Manual
For Remote Control

AutoWave

**Portable solution to measure,
simulate and analyse
Battery Supply Voltage Variation**

Table of contents

1 Interfaces

1.1 Ethernet

10/100Base-T interface
10Mbit/sec or 100Mbit/sec
Ethernet Address selectable (default: 10.0.0.2)
Ethernet Gateway selectable (default: 10.0.0.1)
Ethernet Net mask selectable (default: 255.0.0.0)

1.1.1 Transmission Control Protocol (TCP)

TCP Port: 15000

1.1.2 FTP

FTP Port: 21
Username: guest
Password: no password

1.2 Parallel IEEE 488 interface

- Addresses 1 - 30 selectable
- Command: (SH1, AH1, T4, L2, SR1, RL2, PP1, DC0, DT0, C0, E1)
- Connector and pin layout as per IEEE - 488 - 1975
- 24-pin Amphenol connector
- 8 ground pins

1.3 Timing

- It is recommended to use a minimum delay of 250ms between two commands

1.4 Firmware

These commands are implemented in Firmware version 8.03.02 or higher

2 Parameters

	Name	Min – Max	Step	Unit	Delivery value
Polarity	**Pol.**	0: UNIPOLAR 1: BIPOLAR	-	-	0, 1
Input Voltage DC Source	**InDC**	1 - 10	1	V	1 - 10
Output Voltage DC Source	**OutDC**	1 - 999	1	V	1 - 999
Measuring Input Voltage	**MeasIn**	5, 10, 20, 50, 100	-	V	5, 10, 20, 50, 100
Filename Segments	**SegFile**	*.dsg, *.tsg	-	-	*.dsg, *.tsg
Filename Points	**PntFile**	*.dpt, *.tpt	-	-	*.dpt, *.tpt
Filename Record	**RecFile**	*.rec, *.trc	-	-	*.rec, *.trc
Filename PFM200N	**SwitchFile**	*.dsw, *.tsw	-	-	*.dsw, *.tsw
Events	**Evnt**	0: File Events, -1: endless, 1 - 9'999'999	1	-	-1, 0, 1 - 9'999'999
ON /OFF	**ON/OFF**	ON, OFF	-	-	ON, OFF
Voltage	**Voltage**	-100 - +100		V	-100.0 - +100.0 (float)
Pathname	**Path**	-	-	-	Pathname
Filename	**File**	-	-	-	Filename
DUT Monitor Action	**Action**	Disable, Notify, Stop	-	-	0, 1, 3
Triggers	**TrigGen**	Off Manual @ start Trigger In @ start Automatic Manual @ event Trigger In @ event Manual @ iteration Trigger In @ iteration	-	-	0 1 2 3 4 5 6 7
	TrigOutx	Off Start Stop Event Break Iteration	-	-	0 1 2 3 4 5
	TrigInx	Off On	-	-	0 1
Directory Pathname	**DirPath**	Download Dir. Record Dir. Upgrade Dir. Log Files Dir.			DOWD, RECD, UPGD, LOGD
Date	**Timestamp**	Unix time, number of seconds since 00:00:00 UTC on January 1, 1970	1	s	0 – 2147483647

3 Commands

COMMUNICATION		
Command	**Syntax**	**Description**
Identification	*IDN?	The identification code includes the model name, the coding of hardware options, and the version of the firmware's. *Answer: <manufacturer>,<model>, <0>,<Firmware level>, <Outputs>, <Inputs>* *IDN:EM TEST, AutoWave, 0, 5.06.02, 4, 2
Reset	*RST	Stops the communication
Go to local	*GTL	Stops a running test and returns to local mode
Echo	*ECHO:<ON/OFF> *ECHO?	Switch echo on / off Ask for echo state
Reboot	REB	Reboot the machine
License	LCN <key> LCN?	License Answer: <OK> / <ERR>
Protocol	*PRCL:<ON/OFF> *PRCL?	Switch protocol on / off Ask for protocol state

TEST SETUP				
Command			**Syntax**	**Description**
Range	RANG	OUT1	RANG:OUT1 <Pol,InDC,OutDC>	Sets the In/Output range of the DC Source Gain of the source is calculated with the value of OutDC/InDC
		OUT2	RANG:OUT2 <Pol,InDC,OutDC>	
		OUT3	RANG:OUT3 <Pol,InDC,OutDC>	
		OUT4	RANG:OUT4 <Pol,InDC,OutDC>	
		IN1	RANG:IN1 < MeasIn>	
		IN2	RANG:IN2 < MeasIn>	

Mode	MOD	GEN	MOD:GEN
			      REC
			      GNRC
				Set to Mode Generator Set to Mode Recorder Set to Mode Gen. & Rec.

Source	SOUR	SEGM	SOUR:SEGM <SegFile>	Select the play file
		POIN	SOUR:POIN <PntFile>	
		POIN	SOUR:POIN <RecFile>	
Events	EVNT		EVNT <Evnt>	Set the number of events
Set Voltage	VSET	OUT1-4	VSET:OUT1 <Voltage>	Set the output voltage
Set Offset	VOFS	OUT1-4	VOFS:OUT1 <Voltage>	Set the output offset
Trigger	TRIG	GEN	TRIG:GEN <TrigGen>	Set the start trigger (play)
		OUT1-2	TRIG:OUT1 <TrigOutx> TRIG:OUT2 <TrigOutx>	Set the "trigger OUTx" property
		IN2	TRIG:IN2 <TrigInx>	Set the "trigger IN2" property

TEST				
Command			**Syntax**	**Description**
START	STAR		STAR	Start
STOP	STOP		STOP	Stop
BREAK	BREA		BREA	Break
DUT Monitor	DUTM	IN1, IN2	DUTM:IN1 <Action>	Set the DUT Monitor mode
	DUTM?	IN1, IN2	DUTM?:IN1	Ask the DUT Monitor mode

Not classified			
Command		**Syntax**	**Description**
DISPLAY	DISP	DISP <string>	Display a 40 characters long string (lowest line)
DATE	DAT	DAT <timestamp>	Set the date
	DAT?	DAT?	Ask for the date (returns the actual timestamp)

FILES			
Command		**Syntax**	**Description**
SIZE	SIZ?	SIZ? <filePath>	Ask for file size
TRANSMIT	TRFL	TRFL <filePath>	Initialise a file download. (not sending the file) Return ERR if the file already exists on target.
	TRFL?	TRFL? <filePath>	Initialise a file upload. (not loading the file) Return ERR if the file doesn't exist on target
DELETE	DEL	DEL <filePath>	Delete a file on target. Return ERR if the file doesn't exist
DIR?	DIR?	DIR? <dirPath>	Get the absolute paths of default directory or the content of the give directory path
CHECK	CKFL?	CKFL? <filePath>	Check if file exists on target (ex.: after download)
	CKLF?	CKLF? <FileName>	Ask for duration, channels, events, trigger and master channel of a test file
	CKFD?	CKFD? <FileName>	Ask for total duration, events of a test file
	CKHD?	CKHD? <filePath.dpt>	Save header from < filePath.dpt> under </home/guest/LogFiles/header.hpt> (point file only)
FLNM?	FLNM?	FLNM? DUTM	Get the file path of the DUT Events log file
		FLNM? ERR	Get the file path of process errors log file

Files parameters	Description	Example
<filePath>	Absolute file path	/home/guest/DowFiles/SineTest.dsg
<dirPath>	Default directory name	DOWD: Test file directory RECD: record file directory UPGD: upgrade file directory LOGD: log files directory
	Absolute directory path	/home/guest/DowFiles/
<FileName>	Name of test file	SineTest.dsg

*Note: Files commands gives only information about the files, they don't transfer the files!
    To send or upload files to (from) the device a software (ex. Autowave.control or FTP client) or
    an USB stick must be used.

STATE				
Command			**Syntax**	**Description**
Test	STAT?	TEST	STAT? TEST	State of all channels
			answer: <testval>	
Input	STAT?	IN1-2	STAT? IN1	State of a chosen input
			answer: <inval>	
Output	STAT?	OUT1-4	STAT? OUT1	State of a chosen output
			answer: <outval>	
System	STAT?	SYST	STAT? SYST	System Versions
			answer: <sysval>	
Battery	STAT?	BATT	STAT? BATT	Battery state
			answer: <battval>	
MAC	STAT?	MAC	STAT? MAC	MAC Address
			Answer: <macval>	
DUT monitor	STAT?	DUTM	STAT? DUTM	DUT Monitors
			Answer: <dutval>	
Error	STAT?	ERR	STAT? ERR	Get error code /cleared after read
			answer: <errval>	
DUT monitor in	STAT:DUTM:	IN1-2?	*STAT:DUTM:IN1?*	Get DUT Monitor level
			Answer:<dutlevel>	
DLTM	STAT?	DLTM	*STAT? DLTM*	Get the minimal latency time between segments, points and iterations
			Answer:<segments>, <points>,<iterations>	

4 Feedback Messages

Message	Description	
OK	The command has been accepted and will be executed	
ERR	The command is not a valid command	
testval	*Out 1 <statval>,* *Out 2 <statval>,* *Out 3 <statval>,* *Out 4 <statval>* *In 1 <statval>* *In 2 <statval>* *Dut <dutstat>*	State Test Value STAT TEST:2,0,0,2,3,4,0
inval	*In <statval>,* *Dut <dutstat>,* *Time <time>*	State In Value STAT IN1:2,0,0.02
outval	*Out <statval>,* *Dut <dutstat>,* *Iteration Total,* *Iteration Current,* *Event,* *SegNr,* *Time <time>,* *Test time*	State Out Value STAT OUT1:6,0,1,1,0,2,0.28,4.35
sysval	*HW AutoWave,* *FW AutoWave,* *NAME FB,* *HW Version FB,* *FW Version FB,* *HW DSP,* *FW DSP,* *SN DSP,* *Calibration Date,* *FB Unique ID*	System Value SYST:FWV_AW,1.20t55;NAME_FB,AUTOWAVE_FRAME BOARD;HWV_FB,101039- 2;FWV_FB,0.53a01;HWV_DSP,101066- 0;FWV_DSP,1.07.00;SN_DSP,0000000;CAL,25072006;UI D_FB,00:00:00:00:00:5E
statval	*0: stopped* *1: ready* *2: started* *3: fail* *4: fast* *5: DSP not ok* *6: break* *7: not ready* *8: finished* *9: iterate* *10: undefined* *11: writetofile* *13: file processing*	Status Value
battval	*0: nc* *1: ok* *2: low* *3: empty*	Current battery state
dutstat	*0: no dut monitor event* *1: dut monitor event occurred*	DUT Monitor Status
dutval	*0: nothing* *1: notify* *3: stop*	DUT Monitor Value STAT DUTM:1
dutlevel	*0 : inactive* *1 : active*	

Message	Description	
errval	*0: No Error* *1: Internal Error* *2: Disk Space* *3: Record Time* *4: Source Polarity* *5: Record sample rate to high* *6: Number of channels* *7: Scale factor* *8: Sample rate* *9: Send Sequence to DSP* *10: Acquiring Rate* *11: Calibration Data* *12: DUT Monitor* *13: Play file name* *17: Memory* *18: Firmware not able to play* *21: Power supply is off (VDS 200Q)* *22: Power supply mismatch (VDS 200Q)* *23: File error* *24: File reading error* *26: File processing error* *27: Not supported segment* *28: SegmentTrigger not supported* *29: PointsTrigger not supported* *30: OutTrigger configuration conflict* *31: Unsupported OutTrigger configuration* *33: Segment checking fails* *38: DSP output is in overflow* *50: Module error* *51: Module update in progress* *52: Can't play with module*	Error Value
macval	MAC Address STAT MAC: 00:E0:4B:10:F7:FB	
Time	Time in seconds	

5 Protocol

The communication between the host computer and the AutoWave could be more secure by implementing a protocol.

The protocol could be switched ON/OFF by the command " *PRCL:<ON/OFF> " At switch on of equipment the protocol is OFF.

All commands with first character * has no protocol.

For any request a response should come within a preset time (i.e. should be less than 300 ms, which is normally the timeout for a disconnection detection).

Answer can be one of the following:

Simple answers (when no decoration is expected):

- ACK: acknowledge: command is understood and treated.
- NAK: not acknowledge: command is not understood or checksum is wrong.
- NOTREADY: command cannot be accepted (various reasons: busy with another command, ...)
- BUSY: command is understood, but treatment is (already) in progress).

Decorated answers:

- A decorated response that is always equivalent to an ACK.

If a BUSY answer comes, the remote caller is expected to send again the previous message (the called device cannot spontaneously answer when the treatment of a command is achieved. It is only expected to send an answer when asked.)

If the remote caller sends a new command while a previous is still in treatment, then the caller will be notified with a NOTREADY (this command was not the expected one) and the current treated command will be flushed as soon as possible. (Remark: any further call will return NOTREADY until the previous command is effectively flushed.)

5.1 Message format
The message starts with a control mark STX followed by the command. At least the control mark ETX and the checksum

	STX	Command	ETX	CS
Characters	1	X	1	1

Command: The characters are IBM-PC characters from 20H to FFH.
CS: Checksum. For checksum value less than or equal to 1FH, 20H must be added.

5.1.1   Control element of the message:
The control marks in the messages are special characters as follows:
(ASCII character from 00H to 1FH)

Elements		Hex-code	Comment
STX	Start of TeXt	02H	Begin Calc. Checksum.
ETX	End of TeXt	03H	End Calc. Checksum.
ACK	ACKnowledge	06H	Command is understood and treated
NACK	Negative ACKnowledge	15H	command is not understood or checksum is wrong
BUSY	Busy	19H	command is understood, but treatment is (already) in progress
NOTREADY	Not ready	16H	command can not be accepted (various reasons: busy with another command, ...)

Rem: BUSY uses the regular End of Medium (EM) character control, NOTREADY uses the regular Synchronous Idle (SYN) character control.

5.1.2   Calculation of Checksum

The checksum will be calculated by adding the ASCII codes between the STX and ETX control and appends to the end of the message.
If the checksum is less or equal to 0x20, 0x20 is added again. Thus ensures that the checksum is not interpreted as control character.

STAT? PSRC	Command		Checksum	
	Decimal	Hex	Decimal	Hex
S	83	0x53	83	0x53
T	84	0x54	167	0xA7
A	65	0x41	232	0xE8
T	84	0x54	316	0x13C
?	63	0x3F	379	0x17B
	32	0x20	411	0x19B
P	80	0x50	491	0x1EB
S	83	0x53	574	0x23E
R	82	0x52	656	0x290
C	67	0x43	723	0x2D3
0x00FF & Checksum			211	0xD3

LCN?	Command		Checksum	
	Decimal	Hex	Decimal	Hex
L	76	0x4C	76	0x4C
C	67	0x43	143	0x8F
N	78	0x4E	221	0xDD
?	63	0x3F	284	0x11C
0x00FF & Checksum			28	0x1C
Checksum < 0x20			60	0x3C

STX	Command				ETX	CS
0x02	0x4C	0x43	0x4E	0x3F	0x03	0x3C

5.1.3   Example of message

STX	STAT? PSRC										ETX	CS
0x02	0x53	0x54	0x41	0x54	0x3f	0x20	0x50	0x53	0x52	0x43	0x03	0xD3

STX	LCN?				ETX	CS
0x02	0x4C	0x43	0x4E	0x3F	0x03	0x3C

5.1.4   Example of answers

Remote: *<STX>*CKSR? file.dsg*<ETX><CS>*
Answer sample 1: *<STX>*CKSR file.dsg: 300, 20000, 20000, 0.102400;*<ETX><CS>*
Answer sample 2: *<STX>*CKSR file.dsg: ERR;*<ETX><CS>*
Answer sample 3: *<BUSY>*
Answer sample 4: *<NOTREADY>*
Answer sample 5: *<NAK>*

6 Examples

6.1 *Initialization*

	Command	Answer
Read Identification	*IDN?	*IDN:EM TEST, AutoWave, 0, 5.09.00, 4, 2
Switch echo on	*ECHO:ON	*ECHO ON:OK
Switch protocol on	*PRCL ON	*PRCL ON:OK
Read System version	STAT? SYST	STAT SYST: FWV_AW,5.09.00; NAME_FB,AUTOWAVE_FRAMEBOARD; HWV_FB,101039-2; FWV_FB,0.60a01; HWV_DSP,101066-0; FWV_DSP,3.31.00; SN_DSP,0000000; CAL,01012003; UID_FB,00:00:00:00:00:5E
Read MAC address	STAT? MAC	STAT MAC: 00:E0:4B:25:AA:F2
Get the minimal latency time	STAT? DLTM	STAT DLTM: 0.000000, 0.180000, 0.070000
Sets the In/Output range of the DC Source	RANG OUT1-4 ,0,10,100	RANG OUT1-4,0,10,100
Ask for available modules	GTMD?	GTMD:<Empty if no module connected>
Set the output voltage	VOFS:OUT1-4 0	VOFS:OUT1-4 0
Set the output offset	VSET:OUT1-4 13.5	VSET:OUT1-4 13.5
License check	LCN?	LCN:xxxxx-xxxxx-xxxxx-xxxxxxxxxxx

6.2 *Start a test file*

	Command	Answer
Read download path	DIR? DOWD	DIR DOWD:/home/guest/DowFiles
Initialize transfer	TRFL home/guest/DowFiles/SineTest.dsg	TRFL /home/guest/DowFiles/SineTest.dsg:OK
[Send the file]	No command: Send the file to download path with a FTP client, or use an USB stick or use the download function of the autowave.control software.	
Set mode to Generate	MOD GEN	MOD GEN
Select file to generate	SOUR SEGM SineTest.dsg	SOUR SEGM SineTest.dsg
Start	STAR	STAR
Read status	STAT? OUT1	STAT OUT1:13,0,0,0,0,0,0,0.00,-1
	STAT? OUT1	STAT OUT1:2,0,1,1,0,0,9.94,0.06,-1
	STAT? OUT1	STAT OUT1:8,0,1,1,0,0,0.00,10.00,-1

* The file *SineTest.dsg* is generated by the autowave.control software.

To stop the generator

	Command	Answer
Start the test	See above	
Read status	STAT? OUT1	STAT OUT1:2,0,1,1,0,0,9.94,0.06,-1
Stop the test	STOP	STOP
Reset the output offset	VSET:OUT1-4 13.5	VSET:OUT1-4 13.5

7 Modules commands

7.1 Modules Identification and Status

Ask available modules	GTMD?	GTMD? *answer: <id>,<id>,...*	Ask for available modules (id = address of module)
Ask upgrade progress	UPGD: STAT?	MODL:UPGD:STAT? *answer: <id>,<model>,<FWV>,<% of progress>*	Used in case of "STAT? ERR 51" module update in progress
Ask module identification	IDN?	MODL:IDN? <id> *answer: <id>,<manufacturer>,<model>,<0>,<firmware version>,<type>[,<othersinfo>]*	Ask for module identification *<othersinfo>* is specific to module
Ask module system	SYST?	MODL:SYST? <id> *answer: <id>,<name>,<fwv>,<hwv>,<uid>,<blv>*	Ask for module system details
Status	STAT?	MODL:STAT? <id> *answer: <id>,<modlstatus>*	Ask for the module status
Error	ERR?	MODL:ERR? <id> *answer: <id>,<modlerror>[,<errorinfo>]*	Ask for the module error, *modlerror* and *errorinfo* are specific to module
	RST	MODL:ERR:RST <id>	Reset the last module error
Limits	LIM?	MODL:LIM? <id> *answer: <id>,<limits>*	 *<limits>* is specific to module

Parameter	Name	Value / Min-Max	Comment
Identifier	id	050100 : default for AMP 200N 060100: default for PFM 200N 070100: default for VDS 200Q/R 080100: default for SNG 200P	Address of modules In case of mutli-module (PFM or VDS) the tow last digits are used for module index.
System	name	Name of module	
	fwv	Firmware version	
	hwv	Hardware version	
	uid	Unique identifier	
	blv	Bootloader version	
Module status	modlstatus	0 : Ready 1 : Module disconnected 2 : Module error 3 : test ON (button Off)	4 : Wait for Error Acquit 5 : Restarting 6 : Busy 10: Undefined

7.2 Specific for AMP 200Nx

Parameter	Name	Value / Min-Max	Unit	Comment
Other info	othersinfo	*<Has Measure>,<Amplifier type>,<Amplifier FWV>,<has DC mode>*		
Error	modlerror	0 : No Error 1 : Busy (1) 2 : Test On State (1) 3 : Fail (2) 4 : Over temperature (3) 5 : Overload (3) 6 : Safety Loop (3) 7 : Master Absent (3)		(1) Already defined in Module Status (2) Need a module hard reset (3) Module restart automatically after command MODL:ERR:RST
	errorinfo	*<powerdisp>,<temp>*		
Measure option	Has Measure	0 : No measure option 1 : Measure option installed		
Amplifier type	Amplifier type	<Power in W>.<Revision>		Ex. 800.3
Amplifier FWV	Amplifier FWV	Firmware version of amplifier		
DC mode option	has DC mode	0 : No DC mode 1 : DC mode option installed		
Power dissipation	powerdisp		W	

Temperature	temp			°C	
Limits	limits	*<fmin>,<fmax>,<sgout Vmin>,<sgout Vmax>,<2W Vmin>,<2W Vmax>,<2W Imin>,<2W Imax>*			f: device frequency [Hz] sgout V: signal out voltage [V] 2W V: 2wire/coax out voltage [V] 2W I: 2wire/coax out current [A]

Module AMP 200Nx Setup

Range	RANG	MODL:RANG <id>,<moduleOut>,<pol>,<+Vin>,<+Vout>	Set the range of module output
Input setup	SETUP	MODL:SETUP:IN1 <id>,<masterOut> MODL:SETUP:IN2 <id>,<masterOut>	
DC source mode	DC	MODL:SETUP:DC <id>,<OnOff>	Set DC source mode On or Off Usable only if DC mode option is installed
	DC?	MODL:SETUP:DC? <id> *answer: <id>,<OnOff>*	
Frequency range	EXRNG	MODL:SETUP:EXRNG <id>	Set DDS frequency max. to 500kHz

Parameter	Name	Value / Min-Max		Unit	Comment
Polarity	pol	0 : Unipolar 1 : Bipolar			
In / out voltage	+Vin / +Vout			V	Positive max values
Master output	masterOUT	-1 : none 0 : CH1 1 : CH2	2 : CH3 3 : CH4		
DC source mode On or OFF	OnOff	0 : OFF 1 : ON			

AMP 200Nx Signal output setup

Subset	Signal	SGNL:	
Signal path	PATH	MODL:SGNL:PATH <id>,<in1out>,<in2out>,<DDSout>	Set the signal path
	PATH?	MODL:SGNL:PATH? <id> *answer: <id>,<in1out>,<in2out>,<DDSout>*	Ask for the signal path
Source Switch AMP 200N2 only	SRCE	MODL:SGNL:SRCE <id>,<OnOff>	Set the Source Switch state
	SRCE?	MODL:SGNL:SRCE? <id> *answer: <id>,<OnOff>*	Ask for the Source Switch state
Voltage range	VRNG	MODL:SGNL:VRNG <id>,<vrange>	
Amplifier range	LFAR	MODL:SGNL:LFAR <id>,<lfarange>	Set LFA range
	LFAR?	MODL:SGNL:LFAR? <id> *answer: <id>,<lfarange>*	Ask for LFA range

Parameter	Name	Value / Min-Max		Unit	Comment
Module output	in1out / in2out / DDSout	0 : None 1 : Signal Out	2 : 2Wire 3 : Coaxial		
Voltage range	vrange	0 .. Vmax		Vp	(float)
Amplifier range	lfarange	0 : Low range 1 : High range 2 : Middle range			

AMP 200Nx Signal

Signal setting	DATA	MODL:SGNL:DATA <id>,<sigValues>	Set the signal values
Signal offset	OFST	MODL:SGNL:OFST <id>,<level>,<rampfactor>	Set the signal offset
	OFST?	MODL:SGNL:OFST? <id> *answer: <id>,<level>*	Ask for the signal offset
Limits	LIM?	MODL:SGNL:LIM[:ALL]? <id>	Fmin,Fmax,Fstp,Vmin,Vmax,Vstp, dBmin,dBmax,dBstp,Imin,Imax,Istp
Signal start	STAR	MODL:SGNL:STAR <id>	
Signal stop	STOP	MODL:SGNL:STOP <id>,<end>	

Signal status	STAT?	MODL:SGNL:STAT? <id> *answer: <id>,<sigstatus>,<dutstatus>,* *<powerdisp>,<currstresttime>,<elapstottime>*	Ask for the Signal Status

Parameter	Name	Value / Min-Max	Unit	Comment
Signal Values	sigValues	<frequency>,<amplitude>,<unit>, <dwelltime>,<breaktime>,<rampfactor>		
	frequency	0 ... 250000 [500000]	Hz	
	amplitude	0 ...10.0	Vp	
		-60 ... +40	dB	
	unit	V , dB		
	dwelltime	0.1 … 9999	s	
	breaktime	0 ... 60	s	
	rampfactor	<= 0 : No ramp 1.. 1000000000	uVp/ms	
Signal stop state	end	0 : Stop 1 : maintains signal		
Signal Status	sigstatus	0 : Stopped 4 : Maintained 1 : Started 5 : Fail 2 : Broken 6 : Working 3 : Finished 10 : Undefined		
DUT Monitor Status	*dutstatus*	0 : No DUT Monitor event 1 : DUT Monitor event occurred		
Rest Time	*currstresttime*		s	
Total Time	*elapstottime*		s	

AMP 200Nx Measure

Subset	Measure	MEAS:	
Measure Source	SRCE	MODL:MEAS:SRCE <id>,<measIn>	Set the Measure Source
	SRCE?	MODL:MEAS:SRCE? <id> *answer: <id>,<measIn>*	Ask for the Measure source
Read Measure	READ?	MODL:MEAS:READ? <id>[,<frequency>] *answer: <id>,<frequency>,<value>,<unit>*	If *<frequency>* isn't specified, use signal frequency

Parameter	Name	Value / Min-Max	Unit	Comment
Measure input	measIn	1 : Voltage 2 : Current Clamp		
Measure Values	frequency	10 – 250000	Hz	
	value		'V'	

AMP 200Nx Parameters

Subset	Param	PARM	
Power dissipation	POWD	MODL:PARM:POWD? <id> *answer: <id>,<value>*	
Temperature	TEMP	MODL:PARM:TEMP? <id> *answer: <id>,<value>*	

AMP 200Nx Calibration

Subset	Calib	CAL	
Calibration status	STAT?	MODL:CAL:STAT? <id> *answer: <id>,<Status>*	0 : Error (not calibrated) 1 : Calibration OK

7.3   Specific for PFM 200Nx

Parameter	Name	Value / Min-Max	Unit	Comment
Other info	othersinfo	*<has idle setting>*,<nb slaves>		
Error	modlerror	0 : No Error 1 : Busy (1) 2 : Test ON (button Off) (1) 3 : Over temperature (3) 4 : Overload (3) 5 : Memory full 6 : Segment not OK (4) 7 : OverRun error (3) 8 : Hard error (5) 9 : Sequence error (3) 10 : ReversOverCurrent (3) 11 : OverVoltage 50 : Other error (2)		(1) Already defined in Module Status (2) Need a module hard reset (3) Module restart automatically after command *MODL:ERR:RST* (4) Segment is not compatible with switch setting (5) Internal Hardware error, need EMTEST service.
	errorinfo	*Void for PFM200*		
Limits	limits	*<power Vmax>,<power Imax>,* *<data Vmax>,<data Imax>,* *<off time min>,<on time min>,* *<cycle time min>,<safe time min>*		Vmax in Volts Imax in Amps Time min in µs
Idle setting	has idle setting	0 : No idle setting (switch closed with TestON) 1 : Idle state can be defined		
Number of modules	nb slaves	In case of Multi-PFM this number indicate how many PFM 200N are connected to the AutoWave. (only for "master PFM" with ID 060100)		

Module PFM 200Nx Setup

Subset	Setup	SETUP:	
Idle	IDLE	MODL:SETUP:IDLE <id>,<DataLines>,<PowerLines>	
Parallel mode	PARA	MODL:SETUP:PARA <id>,<OnOff>	Set up the parallel mode (only for PFM 200N100.1 and N200)
	PARA?	MODL:SETUP:PARA? <id> answer: <id>,< devMode >	
Test ON button	PBTN	MODL:SETUP:PBTN <id>,<OnOff>	

Parameter	Name	Value / Min-Max	Unit	Comment
Idle status	status	0 : Switch open 1 : Switch closed		Set the idle state for all switch

7.4   Specific for VDS 200Qx / Rx

Parameter	Name	Value / Min-Max	Unit	Comment
Status	othersinfo	<nb slaves>		
Error	modlerror	0 : No Error 1 : Busy 2 : Test ON (button Off) 3 : Over temperature 4 : Over voltage 5 : Current limitation (Info) 6 : Error power fail 7 : Error safety fail 8 : Segment Error 9 : Power source not started 10 : Error amplifier not detected 11 : Error amplifier power supply 20 : Other error		Already defined in Module Status Need a module hard reset
	errorinfo	*Void for VDS 200Q*		
Limits	limits	*<Vmin>,<Vmax>,<Imax>,<Ipeak>,* *<peak Time>,<fmax>*		V in Volts, I in Amps, f in Hz, time in ms
Number of modules	nb slaves	In case of Multi-VDS this number indicate how many VDS 200Q are connected to the AutoWave. (only for "master VDS" with ID 070100)		

Module VDS 200Qx / Rx Capability

Subset	Capability	CAP:	
Voltage range	VRNG?	MODL:CAP:VRNG? <id> *answer: <id>,<available ranges>*	
Amplifier gain	GAIN?	MODL:CAP:GAIN? <id> *answer: <id>,<available gains>*	Capabilities are detailed below for each device.
Frequency Compensation	FCMP?	MODL:CAP:FCMP? <id> *answer: <id>,<available compensations>*	
Current limiter	IMAX?	MODL:CAP:IMAX? <id> *answer: <id>,< available current limit mode>*	

Information: Capability for each device.

- VDS 200Q25, Q50, Q100 , Q150 , Q200 (and .1):
  Voltage range: 1 = low range (Vmax = 30V)
                            2 = full range (Vmax = 60/80V)
  Amplifier gain: 1 = low gain (x1)
                            2 = High gain (x7)
  Current limiter mode: 0 = disable (current limitation is done by the hardware)
                            1 = peak OFF (no inrush current)
                            2 = Icontrol (inrush of 3x programmed current limit for 200ms)
                            3 = Imax (inrush of 3x maximum current of device for 200ms)
  Frequency Compensation: 1 = standard (bw ≈ 40kHz)
                            2 = capacitive (bw ≈ 3kHz)
                            3 = high frequency (bw ≈ 150/250kHz)

- VDS 200Q10:
  Voltage range: 1 = 2 = fix to full range (Vmax = 60V)
  Amplifier gain: 1 = low gain (x1)
                            2 = High gain (x7)
  Current limiter mode: 1 = fix to peak OFF (no inrush current)
  Frequency Compensation: 1 = standard (bw ≈ 40kHz)
                            2 = capacitive (bw ≈ 3kHz)
                            3 = high frequency (bw ≈ 180kHz)

- VDS200Qx.2:
  Voltage range: 1 = fix
  Amplifier gain: 1 = low gain (x4)
                            2 = High gain (x8)
  Current limiter mode: 0 = disable (current limitation is done by the hardware)
                            1 = peak OFF (no inrush current)
                            2 = 3*I (inrush of 3x programmed current limit for 200ms)
                            3 = 3*Imax (inrush of 3x maximum current of device for 200ms)
  Frequency Compensation: 1 = standard (bw ≈ 40kHz)
                            2 = capacitive (bw ≈ 3kHz)
                            3 = high frequency (bw ≈ 150/250kHz)

- VDS 200Rx:
  Voltage range: 0 = full range only [0V .. 60V]
  Amplifier gain: 0 = gain fix (x8)
  Current limiter mode: 0 = inrush current fix = 2 x max. current of the device
  Frequency Compensation: 0 = no frequency compensation (bw: -3dB @ 180kHz)

Module VDS 200Qx / Rx Setup

Subset	Setup	SETUP:	
Device mode	MOD	MODL:SETUP:MOD <id>,<devMode>	
	MOD?	MODL:SETUP:MOD? <id> *answer: <id>,< devMode >*	
Input setup	IN	MODL:SETUP:IN1 <id>,<masterOut>	
Source setup	SRCE	MODL:SETUP:SRCE<id>,<vRange>,<gain>,<iLimitMode>,<fComp>	Setup the source parameters
	SRCE?	MODL:SETUP:SRCE? <id> *answer: <id>,<vRange>,<gain>,<iLimitMode>,<fComp>*	*VDS 200Qx Only*

Current limit	CURRENT	MODL:SETUP:CURRENT <id>,<ImaxValue>	
Voltage limit	VLIM	MODL:SETUP:VLIM <id>,<VmaxPos>,<VmaxNeg>	*VDS 200Qx.2 Only*
	VLIM?	MODL:SETUP:VLIM? <id> *answer: <id>,< VmaxPos>,<VmaxNeg>,<VlimLock>*	
Output Impedance	OIMP	MODL:SETUP:OIMP <id>,<ImpValue>	*VDS 200Qx.2 Only*
	OIMP?	MODL:SETUP:OIMP? <id> *answer: <id>,< ImpValue>*	
Parallel mode	PARA	MODL:SETUP:PARA <id>,<OnOff>	Set up the parallel mode *VDS 200Qx.2 Only*
	PARA?	MODL:SETUP:PARA? <id> answer: <id>,< devMode >	

Parameter	Name	Value / Min-Max	Unit	Comment
Device mode	devMode	0: FrameBus Off (VDS stand alone or other master) 1: FrameBus On (AutoWave is master) 2: Running mode (AutoWave is master and signal goes out)		
Master output	masterOUT	-1 : none 2 : CH3 0 : CH1 3 : CH4 1 : CH2	ex.: 2 = Channel 3 of AutoWave connected to Analogue input of VDS	
Output range	vRange	*See §7.4 Module Capability, Information: Capability for each device*		
Amplifier gain	gain			
Current limitation mode	iLimitMode			
Frequency Compensation	fComp			
Current limitation	ImaxValue	0 - Imax	A	
Voltage limitation	VmaxPos VmaxNeg	Pos : 0 – device Vmax Neg : Device Vmin – 0	V	
	VlimLock	0 : Voltage limits not locked 1 : Voltage limits locked		
Output Impedance	ImpValue	OFF(0) / 10 – 200 Step : 10 mΩ	mΩ	OFF = Amplifier impedance

7.5 Specific for SNG 200P

Parameter	Name	Value / Min-Max	Unit	Comment
Other info	othersinfo	*Void for SNG 200P*		
Error	modlerror	0 : No Error 1 : Busy 2 : Test ON (button Off) 6 : Download error 50 : Other error		
	errorinfo	*Void for SNG 200P*		
Limits	limits	*<Vmax>,<off time min>,<on time min>,<cycle time min>,<safe time min>*		Vmax in Volts Time min in µs

Module SNG 200P Sequences

Save sequences	SAV	MODL:SAV <id>,<SequenceID>,<File>

Parameter	Name	Value / Min-Max	Unit	Comment
Sequence ID	SequenceID	1 - 4		
File to save	File	"Name.tsw"		Temporary switched wave Default: SNG_SEQUENCE_X.TSW