3.10 IEC/IEEE-Bus Commands

3.10.1 Generators

3.10.1.1 Selection of Generator

Command	Parameter	Basic unit	Meaning	Section
INSTrument[1][:SELect] equivalent to **INST**rument[1]:**NSEL**ect	***A25*** ***D48*** aias **1** **3**		→ Two-channel analog generator, frequency range: 2 Hz to 21.75 kHz with universal generator 10 Hz to 110 kHz low-distortion generator (UPL-B1 option) → Two-channel digital generator, frequency range: 2 Hz to 21.93 kHz with option UPL-B2 (digital audio I/O) 2 Hz to 43.86 kHz with option UPL-B29 (digital audio 96 kHz) → Analog generator → Digital generator	**2.5.1** **GEN panel** INSTRUMENT → ANALOG → DIGITAL

3.10.1.2 Configuration of Analog Generators

Command	Parameter	Basic unit	Meaning	Section
OUTPut:***SEL****ect***	***OFF*** ***CH1*** ***CH2*** ***CH2I****s1*		→ Generator channels switched off → Only generator channel 1 active → Only generator channel 2 active → Both generator channels active	**2.5.2** **GEN panel** Channel(s) → OFF → 1 → 2 → 2 ≡ 1

Command	Parameter	Basic unit	Meaning	Section
OUTPut:***TYPE***	***BAL**anced* ***UNB**alanced*		→ Balanced output (XLR connector) → Unbalanced output (BNC connector)	**2.5.2** **GEN panel** Output → BAL → UNBAL
OUTPut:**IMP**edance	 ***R10*** ***R200*** ***R150*** *(Query reply. = R200)* ***R600***		Only for OUTPut:TYPE Bal → Output impedance 10 Ω → Output impedance 200 Ω → Output impedance 150 Ω, if the standard generator source impedance was changed from 200 Ω to 150 Ω using Modification Analog Generator UPL-U3 (Order No. 1078.4900.02) → Output impedance 600 Ω	2.5.2 **GEN panel** Impedance → 10 Ω → 200 Ω (→ 150 Ω) → 600 Ω
SOURce:**VOLT**age:**RANG**e:**AUTO**	**ON** **OFF**		Range selection for setting the generator output voltage. → D/A converters operating at full range. The output voltage is set using the output amplifier. Optimum noise and THD values. Any maximum voltage can be entered with command SOUR:VOLT:LIM <nu>, higher voltages are not permissible. → The output amplifier is set to the maximum voltage specified by the next command; higher voltages are not permissible. The current output voltage is attained with the smaller digital values of the D/A converter. Setting the analog hardware is not required for changing the output voltage. Advantage: fast level changes and better transient response.	**2.5.2** **GEN panel** Volt Range → AUTO → FIX
SOURce:**VOLT**age:**LIM**it[:AMPLitude]	**<nu>** 0 to 20 V	V	Output voltage limit for command SOUR:VOLT:RANG:AUTO OFF preventing too high voltages to be entered.	**2.5.2** **GEN panel** For Volt Range = AUTO, Max Volt is displayed, for Volt Range = FIX, a numeric value.

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FREQ**uency:***REF****erence*	**<nu>** 1 MHz to 1 MHz	Hz	Reference frequency	2.5.2 **GEN panel** Ref.Freq
SOURce:**VOLT**age:**REF**erence	**<nu>** 1µV to 1 MV	V	Reference voltage	2.5.2 **GEN panel** Ref.Volt
OUTPut	**ON** **OFF**		→ Switches all outputs on. After an overload of analyzer inputs (input voltage into 300 Ω and 600 Ω above 25 V), the input impedance is automatically switched to 200 kΩ to protect the analyzer input and the generator output is switched off. This command switches the generator on again and measurements can be continued provided the overvoltage is eliminated or the input impedance switched to 200 kΩ (INP:IMP R200K). The overload protection of the analyzer iniputs is valid for analog board versions ≥ 4.00 and software versions ≥ 1.0. → Switches all outputs off including clock lines of digital interfaces. See 2.13 Fast Switch-off of Outputs.	2.13 Taste OUTPUT OFF

3.10.1.3 Configuration of Digital Generators

Command	Parameter	Basic unit	Meaning	Section
SOURce:**DIG**ital:**FEED**	***ADAT****a* ***JITT****er* ***PH****ASe* ***COMM****on*		Use of generator data: → Generator controls the audio content of the output → Generator controls the jitter modulator of the digital interface → Same as JITTer with additional phase offset. → Generator controls common-mode voltage at digital output	2.5.3 **GEN panel** Src Mode → AUDIO DATA → JITTER ONLY → PHASE → COMMON ONLY
SOURce:**DIG**ital:**SYNC**:**DEL**ay	**<nu>**	UI see 2.5.3.1	Setting a phase offset for SOUR:DIG:FEED JPHase	2.5.3.1 **GEN panel** Phase ToRef
OUTPut:***SEL****ect*	***OFF*** ***CH1*** ***CH2*** ***CH2I****s1*		→ Generator channels off → Only generator channel 1 active → Only generator channel 2 active → Both generator channels active and in phase	2.5.3 **GEN panel** Channel(s) → OFF → 1 → 2 → 2 ≡ 1
OUTPut:**DIG**ital:**UNB**alanced:**FEED**	***AOUT****put* ***AINP****ut*		→ Same channel present at BNC and XLR connectors → Input signal through-connected and output at BNC connector	2.5.3 **GEN panel** Unbal Out → AUDIO OUT → AUDIO IN
OUTPut:**DIG**ital:**CSIM**ulator	***OFF*** ***SIML****ong*		A 100-m cable of 110-Ω nominal impedance is simulated and cut into the generator output. → Cable simulation switched off → Cable simulation switched on	2.5.3 **GEN panel** Cable Sim → OFF → LONG CABLE

Command	Parameter	Basic unit	Meaning	Section
SOURce:**DIG**ital:**SYNC**:**SOUR**ce	***GCL**ock* ***AINP**ut* ***RINP**ut* ***SINP**ut*		→ The clock is generated in the UPL. Selectable: 32, 44.1 or 48 kHz and 27 to 55 kHz variable. → Generator clock from analyzer input. → Generator clock from rear reference input → Generator clock controlled via rear BNC connector. The mark-to-space ratio can be set with command SOUR:DIG:SYNC:MODE to .	2.5.3 **GEN panel** Sync Out → GEN CLK → AUDIO IN → REF IN → SYNC IN
SOURce:**DIG**ital:**SYNC**:**MODE**	***V50*** ***V60*** ***WCL**ock* ***IWCL**ock* ***F1024***		→ The generator sampling rates of 32, 44.1 and 48 kHz are synchronized to the 50-Hz video repetition rate. → Same as V50, but for 60 Hz (NTSC). → Generator directly synchronized to applied word clock using PLL. → Same as WCLock but with the inverted input used for synchronization. → Synchronization to a "customized clock", eg in the case of DAB	2.5.3 **GEN panel** Sync Mode → VIDEO 50 → VIDEO 60 → WORD CLK → WRD CLK INV → 1024 kHz
OUTPut:**SAMP**le[:FREQuency]:**MODE**	***F32*** ***F44*** ***F48*** ***F88*** ***F96*** ***EXT**ern* ***SYNC**hron* ***VAL**ue*		→ Sampling frequency 32 kHz (only with option UPL-B2 Digital Audio I/O, not with option UPL-B29 Digital Audio 96 kHz) → Sampling frequency 44.1 kHz → Sampling frequency 48 kHz → Sample freq. 88.2 kHz (only with option UPL-B29 Digital Audio 96 kHz in High Rate Mode CONF:DAI HRM) → Sample freq. 96 kHz (only with option UPL-B29 Digital Audio 96 kHz in High Rate Mode CONF:DAI HRM) → External sample frequency. Refer to next command for input values. → Sampling frequency synchronized to analyzer. → Sampling frequency entered with next command.	2.5.3 **GEN panel** Sample Freq → 32 kHz → 44.1 kHz → 48 kHz → 88.2 kHz → 96 kHz → EXTERN → SYNCHRON → VALUE:
OUTPut:***SAMP**le*:**FREQ**uency	**<nu>** 27 kHz to 55 kHz 40 kHz to 106 kHz	Hz	External sample frequency for digital instrument. Option UPL-B2 (Digital Audio I/O) Option UPL-B29 (Digital Audio 96 kHz)	2.5.3 **GEN panel**

Command	Parameter	Basic unit	Meaning	Section
OUTPut:**DIG**ital:**SYNC**:**FEED**	***AIP**ut* ***GCL**ock* ***RINP**ut* ***SPLL***		Specifies the signal to be output at rear BNC connector for synchronization. → Audio input signal output without clock processing. → Output of internal generator clock. → Same as GCLock, but reference input. → Audio input signal output after clock processing with internal PLL.	2.5.3 **GEN panel** Sync Out → AUDIO IN → GEN CLK → REF IN → SYNC PLL
OUTPut:**DIG**ital:**SYNC**:**TYPE**	***WCL**ock* ***BCL**ock*		Specifies the signal type for OUTPut:DIGital:SYNC:FEED ..... . → Sampling frequency → 128 times the sampling frequency	2.5.3 **GEN panel** Type → WORD CLK → BIPHASE CLK
OUTPut:**DIG**ital:**REF**erence:**FEED**	***AINP**ut* ***AINR**eclock* ***AOUT**put* ***RGEN**erator*		Specifies the signal to be output at the Ref-Out connector. → The input is throughconnected. → The input signal is output again; the clock is processed via PLL using the internal clock ("jitter suppression"). → The same signal as on the front panel is output. → Reference generator output. For an output with phase the reference is defined.	2.5.3 **GEN panel** Ref Out → AUDIO IN → AUD IN RCLK → AUDIO OUT → REF GEN
SOURce:**DIG**ital:**REF**erence	***AZER**o* ***AONE***		All data of the reference generator are → 0 → 1	2.5.3 **GEN panel** Data → ALL ZERO → ALL ONE
SOURce:**VOLT**age:**LIM**it[:AMPLitude]	**<nu>** 0 to 1 FS	FS	Voltage limitation (for audio data only)	2.5.3 **GEN panel** Max Volt
SOURce:***FREQ**uency:**REF**erence*	**<nu>** 1 MHz to 1 MHz	Hz	Reference frequency	2.5.3 **GEN panel** Ref.Freq

Command	Parameter	Basic unit	Meaning	Section
SOURce:**Volt**age:***REF****erence***	**<nu>** 10 nFS to 100 Fs	Hz	Reference level	2.5.3 **GEN panel** Ref Volt
OUTPut:***AUD****iobits***	**<n>** 8 to 24		Word length of audio samples in bits.	2.5.3 **GEN panel** Audio Bits
OUTPut:**SIGN**al: **LEV**el	**<nu>**	Vpp	Voltage at Unbal AES output	2.5.3 **GEN panel** Unbal Vpp
OUTPut:**SIGN**al:**BAL**anced**:LEV**el	**<nu>** 0 to 8.5 V		Setting the output voltage of the digital signal at the BAL (XLR) interface. Peak-to-peak voltage upon termination with nominal impedance (110 Ω); without termination the voltage is twice as high. This voltage is always 4 times as high as the voltage at the UNBAL (BNC) interface.	2.5.3 **GEN panel** BAL Vpp

3.10.1.3.1 AES / EBU PROTOCOL Definition

Command	Parameter	Basic unit	Meaning	Section
SOURce:**PROT**ocol	***OFF***		→ If the generated channel status data are of no interest, the undesired menu lines are removed from the generator panel. Channel status data cannot be entered. The last-defined status remains unchanged.	2.5.3.2 **ANA panel** PROTOCOL → PANEL OFF → STATIC → ENHANCED
	STATic		→ Only basic channel status data can be generated (RAW data identical in both channels have to be defined via a file with or without valid CRC) This mode can always be used without any restriction.	
	ENHanced		→ Selectable only with option UPL-B21 (digital audio protocol) fitted. All protocol commands are displayed in the GENERATOR panel where the full scope of protocol data generation can be entered and displayed. Besides the valid CRC, local time code can also be generated, which is reset with generator start and automatically counted up. In this mode the analyzer must also be set to protocol analysis. Therefore, when switching on ENHANCED the following settings are made automatically in the analyzer panel: • INSTRUMENT DIGITAL (INST2 D48) • Meas Mode AUDIO DATA (SENS:DIG:FEED ADAT) • FUNCTION PROTOCOL (SENS:FUNC 'PROT') Conversely, this function is set to OFF as soon as one of the three named analyzer menu lines is changed.	
OUTPut:***VAL****idity*	***CH1A****nd2*		Sets the validity bits in the AES/EBU data stream. → Valid bit for both channels set.	2.5.3.2 **GEN panel** Validity
	NONE		→ Valid bit for none of the channels set	
SOURce:***PROT****ocol:****LCH****annelstatus*	***ZERO***		Specifies how the channel status data for LEFT are to be generated. → All channel status data bits are 0	2.5.3.2 **GEN panel** Ch Sta. L → ZERO → FILE+AES3 → FILE+CRC → FILE
	AES3		→ UPL generates local timecode and CRC. All other channel status data are defined by the file loaded with command MMEMory:LOAD:LPGC **"filename"**.	
	CRC		→ Same as AES3, however local timecode is not generated by UPL but set as a fixed value from the file.	
	RAW		→ Same as AES3, however neither local timecode nor CRC is generated by UPL but set as fixed values from the file.	

Command	Parameter	Basic unit	Meaning	Section
MMEMory:**LOAD:*LPGC***	**"filename"**		Stating a file containing channel status data for LEFT. Preset file type: * ·pgc	2.5.3.2 **GEN panel** Filename
SOURce:***PROT**ocol:**RCH**annelstatus*	**ZERO** **LEQ**ual **AES3** **CRC** **RAW**		Specifies how the channel status data RIGHT are to be generated. → All channel status data bits are 0 → The two sides are identical, all definitions made for left are copied to the right side. The operating mode is defined by Ch. Stat L. → UPL generates local timecode and CRC. All other channel status data are defined by the file loaded with command MMEMory:LOAD:RPGC "filename". → Same as AES3, however local timecode not generated by UPL but set as a fixed value from the file. → Same as AES3, however neither local timecode nor CRC is generated by UPL but set as fixed values from the file.	2.5.3.2 **GEN panel** Ch Stat. R → ZERO → EQUAL L → FILE+AES3 → FILE+CRC → FILE
MMEMory:**LOAD:*RPGC***	**"filename"**		Stating a file containing channel status data for RIGHT. Preset file type: *.prd	2.5.3.2 **GEN panel** Filename
SOURce:***PROT**ocol:**UMOD**e*	**ZERO** **FILE**		Specifies how user data are to be generated. → All user bits are initialized to be 0. → User bits are output according to the definitions in the file loaded with command MEMory:LOAD:PGU "filename".	2.5.3.2 **GEN panel** User Mode → ZERO → FILE DEF
MMEMory:**LOAD:*PGU***	**"filename"**		Stating a file containing USER data Preset data type: *.prd	2.5.3.2 **GEN panel** Filname

3.10.1.3.2 Auxiliary AUX GEN

Command	Parameter	Basic unit	Meaning	Section
SOURce**2**:**FUNC**tion	**OFF** **ANLG**out **COMM**on **JITT**er		→ Auxiliary generator switched off, audio data generated without interference signal, analog outputs switched off (high-impedance). → Audio data generated without interference signal, an analog signal is generated at the analog XLR connectors in addition to the digital signal at the BAL, UNBAL and optical outputs. Frequency and level of the analog signal can be set or swept. → A common-mode interference signal is superimposed on the audio data, the analog outputs are switched off (high-impedance). Frequency and level of the interference signal can be set or swept → A jitter signal is added to the audio signal, the analog outputs are switched off (high-impedance). Jitter frequency and level can be set or swept. Permissible only for digital generator in the Src Mode AUDIO DATA | PHASE (INST D48 with SOUR:DIG:FEED ADAT|PHAS)	**2.5.5** **GEN panel** → OFF → ANALOG OUT → **COMMON MODE** → JITTER
OUTPut**2**:**SEL**ect	***OFF*** ***CH1*** ***CH2*** ***CH2****ls1*		Selection of output channel when the auxiliary generator is used as an analog generator (SOUR2:FUNC ANLG). The low-distortion generator is used, level control is via the output amplifier. → Both channels off → Channel 1 on, channel 2 off → Channel 2 on, channel 1 off → Same signal on both channels	**2.5.5** **GEN panel** Channel(s) → OFF → 1 → 2 → 2 ≡ 1
OUTPut**2**:**TYPE**	**UNB**alanced **BAL**anced		Selection of output channel when the auxiliary generator is used as an analog generator (SOUR2:FUNC ANLG). → An unbalanced signal is generated at the XLR connector; the maximum output level is 10 V. → A balanced signal is generated at the XLR connector, the maximum output level is 20 V. The output impedance can be selected in three steps with the subsequent command.	**2.5.5** **GEN panel** Output → UNBAL → BAL

Command	Parameter	Basic unit	Meaning	Section
OUTPut**2**:**IMP**edance	**R10** **R200** **R600**		Selection of output impedance when the auxiliary generator is used as an analog generator (SOUR2:FUNC ANLG) and OUTP2:TYPE BAL is selected; the output impedance of the unbalanced output is generally 5 Ω. → 10 Ω → 200 Ω → 600 Ω	**2.5.5** **GEN panel** Impedance → 10 Ω → 200 Ω → 600 Ω
SOURce**2**:**SWE**ep ...			The auxiliary generator has its own sweep system which is similar to that of the function generator. 2-dimensional sweep, ie simultaneous frequency and level sweep, is not implemented. **The commands permissible for the auxiliary generator are listed in section** 3.10.1.4.1 Sweep Settings for Auxiliary Generator (AUX GEN).	**2.5.4.2** **GEN-Panel**
SOURce**2**:**FREQ**uency[:CW|FIXed]	**<nu>** 10 Hz to 110 kHz	Hz	For SOUR2:FUNC ANLG: Entry of sinewave frequency of analog signal For SOUR2:FUNC COMM: Entry of common-mode frequency For SOUR2:FUNC JITT: Entry of jitter frequency	**2.5.5** **GEN panel** Depending on AUX GEN: → Anlg Freq → Comm Freq → JittPkFreq
SOURce**2**:**VOLT**age[:LEVel|AMPLitude]	**<nu>** 0 to 7.07 V 0 to 7.07 V 0 to 250 mUI	V V UI	For SOUR2:FUNC ANLG: Entry of sinewave amplitude of analog signal For SOUR2:FUNC COMM: Entry of common-mode amplitude For SOUR2:FUNC JITT: Entry of jitter-peak amplitude	**2.5.5** **GEN panel** Depending on AUX GEN: → Anlg Ampl → Comm Ampl → JittPkAmpl

3.10.1.4 Generator Sweeps

3.10.1.4.1 Sweep Settings for Auxiliary Generator (AUX GEN)

Command	Parameter	Basic unit	Meaning	Section
SOURce**2**:**SWE**ep:**MODE**	**MAN**ual **AUTO**		Auxiliary generator: → Manual sweep trigger → Automatic sweep trigger	**2.5.4.2 Sweeps GEN panel** Sweep Ctrl
SOURce**2**:**SWE**ep:***NEXT****step***	***DWEL****l* ***ASYN****c* ***LIST***		Auxiliary generator: → Sweep trigger at fixed preset time → Sweep triggered when a valid result is obtained → Sweep trigger is time-controlled by interpolated list value Permissible for AUTO SWEEP and AUTO LIST only (SOUR2:SWE:MODE AUTO;:SOUR2:FREQ|VOLT:MODE SWE1|LIST1)	**2.5.4.2 Sweeps GEN panel** Next Step → ANLR SYNC → DWELL VALUE → DWELL FILE
SOURce**2**:**SWE**ep:**DWEL**l	**<nu>** 10 ms to 1000 s	s	Auxiliary generator: Dwell time for each sweep step Permissible for SOUR2:SWE:NEXT DWEL only.	**2.5.4.2 Sweeps GEN panel** Dwell
MMEMory:**LOAD:LIST**	**DWEL2,'filename'** Query: MMEM:LOAD:LIST? DWEL2		Specified file contains dwell times Permissible for SOUR2:SWE:NEXT LIST only	**2.5.4.2 Sweeps GEN panel** Dwell File
SOURce**2**:**FREQ**uency:**MODE**	**CW | FIX**ed **SWE**ep**1** **LIST1**		Auxiliary generator: → Frequency setting by entry using command SOUR2:FREQ <nu> → Frequency setting for X axis via normal sweep → Frequency setting for X axis via list sweep	**2.5.4.2 Sweeps GEN panel** SWEEP CTRL X Axis

Command	Parameter	Basic unit	Meaning	Section
SOURce**2**:**SWE**ep:**FREQ**uency**:SPAC**ing	**LIN**ear **LOG**arithmic		Auxiliary generator: Division of sweep range for - frequency sweep of analog signal (SOUR2:FUNC ANLG) - comon-mode frequency sweep (SOUR2:FUNC COMM) - jitter frequency sweep (SOUR2:FUNC JITT) → linear → logarithmic Permissible for SOUR:FREQ:MODE SWE1 only	**2.5.4.2 Sweeps GEN panel** Spacing → LIN → LOG
SOURce**2**:**FREQ**uency:**STAR**t	**<nu>** 10 Hz to 110 kHz	Hz	Auxiliary generator: Start value for frequency sweep Permissible for SOUR:FREQ:MODE SWE1 only	**2.5.4.2 Sweeps GEN panel** FREQUENCY Start
SOURce**2**:**FREQ**uency:**STOP**	**<nu>** 10 Hz to 110 kHz	Hz	Auxiliary generator: Stop value of frequency sweep Permissible for SOUR:FREQ:MODE SWE1 only	**2.5.4.2 Sweeps GEN panel** FREQUENCY Stop
SOURce**2**:**SWE**ep:**FREQ**uency**:POIN**ts	**<n>** 2 to 1024		Auxiliary generator: Number of sweep points of frequency sweep Permissible for SOUR:FREQ:MODE SWE1 only	**2.5.4.2 Sweeps GEN panel** FREQUENCY Points
SOURce**2**:**SWE**ep:**FREQ**uency**:STEP**	**<nu>** depending on STARt and STOP	Hz	Auxiliary generator: Step width of frequency sweep Permissible for SOUR:FREQ:MODE SWE1 only	**2.5.4.2 Sweeps GEN panel** FREQUENCY Step
MMEMory:**LOAD:LIST**	**FREQ**uency**2**,**'file'** Query MMEM:LOAD:LIST? FREQ2		File containing frequency values Permissible for SOUR2:SWE:MODE AUTO|MAN;:SOUR2:FREQ:MODE LIST1 only	**2.5.4.2 Sweeps GEN panel** FREQ FILE
SOURce**2**:**VOLT**age:**MODE**	**CW | FIX**ed **SWE**ep**1** **LIST1**		Auxiliary generator: → Amplitude setting by entry using command SOUR2:VOLT <nu> → Amplitude setting via normal sweep, amplitude as X axis → Amplitude setting via list sweep, amplitude as X axis	**2.5.4.2 Sweeps GEN panel** SWEEP CTRL X Axis

Command	Parameter	Basic unit	Meaning	Section
SOURce**2**:**SWE**ep:**VOLT**age**:SPAC**ing	**LIN**ear **LOG**arithmic		Auxiliary generator: Division of sweep range for - sinewave amplitude of analog signal (SOUR2:FUNC ANLG) - common-mode amplitude (SOUR2:FUNC COMM) - jitter-peak amplitude (SOUR2:FUNC JITT) → linear → logarithmic Permissible for SOUR2:VOLT:MODE SWE1 only	**2.5.4.2 Sweeps GEN panel** VOLTAGE | AMPL Spacing → LIN → LOG
SOURce**2**:**VOLT**age:**STAR**t	**<nu>** 0 to 7.07 V 0 to 7.07 V 0 to 250 mUI	 V V UI	Auxiliary generator: Start value for amplitude sweep Permissible for SOUR2:VOLT:MODE SWE1 only	**2.5.4.2 Sweeps GEN panel** VOLTAGE | AMPL Start
SOURce**2**:**VOLT**age:**STOP**	**<nu>** 0 to 7.07 V 0 to 7.07 V 0 to 250 mUI	 V V UI	Auxiliary generator: Stop value for amplitude sweep Permissible for SOUR2:VOLT:MODE SWE1 only	**2.5.4.2 Sweeps GEN panel** VOLTAGE | AMPL Stop
SOURce**2**:**SWE**ep:**VOLT**age**:POIN**ts	**<n>** 2 to 1024		Auxiliary generator: Number of sweep points of amplitude sweep Permissible for SOUR2:VOLT:MODE SWE1 only	**2.5.4.2 Sweeps GEN panel** VOLTAGE | AMPL Points
SOURce**2**:**SWE**ep:**VOLT**age**:STEP**	**<nu>** depending on STARt and STOP	V FS	Auxiliary generator: Step width for amplitude sweep Permissible for SOUR2:VOLT:MODE SWE1 only	**2.5.4.2 Sweeps GEN panel** VOLTAGE | AMPL Step
MMEMory:**LOAD:LIST**	**VOLT**age**2,'filename'** Query: MMEM:LOAD:LIST? VOLT2		File containing amplitude values Permissible for SOUR2:SWE:MODE AUTO|MAN;:SOUR2:VOLT:MODE LIST1 only	**2.5.4.2 Sweeps**s **GEN panel** VOLTAGE | AMPL VOLT FILE

3.10.1.4.2 Sweep Settings for Generator Functions SINusoid, STEReo, BURSt, S2Pulse, MDISt, DFD and DC

- With a SINusoid, STEReo or DC sweep the sinusoidal frequency and/or the level is swept.
- With a BURSt and S2Pulse sweep the burst frequency and/or the level is swept, likewise Ontime and/or interval (see next section).
- With a MDISt sweep the upper frequency and/or the total voltage is swept.
- With a DFD sweep the center frequency and/or the total voltage is swept.

See 3.10.1.4.4 Which parameters can be swept?

Command	Parameter	Basic unit	Meaning	Section
SOURce:**SWE**ep:**MODE**	**MAN**ual **AUTO**		→ Manual sweep switching → Automatic sweep switching	**2.5.4.1.3** **GEN panel** Sweep Ctrl
SOURce:**SWE**ep:***NEXT**step*	***DWEL**l* ***ASYN**c* ***LIST***		→ Sweep after a certain (fixed) time has elapsed → Sweep after a valid measured value has been obtained → Sweep after a certain time defined by interpolated list value	**2.5.4.1.3** **GEN panel** Next Step → ANLR SYNC → DWELL VALUE → DWELL FILE
SOURce:**SWE**ep:**DWEL**l	**<nu>** 10 ms to 1000 s	s	Dwell time per sweep	**2.5.4.1.3** **GEN panel** Dwell
MMEMory:**LOAD:LIST**	**DWEL**l**,'filename'** Query: MMEM:LOAD:LIST? DWEL		Specified file contains the dwell times	**2.5.4.1.3** **GEN panel** Dwell File
SOURce:**FREQ**uency:**MODE**	**CW | FIX**ed **SWE**ep1 **SWE**ep**2** **LIST1** **LIST2**		→ Frequency setting via entry → Frequency setting via normal sweep; frequency as X axis → Frequency setting via normal sweep; frequency as Z axis → Frequency setting via list sweep; frequency as X axis → Frequency setting via list sweep; frequency as Z axis	**2.5.4.1.3** **GEN panel** SWEEP CTRL X Axis Z Axis

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FREQ**uency:**STAR**t	**<nu>** Value range determined by instrument or function	Hz	Start value for frequency sweep See 3.10.1.4.4 Which parameters can be swept?	**2.5.4.2** **GEN panel** FREQUENCY → Start
SOURce:**FREQ**uency:**STOP**	**<nu>** Value range determined by instrument or function	Hz	Stop value for frequency sweep	**2.5.4.2** FREQUENCY → Stop
SOURce:**SWE**ep:***FREQ**uency*:**POIN**ts	**<n>** 2 to 1024		For analog instrument Number of sweep points for frequency sweep	**2.5.4.2** **GEN panel** Points
SOURce:**SWE**ep:***FREQ**uency*:**SPAC**ing	 **LIN**ear **LOG**arithmic		Scaling of frequency sweep range → linear → logarithmic	**2.5.4.2** **GEN panel** Spacing
SOURce:**SWE**ep:***FREQ**uency*:**STEP**	**<nu>**	Hz	Step width for frequency sweep	**2.5.4.2** **GEN panel** Step
MMEMory:**LOAD:*LIST***	**FREQ**uency[1] **"filename"** Query: MMEM:LOAD:LIST? FREQ**,**		File containing frequencies	**2.5.4.2** **GEN panel** FREQ FILE
SOURce:**VOLT**age:**MODE**	**CW | FIX**ed **SWE**ep1 **SWE**ep**2** **LIST1** **LIST2**		→ Amplitude setting via entry → Amplitude setting via normal sweep; amplitude as X axis → Amplitude setting via normal sweep; amplitude as Z axis → Amplitude setting via list sweep; amplitude as X axis → Amplitude setting via list sweep; amplitude as Z axis	**2.5.4.2** **GEN panel** SWEEP CTRL X Axis Z Axis
SOURce:**VOLT**age:**STAR**t	**<nu>** Value range determined by instrument or function	 V FS	Start value for amplitude sweep See 3.10.1.4.4 Which parameters can be swept?	**2.5.4.2** **GEN panel** VOLTAGE → Start

Command	Parameter	Basic unit	Meaning	Section
SOURce:**VOLT**age:**STOP**	**<nu>** Value range determined by instrument or function	V FS	Stop value for amplitude sweep	**2.5.4.2** **GEN panel** VOLTAGE → Stop
SOURce:**SWE**ep:***VOLT****age*:**POIN**ts	**<n>** ***2 to 1024***		Number of sweep points for amplitude sweep	**2.5.4.2** **GEN panel** Points
SOURce:**SWE**ep:***VOLT****age*:**SPAC**ing	***LIN****ear* **LOG**arithmic		Scaling of amplitude sweep range → linear → logarithmic	**2.5.4.2** **GEN panel** Spacing → LIN → LOG
SOURce:**SWE**ep:***VOLT****age*:**STEP**	**<nu>** Value range determined by instrument or function	V FS	Step width for amplitude sweep	**2.5.4.2** **GEN panel** Step
MMEMory:**LOAD:LIST**	**VOLT**age**,'filename'** Query: MMEM:LOAD:LIST? VOLT		File containing amplitude values	**2.5.4.2** **GEN panel** VOLT FILE
SOURce:***OFF*:MODE**	**SWE**ep**2 | LIST2**		Switches a Z sweep off which was switched on with one of the following commands. SOURce:FREQuency:MODE SWEep2 **|** LIST2 or SOURce:VOLTage:MODE SWEep2 **|** LIST2 or SOURce:ONTime:MODE SWEep2 **|** LIST2 or SOURce:INTerval:MODE SWEep2 **|** LIST2 SWEep2 and LIST2 are synonyms in this command	**2.5.4.2** **GEN panel** Z Axis → OFF

Note: Max. 2 sweep parameters can be selected not to equal CW (= FIXed). Combining SWEep and LIST is not permissible. Likewise, assignment of the same selection point (eg SWEep1) to different sweep parameters is not permissible; the selection made most recently is valid, the other sweep parameters are set to FIXed.

A normal sweep (or list sweep) is possible only when exactly 1 sweep parameter is set to SWEep1 (or LIST1).
The sweep system is switched off when all sweep parameters are set to CW (=FIXed).
Value range for "STARt", "STOP": values are specified in the functions section.

3.10.1.4.3 Sweep Settings for Generator Functions BURSt and S2Pulse

Sweep settings same as with SINusoid, but for BURSt and S2Pulse **Ontime** and **Interval** may be swept in addition see 3.10.1.4.4 Which parameters can be swept?:

Command	Parameter	Basic unit	Meaning	Section
SOURce:***ONT**ime*:**MODE**	**CW | FIX**ed **SWE**ep**1** **SWE**ep**2** **LIST1** **LIST2**		→ Burst time setting via entry → Burst time setting via normal sweep; burst time as X axis → Burst time setting via normal sweep; burst time as Z axis → Burst time setting via list sweep; burst time as X axis → Burst time setting via list sweep; burst time as Z axis	**2.5.4.2** **GEN panel** SWEEP CTRL X Axis Z Axis
SOURce:***INT**erval*:**MODE**	**CW | FIX**ed **SWE**ep1 **SWE**ep**2** **LIST1** **LIST2**		→ Interval setting via entry → Interval setting via normal sweep; interval as X axis → Interval setting via normal sweep; interval as Z axis → Interval setting via list sweep; interval as X axis → Interval setting via list sweep; interval as Z axis	**2.5.4.2** **GEN panel** SWEEP CTRL X Axis Z Axis
SOURce:***ONT**ime*:**STAR**t	**<nu>** Value range determined by instrument or function	s, cyc	Start value for burst time sweep See 3.10.1.4.4 Which parameters can be swept?	**2.5.4.2** 2.5.4.5 2.5.4.6 **GEN panel** Start
SOURce:***ONT**ime*:**STOP**	**<nu>** Value range determined by instrument or function	s, cyc	Stop value for burst time sweep	**2.5.4.2** 2.5.4.5 2.5.4.6 **GEN panel** Stop
SOURce:**SWE**ep:***ONT**ime*:**POIN**ts	**<n>** 2 to 1024		Number of sweep points of burst time sweep	**2.5.4.2** **GEN panel** Points

Command	Parameter	Basic unit	Meaning	Section
SOURce:**SWE**ep:***ONT**ime*:**SPAC**ing	**LIN**ear **LOG**arithmic		Scaling of burst time sweep range → linear → logarithmic	**2.5.4.2** **GEN panel** Spacing → LIN → LOG
SOURce:**SWE**ep:***ONT**ime*:**STEP**	**<nu>** Value range determined by instrument or function	s, cyc	Step size for burst time sweep	**2.5.4.2** **GEN panel** Step
MMEMory:**LOAD:LIST**	**ONT**ime,**'filename'** Query: MMEM:LOAD:LIST? ONT		File containing burst time values	2.5.4.5 2.5.4.6 **GEN panel** ONTIM FILE
SOURce:***INT**erval*:**STAR**t	**<nu>** Value range determined by instrument or function	s	Start value for interval sweep See 3.10.1.4.4 Which parameters can be swept?	**2.5.4.2** 2.5.4.5 2.5.4.6 **GEN panel** Start
SOURce:***INT**erval*:**STOP**	**<nu>** Value range determined by instrument or function	s	Stop value for interval sweep	**2.5.4.2** 2.5.4.5 2.5.4.6 **GEN panel** Stop
SOURce:**SWE**ep:***INT**erval*:**POIN**ts	**<n>** 2 to 1024		Number of sweep points for interval sweep	**2.5.4.2** **GEN panel** Points
SOURce:**SWE**ep:***INT**erval*:**SPAC**ing	**LIN**ear **LOG**arithmic		Scaling of interval sweep range → linear → logarithmic	**2.5.4.2** **GEN panel** Spacing → LIN → LOG

Command	Parameter	Basic unit	Meaning	Section
SOURce:**SWE**ep:***INT**erval*:**STEP**	**<nu>** Value range determined by instrument or function	s	Step size for interval sweep	**2.5.4.2** **GEN panel** Step
MMEMory:**LOAD:LIST**	***INT**erval*, **'filename'** Query: MMEM:LOAD:LIST? INT		File containing interval values	2.5.4.5 2.5.4.6 **GEN panel** INTV FILE

3.10.1.4.4 Which parameters can be swept?

Generator Funktion	FREQ-Sweep	VOLT-Sweep	ON TIME-Sweep	INTERVAL-Sweep
SINusoid	Sine frequency	Sine amplitude	---	---
STEReo	If SOUR:FREQ:SEL FQPH selected: Common sine frequency for both channels may be swept If SOUR:FREQ:SEL FQFQ selected: Sine frequency of left channel may be swept. Sine frequency of right channel remains constant.	If SOUR:VOLT:SEL VLRT selected: The levels of the left (CH1) and right channel (CH2) may be swept and have a fixed offset. The offset remains constant during level sweep. The level offset can be set with SOUR:VOLT:RAT <n> If SOUR:VOLT:SEL VLVL selected:	---	---

		The sine amplitude of the left channel (CH1) may be swept. The sine amplitude of right channel (CH2) remains constant during sweep.		
BURSt	Sine frequency	Burst amplitude (amplitude during HIGH phase of signal)	Burst duration, the time during which the sine has ist high level.	Burst interval length.
S2Pulse	Burst frequency	Burst amplitude (amplitude during HIGH phase of signal)	Burst duration, the time during which the sine has ist high level.	Burst interval length.
MDISt	Useful frequency	Total amplitude of both sinewave signals	---	---
DFD	Center frequency	Total amplitude of both sinewave signals	---	---
DC	---	DC voltage	---	---

3.10.1.5 Generator Functions

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FUNC**tion[:SHAPe]	**SIN**usoid **STER**eo**MULT**isine ***BURS****t* **S2P**ulse **MDIS**t **DFD** ***RAND****om* ***USER*** **POL**arity **FSK** ***FM*** **DC**		Generator signal: → Sinusoidal tone → Stereo signal → Multi-tone (up to 17 sine lines) → Sine burst → Sine^2 burst → Double sine (similar to SMPTE) → Double sine (difference frequency distortion method) → Noise → User-defined signals → Polarity test signal → Frequency shift keying → Modulated sine → DC Voltage	2.5.4 **GEN panel** FUNCTION → SINE → STEREO SINE → MULTISINE → SINE BURST → SINE² BURST → MOD DIST → DFD → RANDOM → ARBITRARY → POLARITY → FSK → MODULATION → DC

3.10.1.5.1 SINE

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FUNC**tion [:SHAPe]	**SIN**usoid		→ Sinusoidal tone	2.5.4.3 **GEN panel** FUNCTION → SINE
SOURce:**FREQ**uency:***OFFS**et:***STATe**	**ON** **OFF**		→ Frequency offset 0.1 % → No frequency offset	2.5.4.1 **GEN panel** Frq. Offset
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et:**STATe**	**OFF** **ON**		DC offset permitting a DC voltage to be superimposed to the generator output. → Hardly any DC voltage at the output → DC voltage can be set with the next command. ***Note**:* *This setting cannot be made in the analog generator when a low-distortion generator is used.*	2.5.4.1 **GEN panel** DC Offset → OFF → ON
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et	**<n>** -5 V to 5 V -10 V to 10 V -1FS to 1FS	V FS	DC amplitude Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument	2.5.4.1 **GEN panel** DC Offset
SOURce:***SIN**usoid:**DITH**er:***STATe**	**ON** **OFF**		→ Noise superimposed on signal → Noise superimposition off For digital instrument only	2.5.4.1 **GEN panel** Dither → ON → OFF
SOURce:***SIN**usoid:**DITH**er	**<nu>** 0 to 1 FS	FS	Noise amplitude	2.5.4.1 **GEN panel** Dither

Command	Parameter	Basic unit	Meaning	Section
SOURce:***RAND**om:**PDF***	**GAUS**sian **TRI**angle **RECT**angle		→ Noise distribution, Gaussian → Noise distribution, triangular → Noise distribution, uniform	2.5.4.1 **GEN panel** PDF → GAUSS → TRIANGLE → RECTANGLE
SOURce:***LOWD**istortion*	**ON** **OFF**		→ Sine signal generated by LDG → Sine signal generated by function generator Only available with ANALOG generator and option UPL-B1 (Low Distortion Generator)	2.5.4.1 2.5.4.3 **GEN panel** Low Dist → ON → OFF
SOURce**:SWE**ep ...			For sweep commands see 3.10.1.4 Generator Sweeps	
SOURce:**FREQ**uency[:CW|FIXed]	**<nu>** Value range determined by instrument or function	Hz	Sine frequency Can be used as sweep parameter	2.5.4.3 **GEN panel** FREQUENQY
SOURce:**VOLT**age:***EQU**alize*:**STATe**	**ON** **OFF**		→ Sine signal equalized → Sine signal not dependent on frequency	2.5.4.3 **GEN panel** Equalizer → ON → OFF
MMEMory:**LOAD:*LIST***	***EQU**alize,***'filename'** Query: MMEM:LOAD:LIST? EQU		File containing equalizer data	2.5.4.3 **GEN panel** Equal.File
SOURce**:VOLT**age[:LEVel|AMPLitude]	**<nu>** 0 to 10 V 0 to 20 V 0 to 1 FS	 V V FS	Sine amplitude Can be used as sweep parameter Analog range (OUTP:TYPE UNB) Analog range (OUTP:TYPE BAL) Digital range Is voltage-limited by SOUR:VOLT:LIM see 3.10.1.2 and 3.10.1.3	2.5.4.3 **GEN panel** VOLTAGE

3.10.1.5.2 MULTISINE

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FUNC**tion [:SHAPe]	***MULT****isine*		Multi-tone (up to 17 sine lines)	2.5.4.4 **GEN panel** FUNCTION → MULTISINE
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et:**STATe**	**OFF** **ON**		DC offset permitting a DC voltage to be superimposed on the generator output. → Virtually no DC voltage component at the output → DC voltage can be set with the next command. ***Note:*** *This setting cannot be made in the analog generator when a low-distortion generator is used.*	2.5.4.1.1 **GEN panel** DC Offset → OFF → ON
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et	**<n>** -5 V to 5 V -10 V to 10 V -1FS to 1FS	V V FS	DC amplitude Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument	2.5.4.1.1 **GEN panel** DC Offset
SOURce:***RAND****om:SPAC****ing:*****MODE**	**USER**defined **ATR**ack		Setting the frequency spacing for the multisine measurement → The entered value (see next command) is corrected to the next settable value. → The value of the analyzer frequency spacing of FFT is automatically set It can be read out with command CALC:TRAN:FREQ:RES? provided FFT is selected in the analyzer.	2.5.4.4 **GEN panel** Spacing → USER DEF → ANLR TRACK
SOURce:***RAND****om:SPAC****ing:*****FREQ**uency	**<nu>** Lower limit value: analog = 2.93 Hz digital = sampling frequency / 16384	Hz	Setting value for frequency spacing for multisine measurement The value range depends on the selected generator and its sampling rate (see 2.5.1 Selecting the Generator	2.5.4.4 **GEN panel** Spacing

Command	Parameter	Basic unit	Meaning	Section
SOURce**:FUNC**tion:**MODE** alias **SOUR**ce:***MULT**isine*:**MODE**	***EQU**alvoltage* ***DEF**inedvoltage*		Selection of entry mode for individual multisine voltages: → The same amplitude applies for each sine. It is entered with command SOUR:VOLT1 <nu>. → A separate amplitude can be defined for each sine.	2.5.4.4 **GEN panel** Mode → EQUAL VOLT → DEFINE VOLT
SOURce:**VOLT**age:***EQU**alizer:*__STATe__	**ON** **OFF**		See 2.5.4.1.3 Equalization of SINE, SINE BURST, DFD, MULTISINE, RANDOM → Every active multisine frequency line is equalized. Equalizer is switched on. The menu item "Equal. file" is activated, ie the indicated file is loaded. → The levels of all frequency lines remain unchanged.	**2.5.4.4** **GEN panel** Equalizer → ON → OFF
MMEMory:**LOAD:LIST**	***EQU**alizer,'filename'.* Query: MMEM:LOAD:LIST? EQU		Equalizer file for correcting the multisine frequency lines. Only with SOUR:VOLT:EQU:STAT ON selected, see 2.5.4.1.3 Equalization of SINE, SINE BURST, DFD, MULTISINE, RANDOM	**2.5.4.4** **GEN panel** Equal.File
SOURce:***MULT**isine:**COUN**t*	**<n>** 1 to 17		Number of settable frequencies	2.5.4.4 **GEN panel** No of Sin
SOURce:**VOLT**age:**CRES**tfactor:**MODE**	***MIN**imized* ***DPH**ase* ***VAL**ue*		→ The crest factor (ratio of peak/rms value) is minimized. → The phase of the lines can be separately set with the next but one command SOURce:PHASe[**<i>**][:ADJust]. The start phase of the sinewave is entered. → The crest factor is set with the next command SOUR:VOLT:CRES <n> so that it closely approaches a settable value.	2.5.4.4 **GEN panel** Crest Fact → OPTIMIZED → DEFINE PHAS → VALUE
SOURce:**VOLT**age:**CRES**tfactor	**<n>** 1 to 100		The specified crest factor is approximated. This is the easier the more lines are used for optimization. Acc. to measurements in line with ANSI S3.42 a crest factor of 4 (= 12 dB) is recommended.	2.5.4.4 **GEN panel** Crest Fact

Command	Parameter	Basic unit	Meaning	Section
SOURce:**PHAS**e[**<i>**][:ADJust]	**<i>** 1 to 17 **<nu>** 0 to 360 °		Entered phase: i-th sine phase; i = 2 to 17 The line is output starting with the specified phase. If 0° is entered, the line starts at 0 and then rises. If 90° is entered, the line starts with the specified voltage and then decreases. For SOUR:VOLT:CRES:MODE DPHase only	2.5.4.4 **GEN panel** Phas No 1 to 17
SOURce:**VOLT**age[**<i>**][:LEVel|AMPLitude]	1 to 17 <nu> Analog instrument OUTP:TYPE UNB 0 to 10 V Analog instrument OUTP:TYPE BAL 0 to 20 V Digital instrument 0 to 1 FS		Level entry for i-th multisine line Is voltage-limited by SOUR:VOLT:LIM see 3.10.1.2 and 3.10.1.3 The maximum amplitude can be set for SOUR<i>:VOLT only when all other sinewaves have an amplitude of 0. Otherwise, V_{max} must be reduced by the sum of the remaining single voltages.	2.5.4.4 **GEN panel** Volt No 1 **to** 17
SOURce:**FREQ**uency[<i>][:CW|FIXed]	**<i>** 1 to 17 **<nu>** Value range determined by instrument or function	Hz	Frequency entry for the i-th multisine line	2.5.4.4 **GEN panel** Freq No 1 to17
SOURce:**VOLT**age:***TOT**al**:GAIN***	**<nu>**	dB	Subsequent amplification of all sine lines (<0 → attenuation); the upper range limit depends on individual rules for sine and sine frequencies as well as on SOUR:VOLT:LIM	2.5.4.4 **GEN panel** TOTAL GAIN
SOURce:**VOLT**age:***TOT**al*[:LEVel|AMPLitude]**?**	**<nu>** Query only	V FS	Total peak amplitude; query only With the single amplitudes being unknown, all sinewaves should be set explicitly to 0 before setting the maximum amplitude. 1. SOUR:MULT:MODE EQU 2. SOUR1:VOLT 0	2.5.4.4 **GEN panel** TOTAL PEAK

Command	Parameter	Basic unit	Meaning	Section
SOURce:**VOLT**age:***TOT**al:**RMS?***	**<nu>** Query only	V FS	Total RMS amplitude; query only	2.5.4.4 **GEN panel** TOTAL RMS
SOURce:**AM:MODE**	**OFF** **SIN**usoid **BURS**t		Selection of the type of modulation → The amplitude modulation is switched off, the generator signal is not modulated. → The generator signal is amplitude-modulated from 0% to -100% in the form of a sinewave. → The generator signal is switched on and off periodically.	2.5.4.4 **GEN-Panel** Ampl Var → OFF → SINE → BURST
SOURce:**FREQ**uency:**AM**	**<nu>** 1 µHz to f_{max} f_{max} depending on generator	Hz	Setting of the modulation frequency Available only with SINE modulation (SOUR:AM.MODE SIN)	2.5.4.4 **GEN-Panel** Mod Freq
SOURce:**VOLT**age:**AM** **<new>**	**<nu>** -100% to 0%	PCT	Setting of the modulation deviation in % Available only with SINE modulation (SOUR:AM.MODE SIN)	2.5.4.4 **GEN-Panel** Variation
SOURce:**ONT**ime	**<nu>** tmin to tmax Analog generator: tmin= 20.83 µs Digital generator: tmin= 1 / sample frequency tmax: 60 s – tmin	s	Entry of the burst duration (time, the sine is switched on) Available only with BURST modulation (SOUR:AM:MODE BURS)	2.5.4.4 **GEN-Panel** ON TIME
SOURce:**INT**erval	**<nu>** set burst duration ... 60 s	s	Entry of the burst interval length (burst period), the sum of burst duration and break time. Available only with BURST modulation (SOUR:AM:MODE BURS)	2.5.4.4 **GEN-Panel** INTERVAL

3.10.1.5.3 SINE BURST

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FUNC**tion [:SHAPe]	***BURS**t*		→ Sine burst	2.5.4.5 **GEN panel** FUNCTION → SINE BURST
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et:**STATe**	**OFF** **ON**		DC offset permitting a DC voltage to be superimposed at the generator output. → Hardly any DC voltage at the output → DC voltage can be set with the next command. ***Note:*** *This setting cannot be made in the analog generator when a low-distortion generator is used.*	2.5.4.1.1 **GEN panel** DC Offset → OFF → ON
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et	**<n>** -5 V to 5 V -10 V to 10 V -1FS to 1FS	V FS	DC amplitude Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument	2.5.4.1.1 **GEN panel** DC Offset
SOURce**:VOLT**age:**EQU**alize**:STAT**e	**ON** **OFF**		Equalization of the sine voltage of the bursted sinewave → Equalizer on → Equalizer off	2.5.4.1.1 **GEN-Panel** Equalizer → ON → OFF
MMEMory**:LOAD:LIST**	**EQU**alize,**'filename'** Query form: MMEM:LOAD:LIST? EQU		File containing equlizer data	2.5.4.1.1 **GEN-Panel** Equal.File
SOURce**:SWE**ep ...			For sweep commands see 3.10.1.4 Generator Sweeps	

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FREQ**uency[:CW|FIXed]	**<nu>** Voltage range determined by instrument or function	Hz	Sine frequency Can be used as sweep parameter	2.5.4.5 **GEN panel** FREQUENCY
SOURce:**VOLT**age[:LEVel|AMPLitude]	**<nu>** 0 to 12 V 0 to 24 V 0 to 1 FS	 V FS	Burst amplitude (amplitude during HIGH phase of signal) Can be used as sweep parameter Analog instrument (OUTPUP:TYPE UNB) Analog instrument(OUTP:TYPE BAL) Digital instrument Is voltage-limited by SOUR:VOLT:LIM see 3.10.1.2 and 3.10.1.3	2.5.4.5 **GEN panel** VOLTAGE
SOURce:**VOLT**age**:*LOWL*evel**	**<nu>** 0 to SOUR:VOLT	V %on FS %on	Amplitude during LOW phase of signal Analog instrument Digital instrument	2.5.4.5 **GEN panel** Low Level
SOURce:***ONT**ime*[:CW|FIXed]	**<nu>** 0 to 60 s Value range determined by instrument or function	s, cyc	Burst time Can be used as sweep parameter	2.5.4.5 **GEN panel** ON TIME
SOURce:**INT**erval[:CW|FIXed]	**<nu>** Value range determined by instrument or function	s	Interval time Can be used as sweep parameter	2.5.4.5 **GEN panel** INTERVAL
SOURce**:*ONT**ime*:DEL**ay	**<nu>** 0 to 60 s		Sets a start delay for SINE BURST and SINE^2 BURST.	2.5.4.5 2.5.4.6 **GEN panel** BurstOnDel

Note: Clock rate and f_{max} depend on generator (see 2.5.1 Selecting the Generator).

Caution: "SOUR:VOLT" is voltage-limited by SCPI command "SOUR:VOLT:LIM"

3.10.1.5.4 SINE^2 BURST

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FUNC**tion [:SHAPe]	***S2P**ulse*		Sine^2 burst	2.5.4.6 **GEN panel** FUNCTION → SINE² BURST
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et:**STATe**	**OFF** **ON**		DC offset permitting a DC voltage to be superimposed at the generator output. → Hardly any DC voltage at the output → DC voltage can be set with the next command. ***Note:*** *This setting cannot be made in the analog generator when a low-distortion generator is used.*	2.5.4.1.1 **GEN panel** DC Offset → OFF → ON
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et	**<nu>** -5 V to 5 V -10 V to 10 V -1FS to 1FS	V FS	DC amplitude Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument	2.5.4.1.1 DC Offset
SOURce:**SWE**ep ...			For sweep commands see 3.10.1.4 Generator Sweeps	2.5.4.7 **GEN panel**
SOURce:**FREQ**uency[:CW|FIXed]	**<nu>** Value range determined by instrument or function	Hz	Burst frequency Can be used as sweep parameter	2.5.4.6 **GEN panel** FREQUENCY
SOURce:**VOLT**age[:LEVel|AMPLitude]	**<nu>** 0 to 12 V 0 to 24 V 0 to 1 FS	V FS	Burst amplitude Can be used as sweep parameter Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument Is voltage-limited by SOUR:VOLT:LIM see 3.10.1.2 and 3.10.1.3 When negative amplitudes are entered the pulse is inverted.	2.5.4.6 **GEN panel** VOLTAGE

Command	Parameter	Basic unit	Meaning	Section
SOURce:***ONT**ime*[:CW|FIXed]	**<nu>** Value range determined by instrument or function	s ,cyc	Burst time Can be used as sweep parameter	2.5.4.6 **GEN panel** ON TIME
SOURce:***INT**erval*[:CW|FIXed]	**<nu>** Value range determined by instrument or function	s	Interval time Can be used as sweep parameter	2.5.4.6 **GEN panel** INTERVAL
SOURce:***ONT**ime**:DEL**ay*	**<nu>** 0 to 60 s		Sets a start delay for SINE BURST and SINE^2 BURST.	2.5.4.5 2.5.4.6 **GEN panel** BurstOnDel

3.10.1.5.5 MOD DIST

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FUNC**tion [:SHAPe]	***MDIS****t*		→ Double sine (similar to SMPTE)	2.5.4.7 **GEN panel** FUNCTION → MOD DIST
SOURce:**FREQ**uency:***OFFS****et:***STATe**	**ON** **OFF**		→ Frequency offset 0.1 % → No frequency offset	2.5.4.1.1 **GEN panel** Frq. Offset → +1000 PPM → OFF
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et:**STATe**	**OFF** **ON**		DC offset permitting a DC voltage to be superimposed at the generator output. → Hardly any DC voltage at the output → DC voltage can be set with the next command. ***Note:*** *This setting cannot be made in the analog generator when a low-distortion generator is used.*	2.5.4.1.1 **GEN panel** DC Offset → OFF → ON
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et	**<n>** -5 V to 5 V -10 V to 10 V -1FS to 1FS	V FS	DC amplitude Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument	2.5.4.1.1 **GEN panel** DC OFFSET
SOURce:***SIN****usoid:DITH****er:****STATe**	**ON** **OFF**		→ Noise superimposed onto the signal. → Noise superimposition off For digital instrument only With option UPL-B29 (Digital Audio 96 kHz) not allowed in High Rate-Mode (CONF:DAI HRM), allowed in Base Rate-Mode (CONF:DAI BRM)	2.5.4.1.1 **GEN panel** Dither → ON → OFF
SOURce:***SIN****usoid:DITH****er**	**<nu>** 0 to 1 FS	FS	Noise amplitude	2.5.4.1.1 **GEN panel** Dither

Command	Parameter	Basic unit	Meaning	Section
SOURce:***RAND**om:**PDF***	**GAUS**sian **TRI**angle **RECT**angle		→ Noise distribution, Gaussian → Noise distribution, triangular → Noise distribution, equivalent	2.5.4.1.1 **GEN panel** PDF → GAUSS → TRIANGLE → RECTANGLE
SOURce**:LOWD**istortion	**ON** **OFF**		→ Useful signal generated by LDG Only available with ANALOG generator and option UPL-B1 (Low Distortion Generator) → Both sines generated by function generator.	2.5.4.1 2.5.4.7 **GEN panel** Low Dist → ON → OFF
SOURce**:SWE**ep ...			For sweep commands see 3.10.1.4 Generator Sweeps	2.5.4.7 **GEN panel**
SOURce:**FREQ**uency[1][:CW|FIXed]	**<nu>** ANALOG gen: 240 Hz to 21,75 kHz DIGITAL gen: 240 Hz to f_{max} f_{max} see 2.5.1	Hz	Useful frequency Can be used as sweep parameter	2.5.4.7 **GEN panel** UPPER FREQ
SOURce:**FREQ**uency**2**[:CW|FIXed]	**<nu>** 30 Hz to f_{max} / 8 f_{max} see 2.5.1	Hz	Interfering frequency	2.5.4.7 **GEN panel** LOWER FREQ
SOURce:**VOLT**age:***TOT**al*[:LEVel|AMPLitude]	**<nu>** Value range determined by instrument or function	V FS	Total amplitude Can be used as sweep parameter Is voltage-limited by SOUR:VOLT:LIM see 3.10.1.2 and 3.10.1.3In the analog instrument the lower limit SOUR:VOLT:RAT (for high rms voltage specifications) depends on the required total rms voltage (see "TOTAL VOLT").	2.5.4.7 **GEN panel** TOTAL VOLT

Command	Parameter	Basic unit	Meaning	Section
SOURce:**VOLT**age:***RAT****io***	**<n>** 1 to 10		Ratio of interfering to useful signal	2.5.4.7 **GEN panel** VOLT LF:UF

3.10.1.5.6 DFD

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FUNC**tion [:SHAPe]	***DFD***		→ Double sine (difference frequency method)	2.5.4.8 **GEN panel** FUNCTION → DFD
SOURce:**FREQ**uency:***OFFS****et:***STATe**	**ON** **OFF**		→ Frequency offset 0.1 % → No frequency offset	2.5.4.1 **GEN panel** Frq. Offset → + 1000 PPM → OFF
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et:**STATe**	**OFF** **ON**		DC offset permitting a DC voltage to be superimposed at the generator output. → Hardly any DC voltage at the output → DC voltage can be set with the next command. ***Note:*** *This setting cannot be made in the analog generator when a low-distortion generator is used. With the offset switched on, the S/N ratio of the analog DFD signal is poorer by 30 dB .*	2.5.4.1 **GEN panel** DC Offset → OFF → ON
SOURce:**FUNC**tion:**MODE**	**IEC2**68 **IEC1**18		→ Entry of center frequency (MEAN FREQ) and difference frequency (DIFF FREQ) to IEC 268 with commands SOUR:FREQ:MEAN <nu> and SOUR:FREQ:DIFF <nu> If a frequency sweep is selected (for the X or Z axis), the center frequency is swept. → Entry of upper DFD frequency (UPPER FREQ) and difference frequency (DIFF FREQ) to IEC 118 with commands SOUR:FREQ <nu> and SOUR:FREQ:DIFF <nu> If a frequency sweep is selected (for the X or Z axis), the UPPER FREQ is swept.	**2.5.4.1.1** **GEN panel** **Mode** → IEC 268 → IEC 118

Command	Parameter	Basic unit	Meaning	Section
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et	**<n>** -5 V to 5 V -10 V to 10 V -1FS to 1FS	V V FS	DC amplitude Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument	2.5.4.1.1 **GEN panel** DC OFFSET
SOURce:***SIN**usoid:**DITH**er:**STATe**	**ON** **OFF**		→ Noise is superimposed on signal. → Noise superimposition off For digital instrument only. With option UPL-B29 (Digital Audio 96 kHz) not allowed in High Rate-Mode (CONF:DAI HRM), allowed in Base Rate-Mode (CONF:DAI BRM)	2.5.4.1.1 **GEN panel** Dither → ON → OFF
SOURce:***SIN**usoid:**DITH**er	**<nu>** 0 to 1 FS	FS	Noise amplitude	2.5.4.1.1 **GEN panel** Dither
SOURce:***RAND**om:**PDF**	**GAUS**sian **TRI**angle **RECT**angle		→ Noise distribution, Gaussian → Noise distribution, triangular → Noise distribution, uniform	2.5.4.1.1 **GEN panel** PDF → GAUSS → TRIANGLE → RECTANGLE
SOURce**:LOWD**istortion	**ON** **OFF**		→ 1st sine generated by LDG Only available with ANALOG generator and option UPL-B1 (Low Distortion Generator)→ Both sines generated by function generator	2.5.4.1 2.5.4.8 **GEN panel** Low Dist → ON → OFF
SOURce**:SWE**ep ...			For sweep commands see 3.10.1.4 Generator Sweeps	
SOURce:**FREQ**uency:***MEAN**	**<nu>** Value range determined by instrument or function	Hz	Center frequency Can be used as sweep parameter	2.5.4.8 **GEN panel** MEAN FREQ

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FREQ**uency:[1][:CW|FIXed]	**<nu>** Value range determined by instrument or function		Entry of upper DFD frequency with SOURce:FUNCtion:MODE IEC 118 selected.	**2.5.4.8 GEN-panel** UPPER FREQ
SOURce:**FREQ**uency***:DIFF****erence*	**<nu>** Value range determined by instrument or function	Hz	Difference frequency	2.5.4.8 **GEN panel** DIFF FREQ
SOURce:**VOLT**age:***TOT****al*[:LEVel|AMPLitude]	**<nu>** Value range determined by instrument or function	V FS	Total amplitude Is voltage-limited by SOUR:VOLT:LIM see 3.10.1.2 and 3.10.1.3	2.5.4.8 **GEN panel** TOTAL VOLT

3.10.1.5.7 RANDOM

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FUNC**tion [:SHAPe]	**RAND**om		→ Noise	2.5.4.9 **GEN panel** FUNCTION → RANDOM
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et:**STATe**	**OFF** **ON**		DC offset permitting a DC voltage to be superimposed at the generator output. → Hardly any DC voltage at the output DC voltage can be set with the next command. ***Note:*** *This setting cannot be made in the analog generator when a low-distortion generator is used.*	2.5.4.1.1 **GEN panel** DC Offset → OFF → ON
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et	**<n>** -5 V to 5 V -10 V to 10 V -1FS to 1FS	V FS	DC amplitude Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument	2.5.4.1.1 **GEN panel** DC OFFSET
SOURce:***RAND**om**:DOM**ain*	***FREQ**uency* ***TIME***		→ Frequency domain → Time domain	2.5.4.9 **GEN panel** Domain → FREQ → TIME
SOURce:**VOLT**age:***TOT**al*[:LEVel|AMPLitude]	**<nu>** 0 to 12 V 0 to 24 V 0 to 1 FS	V FS	Noise peak amplitude Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument Is voltage-limited by SOUR:VOLT:LIM see 3.10.1.2 and 3.10.1.3	2.5.4.9 **GEN panel** VOLT PEAK
SOURce:**VOLT**age:***TOT**al**:RMS***	**<nu>**	V FS	Noise RMS amplitude Analog-Instrument Digital-Instrument	2.5.4.9 **GEN panel** VOLT RMS

Further commands for frequency domain only (SOUR:RAND:DOM FREQ):

Command	Parameter	Basic unit	Meaning	Section
SOURce:***RAND***om:***SPAC***ing:**MODE**	***ATR***ack ***USER***defined		→ Analyzer frequency spacing synchronous → Frequency spacing acc. to user entry	2.5.4.9 **GEN panel** Spacing → ANLR TRACK → USER DEF
SOURce:***RAND***om:***SPAC***ing:***FREQ***uency	**<nu>** Value range determined by instrument or function	Hz	Entry of frequency spacing	2.5.4.9 **GEN panel** Spacing
SOURce:***RAND*om:*SHAPe**	***WHIT***e ***PINK*** ***TOCT***ave ***ARB***itrary		→ White noise → Pink noise → 1/3-octave noise → File-defined noise	2.5.4.9 **GEN panel** Equalizatn → WHITE → PINK → THIRD OCT → FILE
SOURce:***RAND***om:***FREQ***uency:***LOW***er **SOUR**ce:***RAND***om:***FREQ***uency:***UPP***er	**<nu>** Value range determined by instrument or function	Hz	Lower/upper frequency limit for white and pink noise	2.5.4.9 **GEN panel** Lower Freq Upper Freq
SOURce**:FREQ**uency:***MEAN***	**<nu>** Value range determined by instrument or function	Hz	Center frequency for 1/3-octave noise	2.5.4.9 **GEN panel** MEAM FREQ

Command	Parameter	Basic unit	Meaning	Section
MMEMory:**LOAD:*LIST***	***ARB**itrary*, **'filename'** Query: MMEM:LOAD:LIST? ARB ***RAND**om*, **'filename'** Query: MMEM:LOAD:LIST? RAND		File with data for file-defined noise. ARBitrary and RANDom are synonyms.	2.5.4.9 **GEN panel** Shape File
SOURce**:AM:MODE**	 **OFF** **SIN**usoid **BURS**t		Selection of the type of modulation → The amplitude-modulation is switched off, the generator signal is not modulated. → The generator signal is amplitude-modulated from 0% to 100% in the form of a sinewave. → The generator signal is switched on and off periodically.	2.5.4.9 **GEN-Panel** Ampl Var → OFF → SINE → BURST
SOURce**:FREQ**uency**:AM**	**<nu>** 1 µHz to fmax fmax depending on the generator	Hz	Setting of the modulation frequency Available only with SINE modulation (SOUR:AM.MODE SIN)	2.5.4.9 **GEN-Panel** Mod Freq
SOURce**:VOLT**age**:AM**	**<nu>** **-**100% to 0%	PCT	Setting of the modulation deviation in % Available only with SINE modulation (SOUR:AM.MODE SIN)	2.5.4.9 **GEN-Panel** Variation
SOURce**:ONT**ime	**<nu>** tmin to t max Analog generator: tmin= 20.83 µs Digital generator: tmin= 1 / sample frequency tmax: 60 s – tmin	s	Entry of the burst duration (time the sine is switched on) Available only with BURST modulation (SOUR:AM:MODE BURS)	2.5.4.9 **GEN-Panel** ON TIME

Command	Parameter	Basic unit	Meaning	Section
SOURce**:INT**erval	**<nu>** set burst duration ... 60 s	s	Entry of the burst interval length (burst period), i.e., the sum of burst duration and break time Available only with BURST modulation (SOUR:AM:MODE BURS)	2.5.4.9 **GEN-Panel** INTERVAL

Further commands for time domain only (SOUR:RAND:DOM TIME):

Command	Parameter	Basic unit	Meaning	Section
SOURce:***RAND**om:PDF*	***GAUS**sian* ***TRI**angle* ***RECT**angle*		→ Noise distribution, Gaussian → Noise distribution, triangular → Noise distribution, uniform	2.5.4.9 **GEN panel** PDF → GAUSS → TRIANGLE → RECTANGLE

3.10.1.5.8 ARBITRARY

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FUNC**tion [:SHAPe]	**USER**		→ User-defined waveforms	2.5.4.10 **GEN panel** FUNCTION → ARBITRARY
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et:**STATe**	**OFF** **ON**		DC offset permitting a DC voltage to be superimposed at the generator output. → Hardly any DC voltage at the output → DC voltage can be set with the next command. ***Note:*** *This setting cannot be made in the analog generator when a low-distortion generator is used.*	2.5.4.1.1 **GEN panel** DC Offset → OFF → ON
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et	**<n>** -5 V to 5 V -10 V to 10 V -1FS to 1FS	V FS	DC amplitude Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument	2.5.4.1.1 **GEN panel** DC Offset
MMEMory:**LOAD:*LIST***	***ARB**itrary*, **'filename'** Query: MMEM:LOAD:LIST? ARB		File with data for waveform	2.5.4.10 **GEN panel** Filename

Command	Parameter	Basic unit	Meaning	Section
SOURce:**VOLT**age:***TOT**al*[:LEVel|AMPLitude]	**<nu>** **Analog Instrument:** Output = UNBAL: 0 to 14,142 V (OUTPUT = BAL: 0 to16.971 V **Digital Instrument:** Src Mode = AUDIO DATA: 0 to 1 FS Src Mode = JITTER ONLY: 0 UI to 2,5 UI Src Mode = PHASE: 0 to 1 FS Src Mode = COMMON ONLY: 0 V to 10 V	V FS	Peak amplitude of signal SOUR:VOLT:TOT and SOUR:VOLT:TOT:RMS are coupled via the crest factor (which is constant for a specific signal). A change of SOUR:VOLT:TOT therefore immediately affects the figure for SOUR:VOLT:TOT:RMS. If the crest factor is changed, SOUR:VOLT:TOT will remain unchanged. Is voltage-limited by SOUR:VOLT:LIM see 3.10.1.2 and 3.10.1.3	2.5.4.10 **GEN panel** VOLT PEAK
SOURce:**VOLT**age:***TOT**al:**RMS***	**<nu>** 0 V to 20 V	V FS	RMS signal amplitude for Analog generator Only available with ANALOG generator in format AWD and TTF SOUR:VOLT:TOT and SOUR:VOLT:TOT:RMS are coupled via the crest factor (which is constant for a specific noise signal). A change of SOUR:VOLT:TOT:RMS therefore affects the SOUR:VOLT:TOT value.	2.5.4.10 **GEN panel** VOLT RMS
SOURce**:AM:MODE**	**OFF** **SIN**usoid **BURS**t		Selection of the type of modulation → The amplitude modulation is switched off, the generator signal is not modulated. → The generator signal is amplitude-modulated from 0% to -100% → The generator signal is switched on and off periodically. .	2.5.4.10 **GEN-Panel** Ampl Var → OFF → SINE → BURST
SOURce**:FREQ**uency**:AM**	**<nu>** 1 µHz to f_{max} f_{max} depending on the generator	Hz	Setting of the modulation frequency Available only with SINE modulation (SOUR:AM.MODE SIN)	2.5.4.10 **GEN-Panel** Mod Freq

Command	Parameter	Basic unit	Meaning	Section
SOURce**:VOLT**age**:AM**	**<nu>** -100% ... 0%	PCT	Setting of the modulation deviation in % Available only with SINE modulation (SOUR:AM.MODE SIN)	2.5.4.10 **GEN-Panel** Variation
SOURce**:ONT**ime	**<nu>** tmin to tmax Analog generator: tmin= 20.83 µs Digital generator: tmin= 1 / sample frequency tmax: 60 s – tmin	s	Entry of the burst duration (time the sine is switched on) Available only with BURST modulation (SOUR:AM:MODE BURS)	2.5.4.10 **GEN-Panel** ON TIME
SOURce**:INT**erval	**<nu>** set burst duration ... 60 s	s	Entry of the burst interval length (burst period), i.e., the sum of burst duration and break time Available only with BURST modulation (SOUR:AM:MODE BURS)	2.5.4.10 **GEN-Panel** INTERVAL

3.10.1.5.9 POLARITY

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FUNC**tion [:SHAPe]	***POL**arity*		→ Polarity test signal	2.5.4.11 **GEN panel** FUNCTION → POLARITY
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et:**STATe**	**OFF** **ON**		DC offset permitting a DC voltage to be superimposed at the generator output. → Hardly any DC voltage at the output → DC voltage can be set with the next command. ***Note:*** *This setting cannot be made in the analog generator when a low-distortion generator is used.*	2.5.4.1.1 **GEN panel** DC Offset → OFF → ON
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et	**<n>** -5 V to 5 V -10 V to 10 V -1FS to 1FS	V FS	DC amplitude Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument	2.5.4.1.1 **GEN panel** DC Offset
SOURce:**VOLT**age[:LEVel|AMPLitude]	**<nu>** 0 to 12 V 0 to 20 V 0 to 1 FS	V FS	Pulse amplitude Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument Is voltage-limited by SOUR:VOLT:LIM see 3.10.1.2 and 3.10.1.3	2.5.4.11 **GEN panel** VOLTAGE

3.10.1.5.10 FSK (Frequency shift keying)

Command	Parameter		Meaning	Section
SOURce**:FUNC**tion[:SHAPe]	**FSK**		Frequency shift keying; generates a sequence of two different sinewave frequencies each being output for 9 ms (baud rate 110) . The data coded in this way can only be defined from option UPL-33 or UPL-B10 using command SOURce:O33 'O33-' . Frequency #1: 1850 Hz, logic 0 Frequency #2: 1650 Hz, logic 1	**2.5.4.12** **GEN panel** FUNCTION → FSK
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et:**STATe**	**ON** **OFF**		DC offset allows a DC voltage to be superimposed onto the generator output. → Almost no DC voltage at the output → The DC component can be set with the following command. ***Note**:* *This setting is not possible in the analog generator when the low-distortion generator is used.*	**2.5.4.12** **GEN panel** DC Offset → OFF → ON
SOURce:VOLTage[:LEVel|AMPLitude]:**OFFS**et	**<nu>** -5 V to 5 V -10 V to 10 V -1FS to 1FS		Amplitude of DC component Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument	**2.5.4.12** **GEN panel** DC Offset
SOURce**:VOLT**age	<nu> 0 to 11.29 V 0 FS to 1 FS		Level for both FSK frequencies	**2.5.4.12** **GEN panel** Volt No 1
SOURce:**O33**	'O33 ID code		Sends the code for line measurements. The data coded in this way can only be sent from option UPL-B33 or UPL-B10 (universal sequence controller).	**No manual operation**

3.10.1.5.11 STEREO SINE

Command	Parameter		Meaning	Section
SOURce:**FUNC**tion[:SHAPe]	**STER**eo		→ Sine with different signals for the left and right channel. Only available with DIGITAL generator and option UPL-B6 (Extended Analysis Function)	**2.5.4.13 GEN-Panel** FUNCTION → STEREO SINE
SOURce:**FREQ**uency:***OFFS**et*:***STAT**e*	**ON** **OFF**		→ Frequency offset 0.1 % → No frequency offset	**2.5.4.13 GEN-Panel** Frq. Offset, → +1000 ppm → OFF
SOURce:**VOLT**age[:LEVel|AMPLitude]:**OFFS**et:**STAT**e	**OFF** **ON**		DC offset permitting a DC voltage to be superimposed to the generator output. → Hardly any DC voltage at the output → DC voltage can be set with the next command. ***Note**:* *This setting cannot be made in the ANALOG generator when a low-distortion generator is used.*	**2.5.4.13 GEN-Panel** DC Offset → OFF → ON
SOURce:**VOLT**age[:LEVel|AMPLitude]:**OFFS**et	**<nu>** -1 FS to 1 FS	FS	DC amplitude	**2.5.4.13 GEN-Panel** DC Offset
SOURce:***SIN**usoid*:***DITH**er*:***STAT**e*	**ON** **OFF**		→ Noise superimposed on signal → Noise superimposition off	**2.5.4.13 GEN-Panel** Dither → ON → OFF
SOURce:***SIN**usoid*:***DITH**er*	**<nu>** 0 to 1 FS	FS	Noise amplitude	**2.5.4.13 GEN-Panel** Dither

Command	Parameter		Meaning	Section
SOURce:***RAND***om:***PDF***	**GAUS**sian **TRI**angle **RECT**angle		→ Noise distribution, Gaussian → Noise distribution, triangular → Noise distribution, uniform	**2.5.4.13** **GEN-Panel** PDF → GAUSS → TRIANGLE → RECTANGLE
SOURce:**VOLT**age:***EQU****alize*:**STAT**e	**ON** **OFF**		→ Sine signal equalized → Sine signal not dependent on frequency	**2.5.4.13** **GEN-Panel** Equalizer → ON → OFF
MMEMory:**LOAD**:***LIST***	***EQU****alize*,**'filename'** Query: MMEM:LOAD:LIST? EQU		File containing equalizer data if SOURC:VOLT:EQU:STAT ON	**2.5.4.13** **GEN-Panel** Equal.File
SOURce**:FREQ**uency**:SEL**ect	 ***FQPH*** ***FQFQ***		Determines the type of frequency entry in the left and right channel. → Left (CH1) and right channel (CH2) have the same frequency but a selectable phase with a fixed delay. → The frequency of the left (CH1) and right channel (CH2) can be entered independently of each other.	**2.5.4.13** **GEN-Panel** Freq Mode FREQ&PHASE FREQ CH1&2
SOURce**:VOLT**age**:SEL**ect	 ***VLRT*** ***VLVL***		Determines the type of level entry in the left and right channel. → The levels of the left (CH1) and right channel (CH2) have a fixed offset. The offset remains constant during level sweep. → The level of the left (CH1) and right channel (CH2) can be entered independently of each other.	**2.5.4.13** **GEN-Panel** Volt Mode VOLT&RATIO VOLT CH1&2
SOURce:**SWE**ep ...			For sweep commands see 3.10.1.4 Generator Sweeps	

Command	Parameter		Meaning	Section
SOURce:**FREQ**uency[:CW|FIXed]	**<nu>** Value range determined by instrument or function	Hz	If SOUR:FREQ:SEL FQPH selected: Entry of common sine frequency for both channels. Can be used as sweep parameter. If SOUR:FREQ:SEL FQFQ selected: Entry of sine frequency of left channel. Can be used as sweep parameter.	**2.5.4.13** **GEN-Panel** FREQUENCY oder Freq Ch1
SOURce:**FREQ**uency:**CH2S**tereo	**<nu>** Value range determined by instrument or function		Only available if SOUR:FREQ:SEL FQFQ: Entry of sine frequency of right channel. Remains constant during sweep.	**2.5.4.13** **GEN-Panel** Freq Ch2
SOURce:PHASe	**<nu>** 0 ° to 360 °	DEG	Only available with SOUR.FREQ:SEL FQPH: Entry of phase delay between right and left channel with the left channel (CH1) as reference channel. During the sweep this phase remains constant and cannot be swept.	**2.5.4.13** **GEN-Panel** Phas Ch2:1
SOURce:**VOLT**age[:LEVel|AMPLitude]	**<nu>** 0 to 1 FS	FS	Entry of sine amplitude of left channel; may be used as sweep parameter. The sine amplitude of right channel remains constant during sweep. Is voltage-limited by SOUR:VOLT:LIM see 3.10.1.2 and 3.10.1.3	**2.5.4.13** **GEN-Panel** VOLT Ch1
SOURce:**VOLT**age:**CH2S**tereo	**<nu>** 0 to 1 FS	FS	Only available with SOURce:VOLTage:SELect VLVL: Entry of sine amplitude of right channel. Remains constant during sweep. Is voltage-limited by SOUR:VOLT:LIM see 3.10.1.2 and 3.10.1.3	**2.5.4.13** **GEN-Panel** VOLT Ch2
SOURce:**VOLT**age:**RAT**io	**<n>** 0 to 100000		Only available with SOUR:VOLT:SEL VLRT: Entry of level offset between channel 2 (right channel) and channel 1 (left channel) as numeric value. The level of the right channel is reset upon each command SOUR:VOLT:RATio <n> or SOURce:VOLTage <nu> and limited to 1.0 FS or 'Max Volt'.	**2.5.4.13** **GEN-Panel** Volt Ch2:1

3.10.1.5.12 MODULATION (FM or AM signal)

Command	Parameter		Meaning	Section
SOURce:**FUNC**tion	**FM**		Setting a modulated sinewave signal. Either FM or AM can be used.	2.5.4.14 **GEN-Panel** FUNCTION → FM
SOURce:**VOLT**age[:LEVel|AMPLitude]:**OFFS**et:**STAT**e	**OFF** **ON**		DC offset permitting a DC voltage to be superimposed to the generator output. → Hardly any DC voltage at the output → DC voltage can be set with the next command. ***Note**:* *This setting cannot be made in the ANALOG generator when a low-distortion generator is used.*	2.5.4.14 **GEN-Panel** DC Offset → OFF → ON
SOURce:**VOLT**age[:LEVel|AMPLitude]:**OFFS**et	**<nu>** -5 V to 5 V -10 V to 10 V -1 FS to 1 FS	 V V FS	DC amplitude Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument	2.5.4.14 **GEN-Panel** DC OFFSET
SOURce:**FUNC**tion:**MODE**	 **FM** **AM**		Determines the type of modulation. → Frequency modulation; output of a frequency-modulated sinewave signal. → Amplitude modulation; output of amplitude-modulated sinewave signal.	2.5.4.14 **GEN-Panel** **Mode** → FM → AM
SOURce:**FREQ**uency[:CW|FIXed]	**<nu>** Value range determined by instrument and sample frequency	Hz	Setting the modulation frequency	2.5.4.14 **GEN-Panel** Mod Freq oder Freq Ch1

Command	Parameter		Meaning	Section
SOURce:**VOLT**age[:LEVel|AMPLitude]	**<nu>** 0 to 100 %	PCT	Modulation deviation / depth With SOUR:FUNC:MODE FM: Setting the deviation in %. With SOUR:FUNC:MODE AM: Setting of modulation depth in %	2.5.4.14 **GEN-Panel** Bei FM: Deviation Bei AM: Mod Depth
SOURce:**FREQ**uency**2**[:CW|FIXed]	**<nu>** Value range determined by instrument and sample frequency	Hz	Setting the carrier frequency	2.5.4.14 **GEN-Panel** Carr Freq
SOURce:**VOLT**age**2**	**<nu>** 0 to 5 V 0 to 6V 0 to 0.5 FS	 V V FS	Setting the carrier amplitude Analog instrument (OUTP:TYPE UNB) Analog instrument (OUTP:TYPE BAL) Digital instrument	2.5.4.14 **GEN-Panel** Carr Volt

3.10.1.5.13 DC voltage

Command	Parameter		Meaning	Section
SOURce:**FUNC**tion	**DC**		DC voltage	2.5.4.15 **GEN-Panel** FUNCTION → DC
SOURce:**SWE**ep ...			For sweep commands see 3.10.1.4 Generator Sweeps	
SOURce:**VOLT**age:***TOTal***[:LEVel|AMPLitude]	**<nu>** - 5 V to 5 V -1 FS to 1 FS	 V FS	Entry of DC amplitude; may be used as sweep parameter. Is voltage-limited by SOUR:VOLT:LIM see 3.10.1.2 and 3.10.1.3	2.5.4.15 **GEN-Panel** VOLTAGE

3.10.1.5.14 Coded Audio (Coded Audio Signals)

Command	Parameter	Basic unit	Meaning	Section
SOURce:**FUNC**tion[:SHAPe]	**COD**edaud		→ Output of digitally coded audio data to IEC 61937. Available only • if the UPL-B23 (Coded Audio Signal Generation) is installed in • DIGITAL generator (INST D48) in • Meas Mode AUDIO DATA (SENSe:DIGital:FEED ADATa) at a • sampling frequency of 48 kHz (OUTP:SAMP:MODE F48)	**2.5.4.16** **GEN Panel** FUNCTION → CODED AUDIO
SOURce:**COD**edaudio:**FORM**at	**AC3**		Coding format AC-3 (Dolby Digital) Other formats are in preparation.	**2.5.4.16** **GEN Panel** Format → AC-3
SOURce**:COD**edaudio**:CHAN**nel	 **CH2** **CH6** **CHL** **CHC** **CHR** **CHLS** **CHRS** **CHLF**		Selection of channels producing sound. → Stereo mode at 192 kb/s. Frequency and level variation or sweep are possible. → Multichannel sound with all channels at 448 kb/s. Frequency and level variation or sweep possible. Single channels at 448 kb/s. Limited frequency selection 41.7 Hz, 994.8 Hz or 15 kHz (see next command) at a fixed level of -20 dB. Coding of samples at 16 bit. → Front left → Front center → Front right → Rear left → Rear right → Low frequency enhancement	**2.5.4.16** **GEN Panel** Chan Mode → 2/0 192kb/s → 5.1 448kb/s → L 448kb/s → C 448kb/s → R 448kb/s → LS 448kb/s → RS 448kb/s → LFE 448kb/s

Command	Parameter	Basic unit	Meaning	Section
SOURce**:COD**edaudio**:FREQ**uency	**F042** **F997** **F15K**		Fixed frequency selection for crosstalk measurements and linearity (level) sweeps. → exactly 41.7 Hz → exactly 994.8 Hz → exactly 15000.0 Hz Only available in • single channel modes (SOUR:COD:CHAN CHL|CHC|CHR|CHLS|CHRS|CHLF) or with • level variation (SOUR:VOLT:MODE FIX) selected	**2.5.4.16** **GEN Panel** Frequency → 42 Hz → 997 Hz → 15 kHz
SOURce:**SWE**ep ...			For sweep commands see 3.10.1.4 Generator Swepps	**2.5.4.16** **GEN Panel** SWEEP CTRL
SOURce:**FREQ**uency:**MODE**	**FIX**		Frequency can be varied. The level is at -20 dB. 2.5.4.16	**2.5.4.16** **GEN Panel** Vari Mode → FREQUENCY
SOURce**:FREQ**uency	**<new>** 5.21 Hz to 20 kHz at a sampling rate of 48 kHz	Hz	Entry of sine frequency (can be swept). The frequency step width depends on the number of WAV files in the C:\UPL\AC3\48000\... directory and the frame length per WAV file: Frequency range: 5 Hz to 1 kHz 1 kHz to 3 kHz 3 kHz to 20 kHz Resolution 5.21 Hz 10.42 Hz 31.25 Hz Number of frames: max. 6 max. 3 1 Frequency values outside this pattern are adapted to the next possible value. Only available in the multichannel modes 2/0 or 5.1 (SOUR:COD:CHAN CH2|CH6) with frequency variation SOURce:FREQ:MODE FIX selected.	**2.5.4.16** **GEN Panel** FREQUENCY

Command	Parameter	Basic unit	Meaning	Section
SOURce**:VOLT**age**:MODE**	**FIX**		The level can be varied in 24 steps of –5 dBFS between 0 dBFS and –120 dBFS; one of three fixed settings can be selected as frequency (SOUR:COD:FREQ F042|F997|F15K). This setting allows sweep of the sine amplitude (next command). Only available in the multichannel modes 2/0 or 5.1 (SOUR:COD:CHAN CH2|CH6)	**2.5.4.16 GEN Panel** Vari Mode → VOLTAGE
SOURce:**VOLT**age:**TOT**al[:LEVel|AMPLitude]	**<new>** 1 µFS to 1 FS or -120 dBFS to 0 dBFS	FS	Entry of sine amplitude (can be swept) Level can be varied in 24 steps of –5 dBFS between 0 dBFS and –120 dBFS. Level values outside this pattern are adapted to the next possible value. Only available in the multichannel modes 2/0 or 5.1 (SOUR:COD:CHAN CH2|CH6) with level variation SOURce:VOLTage:MODE FIX selected.	**2.5.4.16 GEN Panel** TOTAL VOLT

3.10.2 IEC/IEEE-Bus Commands for Analyzers

3.10.2.1 Selection of Analyzer

Command	Parameter	Basic unit	Meaning	Section
INSTrument**2**[:SELect] equivalent to **INST**rument**2**:**NSEL**ect	**A22** **A110** **D48** **1** **2** **4**		→ Analog analyzer, 22 kHz → Analog analyzer, 110 kHz → Digital analyzer, 48 kHz → Analog analyzer, 22 kHz → Analog analyzer, 110 kHz → Digital analyzer, 48 kHz	2.6.1 **ANLR panel** INSTRUMENT → ANLG 22 kHz → ANLG 110 kHz → DIGITAL

3.10.2.2 Configuration of Analog Analyzers

Command	Parameter	Basic unit	Meaning	Section
INPut[]:**FILT**er[:LPASs]**:FREQ**uency	**<nu>** Query only 2 Hz **|** 10 Hz	Hz	Lower limit frequency for analyzer instruments A22 and D48.	2.6.2 **ANLR panel** Min Freq
SENSe[]:**POW**er:**REF**erence:***RES**istance*	**<nu>** 1 mΩ to 100 kΩ	Ohm	Reference resistance for power units	2.4 (RREF 2.6.2 **ANLR panel** Ref Imped

Command	Parameter	Basic unit	Meaning	Section
INPut[]:***SEL****ect* **INP**ut[1|**2**]:**COUP**ling **INP**ut[1|**2**]:***TYPE*** **INP**ut[1|**2**]:**IMP**edance	***CH1*** ***CH2*** ***CH1A****nd2* ***CH1I****s2* ***CH2I****s1* **AC** **DC** ***BAL****anced* ***GEN1*** ***GEN2*** ***R300*** ***R600*** ***R200K***		→ Only channel 1 active → Only channel 2 active → Channel 1 and 2 active, settings may be different → Channel 1 and 2 active, identical settings Data of channel 1 adopted for channel 2. → Channel 1 and 2 active, identical settings Data of channel 2 adopted for channel 1. Selection of coupling of analyzer input circuit for channels 1 and 2: available in the two analog analyzer instruments only (INST2 A22 | 100). → AC coupling A DC offset of the DUT will not be transmitted and does not therefore affect the DUT. ***Note****:* *A procedure similar to AC coupling can be selected in the digital analyzer for specific measurement functions. Selection is made with menu item DC Suppres ON (SENS:FUNC:DCS ON).* → DC coupling: Test signals up to 0 Hz are picked up and considered in the results of RMS, RMS selective, Peak, Quasi-peak, DC, FFT and Waveform measurements. → Balanced input (XLR connector), see Fig. 2-1/11. For analog instruments only. → Internal connection to generator channel 1. For analog instruments only. → Internal connection to generator channel 2. For analog instruments only. Input impedance for unbalanced input → 300 Ω → 600 Ω → 200 kΩ	2.6.2 **ANLR panel** CHANNEL(s) → 1 → 2 → 1 & 2 → 1 ≡ 2 → 2 ≡ 1 **2.6.2** **ANLR panel** CH1 Coupl CH2 Coupl → AC → DC 2.6.2 **ANLR panel** Input → BAL XLR → GEN1 → GEN2 → GEN CROSSED 2.6.2 **ANLR panel** Imped → 300 Ω → 600 Ω → 200 Ω

Command	Parameter	Basic unit	Meaning	Section
INPut[1|**2**]:**LOW**	**FLO**at **GRO**und		→ Outer conductor of unbalanced. input not connected to instrument ground (PE conductor). → Outer conductor of unbalanced. input connected to instrument ground (PE conductor)	2.6.2 **ANLR panel** Common → FLOAT → GROUND
SENSe[]:**VOLT**age:**RANG**e[1|**2**]:**LOW**er	**<nu>** For value range see 2.6.2 Configuration of the Analog Analyzers	V	Sets a range containing the specified level value. No underrange but higher ranges may be selected.	2.6.2 **ANLR panel** Range → LOWER
SENSe[]:**VOLT**age:**RANG**e[1|**2**]:**AUTO**	**ON** **OFF**		→ Autoranging → The current range is accepted and retained as :UPPer. Corresponds to SENSe[]:VOLTage:RANGe[1|2][:UPPer]<current range>	2.6.22.6.2 **ANLR panel** Range → AUTO
SENSe[]:**VOLT**age:**RANG**e[1|**2**][:UPPer]	**<nu>** For value range see 2.6.2 Configuration of the Analog Analyzers	V	Sets a range containing the specified level value and holds it unconditionally.	2.6.2 **ANLR panel** Range → FIX

3.10.2.3 Configuration of Digital Analyzers

Command	Parameter	Basic unit	Meaning	Section
SENSe:**DIG**ital:**FEED**	***ADAT**a* ***JPH**ase* ***CINP**ut*		Specifies the parameter measured in the analyzer: → Audio content → Demodulated jitter signal in the frequency range 0 to 100 kHz → Common-mode signal of digital inputs measured. Frequency range and measurement function same as with jitter.	2.6.3.1 **ANLR panel** Meas Mode → AUDIO DATA → JITTER/PHAS → COMMON/INP
SENSe**:DIG**ital**:SYNC:REF**erence	***GCL**ock* ***PLLV**ari* ***PLL32*** ***PLL44*** ***PLL48*** ***PLL88*** ***PLL96***		Indicates the signal to which the jitter measurement should be referenced. → The generator clock is the reference for the jitter measurement. This is *only* possible when the generator is also sychronized to the internal generator clock (menu item "Sync To GEN CLK" (SOUR:DIG:SYNC:SOUR GCL) in GENERATOR panel) → Reference signal is the sampling signal derived from the input signal via the internal synchronization PLL. Synchronization is made via the VCO with maximum lock-in range. The capture range is: • with option UPL-B2 (Digital Audio I/O) 27 kHz to 55 kHz • with option UPL-B29 in the Base Rate Mode 40 kHz to 55 kHz • with option UPL-B29 in the High Rate Mode 40 kHz to 106 kHz → Reference signal is the sampling signal derived from the ... → ... input signal via the internal synchronization PLL. Synchronization is ... → ... made via the fixed-frequency VCXO. → only with option UPL-B29 (Digital Audio 96 kHz) ... → ... in the High Rate Mode. Only with Meas Mode JITTER/PHASE (SENS:DIG:FEED JPH) selected.	2.6.3 **ANLR-Panel** Related to → GEN CLK → VARI (PLL) → 32.0 (PLL) → 44.1 (PLL) → 48.0 (PLL) → 88.2 (PLL) → 96.0 (PLL)
INPut**:FILT**er[:**LPAS**s]**:FREQ**uency	**<n>** Query only **10** Hz **|** **20** Hz	Hz	Lower frequency limit of analyzer. For SENS:DIG:FEED ADAT only.	2.6.1 **ANLR panel** Min Freq

<table>
<tr><th>Command</th><th>Parameter</th><th>Basic unit</th><th>Meaning</th><th>Section</th></tr>
<tr><td>INPut[]:SELect</td><td>
CH1
CH2
BOTH</td><td></td><td>For SENS:DIG:FEED ADAT only
→ Only channel 1 active
→ Only channel 2 active
→ Channel 1 and 2 active, identical setting</td><td>2.6.2
2.6.3
ANLR panel
CHANNEL(s)
→ 1
→ 2
→ BOTH</td></tr>
<tr><td>INPut[1|2]:TYPE</td><td>AESebu
SPDif
OPTical
INTern</td><td></td><td>→ AES/EBU interface, for connector see Fig. 2-1/17.
→ S/P DIFF interface, for connector see Fig. 2-1/17.
→ Optical interface, for connector see Fig. 2-1/17.
→ Internal interface for digital generator OPTical and INTern for SENS:DIG:FEED ADAT|PHAS only.</td><td>2.6.3
ANLR panel
Input
→ BAL (XLR)
→ UNBAL (XLR)
→ OPTICAL
→ INTERN</td></tr>
<tr><td>SENSe:DIGital:SYNC:SOURce</td><td>AINPut

RINPut</td><td></td><td>→ The receiver is clocked with the input signal (for SENS:DIG:FEED ADAT|PHAS only).
→ The receiver is clocked with the signal at the reference input (for SENS:DIG:FEED ADAT|JPH only).</td><td>2.6.3
ANLR panel
Sync To
→ AUDIO IN
→ REF IN</td></tr>
</table>

Command	Parameter	Basic unit	Meaning	Section
INPut[]:***SAMP**le:**FREQ**uency:**MODE***	***F32*** ***F44*** ***F48*** ***F88*** ***F96*** ***VAL**ue* ***AUTO*** ***CHST**atus*		Setting the signal clock rate. → Sampling frequency 32 kHz for digital instrument, only with option UPL-B2 (Digital Audio I/O) → Sampling frequency 44.1 kHz for digital instrument → Sampling frequency 48 kHz for digital instrument → Sample frequency 88.2 kHz (only with option UPL-B29 Digital Audio 96 kHz in High Rate Mode CONF:DAI HRM) → Sample frequency 96 kHz (only with option UPL-B29 Digital Audio 96 kHz in High Rate Mode CONF:DAI HRM) → Sampling frequency externally applied. For input values see next command. → Transfer of measured sample frequency. The sample rate is updated if the value varies by more than 0.01%. Smaller variations are ignored. → Transfer of the sample frequency specified in the channel status data. For SENS:DIG:FEED ADAT|PHAS only.	2.6.3 **ANLR panel** Sample Frq → 32 kHz → 44.1 kHz → 48 kHz → 88.2 kHz → 96.0 kHz → VALUE: → AUTO → CHAN STATUS
INPut[]:***SAMP**le:**FREQ**uency*	**<nu>** 27 kHz to 55 kHz 40 kHz to 55 kHz 40 kHz to 106 kHz	Hz	Value of applied sampling frequency with option UPL-B2 (Digital Audio I/O) with option UPL-B29 im Base Rate Mode with option UPL-B29 im High Rate Mode for SENS:DIG:FEED ADAT|PHAS only	2.6.3 **ANLR panel** Sample Frq → VALUE:
INPut[]:***AUD**iobits*	**<n>** For value range see 2.6.3 Configuration of the Digital Analyzer		Word length of audio samples to be analyzed in bits. For SENS:DIG:FEED ADAT|PHAS only	2.6.3 **ANLR panel** Audio Bits

3.10.2.4 Starting the Analyzer, Ext. Sweep

Command	Parameter	Basic unit	Meaning	Section
TRIGger:**SOUR**ce	**IMM**ediate **TIM**er **CH1F**req|**CH2F**req **CH1L**evel |**CH2L**evel **CH1T**rigger|**CH2T**rigg er **TCH**art **CH1R**apidfreq **CH2R**apidfreq **CH1E**dgetrigger **CH2E**dgetrigger		→ Continuous measurement mode w i t h o u t trigger condition → Storing measured values in the buffer at regular intervals. → Collection of measured values due to a variation in frequency found at the ANALYZER input, channel 1 or channel 2. → Collection of measured values due to a variation in level found at the ANALYZER input, channel 1 or channel 2. → Triggers a single measurement as soon as the level is within the range specified by ARM:VOLT:STAR and ARM:VOLT:STOP. → Measured values from the ongoing continuous measurement are entered into a timing diagram at the time interval selected by means of command TRIG:TIM **<nu>**. → External frequency sweep with fast frequency measurement in channel 1 → and channel 2 → Edge-sensitive triggering; a measurement is triggered as soon as the level → enters the interval between ARM:VOLT:START and ARM:VOLT:STOP **for the first time**.	2.6.4 **ANLR panel** START COND → AUTO → TIME → CH1Freq | CH2Freq → CH1Level | CH2Level → LEV TRG CH1| LEV TRG CH2 → TIME CHART → FRQ FST CH1 → FRQ FST CH2 → EDG TRG CH1 → EDG TRG CH2
TRIGger:**DEL**ay	**<nu>** 0 s to 10 s	s	Waiting time after the measurement (settling time for DUT).	2.6.4 **ANLR panel** Delay
TRIGger:**TIM**er	**<nu>** 10 ms to 2000 s	s	Interval between recordings of measured values.	2.6.4 **ANLR panel** Timetick
TRIGger:**COUN**t	**<n>** 2 to 1024		Number of measured values entered into the buffer.	2.6.4 **ANLR panel** Points
ARM:**LEV**el:**MIN**	**<nu>** Analog instruments 10 µV to 1000 V Digital instrument 1µFS to 1.0 FS	V FS	Minimum voltage required for triggering a measurement with external frequency sweep.	2.6.4 **ANLR panel** Min VOLT

Command	Parameter	Basic unit	Meaning	Section
ARM:**FREQ**uency**:STAR**t **ARM:FREQ**uency**:STOP**	**<nu>** Value range determined by instrument or function	Hz	The input frequency must be within the start/stop frequency for triggering the measurement.	2.6.4 **ANLR panel** Start | Stop
ARM:VOLTage**:STAR**t **ARM:VOLT**age:**STOP**	**<nu>** Analog instruments 10 µV to 1000 V Digital instrument 1 µFS to 1.0 FS	V FS	The input level must be within the start/stop voltage limits for triggering a measurement.	2.6.4 **ANLR panel** Start | Stop
TRIGger**:FREQ**uency**:VAR**iation	**<nu>** LL to 50%	PTC	Minimum percentage by which the input frequency must vary for triggering a measurement. LL: The lower limit for the entry of variation is not less than 0.1% and is output such that not more than 1024 measured values are generated (depending on the spacing between start and stop values).	2.6.4 **ANLR panel** Variation
TRIGger**:VOLT**age**:VAR**iation	**<nu>** LL to 900% or LL to 20 dB	PTC	Minimum percentage or dB value by which the input voltage must vary for triggering a measurement. LL: The lower limit for the entry of variation is not less than 0.1% or 0,01 dB and is output such that not more than 1024 measured values are generated (depending on the spacing between start and stop values).	2.6.4 **ANLR panel** Variation

3.10.2.5 Analyzer Functions

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]**:FUNC**tion	***'OFF'***		→ Function measurement off	**2.6.5**
	'RMS'		→ RMS measurement '	**ANLR panel**
	'RMSS**electiv'		→ RMS selective measurement	FUNCTION
	'PEAK'		→ Peak measurement	→ OFF
	'QREak'		→ Quasi-peak measurement	→ RMS & S/N
	'DC'		→ DC measurement	→ RMS SELECT
	'THD'		→ THD measurement	→ PEAK & S/N
	'THDN**sndr'		→ THD+N measurement	→ QPK & S/N
	'MDIS**t'		→ MOD DIST measurement	→ DC
	'DFD'		→ DFD measurement	→ THD
	'WAF'		→ Wow & flutter measurement	→ THD+N/SINAD
	'POL**arity'		→ Polarity measurement	→ MOD DIST
	'FFT'		→ FFT display	→ DFD
	'FILT**ersimulation'		→ Filter simulation	→ WOW & FL
	'WAV**eform'		→ Waveform display	→ POLARITY
	'COH**erence'		→ Coherence Measurement and Transfer Function	→ FFT
	*'**RUBB**uzz'*		→ Loudspeaker measurements	→ FILTER SIM.
	'PROT**ocol'		→ AES/EBU protocol	→ WAVEFORM
	'THIR**doct'		→ Third analysis	→ COHERENCE
				→ RUB & BUZZ
				→ PROTOCOL
				→ THIRD OCT

3.10.2.5.1 Common Parameters for Analyzer Functions

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**TRIG**ger:**SETTl**ing:**MODE** **SENS**e[1]:**FUNC**tion:**SETTl**ing:**MODE** **SENS**e**3**:**FREQ**uency:**SETTl**ing:**MODE** **SENS**e**3**:**PHAS**e:**SETTl**ing:**MODE**	**OFF** **EXP**onential **FLAT** **AVER**age		SENS:TRIG:SETT = Settling process for external triggering SENS:FUNC:SETT = Settling process for measurement function SENS3:FREQ:SETT = Settling process for frequency measurement SENS3:PHAS:SETT = Settling process for phase measurement → OFF → Settling with exponential tolerance and resolution characteristic → Settling with tolerance and resolution band → Arithmetic averaging (not for settling with external triggering)	2.6.5.1 **ANLR panel** Settling → OFF → EXPONENTIAL → FLAT → AVERAGE
SENSe[1]:**TRIG**ger:**SETTl**ing:**COUN**t **SENS**e[1]:**FUNC**tion:**SETTl**ing:**COUN**t **SENS**e**3**:**FREQ**uency:**SETTl**ing:**COUN**t **SENS**e**3**:**PHAS**e:**SETTl**ing:**COUN**t	**<n>** for EXP **|** FLAT: 2 to 6 for AVER: 2 to 100		Number of test points considered in settling. 3 means that the currently measured value is compared with the two preceding results.	2.6.5.1 **ANLR panel** Samples
SENSe[1]:**TRIG**ger:**SETTl**ing:**TOL**erance **SENS**e[1]:**FUNC**tion:**SETTl**ing:**TOL**erance **SENS**e**3**:**FREQ**uency:**SETTl**ing:**TOL**erance	**<n>** 0.001 to 10 %	%	Starting value of exponential tolerance characteristic or tolerance band.	2.6.5.1 **ANLR panel** Tolerance
SENSe[1]:**TRIG**ger:**SETTl**ing:**RES**olution **SENS**e[1]:**FUNC**tion:**SETTl**ing:**RES**olution **SENS**e**3**:**FREQ**uency:**SETTl**ing:**RES**olution **SENS**e**3**:**PHAS**e:**SETTl**ing:**RES**olution	**<nu>** Value range and units are determined by instrument and function see 2.6.5.1	V FS % dB Hz DEG(°)	Starting value of exponential resolution characteristic or resolution band.	2.6.5.1 **ANLR panel** Resolution
SENSe[1]:**FUNC**tion:**SETTl**ing:**TOUT** **SENS**e**3**:**FREQ**uency:**SETTl**ing:**TOUT** **SENS**e**3**:**PHAS**e:**SETTl**ing:**TOUT**	**<nu>** 0.001 to 10 s	s	Maximum settling time If no settled measurement result is achieved within this time, the measurement is aborted and an invalid result is signalled.	2.6.5.1 **ANLR panel** Timeout

Command	Parameter	Basic unit	Meaning	Section
SYSTem:**SPE**aker:**SOUR**ce	**OFF** **INP1** **INP2** **IN1A**nd2 **FNC1** **FNC2** **FN1A**nd2 **AES1** **AES2** **AE1A**nd2		→ Loudspeaker and headphones output switched off. → Aural monitoring of input signal of analog analyzers A22 and A110 on channel 1. The signal is available at both output channels. In the DIGITAL analyzer with option Digital Audio I/O (UPL-B2) in the **Meas Mode JITTER/PHAS** the demodulated jitter signal is applied to the ANLG 110 kHz analyzer and can be listened to. In the DIGITAL analyzer with option Digital Audio I/O (UPL-B2), in the **Meas Mode COMMON/INP** the superimposed common-mode signal is applied to the digital inputs of the ANLG 110 kHz analyzer and can be monitored. → The input signal of the analog analyzer A22 and A110 can be monitored on channel 2. → ... on both channels (stereo). With channel 1 or 2 selected as analyzer input, only the left or, the right headphones output can be used for monitoring. → Aural monitoring of function output of analog analyzer A22 for all measurement functions (except THD+N) for channel 1. → ... for channel 2. → ... for both channels (stereo). → Aural monitoring of left channel of AES/EBU interface of digital analyzer D48 (Option: Digital Audio Protocol Analysis and Generation UPL-B2). → ... of right channel ... → ... of both channels (stereo) ...	2.6.6 **ANLR panel** SPEAKER → OFF → INPUT Ch1 → INPUT JITT → INPUT COMM → INPUT Ch2 → INPUT Ch1&2 → FUNCT Ch1 → FUNCT Ch2 → FUNCT Ch1&2 → DIG Ch1 → DIG Ch2 → DIG Ch1&2
SYSTem:**SPE**aker:**GAIN**	**<nu>** -120 to 120 dB	dB	Amplification or attenuation of function output.	2.6.6 **ANLR panel** Pre Gain
SYSTem:**SPE**aker:**VOL**ume	**<nu>** 0 to 100 %	%	Volume of monitor output	2.6.6 **ANLR panel** Skp Volume
SYSTem:**PHON**e	**SPKC** **PERM**		→ Phones output conforms to loudspeaker setting. → Headphones output permanently switched on.	2.6.6 **ANLR panel** Phone Out → SPKPhone → PERMANENT

Command	Parameter	Basic unit	Meaning	Section
SYSTem:**SPE**aker[:STATe]	**ON** **OFF**		→ Loudspeaker on → Loudspeaker off Command has no effect if option UPL-B5 is not fitted.	2.6.6 **ANLR panel** LOCAL key

3.10.2.5.2 RMS Measurement incl. S/N

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]**:FUNC**tion	***"RMS"***		→ RMS measurement	**2.6.5** **ANLR panel** FUNCTION → RMS & S/N
SENSe[1]:**FUNC**tion:**DCS**uppression	**ON** **OFF**		Suppression of DUT DC in the digital analyzer. → DC not considered; corresponds to AC coupling → DC considered in the measurement and displayed; corresponds to DC coupling	**2.6.5.1** **ANLR panel** DC Suppres → ON → OFF
SENSe[1]**:FUNC**tion**:*SNS**equence***	**ON** **OFF**		→ S/N (signal-to-noise) measurement on → S/N (signal- to-noise) measurement off	2.6.5.1 **ANLR panel** S/N Sequ
SENSe[1][:VOLTage|POWer]**:UNIT**[1|**2**]	see 3.10.4		Display units for RMS measurement	2.4 **ANLR panel** Unit Ch1/CH2

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]**:VOLT**age**:APER**ture**:MODE**	***AFAS**t* ***AUTO*** ***TRIG**gered* ***GENT**rack* ***VAL**ue*		AFASt and AUTO match the measurement time to the signal frequency by taking the signal period into account. The measurement time is matched as far as possible to the input signal. Maximum algorithmic error: → 1% → 1‰. → A special mode is available for **RMS measurements,** permitting a single **delay-free** measurement with selectable measurement time to be carried out as soon as the signal exceeds a set trigger threshold for the first time.In conjunction with the generator burst signal this measurement mode permits the first period of a signal to be measured and is particularly suitable for echo-free measurements on loudspeakers. → Measurement over (at least) one whole period of the generator signal. If required, the generator frequency is matched to the analyzer sampling rate. In the case of high frequencies the measurement time is extended to several periods to increase the measurement accuracy. Particularly suitable for measuring very noisy or distorted signals and for extremely fast sweeps. This measurement method guarantees **maximum measurement accuracy** at **minimum measurement times** and should therefore be **given preference.** If the MODDIST signal is used as generator signal, the measurement time is referred to the LOWER Frequency, which normally dominates. → Numerical entry of measurement time. For entry of values see next command.	2.6.5.2 **ANLR panel** Meas Time → AUTO FAST → AUTO → TRIGGERED → GEN TRACK → VALUE:
SENSe[1]**:VOLT**age**:APER**ture	**<nu>** 1 ms ... For value range see 2.6.5.2 → Meas Time	s	Numerical entry of measurement time. Measurement time for steadying the display.	2.6.5.2 **ANLR panel** Meas Time

Command	Parameter	Basic unit	Meaning	Section
SENSe[1][:VOLTage|POWer]**:REF**erence**:MODE**	***CH1S**tore* ***CH2S**tore* ***CH1M**eas* ***CH2M**eas* ***STOR**e* ***VAL**ue*		→ For a two-channel measurement, the current measurement result of channel 1 is stored as a reference. → For a two-channel measurement, the current measurement result of channel 2 is stored as a reference. → The value measured in channel 1 is used as a reference for the output of results in reference-related units. → The value measured in channel 2 is used as a reference for the output of results in reference-related units. → For a single-channel measurement, the current measurement result is stored as a reference. → The reference value is entered using the next command.	2.6.5.1 **ANLR panel** Reference
SENSe**[1]**[:VOLTage|POWer]**:REF**erence	**<nu>** Analog instrument 100 pV to 1000 V Digital instrument 0.0 to 1.0 FS	V FS	Numerical entry of reference value.	2.6.5.1 **ANLR panel** Reference
SENSe**:SWE**ep**:SYNC**	**NORM**al **BLOC**k		Permits the speed to be increased for 1-dimensional generator frequency sweeps with the universal generator: → normal speed common for all sweeps → sweep speed increased after the 2nd sweep; traces are not updated online but only upon completion of the sweep (all at once). Only available with option UPL-B29 (Digital Audio 96 kHz) in Base Rate Mode (CONF:DAI BRM). In the high rate mode, the sweep can be operated at NORMal speed only.	**2.6.5.1** **ANLR panel** Sweep Mode → NORMAL → BLOCK
SENSe[1]:***NOTCH***[:STATe]	**OFF** **DB0** **DB12** **DB30**		→ Analog notch filter off; → Analog notch filter on; no gain → Analog notch filter on; gain 12 dB → Analog notch filter on; gain 30 dB	2.6.5.1 **ANLR panel** Anlg. Notch → OFF → 0 dB → 12 dB → 30 dB

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:***NOTCh:FREQ***uency:***MODE***	***FIX****ed* ***GENT****rack*		→ For numerical entry of notch-filter center frequency see next command. → The notch-filter center frequency tracks the generator frequency.	2.6.5.1 **ANLR panel** Notch Freq → VALUE: → GEN TRACK
SENSe[1]:***NOTCh:FREQ***uency:***FIX****ed*	**<nu>** for analog instr. 10 Hz to 22.5 kHz	HZ	Numerical center frequency of notch filter. For analog instrument only.	2.6.5.1 **ANLR panel** Notch Freq → VALUE:
SENSe[1]:**FILT**er<i>:.....	<**i**> 1 to 3		See 3.10.3 Selecting the Analyzer Filters	2.7.1 **ANLR panel** Filter
CALCulate:**TRAN**sform:**FREQ**uency:**STATe**	**OFF** **ON**		→ No POST-FFT for the selected measurement function → POST-FFT for selected measurement function: see 2.6.5.12 FFT with the following settings available: CALCulate:TRANsform:FREQuency:FFT S256 to S8K CALCulate:TRANsform:FREQuency:WINDow RECT to KAIS CALCulate:TRANsform:FREQuency:STARt ? CALCulate:TRANsform:FREQuency:STOP ? CALCulate:TRANsform:FREQuency:RESolution? If the group-delay measurement is selected with command SENSe3:FUNCtion FQGRoupdelay, POST-FFT is always active as the frequency information is obtained from FFT.	2.6.5.1 **ANLR panel** POST FFT → OFF → ON
SENSe[1]:**TRIGger**:**SETTling**:**.....**			For settling commands see 3.10.2.5.1 Common Parameters for Analyzer Functions	2.3.4.2 **ANLR panel** Fnct Settl

3.10.2.5.3 Selective RMS Measurement incl. Sweep

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FUNC**tion	"***RMSS****electiv***"		Selective RMS measurement	**2.6.5** **ANLR panel** FUNCTION → RMS SELECT
SENSe[1]:**FUNC**tion:**DCS**uppression	**ON** **OFF**		Suppression of DUT DC in the digital analyzer. → DC not considered; corresponds to AC coupling → DC considered in the measurement and displayed; corresponds to DC coupling	**2.6.5.1** **ANLR panel** DC Suppres → ON → OFF
SENSe[1][:VOLTage|POWer]**:UNIT**[1|**2**]	see 3.10.4 Units for IEC Measurement Results		Display units for RMS measurement	2.4 **ANLR panel** Unit Ch1/CH2
SENSe[1]:**VOLT**age:**APER**ture:**MODE**	***AFAS****t* ***AUTO*** ***GENT****rack* ***VAL****ue*		AFASt and AUTO: Automatic matching of measurement time to the signal frequency taking the signal period into account. The measurement time is matched as far as possible to the input signal. Maximum algorithmic error → 1% → 1‰ → Measurement over (at least) one whole period of the generator signal. If required, the generator frequency is matched to the analyzer sampling rate. In the case of high frequencies the measurement time is extended to several periods to increase the measurement accuracy. Particularly suitable for measuring very noisy or distorted signals and for extremely fast sweeps. This measurement method guarantees **maximum measurement accuracy** at **minimum measurement times** and should therefore be **given preference**. If the MODDIST signal is used as generator signal, the measurement time is referred to the LOWER Frequency, which normally dominates. → Numerical entry of measurement time. For entry of values see next command.	2.6.5.3 **ANLR panel** Meas Time → AUTO FAST → AUTO → GEN TRACK → VALUE
SENSe[1]:**VOLT**age:**APER**ture	**<nu>** 10 µs to 10s	s	Numerical entry of measurement time. Measurement time for steadying the display.	2.6.5.3 **ANLR panel** Meas Time

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**BWID**th[**:RES**olution]:**MODE** equivalent to **SENS**e[1]:**BANDwid**th[**:RES**olution]**:MODE**	***PPCT1*** ***PPCT3*** ***PTOC**t* ***POCT1**2* ***PFIX*** ***PFAS**t* ***SPCT1*** ***SPCT3*** ***STOC**t* ***SOCT1**2* ***SFIX*** ***SFAS**t*		Bandwidth of bandpass or bandstop of selective RMS filter. Parameter starting with P ... = bandpass S ... = bandstop **PFASt** **SFASt:** Bandstop filter with only 40 dB attenuation, third-octave bandwidth and particularly short settling time.	2.6.5.3 **ANLR panel** Bandwidth → BP 1% → BP 3 % → BP 1/3 OCT → BP 1/12 OCT → BP FIX: → **BP FAST** → BS 1% → BS 3 % → BS 1/3 OCT → BS 1/12 OCT → BS FIX: → **BS FAST**
SENSe[1]:**BWID**th[**:RES**olution] equivalent to **SENS**e[1]:**BAND**width[**:RES**olution]	**<nu>** Value range determined by instrument or function	Hz	Numerical entry of arithmetically symmetrical bandwidth.	2.6.5.3 **ANLR panel** Bandwidth
SENSe[1][:VOLTage|POWer]:**REF**erence:**MODE**	***CH1S**tore* ***CH2S**tore* ***CH1M**eas* ***CH2M**eas* ***STOR**e* ***GENT**rack* ***VAL**ue*		→ For a two-channel measurement, the current measurement result of channel 1 is stored as a reference. → For a two-channel measurement, the current measurement result of channel 2 is stored as a reference. → The value measured in channel 1 is used as a reference for the output of results in reference-related units. → The value measured in channel 2 is used as a reference for the output of results in reference-related units. → For a single-channel measurement, the current measurement result is stored as a reference. → The currently set generator output level is used as a reference. Using the subsequent command SENS:FREQ:FACT <n> the bandpass filter of the RMS SEL measurement in the Freq Mode GENTRACK can be set to any multiple of the fundamental. This allows single harmonics to be measured. → The reference value is entered using the next command.	2.6.5.1 **ANLR panel** Reference → STORE CH1 → STORE CH2 → MEAS CH1 → MEAS CH2 → STORE → GEN TRACK → VALUE:

Command	Parameter	Basic unit	Meaning	Section
SENSe[1][:VOLTage|POWer]:**REF**erence	**<nu>** Analog instruments 100 pV to 1000 V Digital instrument 0.0 to 1.0 FS	V FS	Numerical entry of reference value.	2.6.5.1 **ANLR panel** Reference

Sweep for selective RMS measurement

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FREQ**uency:**MODE**	**FIX**ed|**CW** **SWE**ep **LIST** ***MULT**isine* ***GENT**rack* ***CH1*** ***CH2***		→ Presetting for fixed frequency of selective RMS measurement. Numerical entry with SENSe[1]:FREQuency[:FIXed|:CW]**<nu>** → Frequency sweep of selective RMS measurement. The sweep parameters are determined by the following user specifications: SENSe[1]:FREQuency:STARt|STOP **<nu>** SENSe[1]:SWEep:SPACing LINear|LOGarithmic SENSe[1]:SWEep:STEP **<nu>** SENSe[1]:SWEep:POINts <n> → List sweep of frequency of selective RMS measurement. The sweep parameters are read from the file specified under MMEMory:LOAD:LIST FREQuency, "filename" For format of block/list files see 2.9.1.3 Format of Block/Listen Data. → The frequency of the selective RMS measurement is set consecutively to the multisine frequencies specified in the generator panel (see 2.5.4.4 MULTISINE). The sweep is similar to a LIST sweep. → The frequency of the selective RMS measurement tracks the current generator frequency. By means of the factor (see next command SENS:FREQ:FACT <n>) it can be determined whether the center frequency should directly track the generator frequency (factor = 1) or be a multiple thereof. If the factor is an integral multiple, it may be used for measuring single harmonics. The bandpass center frequency can be tracked to the generator signal functions SINE, MULTISINE, BURST or SINE2 PULSE“, only; any other signal function causes an error message. The frequency of the selective RMS measurement tracks the frequency measured in → channel 1 → channel 2.	2.6.5.3 **ANLR panel** SWEEP CTRL → OFF → AUTO SWEEP MANU SWEEP → AUTO LIST MANU LIST →GEN MLTSINE FREQ MODE → GEN TRACK → FREQ CH1 → FREQ CH2
SENSe:**FREQ**uency:**FACT**or	**<nu>** MLT 1 to 20 for RMS selective measurements		Factor by which the tracking bandpass filter is higher than the generator frequency with setting GENTRACK (SENS:FREQ:MODE GENT).	**2.6.5.3** **ANLR panel** FREQ MODE → Factor

Command	Parameter	Basic unit	Meaning	Section
SENSe**:SWE**ep**:SYNC**	**NORM**al **FAST** **BLOC**k		Permits the speed of 1-dimensional sweeps with the universal generator to be increased. → Normal speed used for any kind of sweep → Sweep speed increased as from 2nd sweep → Sweep speed increased again as from 2nd sweep; update of curve not online but only upon completion of the sweep (all at once). Only available with option UPL-B29 (Digital Audio 96 kHz) in Base Rate Mode (CONF:DAI BRM). In the high rate mode, the sweep can be operated at NORMal speed only.	**2.6.5.3** **ANLR panel** Sweep Mode → NORMAL → FAST → BLOCK
SENSe[1]:***NOTCh***[:STATe]	**DB12** **DB30** **DB0** **OFF**		→ Analog notch filter on; gain 12 dB → Analog notch filter on; gain 30 dB → Analog notch filter on; no gain → Analog notch filter off. The notch filter can only be set in the analog instruments when a bandstop filter has been selected for SENS:BWID:MODE.	2.6.5.1 **ANLR panel** Anlg. Notch → 12 dB Auto → 30 dB Auto → 0 dB → OFF
SENSe[1]:**FILT**er**2**:.....			See 3.10.3 Selecting the Analyzer Filters Particularly when monitoring weak residual signals amplified by means of Pre Gain, a highpass filter should be used for DC suppression to avoid the signal to be distorted or suppressed altogether. In conjunction with a selective RMS measurement **filter No. 2 must** be selected as filter No. 1 is already used in the UPL as a selective RMS bandpass or bandstop filter. 3.10.3 Selecting the Analyzer Filters	2.7.1 **ANLR panel** Filter
SENSe[1]:**FREQ**uency[:FIXed|CW]	**<nu>** Value range determined by instrument or function	Hz	Numerical entry of frequency for selective RMS measurement.	2.6.5.3 **ANLR panel** FREQ MODE → FIX
SENSe[1]:**SWE**ep:**MODE**	**AUTO** **MAN**ual		Automatic sweep → This command in conjunction with command SENSe[1]:FREQuency:MODe SWEep sets the AUTO SWEEP mode. → This command in conjunction with command SENSe[1]:FREQuency:MODe SWEep sets the MANU SWEEP mode. Pressing the LOCAL key activates the spinwheel.	2.6.5.3 **ANLR panel** SWEEP CTRL → AUTO SWEEP → MANU SWEEP

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**LIST**:**MODE**	**AUTO** **MAN**ual		Automatic list sweep → This command in conjunction with command SENSe[1]:FREQuency:MODe LIST sets the AUTO LIST mode. → This command in conjunction with command SENSe[1]:FREQuency:MODe SWEep sets the MANU LIST mode. Pressing the LOCAL key activates the spinwheel.	2.6.5.3 **ANLR panel** SWEEP CTRL → AUTO LIST → MANU LIST
SENSe[1]:**FREQ**uency:**STAR**t **SENS**e[1]:**FREQ**uency:**STOP**	**<nu>** Value range determined by instrument or function	Hz	Start and stop frequency for frequency sweep of selective RMS measurement.	2.6.5.3 **ANLR panel** SWEEP CTRL → Start | Stop
SENSe[1]:**SWE**ep:**SPAC**ing	**LIN**ear **LOG**arithmic		→ Linear sweep spacing → Logarithmic sweep spacing	2.6.5.3 **ANLR panel** Spacing → LIN → LOG
SENSe[1]:**SWE**ep:**POIN**ts	**<n>** 2 to 1024		Number of sweep steps. Depending on the selected SPACing (SENSe[1]:SWEep:SPACing LINear|LOGarithmic), the sweep frequency range between "STARt" and "STOP" is divided into <n> linear or logarithmic sweep points.	2.6.5.3 **ANLR panel** Points
SENSe[1]:**SWE**ep:**STEP**	**<nu>** | **<n>** The selected step size should be so wide that not more than 1023 single steps (= 1024 sweep points) are obtained. It should not exceed the absolute difference between STOP and STARt. →		Sweep step size Depending on selected SPACing SENSe[1]:SWEep:SPACing LINear|LOGarithmic, the sweep frequency range between "STARt" and "STOP" is divided into linear steps in Hz or logarithmic steps in the form of a multiplier. SENSe[1]:SWEep:SPACing LINear: Hz SENSe[1]:SWEep:SPACing LOGarithmic: No unit because of multiplication factor.	2.6.5.3 **ANLR panel** Steps

Command	Parameter	Basic unit	Meaning	Section
MMEMory:**LOAD:*LIST***	**FREQ**ency,**"filename"** = path and filename of frequency list for a LIST sweep of a selective RMS measurement, eg "c:\UPL\ref\swpflst.lst"		Loading a frequency list for the list sweep.	2.6.5.3 2.9.1.3 **ANLR panel** SWEEP CTRL → Filename
SENSe[1]:**FUNC**tion:**SETT**ling:.....			For settling commands see 3.10.2.5.1 Common Parameters for Analyzer Functions	2.3.4.2 **ANLR panel** Fnct Settl

3.10.2.5.4 Peak and Quasi-Peak Measurement incl. S/N

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FUNC**tion	"***PEAK***"		→ Peak measurement	**2.6.5** **ANLR panel** FUNCTION → PEAK & S/N
SENSe[1]:**FUNC**tion	"***QPE**ak*"		→ Quasi-peak measurement	**2.6.5** **ANLR panel** FUNCTION → QPK & S/N
SENSe[1][:VOLTage|POWer]**:UNIT**[1|**2**]	see 3.10.4 Units for IEC Measurement Results		Display units for RMS measurement	2.4 **ANLR panel** Unit Ch1/CH2
SENSe[1]:**FUNC**tion:***SNS**equence*	**ON** **OFF**		→ S/N (signal-to-noise) measurement on. → S/N (signal-to-noise) measurement off.	2.6.5.1 **ANLR panel** S/N Sequ → ON → OFF
SENSe[1]:**FUNC**tion:***MMOD**e*	***PPE**ak* ***NPE**ak* ***PTOP**eak* ***PABS**olut*		→ PK+ value → PK- value → Peak-to-peak value → Absolute peak value	2.6.5.4 **ANLR panel** Meas Mode → PK + → PK - → PK to PK → PK abs
SENSe[1]:**VOLT**age:***INTV**time:***MODE**	***SFAS**t* ***FAST*** ***SLOW*** ***FIX**ed* ***VAL**ue*		→ 50 ms → 200 ms monitoring interval for **peak** search → 1000 ms → s monitoring interval for **quasi-peak** search → Numerical entry of interval time. For entry of values see next command.	2.6.5.4 **ANLR panel** Intv Time → FIX 50ms → FIX 200ms → FIX 1000ms → FIX 3 SEC → VALUE:

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**VOLT**age:***INTV****time***	**<nu>** 20 ms to 10s	s	Numerical entry of interval time. Monitoring interval for peak search	2.6.5.4 **ANLR panel** Intv Time
SENSe[1][:VOLTage|POWer]:**REF**erence:**MODE**	***CH1S****tore* ***CH2S****tore* ***CH1M****eas* ***CH2M****eas* ***STOR****e* ***GENTrack*** ***VAL****ue*		→ For a two-channel measurement, the current measurement result of channel 1 is stored as a reference. → For a two-channel measurement, the current measurement result of channel 2 is stored as a reference. → The value measured of channel 1 is used as a reference for theresults in reference-related units. → The value measured of channel 2 is used as a reference for the results in reference-related units. → For a single-channel measurement, the current measurement result is stored as a reference. → The currently set generator output level is used as a reference. → The reference value is entered using the next command.	2.6.5.1 **ANLR panel** Reference → STORE CH1 → STORE CH2 → MEAS CH1 → MEAS CH2 → STORE → GEN TRACK → VALUE:
SENSe[1][:VOLTage|POWer]**:REF**erence	**<nu>** Analog instrument 100 pV to 1000V Digital instrument 0.0 to 1.0 FS	V FS	Numerical entry of reference value.	2.6.5.1 **ANLR panel** Reference
SENSe[1]:***NOTCh***[:STATe]	**DB0** **DB12** **DB30** **OFF**		→ Analog notch filter on; no gain → Analog notch filter on; gain 12 dB → Analog notch filter on; gain 30 dB → Analog notch filter off;	2.6.5.1 **ANLR panel** Anlg. Notch → 0 dB → 12 dB → 30 dB → OFF
SENSe[1]:***NOTCh:FREQuency:MODE***	***FIX****ed* ***GENT****rack*		→ For numerical entry of notch-filter center frequency see next command. → The center frequency of the notch filter tracks the generator frequency.	2.6.5.1 **ANLR panel** Notch Freq → VALUE: → GEN TRACK

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:***NOTC**h*:***FREQ**uency*:***FIX**ed*	**<nu>** for analog instr. 10 Hz to 22.5 kHz	Hz	Numerical center frequency of notch filter.	2.6.5.1 **ANLR panel** Notch Freq → VALUE:
SENSe[1]:**FILT**er<i>:.....	<i> 1 to 3		See 3.10.3 Selecting the Analyzer Filters Only available with option UPL-B29 (Digital Audio 96 kHz) in Base Rate Mode (CONF:DAI BRM). In the high rate mode (CONF:DAI HRM), the measurement functions PEAK and QPEak can be operated without filter.	2.7.1 **ANLR panel** Filter
SENSe[1]:**FUNC**tion:**SETTl**ing:.....			For settling commands see 3.10.2.5.1 Common Parameters for Analyzer Functions	2.3.4.2 **ANLR panel** Fnct Settl

3.10.2.5.5 DC Measurement

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FUNC**tion	***"DC"***		→ DC measurement	**2.6.5** **ANLR panel** FUNCTION → DC
SENSe[1][:VOLTage|POWer]**:UNIT**[1|**2**]	see 3.10.4 Units for IEC Measurement Results		Display units for RMS measurement	2.4 **ANLR panel** Unit Ch1/CH2
SENSe[1]:**VOLT**age:**APER**ture:**MODE**	***FAST*** ***VAL**ue*		→ 200 ms integration time for steadying the display. → Numerical entry of integration time. For entry of values see next command.	2.6.5.5 **ANLR panel** Meas Time → FIX 200ms → VALUE:
SENSe[1][:VOLTage|POWer]**:REF**erence***:MODE***	***CH1S**tore*** ***CH2S**tore*** ***CH1M**eas*** ***CH2M**eas*** ***STOR**e*** ***GENT**rack*** ***VAL**ue***		→ For a two-channel measurement, the current measurement result of channel 1 is stored as a reference. → For a two-channel measurement, the current measurement result of channel 2 is stored as a reference. → The value measured of channel 1 is used as a reference for the results in reference-related units. → The value measured of channel 2 is used as a reference for the results in reference-related units. → For a single-channel measurement, the current measurement result is stored as a reference. → The currently set generator output level is used as a reference. → The reference unit is specified by the next command.	2.6.5.1 **ANLR panel** Reference → STORE CH1 → STORE CH2 → MEAS CH1 → MEAS CH2 → STORE → GEN TRACK → VALUE:
SENSe[1][:VOLTage|POWer]**:REF**erence	**<nu>** Analog instrument - 1000 V to 1000 V	V	Numerical entry of reference value.	2.6.5.1 **ANLR panel** Reference
SENSe[1]:**FUNC**tion:**SETTL**ing:.....			For settling commands see 3.10.2.5.1 Common Parameters for Analyzer Functions	2.3.4.2 **ANLR panel** Fnct Settl

3.10.2.5.6 THD Measurement

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FUNC**tion	"***THD***"		THD measurement	**2.6.5** **ANLR panel** FUNCTION → THD
SENSe[1]:**FUNC**tion:***MMOD***e	***SEL***ectdi ***LSEL***ectdi ***DALL*** ***LDAL***l ***DODD*** ***LDOD***d ***DEV***en ***LDEV***en		→ Any combination of harmonics from d2 to d9 can be set with the → following command. Result in dB Result in V (analog) or FS (digital) → Selection of harmonics to be measured: → All harmonics from d2 to d9 Result in dB Result in V (analog) or FS (digital) → All uneven harmonics: → d3, d5, d7, d9 Result in dB Result in V (analog) or FS (digital) → All even harmonics: → d2, d4, d6, d8 Result in dB Result in V (analog) or FS (digital)	2.6.5.6 **ANLR panel** Meas Mode →SELECT di → LEV SEL di → All di → LEV All di → All odd di → LEV odd di → All even di → LEV even di
SENSe[1]:**FUNC**tion:***DIST***ortion	**<n>** *)		Decimal equivalent of integer <n> for any combination of harmonics, eg d2, d4, d6, d9, is desired; binary: 10010101; decimal equivalent <n> = 149	2.6.5.6 **ANLR panel** → di2468
SENSe[1]:**FUNC**tion:**DMOD**e	**FAST** **PREC**ision		→ Analog notch switched off. → Analog notch switched on when the applied signal is of good quality.	2.6.5.6 **ANLR panel** Dyn Mode → FAST → PRECISION
SENSe[1]:**UNIT**	**PCT**|**DB**		Display units for results of THD measurements.	2.4 **ANLR panel** Unit

Command	Parameter	Basic unit	Meaning	Section
SENSE[1][:VOLTage|POWer]**:REF**erence	**<nu>** Analog Instruments: 100 pV to 1000 V Digital Instrument: 100 pFS to 100 FS	V FS	Numerical entry of reference value in reference-related level units. SENS:FUNC:MMOD LSEL | LDAL | LDOD | LDEV	2.6.5.1 **ANLR panel** Ref Volt
SENSe[1]:**VOLT**age:***FUND****amental*:MODE**	***AUTO*** ***VAL****ue*		Determining the fundamental frequency: Automatically by frequency measurement. Numerical entry of fundamental frequency. For entry of values see next command.	2.6.5.6 **ANLR panel** Fundamentl
SENSe[1]:**VOLT**age:***FUND****amental*	**<nu>** Value range determined by instrument or function	Hz	Numerical entry	2.6.5.6 **ANLR panel** Fundamentl
SENSe[1]:**FUNC**tion:**SETTl**ing:.....			For settling command see 3.10.2.5.1 Common Parameters for Analyzer Functions	2.3.4.2 **ANLR panel** Fnct Settl

*)

MSB							LSB	Data bit
di9	di8	di7	di6	di5	di4	di3	di2	Harmonics
128	64	32	16	8	4	2	1	Weighting

Example: di1, di3, di5 and di7
Data word: 10101010
Weighting = 2+8+32+128
Decimal equivalent: =170

3.10.2.5.7 THD + N / Sinad Measurement

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FUNC**tion	"***THDN****sndr*"		→ THD+N measurement	**2.6.5** **ANLR panel** FUNCTION → THD+N/SINAD
SENSe[1]:**FUNC**tion:***MMOD****e*	***THDN*** ***LTHD****n* ***SNDR****atio* ***NOIS****e* ***LNO****ise*		Result display as → THD+N value in dB → THD+N RMS value in V (analog) or FS (digital) → SINAD value in negative dB → Same as THD+N but without harmonics weighting, in dB → Same as THD+N RMS value but without harmonics weighting, in V (analog) or FS (digital)	2.6.5.7 **ANLR panel** Meas Mode →THD+N → LEVEL THD+N → SINAD → NOISE → LEVEL NOISE
SENSe[1]:**FUNC**tion:**DMOD**e	**FAST** **PREC**ision		→ Analog notch filter switched off. → Analog notch filter switched on when the applied signal is of good quality.	2.6.5.7 **ANLR panel** Dyn Mode → FAST → PRECISION
SENSe:**FUNC**tion:**APER**ture:**MODE**	**SLOW** **FAST** **SFAS**t		Selection of measurement speed → Measurement using FFT size 8192 → Measurement using FFT size 2048 → Measurement using FFT size 512	**2.6.5.7** **ANLR panel** Meas Time → SLOW → FAST → SUPERFAST
SENSe[1]:***THDN***:***REJ****ection*	***NARR****ow* ***WIDE***		Sets the characteristic of the notch filter in the digital instrument. → The noise is measured close to the carrier. → An two-pole notch filter is additionally taken into account to evaluate attenuated harmonics in the vicinity of the carrier.	2.6.5.7 **ANLR panel** Rejection → NARROW → WIDE
SENSe[1]:**UNIT**	**PCT**|**DB**		Display units for results of THD+N measurement	2.4 **ANLR panel** Unit

Command	Parameter	Basic unit	Meaning	Section
SENSe[1][:VOLTage|POWer]:**REF**erence	**<nu>** Analog Instruments: 100 pV to 1000 V Digital Instrument: 100 pFS to 100 FS	V FS	Numerical entry of reference value for measurement response in reference-related level units for the setting SENS:FUNC:MMOD LTHD | LNO	**2.6.5.1** **ANLR-Panel** Ref Volt
SENSe[1]:**VOLT**age:***FUND**amental:**MODE***	***AUTO*** ***VAL**ue*		Determining the fundamental frequency: → Automatically by frequency measurement. → Numerical entry of fundamental frequency. For entry of values see next command.	2.6.5.7 **ANLR panel** Fundamentl → AUTO → VALUE:
SENSe[1]:**VOLT**age:***FUND**amental*	**<nu>** Value range determined by instrument or function	Hz	Numerical entry of fundamental frequency	2.6.5.7 **ANLR panel** Fundamentl
SENSe[1]:**FILT**er1:.....			See 3.10.3 Selecting the Analyzer Filters	2.7.1 **ANLR panel** Fnct Settl
CALCulate:**TRAN**sform:**FREQ**uency:**STATe**	**OFF** **ON**		→ No POST-FFT for the selected measurement function → POST-FFT for selected measurement function (see 3.10.2.5.12 FFT) CALC:TRAN:FREQ:FT S256 to S8K CALC:TRAN:FREQ:WIND RECT to KAIS CALC:TRAN:FREQ:STAR? CALC:TRAN:FREQ:STOP? CALCe:TRAN:FREQ:RES?	2.6.5.1 **ANLR panel** POST FFT → OFF → ON
CALCulate:**TRAN**sform:**FREQ**uency:***FFT***	***S512*** ***S1K*** ***S2K*** ***S4K*** ***S8K***		FFT Size → 512 lines → 1024 lines → 2048 lines → 4096 lines → 8192 lines	**2.6.5.12** **ANLR-Panel** FFT Size → 512 → 1024 → 2048 → 4096 → 8192

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FREQ**uency:***LIMi****t*:***UPP****er*	**<nu>** Value range determined by instrument or function	Hz	Upper band limit for THD+N measurement function	2.6.5.7 **ANLR panel** → Frq Lim Upp
SENSe[1]:**FREQ**uency:***LIMi****t*:***LOW****er*	**<nu>** Value range determined by instrument or function	Hz	Lower band limit for THD+N measurement function	2.6.5.7 **ANLR panel** → Frq Lim Low
SENSe[1]:**FUNC**tion:**SETTl**ing:.....			For settling commands see 3.10.2.5.1 Common Parameters for Analyzer Functions	2.7.1 **ANLR panel** Fnct Settl
SENSe**:VOLT**age**:EQU**alize[:STATe]	**ON** **OFF**		Activation/deactivation of an equalizer table consisting of frequency information and associated voltage gain factors. → The equalizer is switched on. The command that follows is accepted. The THD+N value is calculated from the equalized FFT spectrum. → The equalizer is switched off. The THD+N value is calculated from the original FFT spectrum.	2.6.5.7 **ANL Panel** Equalizer → ON → OFF
MMEMory:**LOAD**:**LIST SENS**e,	**'filename'**		Command for entering the name of the equalizer file. Only permissible with SENS:VOLT:EQU ON	2.6.5.7 **ANL Panel** Equal. file

3.10.2.5.8 MOD DIST

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FUNC**tion	**"*MDISt*"**		MOD-DIST measurement. Measurement with double-sine (similar to SMPTE)	**2.6.5** **ANLR panel** FUNCTION → MODDIST
SENSe[1]:**FUNC**tion:**DMOD**e	**FAST** **PREC**ision		→ Analog notch filter switched off. → Analog notch filter switched on if the applied signal is of good quality.	2.6.5.8 **ANLR panel** Dyn Mode → FAST → PRECISION
SENSe[1]:**UNIT**	**PCT**|**DB**		Display units for results of MOD-DIST measurement.	2.4 **ANLR panel** Unit
SENSe[1]:**FUNC**tion:**SETTl**ing:.....			For settling commands see 3.10.2.5.1 Common Parameters for Analyzer Functions	2.3.4.2 **ANLR panel** Fnct Settl

3.10.2.5.9 DFD

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FUNC**tion	***"DFD"***		→ Difference frequency distortion measurement	**2.6.5** **ANLR panel** FUNCTION → DFD
SENSe[1]:**UNIT**	**PCT**|**DB**		Display units for results of DFD measurement	2.4 **ANLR panel** Unit
SENSe[1]:**FUNC**tion:***MMOD***e	***D2*** ***D3***		→ Intermodulation distortion d2 → Intermodulation distortion d3	2.6.5.9 **ANLR panel** Meas Mode → d2 (IEC268) → d3 (IEC268) → d2 (IEC118) → d3 (IEC118)
SENSe[1]:**FUNC**tion:**DMOD**e	**FAST** **PREC**ision		→ Analog notch filter switched off. → Analog notch filter switched on if the applied signal is of good quality.	2.6.5.9 **ANLR panel** Dyn Mode → FAST → PRECISION
SENSe[1]:**FUNC**tion:**SETT**ling:.....			For settling commands see 3.10.2.5.1 Common Parameters for Analyzer Functions	2.3.4.2 **ANLR panel** Fnct Settl

3.10.2.5.10 Wow & Flutter

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FUNC**tion	***"WAF"***		→ Wow & flutter measurement	**2.6.5** **ANLR panel** FUNCTION → WOW & FL
SENSe[1]:**FUNC**tion:***STAN****dard* ***NAB*** ***JIS*** ***DIN****iec* ***SI05*** ***SI10***			→ W&F acc. to NAB → W&F acc. to JIS → W&F acc. to DIN/IEC → W&F, 2-sigma, 5 s. → W&F, 2-sigma, 10 s	2.6.5.10 **ANLR panel** Rule → NAB → JIS → DIN/IEC → 2 Sigma 5 s → 2 Sigma 10s
SENSe[1]:**FUNC**tion:***WEIG****hting* ***ON*** ***OFF***			→ W&F weighting filter on → W&F weighting filter off	2.6.5.10 **ANLR panel** Weighting → ON → OFF
SENSe[1]:**UNIT** **PCT**			No further display unit selectable.	2.4 **ANLR panel** Unit
CALCulate:**TRAN**sform:**FREQ**uency:**STATe** **OFF** **ON**			→ No POST-FFT for selected measurement function → POST-FFT for selected measurement function (see 3.10.2.5.12 FFT) CALC:TRAN:FREQ:FFT S256 to S8K CALC:TRAN:FREQ:WIND RECT to KAIS CALC:TRAN:FREQ:STAR? CALC:TRAN:FREQ:STOP? CALC:TRAN:FREQ:RES?	2.6.5.1 **ANLR panel** POST FFT → OFF → ON
SENSe[1]:**FUNC**tion:**SETT**ling:.....			For settling commands see 3.10.2.5.1 Common Parameters for Analyzer Functions	2.3.4.2 **ANLR panel** Fnct Settl

3.10.2.5.11 POLARITY

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FUNC**tion	"***POL**arity*"		→ Polarity test of DUT.	**2.6.5** **ANLR panel** FUNCTION → POLARITY

3.10.2.5.12 FFT

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FUNC**tion	"***FFT***"		→ FFT measurement function	2.6.5.12 **ANLR panel** Function → FFT
SENSe[1]:**FUNC**tion:**DCS**uppression	**ON** **OFF**		Suppression of DUT DC in the digital analyzer. → DC not considered; corresponds to AC coupling → DC considered in the measurement and displayed; corresponds to DC coupling	**2.6.5.1** **ANLR panel** DC Suppres → ON → OFF
SENSe[1][:VOLTage|POWer]**:UNIT**[1|**2**]	see 3.10.4 Units for IEC Measurement Results		Display units for RMS measurement	2.4 **ANLR panel** Unit Ch1/CH2

Command	Parameter	Basic unit	Meaning	Section
SENSe[1][:VOLTage|POWer]**:REF**erence**:MODE**	***CH1S**tore* ***CH2S**tore* ***CH1M**eas* ***CH2M**eas* ***STOR**e* ***GENT**rack* ***VAL**ue*		→ For a two-channel measurement, the current measurement result of channel 1 is stored as a reference. → For a two-channel measurement, the current measurement result of channel 2 is stored as a reference. → The value measured of channel 1 is used as a reference for the results in reference-related units. → The value measured of channel 2 is used as a reference for the results in reference-related units. → For a single-channel measurement, the current measurement result is stored as a reference. → The currently set generator output level is used as a reference. → The reference unit is specified by the next command.	2.6.5.1 **ANLR panel** Reference → STORE CH1 → STORE CH2 → MEAS CH1 → MEAS CH2 → STORE → GEN TRACK → VALUE:
SENSe[1][:VOLTage|POWer]**:REF**erence	**<nu>** Value range determined by instrument or function	V FS	Numerical entry of reference value.	2.6.5.1 **ANLR panel** Reference
SENSe[1]:**CHAN**nel:**DEL**ay	**<nu>** -10 to 10 s	s	Interchannel delay Delay compensation of the DUT by entering the time by which channel 1 is to be delayed with respect to channel 2. If channel 2 has a shorter delay than channel 1, this can be compensated for by entering a negative value. Available only for for two-channel measurements in instruments A22 and D48 and Zoom FFT off ("CALC:TRAN:FREQ:ZOOM 1")	**2.6.5.12** **ANLR-Panel** Chan Delay
SENSe[1]:***NOTCh***[:STATe]	**DB12** **DB30** **DB0** **OFF**		→ Analog notch filter on; gain 12 dB → Analog notch filter on; gain 30 dB → Analog notch filter on; no gain → Analog notch filter off;	2.6.5.1 **ANLR panel** Anlg. Notch → 0 dB → 12 dB → 30 dB → OFF

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:***NOTCh:FREQ***uency:**MODE**	***FIX**ed* ***GENT**rack*		→ For numerical entry of notch-filter center frequency see next command. → Center frequency of notch filter tracks the generator frequency.	2.6.5.1 **ANLR panel** Notch Freq → VALUE: → GEN TRACK
SENSe[1]:***NOTCh:FREQ***uency:*** FIX**ed**	**<nu>** Value range determined by instrument or function	HZ	Numerical entry of notch-filter center frequency.	2.6.5.1 **ANLR panel** Notch Freq → VALUE:
SENSe[1]:**FILT**er**<i>**:...	**<i>** 1 to 3		See 3.10.3 Selecting the Analyzer Filters The three filters are available with: • Analyzer ANLG 22 kHz (INST2 A22) or • Analyzer DIGITAL (INST2 D48) in Meas Mode AUDIO DATA (SENS:DIG:FEED ADAT) No filter can be switched on: • Analyzer ANLG 110kHz • Option UPL-B29 (Digital Audio 96 kHz) in high rate mode (CONF:DAI HRM)	2.7.1 **ANLR-Panel** Filter
CALCulate:**TRAN**sform:**FREQ**uency:***FFT***	***S256*** ***S512*** ***S1K*** ***S2K*** ***S4K*** ***S8K***		FFT size → 256 lines → 512 lines → 1024 lines → 2048 lines → 4096 lines → 8192 lines	2.6.5.12 **ANLR panel** FFT Size → 256 → 512 → 1024 → 2048 → 4096 → 8192
CALCulate:**TRAN**sform:**FREQ**uency: ***AVER**age*	**<n>** 1 to 256		Number of averaging procedures for optimum noise suppression.	2.6.5.12 **ANLR panel** Average

Command	Parameter	Basic unit	Meaning	Section
CALCulate:**TRAN**sform:**FREQ**uency**:AVER**age:**TCON**trol	**NORM**al **EXP**onential		→ The specified number of FFTs is performed, intermediate results are added and then divided by this number. → Averaging is performed continuously.	2.6.5.12 **ANLR panel** Avg Mode → NORMAL → EXPONENTIAL
CALCulate:**TRAN**sform:**FREQ**uency:**STAR**t? **CALC**ulate:**TRAN**sform:**FREQ**uency:**STOP**?	**<nu>** Query only		Queries the beginning and end of FFT, depending on CENTer and SPAN. The response is **<nu>** in Hz.	2.6.5.12 **ANLR panel** Start / Stop
CALCulate:**TRAN**sform:**FREQ**uency:**CENT**er	**<nu>** Value range determined by instrument or function	Hz	Center frequency for FFT calculation	2.6.5.12 **ANLR panel** Center
CALCulate:**TRAN**sform:**FREQ**uency:***ZOOM***	**<n>** = 1 **1 to 128** for instr. A22 a. D48 n = 1, 2, 4, 8, 16, 32, 64, 128 A110 = n =1, 2, 4, 8,16		Zoom FFT off (standard FFT) FFT zoom factor Contrary to the manual mode, the zoom factor instead of the SPAN is entered in the IEC/IEEE-bus mode. The SPAN being a function of the zoom factor it can be determined by the following query.	2.6.5.12 **ANLR panel** Zoom-FFT
CALCulate:**TRAN**sform:**FREQ**uency:**SPAN?**	**<nu>** Query only		Queries the frequency range around the center frequency as a function of the zoom factor. The response is **<nu>** in Hz. Contrary to the manual mode, SPAN can only be read in but not entered in the IEC/IEEE-bus mode. The SPAN value can be changed by changing the zoom factor and modifying the sampling frequency and the oversampling factor.	2.6.5.12 **ANLR panel** Span
CALCulate:**TRAN**sform:**FREQ**uency:***RES*olution**?**	**<nu>** Query only		Queries the frequency resolution of FFT, depending on CENTer and SPAN. The response is **<nu>** in Hz.	2.6.5.12 **ANLR panel** Resolution

Command	Parameter	Basic unit	Meaning	Section
CALCulate:**TRAN**sform:**FREQ**uency:***MTIMe*****?**	**<nu>** Query only		Queries the measurement time of FFT, depending on FFT size. The response is **<nu>** in s.	2.6.5.12 **ANLR panel** Meas Time
CALCulate:**TRAN**sform:**FREQ**uency:**WIND**ow	**RECT**angular **HANN**ing ***BLAC****kman_harris* ***RIF1*** ***RIF2*** ***RIF3*** **HAMM**ing **FLAT**top ***KAIS****er*		→ Fast and frequency-accurate → High spectral resolution, wide, bell-shaped curve → Steep slope of bell lobe → Excellent suppression of distant interference → Excellent suppression of distant interference → Excellent suppression of distant interference → Implemented for the sake of completeness → Amplitude read from graphic diagram → Characteristics determined by ß factor	2.6.5.12 **ANLR panel** Window → RECTANG... → HANN → BLACKMAN H → RIFE VINC 1 → RIFE VINC 2 → RIFE VINC 3 → HAMMING → FLAT TOP → KAISER
CALCulate:**TRAN**sform:**FREQ**uency:**WIND**ow:***BETA****factor*	**<n>** = 1 to 20	keine Einheit	ß factor for KAISer window	2.6.5.12 **ANLR panel** ß-Factor
SENSe**:VOLT**age**:EQU**alize[:STATe]	 **ON** **OFF**		Activation/deactivation of an equalizer table consisting of frequency information and associated voltage gain factors. → The equalizer is switched on. The command that follows is accepted. → The equalizer is switched off; the FFT spectrum remains unchanged.	2.6.5.12 **ANL Panel** Equalizer → ON → OFF
MMEMory:**LOAD**:**LIST SENS**e,	**'filename'**		Command for entering the name of the equalizer file. Only permissible with SENS:VOLT:EQU ON	2.6.5.12 **ANL Panel** Equal. file

3.10.2.5.13 Filter Simulation

Command	Parameter	Basic unit-	Meaning	Section
SENSe[1]:**FUNC**tion	**'FILT**ersim**'**		→ Display of sum frequency response of the filter to be selected with SENS:FILT... on the UPL display, eg SENS:FILT:AWE ON SESN:FILT2:UFIL5 ON SENS:FUNC 'FILT' IEC LAD 20 IEC GTL	2.6.5.13 ANLR panel Function → FILTER SIM.
SENSe[1][:VOLTage|POWer]**:UNIT**[1|**2**]	**PCT** **DB** see 3.10.4 Units for IEC Measurement Results		Unit of Y axis to be selected with the next command for display of the filter curve.	2.4 ANLR panel Unit Ch1/Ch2
SENSe[1]:**FILT**er**<i>**:.....	**<i>** 1 to 3		See 3.10.3 Selecting the Analyzer Filters	2.7.1 ANLR panel Filter

3.10.2.5.14 WAVEFORM

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FUNC**tion	**"WAV**eform**"**		→ Waveform display of applied signal	**2.6.5** **ANLR panel** Function → WAVEFORM
SENSe[1]:**FUNC**tion:**DCS**uppression	**ON** **OFF**		Suppression of DUT DC in the digital analyzer. → DC not considered; corresponds to AC coupling → DC considered in the measurement and displayed; corresponds to DC coupling	**2.6.5.1** **ANLR panel** DC Suppres → ON → OFF
SENSe[1]:**FUNC**tion:***MMOD**e*	***STAN**dard* ***COMP**ressed* ***USAM**pl*		→ Standard display of samples, max. trace length is 7488 samples. Interpolation can be switched on. → To allow measurements over longer periods of time only peaks are displayed. With command SENSe:WAVeform:COMPression <n> (see below) the number of peak-weighted samples is determined. Available only for instruments A22 and D48. Interpolation cannot be switched on. → Undersampling of signal to record longer periods; the number of samples specified under SENSe:WAVeform: COMPression is arithmetically combined (without detection).	2.6.5.14 **ANLR panel** Meas Mode → STANDARD → COMPRESSED → UNDERSAMP
SENSe[1]:***WAV**eform**:COMP**ression*	**<n>** 2 to 1024		Number of peak-weighted samples of WAVeform mode SENSe:FUNCtion:MMODe COMPressed.	2.6.5.14 **ANLR panel** Comp Fact
SENSe[1][:VOLTage|POWer]**:UNIT**[1|**2**]	see 3.10.4 Units for IEC Measurement Results		Display unit for results of DC measurement.	2.4 **ANLR panel** Unit
SENSE[1][:VOLTage|POWer]**:REF**erence	**<nu>** Analog instrument - 1000 V to 1000 V Digital instrument - 1 kFS to 1 kFS	V FS	Numerical entry of reference value.	2.6.5.1 **ANLR panel** Reference

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]**:FILT**er**<i>:.....**	**<i>** 1		See 3.10.3 Selecting the Analyzer Filters A filter can be selected if • Option UPL-B29 (Digital Audio 96 kHz) fitted and Base Rate Mode (CONF:DAI BRM) • ANLG 22 kHz or DIGITAL instument (INST2 A22|D48) • In DIGITAL analyzer Source Mode AUDIO DATA (SENS:DIG:FEED ADAT) • Measurement function WAVEFORM, Meas Mode UNDERSAMPLE (SENS:FUNC:MMOD USAM) . No filter can be switched on: • In analyzer ANLG 110kHz • Option UPL-B29 (Digital Audio 96 kHz) eingebaut und High Rate Mode (CONF:DAI HRM)	**2.6.5.14** **ANLR-Panel** Filter
TRIGger:**LEV**el	**<nu>** Analog instruments -50V to 50V Digital instrument -1 FS to 1 FS	V FS	Sets the voltage for the trigger threshold.	2.6.5.14 **ANLR panel** Trig Level
TRIGger**:SLOP**e	**POS**itive alias **RIS**ing **NEG**ative alias **FALL**ing		Sets the trigger edge.	2.6.5.14 **ANLR panel** Trig Slope → RISING → FALLING
SENSe[1]:**SMO**othing**:APER**ture	**N1** **N2** **N4** **N8** **N16** **N32**		Selects the interpolation stages for smoothing the display of the traced waveform. N1 to N32 = factor 1 to 32	2.6.5.14 **ANLR panel** Interpol → 1 → 2 → 4 → 8 → 16 → 32

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:***WAV****eform:DUR****ation***	**<nu>** see 2.6.5.14 WAVEFORM	s	Sets the period for which the signal is traced. The max. settable Trace Len is a function of the sampling rate and the interpolation value.	2.6.5.14 **ANLR panel** Trace Len
TRIGger**:CHAN**nel	***CH1*** ***CH2*** ***GENB****urst*		→ Channel 1 → Channel 2 triggers the measurement for both channels when the trigger level is exceeded (TRIGger:LEVel **<nu>**). → The generator signal triggers the measurement upon start of the "Burst On" phase, provided that a suitable generator function has been selected. Signal delay times of the devices under test can thus be determined graphically from the waveform display. To be set only for two-channel measurements in instruments A22 and D48.	2.6.5.14 **ANLR panel** Trig Src → CHAN 1 → CHAN 2 → GEN BURST

3.10.2.5.15 Coherence Measurement and Transfer Function

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]**:FUNC**tion	**'COH**erence**'**		Coherence and transfer function with built-in option UPL-B6 Conditions: • Analog instrument 22 kHz (INST2 A22) or digital instrument (INST2 D48) in Meas Mode AUDIO DATA (SENS:DIG:FEED ADAT) • Two-channel measurement (INP:SEL CH1A | CH2ICH1I | BOTH)	**2.6.5.22** **ANLR panel** FUNCTION → COHERENCE
SENSe[1][:VOLTage|POWer]**:UNIT**[1]	**PCT** **DB**		Units for result display for transfer function (ratio channel 2/channel 1) of COHERENCE measurement provided TRACE A is selected with DISP:TRAC:FEED 'SENS:DATA'.	**2.6.5.22** **ANLR panel** Unit Ch1
SENSe[1]:**CHAN**nel:**DEL**ay	**<nu>** -10to10 s	s	Interchannel delay Delay compensation of the DUT by entering the time by which channel 1 is to be delayed with respect to channel 2. If channel 2 has a shorter delay than channel 1, this can be compensated for by entering a negative value. Available only for for two-channel measurements in instruments A22 and D48	**2.6.5.22** **ANLR-Panel** Chan Delay
CALCulate:**TRAN**sform:**FREQ**uency: ***FFT***	***S256*** ***S512*** ***S1K*** ***S2K*** ***S4K*** ***S8K***		FFT size → 256 lines → 512 lines → 1024 lines → 2048 lines → 4096 lines → 8192 lines	**2.6.5.22** A**NLR panel** FFT Size → 256 → 512 → 1024 → 2048 → 4096 → 8192

Command	Parameter	Basic unit	Meaning	Section
CALCulate:**TRAN**sform:**FREQ**uency: **WIND**ow	**HANN**ing **RECT**angular ***BLAC****kman_harris* ***RIF1*** ***RIF2*** ***RIF3*** **HAMM**ing **FLAT**top ***KAIS****er*		→ Fast and frequency-accurate → Selective, wide bell → Steep bell slopes → Excellent far-off band attenuation → Excellent far-off band attenuation → Excellent far-off band attenuation → For reason of completeness → Amplitude can be read off the graphics display → Characteristics determinable by ß factor (subsequent command)	**2.6.5.22** **ANLR panel** Window → HANN → RECTANG... → BLACKMAN H → RIFE VINC 1 → RIFE VINC 2 → RIFE VINC 3 → HAMMING → FLAT TOP → KAISER
CALCulate:**TRAN**sform:**FREQ**uency:**WIND**ow:***BETA****fact****or***	**<n>** 1 to 20		ß-factor for KAISer window	**2.6.5.22** **ANLR panel** ß factor
CALCulate:**TRAN**sform:**FREQ**uency: ***AVER****age*	**<n>** 2 to 2048		Number of averaging procedures to increase the accuracy of the coherence measurement	**2.6.5.22** **ANLR panel** Average

3.10.2.5.16 Loudspeaker Measurements (RUB & BUZZ)

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]**:FUNC**tion	**'RUBB**uzz'		Loudspeaker measurements only with built-in option UPL-B6 Rub&Buzz measurement is available if • Option UPL-B6. • Option UPL-B29 (Digital Audio 96 kHz) fitted and Base Rate Mode (CONF:DAI BRM) • Analog instrumente 22 kHz (INST2 A22) both channels, • Analog instrument 110 kHz (INST2 A100) channel 1 (INP:SEL CH1) No Rub&Buzz measurement available if • im DIGITAL-Instrument • Option UPL-B29 (Digital Audio 96 kHz) in High Rate Mode (CONF:DAI HRM.	**2.6.5.23** **ANLR panel** FUNCTION → RUB & BUZZ
SENSe[1]**:VOLT**age**:APER**ture**:MODE**	**AFAS**t **AUTO** **VAL**ue **GENT**rack		Measurement time of RUB & BUZZ measurement for adapting the measurement speed to the signal frequency. → Automatic matching of measurement time to signal frequency taking into account the → signal period. → Numerical entry of desired measurement time. → Measurement taking up (at least) one whole generator signal period. If required, the generator frequency can be adapted to the analyzer sample rate. To increase the measurement time in the case of high frequencies, the measurement time is exceeded to several periods. This mode guarantees **maximum accuracy** at a **minimum measurement time** and **should be given preference.**	**2.6.5.23** **ANLR panel** Meas Time → AUTO FAST → AUTO → VALUE: → GEN TRACK
SENSe[1][:VOLTage|POWer]**:UNIT**[1|**2**]	**V** | **DBV** | **DBU** | ... | **DBR**		Unit for result display of RUB & BUZZ measurement	**2.6.5.23** **ANLR panel** Unit Ch1/CH2

Command	Parameter	Basic unit	Meaning	Section
SENSe[1][:VOLTage|POWer]**:REF**erence**:MODE**	***VAL**ue* ***CH1S**tore* ***CH2S**tore* ***CH1M**eas* ***CH2M**eas* ***STOR**e*		→ Reference value to be entered with the following command → With two-channel measurements the current measurement result of channel 1 is stored as reference value. → With two-channel measurements the current measurement result of channel 2 is stored as reference value. → Value measured in channel 1 is used as a reference for result display with relative units → Value measured in channel 2 is used as a reference for result display with relative units. → With single-channel measurements the current result is stored as reference value.	**2.6.5.23** **ANLR panel** Reference
SENSe[**1**][:VOLTage|POWer]**:REF**erence	**<nu>** Analog instrument 100 pV to 1000 V		Numerical entry of reference value with command SENS:REF:MODE VAL	**2.6.5.23** **ANLR panel** Reference
SENSe[1]:**FREQ**uency:**MODE**	 **FIX**ed | **CW** ***GENT**rack*		Determination of highpass filter type → A fixed highpass filter is used; the numeric value of the passband frequency is entered with the subsequent command SENS:FREQ <nu>. → Generator tracking: A tracking highpass filter is used which should preferably be tuned to about the 5th harmonic of the generator frequency. The multiple by which the passband frequency should be higher than the generator frequency can be entered with the subsequent command SENS:FREQ:FACT <n>. Frequency limits, within which tracking of the filter frequency should be performed, can be selected with commands SENSe[1]:FREQuency:LIMit:LOWer and SENSe[1]:FREQuency:LIMit:UPPer. When a limit is reached (FrqLim Low or Upp) the filter frequency is held at this frequency. Thus a tracking highpass filter can be created which becomes a fixed-frequency highpass filter below FrqLim Low and/or above FrqLim Upp. If tracking should be performed over the entire frequency range, the frequency limits should be set to the minimum and maximum value.	**2.6.5.23** **ANLR panel** FREQ MODE → FIX → GEN TRACK

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FREQ**uency[:FIXed|CW]	**<nu>** Value range depends on instrument		Entry of numeric passband frequency for the setting SENS:FREQ:MODE FIX	**2.6.5.23** **ANLR panel** FREQ MODE → FIX
SENSe:**FREQ**uency:**FACT**or	**<nu>** MLT 2 to 20		Factor by which the passband frequency of the tracking bandpass or highpass filter should be higher than the generator frequency when GENTRACK (SENS:FREQ:MODE GENT) is set.	**2.6.5.23** **ANLR panel** FREQ MODE → Factor
SENSe**:SWE**ep**:SYNC**	**NORM**al **FAST** **BLOC**k		Permits the speed for 1-dimensional sweeps with the universal generator to be increased: → Normal sweep speed to be used with any kind of sweeps. → Sweep speed increased as from 2nd sweep run. → Further increase of sweep speed as from 2nd sweep. Update of trace is not online but performed (all in one) when the sweep is completed.	**2.6.5.23** **ANLR panel** Sweep Mode → NORMAL → FAST → BLOCK
SENSe[1]:**FILT**er**2**:..... **SENS**e[1]:**FILT**er**3**:... ↑ **The 2 is important!**			Two digital filters (number 2! and 3!) can be selected in addition to the standard highpass filter. **Use**: Lowpass filter for band limiting (particularly in the ANLG 110 kHz instrument), delay filter for extending the settling time, etc., Bandstop to filter out spurious. ***Note**:* *Like the standard highpass filter, the filter selected here is only active for measurement channel 1.*	**2.6.5.23** **ANLR panel** Filter
SENSe[1]:**FREQ**uency:**LIMi**t:**LOW**er	**<nu>** Value range: ANLG 22 kHz: 10.0 Hz to 21.9 kHz ANLG 110 kHz: 20.0 Hz to 120 kHz		Lower band limit for tracking the highpass filter frequency for command SENS:FREQ:MODE GENT. If the product of generator frequency and factor drops below the value specified here, the passband frequency of the highpass filter is held at this value.	**2.6.5.23** **ANLR panel** Frq Lim Low

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FREQ**uency:**LIMi**t:**UPP**er	**<nu>** Value range: ANLG 22 kHz: FrqLim Low to 21.9 kHz ANLG 110 kHz: FrqLim Low to 120 kHz		Upper band limit for tracking the highpass filter frequency for command SENS:FREQ:MODE GENT. If the product of generator frequency and factor exceeds the value specified here, the passband frequency of the highpass filter is held at this value.	**2.6.5.23** **ANLR panel** Frq Lim Upp
SYSTem:***SPE**aker ...*			In the 22 kHz analyzer, the (residual) Rub & Buzz signal in channel 1 and the unfiltered signal in channel 2 can be monitored. This is done by selecting SYST:SPE:SOUR FNC1 | FNC2 provided the selected channel is also active as a measurement channel.	**2.6.5.23** **ANLR panel** SPEAKER

3.10.2.5.17 Input Level of Digital Signal (DIG INP AMP)

Command	Parameter	Basic unit	Meaning	Section
SENSe**2**:**FUNC**tion	**'DIGI**npampl**'**		→ Measurement of digital input amplitude, see 3.10.2.5.20 Available only in Meas Mode COMMON/INP ("SENS:DIG:FEED CINP")	2.6.5.16 **ANLR-Panel** INPUT DISP → DIG INP AMPL
SENSe**2**:**UNIT**[]	**V** | **DBV** | **DBU** | **DBM** **W** | **DPCTV** | **DV** | **VVR** **PCTVVR** | **DPCTW** **DW** | **PPR** | **PCTPPR** **DBR**		Unit for result display of digital input amplitude.	**2.6.5.16** **ANLR-Panel** Unit
SENSe**2**[:VOLTage|POWer]**:REF**erence**:*MODE***	***VAL**ue* ***STOR**e* ***DIG**outampl*		Reference value for result display in relative units provided a referenced unit is selected. → Reference value specified with the following command. → The current measurement result is stored as reference value. → The currently valid and each newly set generator voltage is stored as reference value.	**2.6.5.16** **ANLR-Panel** Reference → VALIE: → STORE → DIG OUT AMP
SENSe**2**[:VOLTage|POWer]**:REF**erence	**<nu>** 100 pV to1000 V	V	Numerical entry of reference value.	**2.6.5.16** **ANLR-Panel**

3.10.2.5.18 Phase Measurement (PHAS TO REF)

Command	Parameter	Basic unit	Meaning	Section
SENSe2:**FUNC**tion **'PHAS**etoref'			→ Measurement of phase between digital input and reference input see 3.10.2.5.20 Nur verfügbar im Meas Mode JITTER/PHAS (SENS:DIG:FEED JPH"	**2.6.5.17 ANLR-Panel** INPUT DISP → PHAS TO REF
SENSe2:**UNIT**[]	**UI** | **PCTFRM** | **DEGFRM** **NS**		Unit for result display of phase.	**2.6.5.17 ANLR-Panel** Unit

3.10.2.5.19 PROTOCOL

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FUNC**tion	**"PROTocol"**		Protocol data of the digital AES/EBU interface are displayed in the graphics window.	**2.6.5 ANLR panel** Function → PROTOCOL

3.10.2.5.20 INPUT DISP

Command	Parameter	Basic unit	Meaning	Section
SENSe**2**:**FUNC**tion	**"OFF"** **"PEAK**voltage"		→ Input peak measurement off → Display of input peak value for all analyzers in all measurement modes In the **digital analyzer** the input signal is sampled with the user-determined sample rate (see **2.6.3)**. In the **analog analyzer** the input signal is sampled with the following clock rates after input level control: ANLG 22 kHz with 48 kHz, ANLG 110 kHz with 307.2 kHz The input peak measurement mainly serves for level control and shows peak values of the AC-coupled input signal in front of the filters.	2.6.5.18 **ANLR panel** INPUT DISP → OFF → PEAK → RMS → PHAS to REF → DIG INP AMP
	"**RMS**"		→ Input RMS measurement for the analog analyzers INST2 A22 | A100, and the digital analyzers INST D48 in the measurement mode SENS:DIG:FEED ADAT for measurement functions SENS:FUNC 'THD'|'THDNsndr'|'MDISt'|'DFD'|'FFT' The input RMS measurement can be displayed in the form of a sweep curve if DISP:TRAC:FEED 'SENS2:DATA' is set in the DISPLAY panel	
	"**PHAS**etoref"		→ Display of frame phase of the signal with jitter between AUDIO and REF input. This measurement can be carried out **simultaneously** with any measurement function available for the JITTER signal: SENS:FUNC 'RMS'|'RMSS'|'PEAK'|'FFT'|'WAV'|'PROT'	
	"**DIGI**npampl"		→ Display of digital input amplitude at the selected digital input (XLR or BNC). Only with jitter option (UPL-B22) in the measurement mode COMMON/INP. (INST2 D48 mit SENS:DIG:FEED JPH) This measurement can be carried out **simultaneously** with any measurement function available for the COMMON signal: SENS:FUNC 'RMS'|'RMSS'|'PEAK'|'FFT'|'WAV'	
SENSe[1][:VOLTage|POWer]**:UNIT**[1|**2**]	see 3.10.4 Units for IEC Measurement Results		Display units for RMS measurement	2.4 Unit Ch1/CH2

Command	Parameter	Basic unit	Meaning	Section
SENSe**2**[:VOLTage|POWer]:**REF**erence:**MODE**	***CH1****Store* ***CH2****Store* ***STOR****e* ***CH1M****eas* ***CH2M****eas* ***GENT****rack* ***DIG****outampl* ***VAL****ue*		→ For a two-channel measurement, the current measurement result of channel 1 is stored as a reference. → For a two-channel measurement, the current measurement result of channel 2 is stored as a reference. → The value measured of channel 1 is used as a reference for the results in reference-related units. → The value measured of channel 2 is used as a reference for the results in reference-related units. → For a single-channel measurement, the current measurement result is stored as a reference. → The currently set generator output level is used as a reference. → The measured value is referenced to the level of the digital signal set in the digital generator (see 2.6.5.18 INPUT) that is to - "Unbal Vpp", with the UNBAL input selected, and to - "Bal Vpp", with the BAL input selected. Permissible only in the Meas Mode COMMON/INP (SENS:DIG:FEED CINP) with display of digital input amplitude INPUT DISP = DIG INP AMP (SENS2:FUNC 'DIGI') if GENERATOR INSTRUMENT = DIGITAL is set. → The reference value is entered using the next command.	2.6.5.1 **ANLR panel** Reference → STORE CH1 → STORE CH2 → MEAS CH1 → MEAS CH2 → STORE → GEN TRACK → DIG OUT AMP → VALUE:
SENSe**2**[:VOLTage|POWer]:**REF**erence	**<nu>** Analog instrument 1µV to 1000V Digital instrument 0.0 to 1.0 FS	V FS	Numerical entry of reference value.	2.6.5.1 **ANLR panel** Reference

3.10.2.5.21 Frequency Measurement

Command	Parameter	Basic unit	Meaning	Section
SENSe**3**:**FUNC**tion	**"OFF"** **"FREQ**uency"		→ Frequency measurement off → Frequency measurement on The availability of the frequency measurement depends on measurement function and option UPL-B29 (digital audio 96 kHz), see 2.6.1 Selecting the Analyzer	2.6.5.19 **ANLR panel** FREQ/PHAS → OFF → FREQ
SENSe[1]**:FREQ**uency**:APER**ture**:MODE**	 **FAST** **PREC**ision		Definition of measurement time and precision of the frequency measurement for the measurement functions OFF and RMS. Does not influence the other measurement functions. → The frequency measurementis set to attain optimum speed → The frequency measurement is set to attain optimum precision	**2.6.5.19** **ANLR-Panel** Meas Time → FAST → PRECISION
SENSe**3**:**FREQ**uency:**UNIT**[1|**2**]	**HZ**|**DHZ**|**DPCTHZ**| **TOCT**|**OCT**|**DEC**| **F**|**FR**		Display units for results of frequency measurement.	2.4 **ANLR panel** Unit Ch1/Ch2
SENSe**3**:**FREQ**uency:**REF**erence:**MODE**	***CH1S**tore* ***CH2S**tore* ***CH1M**eas* ***CH2M**eas* ***STOR**e* ***GENT**rack* ***VAL**ue*		→ For a two-channel measurement, the current measurement result of channel 1 is stored as a reference. → For a two-channel measurement, the current measurement result of channel 2 is stored as a reference. → The value measured of channel 1 is used as a reference for the results in reference-related units. → The value measured of channel 2 is used as a reference for the results in reference-related units. → For a single-channel measurement, the current measurement result is stored as a reference. → The currently set generator output level is used as a reference. → The reference unit is specified by the next command.	2.6.5.1 **ANLR panel** Ref Freq → STORE CH1 → STORE CH2 → MEAS CH1 → MEAS CH2 → STORE → GEN TRACK → VALUE:
SENSe**3**:**FREQ**uency:**REF**erence	**<nu>** - 1 MHz to 1 MHz	Hz	Numerical entry of reference value.	2.6.5.1 **ANLR panel** Ref Freq
SENSe**3**:**FREQ**uency:**SETT**ling:.....			For settling commands see 3.10.2.5.1 Common Parameters for Analyzer Functions Frequency settling not selectable for SENSe:DIGital:FEED PHASe|CINPut	2.3.4.2 **ANLR panel** Freq Settl

3.10.2.5.22 Combined Frequency, Phase and Group-Delay Measurement

Combined Frequency and Phase Measurement

Command	Parameter	Basic unit	Meaning	Section
SENSe3:**FUNC**tion	"**OFF"** **"FQPH**ase"		→ Combined frequency and phase measurement off. → Combined frequency and phase measurement on. The availability of the frequency and phase measurement depends on measurement function and option UPL-B29 (digital audio 96 kHz), see 2.6.1 Selecting the Analyzer	2.6.5.19 **ANLR panel** FREQ/PHASE → OFF → FREQ&PHASE
SENSe3:**FREQ**uency:**UNIT**[1]	**HZ**|**DHZ**|**DPCTHZ**| **TOCT**|**OCT**|**DEC**| **FFR**		Display units for results of frequency measurement.	2.4 **ANLR panel** Unit Ch1
SENSe3:**PHAS**e:**UNIT2**	**DEG**|**RAD**|**DDEG**| **DRAD**|		Display units for results of phase measurement.	2.4 **ANLR panel** Unit Ch2
SENSe3:**FREQ**uency:**REF**erence:**MODE**	***STOR**e* ***GENT**rack* ***VAL**ue*		→ The current frequency measurement result is stored as reference value. → The currently set generator frequency is used as a reference. → The reference value is entered using the next command.	2.6.5.1 **ANLR panel** Ref Freq → STORE → VALUE: → GEN TRACK
SENSe3:**FREQ**uency:**REF**erence	**<nu>** - 1 MHz to 1 MHz	Hz	Numerical entry of reference value.	2.6.5.1 **ANLR panel** Reference

Command	Parameter	Basic unit	Meaning	Section
SENSe**3**:***PHAS***e:***FORM***at	***POS**itive* ***POSN**egative* ***NEG**ative* ***RAD*** ***RADB**ipolar* ***RADN**egative*		Display format for phase measurement → 0 to 360° → - 180° to -180° → - 360° to 0 ° → 0 to 2 π → - π to + π → -2 π to 0	2.6.5.19 **ANLR panel** Format Pha → 0 .. 360° → -180° .. 180° → - 360° .. 0° → 0 .. 2 π → - π .. + π → -2 π .. 0
SENSe**3**:***PHAS***e:***REF***erence:**MODE**	***STOR**e* ***VAL**ue*		→ The current phase measurement result is stored as reference value. → The reference value is entered using the next command.	2.6.5.1 **ANLR panel** Reference → STORE → VALUE:
SENSe**3**:***PHAS***e:***REF***erence	**<nu>** -360° to +360°	DEG	Numerical entry of reference value .	2.6.5.1 **ANLR panel** Reference
SENSe**3**:**FREQ**uency:**SETTL**ing:.....			For settling commands see 3.10.2.5.1 Common Parameters for Analyzer Functions	2.3.4.2 **ANLR panel** Freq Settl
SENSe**3**:***PHAS***e:**SETTL**ing:.....			For settling commands see 3.10.2.5.1 Common Parameters for Analyzer Functions	2.3.4.2 **ANLR panel** Phas Settl

Combined Frequency and Group-Delay Measurement

Command	Parameter	Basic unit	Meaning	Section
SENSe**3**:**FUNC**tion	**"OFF"** **"FQGR**oupdelay"		→ Combined frequency and group-delay measurement off → Combined frequency and group-delay measurement on. With RSM measurements, POST-FFT is automatically switched on as the frequency information is obtained from FFT. The availability of the frequency and group-delay measurement depends on measurement function and option UPL-B29 (digital audio 96 kHz), see 2.6.1 Selecting the Analyzer	2.6.5.19 **ANLR panel** FREQ/PHASE → FREQ&GRPDEL
SENSe**3**:**FREQ**uency:**UNIT**[1]	**HZ**|**DHZ**|**DPCTHZ**| **TOCT**|**OCT**|**DEC**| **FFR**		Display units for results of frequency measurement	2.4 **ANLR panel** Unit Ch1
SENSe**3**:**PHAS**e:**UNIT2**	**S** **DS** **DEG** **RAD**		Display units for results of group-delay measurement ***Note:*** *In addition to group delay (in s), phases outside the range ±360° can be measured in DEG or RAD when the frequency sweep mode has been selected.*	2.4 **ANLR panel** Unit Ch2
SENSe**3**:**FREQ**uency:**REF**erence:**MODE**	***STOR**e* ***VAL**ue* ***GENT**rack*		→ The current frequency measurement result is stored as reference value. → The reference value is entered using the next command. → The currently set generator frequency is used as a reference value.	2.6.5.1 **ANLR panel** Ref Freq → STORE → VALUE: → GEN TRACK
SENSe**3:FREQ**uency:**REF**erence	**<nu>** -1 MHz to 1 MHz	Hz	Numerical entry of reference value.	2.6.5.1 **ANLR panel** Ref Freq
SENSe**3**:***PHAS**e*:**REF**erence:**MODE**	***STOR**e* ***VAL**ue*		→ The current phase measurement result is stored as reference value. → The reference value is entered using the next command.	2.6.5.1 **ANLR panel** Ref Phase → STORe → VALUE:

Command	Parameter	Basic unit	Meaning	Section
SENSe3:*PHAS*e:**REF**erence	**<nu>** -360 s to +360 s	s	Numerical entry of reference value	2.6.5.1 **ANLR panel** Ref Phase
SENSe3:**FREQ**uency:**SETTl**ing:.....			For settling commands see 3.10.2.5.1 Common Parameters for Analyzer Functions	2.3.4.2 **ANLR panel** Freq Settl

3.10.2.5.23 Sample Rate Measurement

Command	Parameter	Basic unit	Meaning	Section
SENSe3:**FUNC**tion	'**OFF'** **'SFRE**quency'		→ Off → The measured sampling frequency is displayed on the channels switched on Available only for instrument D48	2.6.5.21 **ANLR-Panel** FREQUENCY → SAMPLE FREQ
SENSe[1]**:FREQ**uency**:APER**ture**:MODE**	**FAST** **PREC**ision		Definition of measurement time and precision of the frequency measurement for the measurement functions OFF and RMS. Does not influence the other measurement functions. → The frequency measurementis set to attain optimum speed → The frequency measurement is set to attain optimum precision	**2.6.5.19** **ANLR-Panel** Meas Time → FAST → PRECISION
SENSe3:**FREQ**uency:**UNIT**[1]	**HZ** | **DHZ** | **DPCTHZ** | **TOCT** | **OCT** | **DEC** | **FFR**		Selection of the result units for channel 1	2.4 **ANLR-Panel** Unit Ch1
SENSe3:**FREQ**uency:**UNIT2**	**HZ** | **DHZ** | **DPCTHZ** | **TOCT** | **OCT** | **DEC** | **FFR**		Selection of the result units for channel 2.	2.4 **ANLR-Panel** Unit Ch2

Command	Parameter	Basic unit	Meaning	Section
SENSe**3**:**FREQ**uency:**REF**erence:***MODE***	***CH1S**tore* ***CH2S**tore* ***CH1M**eas* ***CH2M**ea* ***STOR**e* ***GENT**rack* ***VAL**ue*		→ For a two-channel measurement, the current measurement result of channel 1 is stored as a reference. → For a two-channel measurement, the current measurement result of channel 2 is stored as a reference. → The value measured of channel 1 is used as a reference for the results in reference-related units. → The value measured of channel 2 is used as a reference for the results in reference-related units. → For a single-channel measurement, the current measurement result is stored as a reference. → The currently set generator output level is used as a reference. → The reference unit is specified by the next command.	2.6.5.19 **ANLR-Panel** Ref Freq → STORE CH1 → STORE CH2 → MEAS CH1 → MEAS CH2 → STORE → GEN TRACK → VALUE:
SENSe**3**:**FREQ**uency:**REF**erence	**<nu>** -1 MHz to 1 MHz	Hz	Numerical entry of reference value.	2.6.5.1 **ANLR-Panel** Ref Freq
SENSe**3**:**FREQ**uency:**SETT**ling:...			For settling commands see **3.10.2.5.1 Common Parameters for** Analyzer Functions	2.3.4.2 **ANLR-Panel** Freq Settl

3.10.2.5.24 Terzanalyse

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FUNC**ion	'***THIR****doct*'		The analysis is performed according to standard IEC 1260 of 1995 with level accuracy of class 0 (± 1,0 dB). Third Analysis measurement is available if • Option UPL-B6 (Extended Analysis Functions) or with hardware upgrade UPL-U8 or in modell UPL 06G. • Analog instrumente 22 kHz (INST2 A22) both channels • Digital instrument with option UPL-B29 (Digital Audio 96 kHz) in Base Rate Mode (CONF:DAI BRM) No Third Analysis measurement available if • Analyzer 110 kHz • Digital instrument with option UPL-B29 (Digital Audio 96 kHz) in High Rate Mode (CONF:DAI HRM. For a detailed example see 3.15.19 Readout of Blockdata of Third Octave Measurement	**2.6.5.24** **ANLR-Panel** Function → 1/3 OCTAVE
SENSe[1]**:FUNC**tion**:MCO**unt	**T30** **T32**		Defines the number of thirds which can be measured and displayed → Maximum 30 thirds can be calculated and displayed. The lowest third which can be measured has a rated center frequency of 25 Hz. → 2 additional low-frequency thirds, i.e., maximum 32 thirds, can be calculated and displayed. The lowest third which can be measured has a nominal center frequency of 16 Hz.	2.6.5.24 **ANLR-Panel** Line Count → 30 → 32
SENSe[1]:**VOLT**age:**APER**ture:**MODE**	**VAL**ue		Measurement Time of third analysis → The only parameter determining the measurement speed is the measurement time, which is entered with the next command. The measurement time also determines the update rate of the third analysis.	**2.6.5.24** **ANLR-Panel** Meas Time → VALUE:
SENSe[1]:**VOLT**age:**APER**ture	**<nu>** 64 ms to 43200s	s	Numerical entry of measurement time of the third analysis.	**2.6.5.24** **ANLR-Panel** Meas Time

Command	Parameter	Basic unit	Meaning	Section
SENSe:**VOLT**age:***INTV***:**MODE**	**OFF** ***FOR****ever* ***SMO****oth* ***EDGE***		Hold function for the maximum result of each third. Reset by "INIT:CONT ON" → Max-hold function switched off; only the third bars are displayed. → Max-hold function switched on; the markers lie on the maximum values; reset only by starting the measurement with "INIT:CONT ON". → Max-hold function switched on; the markers lie on the maximum values for the "hold time" to be set with the following command (SENSe[1]:VOLTage:INTVtime <n>) and then decay exponentially (time constant 0.5 s). → Max-hold function switched on; the markers remain on the maximum values for the "hold time" to be set with the following command (SENSe[1]:VOLTage:INTVtime <n>) and then go back to the current measurement value for the third.	**2.6.5.24** **ANLR-Panel** Max Hold → OFF → FOREVER → SLOW DECAY → FAST DECAY
SENSe[1]:**VOLT**age:***INTV****time***	**<nu>** 20 ms to 100 s	s	Setting of the time for which the maximum value of a third is held before the marker returns to the measured value. The selected hold time does not influence the decay time. Only for Max Hold = SLOW DECAY (SENSe:VOLTage:INTV:MODE SMOoth) und Max Hold = FAST DECAY (SENSe:VOLTage:INTV:MODE EDGE)	**2.6.5.24** **ANLR-Panel** Holdtime
SENSe[1][:VOLTage|POWer]:**UNIT**[1|**2**]	Analog units: **V** | **DBV** | **DBU** | **DBM** | **W** | **DPCTV** | **DV** | **VVR** | **PCTVVR** | **DPCTW** |**DW** | **PPR** | **PCTPPR** |**DBR** Digital units: **FS** | **PCTFS** | **DBFS** | **DPCT** | **DBR** | **LSBS** | **BITS**		Units for the third analysis measurement results	**2.4** **ANLR-Panel** Unit Ch1/Ch2

Command	Parameter	Basic unit	Meaning	Section
SENSe[1][:VOLTage|POWer]:**REF**erence:**MODE**	**CH1S**tore **CH2S**tore **CH1M**eas **CH2M**eas **STOR**e **VAL**ue		→ **Dual**-channel measurement: Store the current measurement result of channel 1 as reference value. → **Dual**-channel measurement: Store the current measurement result of channel 2 as reference value. → **Dual**-channel measurement: Each result of level measurement in channel 1 is used as reference value for result output in reference-related units (floating reference value). → **Dual**-channel measurement: Each result of level measurement in channel 2 is used as reference value for result output in reference-related units (floating reference value). → With **single-**channel measurement: Store the current result as reference value → Reference value is displayed upon using the following command	**2.6.5.1** **ANLR-Panel** Reference → STORE CH1 → STORE CH2 → MEAS CH1 → MEAS CH2 → VALUE:
SENSe[1][**:**VOLTage|POWer]**:REF**erence	**<nu>** Analog instruments 100 pV to 1000 V Digital instrument 0.0 to 1.0 FS	V FS	Numeric entry of reference value.	2.6.5.1 **ANLR-Panel** Reference
SENSe[1]:**FILT**er[1] ...			See 3.10.3 Selecting the Analyzer Filters Only available with option UPL-B29 (Digital Audio 96 kHz) in Base Rate Mode (CONF:DAI BRM). In the high rate mode (CONF:DAI HRM), the measurement functions THIRdoct can be operated without filter.	**2.7.1** **ANLR-Panel** Filter

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FREQ**uency:**LIMi**t:**LOW**er	**<nu>** ANLG 22 kHz, 32 lines: 14.1 Hz to 21938 Hz 30 lines 22.6 Hz to 21938 Hz DIG 48 kHz, 32 lines: 14.1Hz to fmax 30 lines 22.6 Hz to 21938 Hz fmax depending on the sampling rate but not exceeding 22449 Hz	Hz	Lower band limit for third analysis.	**2.6.5.24 ANLR-Panel** → Frq Lim Low
SENSe[1]:**FREQ**uency:**LIMi**t:**UPP**er	**<nu>** ANLG 22 kHz: FrqLim Low to 21938 Hz DIGITAL: FrqLim Low to fmax fmax depending on the sampling rate but not exceeding 22449 Hz	Hz	Upper band limit for third analysis.	**2.6.5.24 ANLR-Panel** → Frq Lim Upp

3.10.2.5.25 12th Octave Analysis (12th OCTAVE)

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]**:FUNCt**ion	**'TWEL**vthoct'		The 12th octave analysis is a level measurement by means of a special zoom FFT in up to 125 frequency bands simultaneously. The 12th octave analysis is available • with UPL-B6 option installed (Extended Analysis Functions) • in the analog instrument 22 kHz (INST2 A22), • in the digital instrument with UPL-B29 option installed (Digital Audio 96 kHz) in base rate mode, only (CONF:DAI BRM) The 12th octave analysis is **not** available • in the 110-kHz analyzer • in the digital instrument, with UPL-B29 option installed (Digital Audio 96 kHz) in high rate mode (CONF:DAI HRM).	**2.6.5.25** **ANLR-Panel** Function → 12th OCTAVE
SENSe[1]**:VOLT**age**:APER**ture**:MODE**	**VAL**ue		→ Numeric entry of the measurement time of the 12th octave analysis The measurement time defines the update rate of the 12th octave analysis For entry of values see next command..	**2.6.5.25** **ANLR-Panel** Meas Time → VALUE:
SENSe[1]**:VOLT**age**:APER**ture	**<nu>** tmessFFT ... 43200 s tmessFFT = Measurement time for a zoom FFT depending on the lower frequency limit	s	Numeric entry of the measurement time of the 12th octave analysis	**2.6.5.25** **ANLR-Panel** Meas Time
SENSe**:VOLT**age**:INTV:MODE**	**OFF** **ON**		Hold function for the maximum values of the individual thirds. axhold function switched off, the bars of the frequency bands are displayed, only. → Maxhold function switched on, the markers lie on the highest values; reset via "INIT:CONT ON".	**2.6.5.25** **ANLR-Panel** Max Hold → OFF → ON

Command	Parameter	Basic unit	Meaning	Section
SENSe[1][:VOLTage|POWer]**:UNIT**[1|**2**]	Analog units: **V** | **DBV** | **DBU** | **DBM** | **W** | **DPCTV** | **DV** | **VVR** | **PCTVVR** | **DPCTW** |**DW** | **PPR** | **PCTPPR** |**DBR** Digital units: **FS** | **PCTFS** | **DBFS** | **DPCT** | **DBR** | **LSBS** | **BITS**		Result display units of the 12th octave analysis.	2.4 **ANLR-Panel** Unit Ch1/Ch2
SENSe[1][:VOLTage|POWer]**:REF**erence**:MODE**	**CH1S**tore **CH2S**tore **CH1M**eas **CH2M**eas **STOR**e **VAL**ue		→ **Dual**-channel measurement: Store the current measurement result of channel 1 as reference value. → **Dual**-channel measurement: Store the current measurement result of channel 2 as reference value. → **Dual**-channel measurement: Each result of level measurement in channel 1 is used as reference value for result output in reference-related units (floating reference value). → **Dual**-channel measurement: Each result of level measurement in channel 2 is used as reference value for result output in reference-related units (floating reference value). → **Single-**channel measurement: Store the current result as reference value → Reference value is displayed upon using the following command	2.6.5.1 **ANLR-Panel** Reference → STORE CH1 → STORE CH2 → MEAS CH1 → MEAS CH2 → STORE → VALUE:
SENSe[1][:VOLTage|POWer]**:REF**erence	**<nu>** Analog instruments 100 pV to 1000 V Digital instrument 0.0 to 1.0 FS	V FS	Numeric entry of reference value.	2.6.5.1 **ANLR-Panel** Reference
SENSe[1]:**FILT**er[1] ...			See 3.10.3 Available only with option UPL-B29 installed (Digital Audio 96 kHz) in base rate mode (CONF:DAI BRM). In the high rate mode (CONF:DAI HRM), the 12th octave function can be operated without filter, only.	2.7.1 **ANLR-Panel** Filter

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FREQ**uency**:LIMi**t**:LOW**er	**<nu>** ANLG 22 kHz: 15.4 Hz to 20586 Hz DIG 48 kHz: 15.4 Hz to fmax fmax depending on the sampling rate but not exceeding 20586 Hz	Hz	Lower band limit for the 12th octave analysis.	**2.6.5.25** **ANLR-Panel** → Frq Lim Low
SENSe[1]**:FREQ**uency:**LIMi**t**:UPP**er	**<nu>** ANLG 22 kHz: FrqLim Low to 20586 Hz DIGITAL: FrqLim Low to fmax fmax depending on the sampling rate but not exceeding 20586 Hz	Hz	Upper band limit for the 12th octave analysis.	**2.6.5.25** **ANLR-Panel** → Frq Lim Upp

3.10.3 Selection of Analyzer Filter

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FILT**er**<i>**	**<i>***) = 1 to 3 **OFF** Query returns name of the filter switched on: **UFIL1** **:** **UFIL9** **AWE** **CMES** **CCIT** **CCIR** **CCIU** **DEMP5015** **DEMP50** **DEMP75** **DEMP17** **WRUM** **URUM** **DCN** **CARM** **IECT** **JITT**		Switches off the filter in the analyzer measurement functions. Measurement functions / Number of possible filters RMS 3 RMS SELECT 1 PEAK 3 (*) QPK 1 (*) THD+N 1 FFT 3 (*) FILTER SIM 3 WAVEFORM 1 (*) RUB&BUZZ 2 THIRD OCT 1 (*) UPL-B29: For the functions marked (*), no digital filter can be switched on in the high rate mode or analyzer ANLG 110 kHz.	2.7.1 **FILTER panel** Filter
SENSe[1]:**FILT**er<i>	<**i**>*) 1 to 3 **OFF**		Switches off the filter in the analyzer measurement functions RMS, PEAK, QPE or THDN.	2.7.1 **FILTER panel** Filter
SENSe[1]:**FILT**er<i>**:*UFIL**ter1*... *UFIL**ter9***[:STATe]	<**i**>*) 1 to 3 **ON**|**OFF**		A HPASs, LPASs, BPASs, BSTOp, NOTCh, TERZ, OCTav or FILE filter with freely selectable parameters (see SENSe:FILTer<n>:HPASs|:LPASs ... and subsequent commands) can be assigned to each of the 9 user filters (UFILter). When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.1 **FILTER panel** Filter

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FILT**er<i>:**CCIT**t[:STATe]	<**i**>*) 1 to 3 **ON**|**OFF**		For psophometric measurements When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.1 **FILTER panel** Filter → CCITT
SENSe[1]:**FILT**er<i>:***CCIU**nweight*[:STATe]	<**i**>*) 1 to 3 **ON**|**OFF**		Bandpass filter 20 Hz to 20 kHz When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.1 **FILTER panel** Filter → CCIR unwtd
SENSe[1]:**FILT**er<i>:**CCIR**weight[:STATe]	<**i**>*) 1 to 3 **ON**|**OFF**		For RFI voltage measurements When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.1 **FILTER panel** Filter → CCIR wtd
SENSe[1]:**FILT**er<i>:**AWE**ighting[:STATe]	<**i**>*) 1 to 3 **ON**|**OFF**		For RFI voltage measurements When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.1 **FILTER panel** Filter → A Weighting
SENSe[1]:**FILT**er<i>:**CMES**sage[:STATe]	<**i**>*) 1 to 3 **ON**|**OFF**		For transmission measurements When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.1 **FILTER panel** Filter → C MESSAGE
SENSe[1]:**FILT**er<i>:***DEMP**hasis**50***[:STATe]	<**i**>*) 1 to 3 **ON**|**OFF**		For unweighted and weighted noise measurements When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.1 **FILTER panel** Filter → DEEMPH 50
SENSe[1]:**FILT**er<i>:***DEMP**hasis**75***[:STATe]	<**i**>*) 1 to 3 **ON**|**OFF**		For unweighted and weighted noise measurements When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.1 **FILTER panel** Filter → DEEMPH 75

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FILT**er<i>:***DEMP**hasis**17***[:STATe]	<**i**>*) 1 to 3 **ON**|**OFF**		For unweighted and weighted noise measurements When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.1 **FILTER panel** Filter → DEEMPH J.17
SENSe[1]:**FILT**er<i>:***DEMP**hasis**5015***[:STATe]	<**i**>*) 1 to 3 **ON**|**OFF**		For unweighted and weighted noise measurements When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.1 **FILTER panel** Filter → DEEM 50/15
SENSe[1]:**FILT**er<i>:***WRUM**ble*[:STATe]	<**i**>*) 1 to 3 **ON**|**OFF**		Weighted noise measurement for testing tape recorders When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.1 **FILTER panel** Filter → RUMBLE wtd
SENSe[1]:**FILT**er<i>:***URUM**ble*[:STATe]	<**i**>*) 1 to 3 **ON**|**OFF**		Unweighted noise measurement for testing tape recorders When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.1 **FILTER panel** Filter → RUMBLE unw
SENSe[1]:**FILT**er<i>:***DCN**oise*[:STATe]	<**i**>*) 1 to 3 **ON**|**OFF**		Highpass filter for measuring the DC noise When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.1 **FILTER panel** Filter → DC NOISE HP
SENSe[1]:**FILT**er<i>:***CARM***[:STATe]	<**i**>*) 1 to 3 **ON**|**OFF**		Filter for weighted noise measurements in line with older regulations. When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.1 **FILTER panel** Filter → CCIR ARM
SENSe[1]:**FILT**er<i>:**JITT**er[:STATe]	<i>*) = 1 to 4 **ON | OFF**		Weighting of jitter transmission function	2.7.1 **FILTER panel** Filter → JITTER wtd

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:**FILT**er<i>:***IECTuner***[:STATe]	<**i**>*) 1 to 4 **ON**|**OFF**		Filter for tuner measurements to DIN/IEC 315	2.7.1 **FILTER panel** Filter → IEC Tuner
SENSe[1]:***UFIL**ter*<i>:**HPAS**s[:STATe]	<**i**> 1 to 9 **ON**		Highpass When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.2 **FILTER panel** FILTER 01 to 09
SENSe[1]:***UFIL**ter*<i>:**LPAS**s[:STATe]	<**i**> 1 to 9 **ON**		Lowpass When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.2 **FILTER panel** FILTER 01 to 09
SENSe[1]:**UFIL**ter<i>:***BPAS**s*[:STATe]	<**i**> 1 to 9 **ON**		Bandpass When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.2 **FILTER panel** FILTER 01 to 09
SENSe[1]:***UFIL**ter*<i>:***BSTOp***[:STATe]	<**i**> = 1 to 9 **ON**		Bandpass When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.2 **FILTER panel** FILTER 01 to 09
SENSe[1]:***UFIL**ter***<i>:NOTCh***[:STATe]	<**i**> 1 to 9 **ON**		Notch filter When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.2 **FILTER panel** FILTER 01 to 09

*) <i> stands for the filter of analyzer measurement functions RMS, PEAK, QPE and THDN, which has been assigned the specified filter function.
Example:
" SENS: FUNC ' RMS ' "
" SENS: FILT1:DEMP5015 ON"
" SENS: FILT3:CCIT ON"
causes the following setting in the ANALYZER panel in the RMS & S/N measurement function
:

• Notch (Gain)	OFF	
• Filter	DEEM 50/15	i = 1
• Filter	OFF	i = 2
• Filter	CCITT	i = 3
• Func Settl	OFF	

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:***UFIL**ter*<i>:***TOCT**ave*[:STATe]	<**i**> 1 to 9 **ON**		Third-octave filter (Third Octave) When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.2 **FILTER panel** FILTER 01 to 09
SENSe[1]:***UFIL**ter*<i>:***OCT**av*[:STATe]	<**i**> 1 to 9 **ON**		Octave filter When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.2 **FILTER panel** FILTER 01 to 09
SENSe[1]:***UFIL**ter*<i>:***FILE**[:STATe]	<**i**> 1 to 9 **ON**		User-defined filter When a filter is switched ON the previously active filter is automatically switched OFF.	2.7.2 **FILTER panel** FILTER 01 to 09
SENSe**:UFIL**ter**[**1**...9]:DEGR**ee	**N4** **N8**		Selection of order for highpass and lowpass filters → Order 4 → Order 8	**2.7.2** **FILTER panel** Degree → 4 → 8
SENSe[1]:***UFIL**ter*<i>:***PASS**b*	<**i**> = 1 to 9 **<nu>** = LL*) For MB limit see 2.6.1 Selecting the Analyzer	Hz	Passband of HPASs and LPASs	2.7.2.2 **FILTER panel** FILTER 01 to 09 → Passband
SENSe[1]:***UFIL**ter*<i>:***STOP**b***?**	<**i**> 1 to 9 Query only		Queries the stopband of HPASs and LPASs	2.7.2.2 **FILTER panel** FILTER 01 to 09 → Stopband
SENSe[1]:***UFIL**ter*<i>:***PASS**b:**LOW**er*	<**i**> = 1 to 9 **<nu>** = LL*) For MB limit see 2.6.5.1 Common Parameters of Analyzer Functions	Hz	Lower passband of BPASs and BSTOp	2.7.2.3 **FILTER panel** FILTER 01 to 09 → Passb low

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:***UFIL***ter<i>:***PASS***b:***UPP***er	<**i**> = 1 to 9 **<nu>** = LL*) For MB limit see 2.6.1 Selecting the Analyzer	Hz	Upper passband of BPASs and BSTOp	2.7.2.3 **FILTER panel** FILTER 01 to 09 → Passb upp
SENSe[1]:***UFIL***ter<i>:***STOP***b:***LOW***er**?**	<**i**> 1 to 9 Query only		Queries the lower stopband of BPASs and BSTOp	2.7.2.3 **FILTER panel** FILTER 01 to 09 → Stopb low
SENSe[1]:***UFIL***ter<i>:***STOP***b:***UPP***er**?**	<**i**> 1 to 9 Query only		Queries the upper stopband of BPASs and BSTOp	2.7.2.3 **FILTER panel** FILTER 01 to 09 → Stopb upp
SENSe[1]:***UFIL***ter<i>:***CENT***er	<**i**> = 1 to 9 **<nu>** = LL*) For MB limit see 2.6.1 Selecting the Analyzer	Hz	Center frequency of NOTCh, TOCT OCTAv	2.7.2.4 2.7.2.5 **FILTER panel** FILTER 01 to 09 → Center Frq
SENSe[1]:***UFIL***ter<i>:***WIDT***h	<**i**> = 1 to 9 **<nu>** = LL*) For MB limit see 2.6.1 Selecting the Analyzer	Hz	Center frequency of NOTCh, TOCT OCTAv	2.7.2.4 and 2.7.2.5 **FILTER panel** FILTER 01 to 09 → Width
SENSe[1]:***UFIL***ter<i>:***ATT***enuation	<**i**> 1 to 9 **<nu>** 3 to 120 dB	dB	Attenuation of all filters except FILE Def. The value may be corrected in the UPL and queried.	2.7.2.1 **FILTER panel** FILTER 01 to 09 → Atten
SENSe[1]:***UFIL***ter<i>:***DEL***ay	Query only for all filters except for file-defined filters <**i**> = 1 to 9 **<nu>** = 0 to 1 s	s	Settling time of FILE-defined filters	2.7.2.7 **FILTER panel** FILTER 01 to 09 → Delay

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]:***UFIL**ter*<i>**:DEL***ay***?**	<**i**> 1 to 9 Query only		Queries the settling time of filters HPASs, LPASs, BPASs, BSTOp, NOTCh, TOCT OCTav	2.7.2.1 **FILTER panel** FILTER 01 to 09 → Delay
SENSe[1]:***UFIL**ter*<i>**:FILE**	**"filename"** <**i**> 1 to 9		Path and file name of file-defined filter data e.g. "C:\UPL\USER\MYFILT.ZPZ"	2.7.2.7 **FILTER panel** FILTER 01 to 09 → Filename

*) LL = Lower limit value for instruments
22: 24 Hz
A110: 171 Hz
D48: Sample Freq*Oversamp/2000 (see 2.6.3 Configuration of the Digital Analyzer)

3.10.4 Units for IEC/IEEE Measurement Results

Command	Parameter		Meaning	Section
SENSe[1|**2**][:VOLTage|POWer]:**UNIT**[1|**2**]	**V** ***MV*** (only for SENS[1]...) ***UV*** (only for SENS[1]...) **DBV** ***DBU*** **W** **DBM**		V mV µV dBV dBu W dBm } Absolute units for analog level measurement results	2.4 **ANLR panel** Unit Ch1/Ch2
	DV ***DPCTV*** ***VVR*** ***PCTVVR*** ***DW*** ***DPCTW*** ***PPR*** ***PCTPPR*** ***DBR***		ΔV Δ%V V/VR $\%V/V_r$ ΔW Δ%W P/P_r $\%P/P_r$ dBr } Relative units for analog level measurement results	
	DB (only for SENS[1]...) ***PCT*** (only for SENS[1]...)		dB % } Relative units for intermodulation measurements and W&F	
	FS ***LSBS*** ***DBFS*** ***BITS***		FS LSBs dBFS bits } Absolute units for digital phase measurements	
	DPCT ***PCTFS***		Δ% %FS } Relative units for digital level measurements	
	UI ***NS***		UI ns } Absolute units for digital jitter and phase measurements	

Command	Parameter		Meaning	Section
SENSe[1|**2**][:VOLTage|POWer]:**UNIT**[1|**2**]	***PPMUI***		⎫ ppm ⎬ Absolute units for digital jitter measurements DBUI ⎭	2.4 **ANLR panel** Unit Ch1/Ch2
	DBUI			
	UIR		⎫ Uir ⎬ Relative units for digital jitter measurements %UI ⎭	
	PCTUI			
	PCTFRM (only for SENS2..)		⎫ %FRM ⎬ Absolute units for digital phase measurement results ⎪ FRM ⎭	
	DEGFRM (only for SENS2..)			
SENSe**3**:**FREQ**uency:**UNIT**[1|**2**]	**HZ**		Absolute and relative units for frequency readout Hz	2.4 **ANLR panel** Unit Ch1/Ch2
	DHZ		ΔHz	
	DPCTHZ		Δ%Hz	
	TERZ		Terz	
	OCT		Oct	
	DEC		Dec	
	FFR		f/fr	
SENSe**3**:**PHAS**e:**UNIT**	**DEG** **RAD**		Absolute and relative units for phase readout ° In addition to group delay (in s), phases outside the range ±360° RAD can be measured in DEG or RAD	2.4 **ANLR panel** Unit Ch1/Ch2
	DDEG		Δ°	
	DRAD		ΔRAD	
	S		s (for group delay)	
	DS		Δs (for group delay)	

Display units selectable for measurement results:

Example:
Display units selectable for measurement results
SENSe[1][:VOLTage|POWer]**:UNIT**[1|**2**]:

Instrument	Measurement function	Selectable display units
"INST2 A22 | A110" "INST2 A22 | A110" "INST2 A22" "INST2 A22" "INST2 A22 | A110" "INST2 A22 | A110"	"SENS:FUNC 'RMS' | 'RMSS' | 'PEAK' | 'QPE' | 'DC' | 'FFT' "	"SENS:UNIT[1|2] V | DBV | DBU | DBM | W | DPCTV | DV | VVR | PCTVVR | DPCTW | DW | PPR | PCTPPR | DBR"
"INST2 A22 | A110"	"SENS:FUNC 'THDN'" und "SENS:FUNC:MMOD LNOI | NOIS "	
"INST2 A22 | A110"	"SENS:FUNC 'WAV'" and "SENS:FUNC:MMOD COMP"	
"INST2 A22 | A110"	"SENS:FUNC 'THD' | 'MDIS' | 'DFD' "	"SENS:UNIT[1|2] DB | PCT"
"INST2 A22 | A110"	"SENS:FUNC 'THDN'" and "SENS:FUNC:MMOD THDN | NOIS"	
"INST2 A22"	"SENS:FUNC 'WAF'"	"SENS:UNIT[1|2] PCT"
"INST2 A22 | A110"	"SENS:FUNC 'WAV'" and "SENS:FUNC:MMOD STAN"	"SENS:UNIT[1|2] V | MV | UV | DPCTV | DV | VVR | PCTVVR"
"INST2 A22 | A110"	"SENS:FUNC 'THDN'" and "SENS:FUNC:MMOD SNDR"	"SENS:UNIT[1|2] DB"

Instrument	Measurement function	Selectable display units
"INST2 D48" and "SENS:DIG:FEED ADAT"	"SENS:FUNC 'RMSS' | 'PEAK' | 'QPE' " "SENS:FUNC 'THDN'" and "SENS:FUNC:MMOD LNOI | NOIS " "SENS:FUNC 'WAV'" and "SENS:FUNC:MMOD COMP"	"SENS:UNIT[1|2] FS | PCTFS | DBFS | DPCT | DBR | LSBS | BITS"
	"SENS:FUNC 'THD' | 'MDIS' | 'DFD' " "SENS:FUNC 'THDN'" and "SENS:FUNC:MMOD THDN | NOIS	"SENS:UNIT[1|2] DB | PCT"
	"SENS:FUNC 'WAF'"	"SENS:UNIT[1|2] PCT"
	"SENS:FUNC 'DC'" "SENS:FUNC 'WAV'" and "SENS:FUNC:MMOD STAN"	"SENS:UNIT[1|2] FS | PCTFS | DPCT | LSBS"
	"SENS:FUNC 'THDN'" and "SENS:FUNC:MMOD SNDR"	"SENS:UNIT[1|2] DB"

Instrument	Measurement function	Selectable display units
"INST2 D48" and "SENS:DIG:FEED JPH"	"SENS:FUNC 'RMS' | 'RMSS' | 'PEAK' | FFT" "SENS:FUNC 'WAV'" and "SENS:FUNC:MMOD COMP"	"SENS:UNIT[1|2] UI | PCTUI | PPMUI | NS | UIR | DBR | DBUI"
	"SENS:FUNC 'WAV'" and "SENS:FUNC:MMOD STAN"	"SENS:UNIT[1|2] UI | PCTUI | PPMUI | NS | UIR"
"INST2 D48" and "SENS:DIG:FEED CINP"	"SENS:FUNC 'RMS' | 'RMSS' | 'PEAK' | FFT" "SENS:FUNC 'WAV'" and "SENS:FUNC:MMOD COMP"	"SENS:UNIT[1|2] V | DBV | DBU | DBM | W | DPCTV | DV | VVR | PCTVVR | DPCTW | DW | PPR | PCTPPR | DBR"
	"SENS:FUNC 'WAV'" and "SENS:FUNC:MMOD STAN"	"SENS:UNIT[1|2] V | MV | UV | DPCTV | DV | VVR | PCTVVR"

Display units selectable for input, peak, RMS and phase measurements
SENSe2[:VOLTage|POWer]**:UNIT**[1|**2**]:

Instrument	Measurement function	Selectable display units
"INST2 A22 | A110"	"SENS2:FUNC 'PEAK' | 'RMS'"	"SENS2:UNIT[1|2] V | DBV | DBU | DBM | W | DPCTV | DV | VVR | PCTVVR | DPCTW | DW | PPR | PCTPPR | DBR"
"INST2 D48" and "SENS:DIG:FEED ADAT"	"SENS2:FUNC 'PEAK'"	"SENS2:UNIT[1|2] FS | PCTFS | DBFS | DPCT | DBR | LSBS | BITS"
"INST2 D48" and "SENS:DIG:FEED JPH"	"SENS2:FUNC 'PEAK'"	"SENS2:UNIT[1|2] UI | PCTUI | PPMUI | NS | UIR | DBR | DBUI"
"INST2 D48" and "SENS:DIG:FEED JPH"	"SENS2:FUNC 'PHAS'"	"SENS2:UNIT UI | PCTFRM | DEGFRM | NS"
"INST2 D48" and "SENS:DIG:FEED CINP"	"SENS2:FUNC 'PEAK | 'DIGI'"	"SENS2:UNIT[1|2] V | DBV | DBU | DBM | W | DPCTV | DV | VVR | PCTVVR | DPCTW | DW | PPR | PCTPPR | DBR"

Display units selectable for frequency, phase and group delay measurements
SENSe**3**:**FREQ**uency:**UNIT**[1|2] and **SENS**e**3**:**PHAS**e:**UNIT2**:

Instrument	Measurement function	Selectable display units
"INST2 A22 | A110 | D48"	"SENS3:FUNC 'FREQ'"	"SENS3:FREQ:UNIT[1|2] HZ | DHZ | DPCTHZ | TOCT | OCT | DEC | FFR"
"INST2 A22"	"SENS3:FUNC 'FQPH'"	"SENS3:FREQ:UNIT HZ | DHZ | DPCTHZ | TOCT | OCT | DEC | FFR" "SENS3:PHAS:UNIT DEG | RAD | DDEG | DRAD"
"INST2 A22"	"SENS3:FUNC 'FQGR'"	"SENS3:FREQ:UNIT HZ | DHZ | DPCTHZ | TOCT | OCT | DEC | FFR" "SENS3:PHAS:UNIT S | DS"

3.10.5 Loading and Storing

3.10.5.1 Loading and Storing Instrument Setups

Command	Parameter	Basic unit	Meaning	Section
SYSTem:**INFO**text**:STATe**	**ON** **OFF**		→ During scrolling in the file selection window of the file box the "Info text" for a setup is displayed in the user info line (of minor importance for IEC/IEEE-bus control). → "Info text" is not displayed.	2.9.1.1 **FILE panel** Info Displ → ON → OFF
MMEMory:**LOAD:STATe**	**0 | 2 | 4, "filename"** Query: MMEM:... ... LOAD:STAT? 0 ... LOAD:STAT? 2 ... LOAD:STAT? 4		0: Load current setup with filename extension .SAC 2: Load complete instrument setup with filename extension .SCO. For loading the R&S default setup under C:UPL \ SETUP \ DEFAULT.SET use command *RST. Switch off the parameter link (see 2.15.8 Transfer of Parameters (Parameter Link Function)) to ensure that the default setup described under annex "A UPL Default Setup" remains unchanged even after an instrument or function change. 4: Display of (4 bit-) PCX pictures on 1:1 scale on the screen of UPL. It is thus possible to view under program control PCX files stored in UPL (eg for demos). As long as a PCX picture is displayed on the screen, UPL is not ready to receive further IEC/IEEE-bus commands. The PCX picture remains on display until the UPL is set to the LOCAL state with the SYST:COMM:GTL command. Subsequently the UPL is ready to receive IEC/IEEE-bus commands. To switch the UPL from LOCAL to REMOTE again, see 3.3 Switchover to Remote Control	2.9.1.1 **FILE panel** Mode / Filename
MMEMory**:STOR**e**:INFO**text	**'string'**		A comment of max. 39 characters can be entered for a description of the measurement, a DUT, etc. This comment is displayed in the file box when a setup is loaded by scrolling through the file selection window and SYST:INFO:STAT ON has been selected.	2.9.1.1 FILE panel Info Text
MMEMory:**STOR**e**:STATe**	0|2,**"filename"** Query: MMEM:STOR:STAT? 0 MMEM:STOR.STAT? 2		0: Store current setup under filename extension .SAC 2: Store complete instrument setup under filename extension .SCO.	2.9.1.1 **FILE panel** Mode / Filename

Command	Parameter	Basic unit	Meaning	Section
MMEMory:**STOR**e**:STAT**e:***RONL**y*	**ON** **OFF**		→ File is write-protected → File is not write-protected	2.9.1.1 **FILE panel** Attrib → REAN ONLY → READ/WRITE

3.10.5.1.1 Loading and Storing Traces and Lists

Command	Parameter	Basic unit	Meaning	Section
MMEMory:**STOR**e:***FORM**at*	***BIN*** ***ASC**ii* ***EXP**ort*		→ Data stored in binary format → Data stored in ASCII format → Daten werden im Textformat in Tabellenform ohne Zusatzinformation mit der Dateierweiterung .EXP gespeichert. Vorteil: Dateien im EXP-Format können von jedem Texteditor oder anderen Programmen problemlos gelesen und weiterverarbeitet werden. Nachteil: Da die Zusatzinformationen fehlen, können die Dateien vomUPL/UPD nicht mehr eingelesen werden. Informationen über den Inhalt der Dateien siehe 2.9.1.2 Loading and Storing of Series of Measured Values and Block/List Data und 2.9.1.3 Format of Block/Listen Data.	2.9.1.2 **FILE panel** Format → REAL → ASCII → EXPORT
MMEMory:**STOR**e:**TRAC**e	**TRAC**e**1**,**"filename"** **TRAC**e**2**,**"filename"** **TR1A**nd2,**"filename"** Query: MMEM:STOR:TRAC? TRAC[1|2] MMEM:STOR:TRAC? TR1A		→ Store trace A buffer under "filename" → Store trace B buffer under "filename" → Store trace pair under "filename"	2.9.1.2 **FILE panel** Store → TRACE A → TRACE B → TRACE A+B
MMEMory:**STOR**e:***LIST***	***LIST1***,**"filename"** ***LIST2***,**"filename"** **DWEL**l**,"filename"** Query: MMEM:STOR:LIST? LIST[1|2] MMEM:STOR:LIST? DWEL		→ Store X-axis list under "filename" → Store Z-axis list under "filename" → Store dwell-time list under "filename"	2.9.1.2 **FILE panel** Store → X-Axis → Z-Axis → DWEL VALUE

3.10.5.1.2 Storing Limit Violations (Error Reports)

Command	Parameter	Basic unit	Meaning	Section
MMEMory:**STOR**e:***FORM**at*	***BIN*** ***ASCii***		→ Data stored in binary format → Data stored in ASCII format	2.9.1.2 **FILE panel** Format → REAL → ASCII
MMEMory:**STOR**e:**LIST**	***ERR**ors*,**"filename"** ***LIMU**pper*,**"filename"** ***LIML**ower*,**"filename"** Query: MMEM:STOR:LIST? ERR MMEM:STOR:LIST? LIMU MMEM:STOR:LIST? LIML		→ Store limit error under "filename" → Store upper tolerance curve under "filename" → Store lower tolerance curve under "filename"	2.9.1.2 **FILE panel** Store → LIM REPORT → LIM UPPER → LIM LOWER

3.10.5.1.3 Storing Equalization Files

Command	Parameter	Basic unit	Meaning	Section
MMEMory:**STOR**e:***FORM**at*	***BIN*** ***ASC**ii*		→ Data stored in binary format → Data stored in ASCII format	2.9.1.2 **FILE panel** Format → REAL → ASCII
CALCulate:***EQU**alize:**FEED***	***TRAC**e1* ***TRAC**e2*		→ Amplitude data read from → Trace buffer A/B	2.9.1.2 **FILE panel** Volt Source → TRACE A → TRACE B
CALCulate:***EQU**alize:**NORM**freq*	**<nu>** f_{min} to f_{max}	Hz	Frequency to the level at which is normalized	2.9.1.2 **FILE panel** Norm Freq
CALCulate:***EQU**alize:**INV**ert*	**ON** **OFF**		→ Frequency stored in inverted form → Frequency stored without inversion	2.9.1.2 **FILE panel** Invert 1/n → ON → OFF
MMEMory:**STOR**e:***LIST***	***EQU**alize*,**"filename"** Query: MMEM:STOR:LIST? EQU		Store equalization file under "filename"	2.9.1.2 **FILE panel** Store → EQUALIZATN

3.10.5.2 Commands for Editing Files and Directories

Command	Parameter	Basic unit	Meaning	Section
MMEMory:**DEL**ete	**"filename"**		Deletes a file.	2.9.2 **FILE panel** Delete
MMEMory:**CDIR**ectory	**"pathname"**		Selects a directory for file operation.	2.9.2 **FILE panel** Work Dir
MMEMory:**COPY**	**"filename1","filenam e2"**		Selects the file to be copied. Specifies the name of the target file (with drive and directory, if required) to which a copy should be made.	2.9.2 **FILE panel** Copy + To

3.10.6 Commands for Graphical Representation of Results

In the following, TRACe1 and TRACe2 serve for differentiating between displayed curves (trace A and trace B), bargraphs and result lists.

Command	Parameter	Basic unit	Meaning	Section
DISPlay[:WINDow]**:TRAC**e[]**:*OPER**ation***	***CURV**eplot* ***LIST**alias **TLIS**t* ***ERR**ors* ***BARG**raph* ***SPEC**trum* ***FFTL**ist* ***FFTE**rrors* ***PROT**ocol* ***AUT**oprotocol alias* ***AUTO**protocol*		The parameters below determine the form for the graphics display of measurement results. → Line chart in Cartesian coordinates. → List of numeric values. → List of out-of-tolerance values. In this case the limit check function must be active. → Bargraph display in analog form. → Display of FFT or, in the case of THD, DFD or MOD-DIST, in the form of a schematic spectrum display. → FFT data in tabular form. → FFT limit violation data in tabular form. Limit check function must be active. → Protocol data of the digital AES/EBU interface displayed in the graphics window. → Protocol data of the digital AES/EBU interface displayed in the graphics window. Automatic decoding of the channel status bits irrespective of the professional bit value (see 2.10.8 PROTOCOL Analysis).	**2.10** **DISP panel** OPERATION → CURVE PLOT 2.10.2 → SWEEP LIST 2.10.4 → SWP LIM REP 2.10.4 → BARGRAPH 2.10.2 → SPECT LIST 2.10.8 → SPC LIM REP 2.10.6 → PROTOCOL 2.10 2.10.8 → PROTO AUTO
DISPlay[:WINDow]**:TRAC**e[]**:MODE**	***DELete_bef_wr*** ***WAT**erfall|**CASC**ade* ***MAXH**old***		→ Selects a single trace or a pair of traces. Each new X sweep overwrites the previous trace. → Shifts a single trace (trace pairs not possible) on the Z axis for obtaining a spatial presentation (with FFT-SPECtrum only). → Maximum hold function for FFT SPECtrum for FFT-AVERage = 1.	2.10 **DISP panel** Mode → DEL BEF WR → WATERFAL → MAX HOLD
DISPlay[:WINDow]**:TRAC**e[]**:*COUNt***	**<n>** recorded: 1 to 100 000 stored: max. 17 traces		Specifies the number of single traces and trace pairs to be recorded together and stored. Automatically sets the number of Z values in the case of a Z sweep.	2.10 **DISP panel** Scan Count

Command	Parameter	Basic unit	Meaning	Section
DISPlay[:WINDow]**:TRAC**e[1|2]**:FEED**	**"SENS**e**1**:**DATA1"** **"SENS**e**1**:**DATA2"** **"SENS**e**2**:**DATA1"** **"SENS**e**2**:**DATA2"** **"SENS**e**3**:**DATA1"** **"SENS**e**3**:**DATA2"** **"HOLD"** **"FILE"** **"DFIL**e**"** **"OFF"**		Selects the result to be displayed as TRACe1 (or TRACe2). → Measurement function specified by SENSe1:FUNCtion "<>". Value from channel 2 (CH1). → Measurement function specified by SENSe1:FUNCtion "<>2. Value from channel 2 (CH2). → Result of input RMS measurement of channel 1 (CH1) for THD and THDN functions. → Result of input RMS measurement of channel 2 (CH2) for THD and THDN functions. → Measured value from frequency meter, channel 1 (CH1). → Measured value from frequency meter,channel 2 (CH2) if SENS3:FUNC FREQ is selected. Measured value from phase meter, channel 2 (CH2) if SENS3:FUNC FQPH. Measured value from group delay measurement, channel 2 (CH2) if SENS:FUNC FQGR is selected → Retains previously displayed values (no collection of new values). → Displays measured values from a file using the command described below. → Loads a trace pair with scale and reference values or reference trace using the command described below. → Switch-off	2.10.1 **DISP panel** TRACE A/B → FUNC CH1 → FUNC CH2 → INP RMS CH1 → INP RMS CH2 → FREQ CH1 → FREQ CH2 → PHASE → GROUP DEL → HOLD → FILE → DUAL FILE → OFF
MMEMory:**LOAD:TRAC**e	**TRAC**e[1|**2**],**"filename"** Query: MMEM:LOAD:TRAC? TRAC[1|2]		Loads a trace from a file for display.	2.10.1 **DISP panel** TRACE A/B → FILE + Filename
TRACe:**DATA?**	**TRAC**e[1|**2**] Query only Query: TRAC? TRAC[1|2]		The trace (block data!) can be read from the UPL to the controller.	2.10.1 **DISP panel**
DISPlay[:WINDow]:**TRAC**e[]**:Y**[:SCALe]:**UNIT**	<**u**> see 3.10.4 Units for IEC Measurement Results	1)	Determines the units for results displayed in numerical form.	2.10.1 **DISP panel** Unit

Command	Parameter	Basic unit	Meaning	Section
DISPlay[:WINDow]:**TRAC**e[1|**2**]**:Y**[:SCALe]:**RLEV**el:**MODE**	***VAL**ue* ***MAX**imum* ***CURS**or[1]* ***CURS**or 2* ***FILE*** ***HOLD*** ***OTRA**ce* ***CH1M**eas* ***CH2M**eas* ***GENT**rack* ***IFIL**e* ***REF9**97* ***REF1**000*		A reference value is required for all relative units of TRACe1 or TRACe2. → The subsequently entered value is used as a reference. → Uses the maximum value of the trace once. → The value pointing to the o-cursor is stored as a reference. → The value pointing to the *-cursor is stored as a reference. → Reference for reference-related units is a file indicated by MMEMory:LOAD:TRACe[1|2]REFTrace,"name.TRC". → The reference-trace memory is no longer filled with new (sweep) values. Stored values are retained. → Reference for reference-related units is another trace. → Reference for reference-related units is the value measured in channel 1 or 2 pertaining to the respective reference point (depending on the display measured frequency, function or input result). → The reference trace is erased and reloaded for each measurement using the respective generator setting. → When a trace with the associated reference trace (Internal reference FILe) is loaded, IFILe activates this internal reference file again when another reference has been selected before. →The value measured at 997 Hz or 1 kHz is taken once as a reference → value for a single sweep run. With FFT traces, the nearest bin (actually measured frequency line) is taken, with frequency sweeps interpolation is made between the two neighbouring points.If the X axis is not the frequency axis (for example in the case of level sweeps or waveform traces), an error message is output and the reference value remains unchanged.	2.10.1 **DISP panel** Reference → VALUE → MAX → oCURSOR → *CURSOR → FILE → HOLD → OTHER TRACE → MEAS CH1 → MEAS CH2 → GEN TRACK → FILE INTERN → REF 997 Hz → REF 1000 Hz
DISPlay[:WINDow]:**TRAC**e[]**:Y**[:SCALe]:**RLEV**el	**<nu>**	1)	Entry of reference value for relative units.	2.10.1 **DISP panel** Reference → VALUE
MMEMory:**LOAD:TRAC**e[1|**2**]	**REFT**race**,"filename"** Query: MMEM:LOAD:TRAC[1|2]? REFT		→ File containing the reference-trace data for trace A. Default extension = .TRC	2.10.1 **DISP panel** Reference → FILE + Reference

Command	Parameter	Basic unit	Meaning	Section
DISPlay[:WINDow]:**TRAC**e**2:Y**[:SCALe]:***EQU**al*	***ON*** ***OFF***		→ TRACe2 may be displayed on the same axis as TRACe1. In this case no values can be entered for: UNIT,: RLEVel,:SCALe:AUTO,:TOP,:BOTTom and :SPACing for the second axis. → Independent of trace 1.	2.10.1 **DISP panel** Scale B → EQUAL A → NOT EQUAL A
DISPlay[:WINDow]:**TRAC**e[1|**2**]**:Y**[:SCALe]:**AUTO**	**ONCE** **OFF**		→ Uses the minimum and maximum values of the present trace for rescaling the display once. The new scaling data are transferred to and used in DISP:TRAC:Y:TOP <n> and DISP:TRAC:Y:BOTT <n>. → Leaves scaling to the user with the aid of the following two commands.	2.10.1 **DISP panel** Scale → AUTO ONCE → MANUAL ONCE mit Softkey F7 (AUTOSCALE) → F7 (A) → F8 (B)
DISPlay[:WINDow]:**TRAC**e[1|**2**]**:Y**[:SCALe]:**NORM**alize:**MODE**	**CURS**or[1] (**o**-Cursor) **CURS**or**2** (*****-Cursor) **VAL**ue		With normalize the reference curve can be multiplied so that a specific Y value is obtained at the desired Y position. → The multiplier is obtained from the measured value at the cursor position divided by the reference value at this position. Thus the new reference corresponds to the value measured at this position (= 0 dBr). → Entry of a fixed multiplier using the next command: Presettings required: DISP:TRAC[1|2]:OPER CURV and DISP:TRAC[1|2]:FEED 'SENS1:DATA1'|'SENS1:DATA2'|'HOLD' and DISP:TRAC[1|2]:Y:UNIT VVRPCTVVR|PPR|PCTPPR|DBR and DISP:TRAC[1|2]:Y:RLEV:MODE GENT or DISP:TRAC[1|2]:OPER CURV and DISP:TRAC[1|2]:FEED 'SENS3:DATA1'|'SENS3:DATA2'|'HOLD' and DISP:TRAC[1|2]:Y:UNIT TOCT|OCT|DEC|FFR and DISP:TRAC[1|2]:Y:RLEV:MODE GENT	2.10.1 **DISP panel** Normalize → **o**-Cursor → *****-Cursor → VALue

Command	Parameter	Basic unit	Meaning	Section
DISPlay[:WINDow]:**TRAC**e[1|**2**]**:Y**[:SCALe]:**NORM**alize	**<nu>** 10^{-12} to 10^{6} or -200 dB to 120 dB	Multi-plier | dB	The specified number is multiplied to obtain the reference value. This allows the reference of a trace to be determined as required.	2.10.1 **DISP panel** Normalize
DISPlay[:WINDow]**:TRAC**e[1|**2**]**:Y:SPAC**ing	**LIN**ear **LOG**arithmic		→ Linear spacing of Y axes → Logarithmic	2.10.1 **DISP panel** Spacing → LIN → LOG
DISPlay[:WINDow]:**TRAC**e[1|**2**]**:Y**[:SCALe]:**TOP**	**<nu>**	1)	Sets the upper value of the Y axis (of the dependent value) in the case of DISPlay:TRACe[1|2]:Y:AUTO OFF	2.10.1 **DISP panel** Top
DISPlay[:WINDow]:**TRAC**e[1|**2**]**:Y**[:SCALe]:**BOTT**om	**<nu>**	1)	Sets the lower value of the Y axis (of the dependent value) in the case of DISPlay:TRACe[1|2]:Y:AUTO OFF.	2.10.1 **DISP panel** Bottom
DISPlay[:WINDow]**:TRAC**e[1|**2**]**:X**[:SCALe]***:UNIT***	<**u**> see 3.10.4 Units for IEC Measurement Results		Determines the units for the numeric results displayed on the X axis.	2.10.1 **DISP panel** Unit
DISPlay[:WINDow]**:TRAC**e[1|**2**]**:X**[:SCALe]**:RLEV**el	**<nu>**	2)	Entry of reference value for relative units.	2.10.1 **DISP panel** Reference
DISPlay[:WINDow]**:TRAC**e[]**:X**[:SCALe]**:AUTO**	**ON** **OFF**		→ Uses the minimum and maximum values of the present trace for scaling the X axis (once). → Leaves scaling to the user with the aid of the following two commands.	2.10.1 **DISP panel** Scale → AUTO → MANUAL or **Softkey** F7 (AUTOSCALE) → F9 (X)

Command	Parameter	Basic unit	Meaning	Section
DISPlay[:WINDow]**:TRACe**[]**:X:SPACing**	**LIN**ear **LOG**arithmic		→ Linear spacing of X axis → Logarithmic	2.10.1 **DISP panel** Spacing → LIN → LOG
DISPlay[:WINDow]**:TRACe**[]**:X**[:SCALe]**:LEFT**	**<nu>**	2)	Sets the left-hand value of the X axis (of the independent value) in the case of DISPlay:TRACe:X:AUTO OFF.	2.10.1 **DISP panel** Left
DISPlay[:WINDow]**:TRACe**[]**:X**[:SCALe]**:RIGHT**	**<nu>**	2)	Sets the right-hand value of the X axis (of the independent value) in the case of DISPlay:TRACe:X:AUTO OFF. The lower value of LEFT and RIGHT is used as left-hand value.	2.10.1 **DISP panel** Right
DISPlay[:WINDow]**:TEXT**[:DATA]	**"string"**		Permits a text to be entered that will be displayed within the trace display in the case of DISPlay:TRACe[1|2]:OPERation CURVeplot.	2.10.1 **DISP panel** COMMENT
DISPlay[:WINDow]**:TEXT:LOC**ate	<**ny**>[,<**nx**>]		Determines the X and Y position of the text. X and Y are the relative distance from the 0 point of the coordinates in % (0 to 100).	2.10.1 **DISP panel** X Pos, Y Pos
DISPlay[:WINDow]**:TRACe**[]**: ACT**ive	***CURSor***[1|**2**]		Switches the cursors alternately on and off. This only affects the display. CURSor1 is marked with o, CURSor2 with *.	2.10.2 **DISP panel** Softkey, 1st level F8
DISPlay[:WINDow]**:TRACe**[]**:*CURSor*[*1*]:MODE**	***N12*** ***D12*** ***OFF***		Parameters used for selecting the cursor function and the type of the displayed numeric cursor values. → Display of measured values A and B and of associated X value. → Display of difference value of A and B at the cursor position and of X value. → The deactivated cursor is no longer displayed.	2.10.2 **Softkey** F8: selects O-CURS. F9: (O-CURSOR) → F6 (A,B) → F7 (A-B) → F11 (ON/OFF)

Command	Parameter	Basic unit	Meaning	Section
DISPlay[:WINDow]**:TRAC**e[]**:*CURS*or*2:*MODE**	***N12*** ***D12*** ***C12*** ***HL1*** ***HL2*** ***HLD1*** ***HLD2*** ***OFF***		→ Display of measured values A and B and of associated X value. → Display of difference value of A and B at the cursor position and of X value. → Difference of trace and X values of curves A and B which are marked by the two cursors. → The *-cursor is switched to horizontal line. Its Y value and intersections with TRACe1 (if any) are displayed. → Intersections with TRACe2 are displayed. → The *-cursor is switched to horizontal line. The difference between its Y value and the Y value of the o-cursor are displayed. Intersections with TRACe1 are displayed as well. → Same as with HLD1, but the intersections with TRACe2 are displayed. → The deactivated cursor is no longer displayed.	2.10.2 **Softkey** F8 sel. o-cursor F9 sel. ***-cursor → F6 (A,B) → F7 (A-B) → F8 (* - O) → F9 (HLINE) → A → F9 (HLINE) → B → F9 (HLINE) → ΔA → F9 (HLINE) → ΔB → F11 (ON/OFF)
DISPlay[:WINDow]**:TRAC**e[]**:*CURS*or**[1|2]**:POS**ition:**MODE**	***MIN1*** ***MIN2*** ***I MAX1*** ***MAX1*** ***I MAX2*** ***MAX2*** ***MARK**er1* ***NEXT**harm* ***VAL**ue*		Changes the position of the specified cursor. → Sets cursor to the minimum of TRACe1. → Sets cursor to the maximum of TRACe2. → Sets cursor to calculated maximum of TRACe1 (with FFT only) → Sets cursor to maximum of TRACe1. → Sets cursor to calculated maximum of TRACe2 (with FFT only) → Sets cursor to maximum of TRACe2. → Sets cursor to value of 1st marker (FFT only). → Sets cursor to the next harmonic (FFT only). → Sets cursor to the value specified with the command below.	2.10.2 **Softkey** F8 sel. O-CURS or ***-CURS → F10 (SET TO) → ---- → ---- → F6 (I MAX A) → F7 (MAX A) → F8 (I MAX B) → F9 (MAX B) → F10 (MARKER) → F11(NXTHARM)
DISPlay[:WINDow]**:TRAC**e[]**:CURS**or[1|**2**]***:POS**ition***	**<nu>**	3)	Sets specified cursor to the value of the X axis if DISPlay:TRACe[]:CURSor[1|2]:POSition:MODE VALue is set.	2.10.2 not via softkey

Command	Parameter	Basic unit	Meaning	Section
DISPlay[:WINDow]**:TRAC**e[1|**2**]**:** ***CURV****e*	**OFF** **ON**		→ TRACe1: trace A on/off → TRACe2: trace B on/off	2.10.2 **Softkey** → F6 (CURVE) → F6 (A ON/OFF) → F7 (B ON/OFF)
DISPlay[:WINDow]**:TRAC**e[]**:*ZOOM***	**<n>** **0** **1** **-1** **2** **3** **4**		 → Restores the original X axis defined by X AXIS LEFT and RIGHT. → Expands the display on the X axis by the factor 2 (can be repeated). → Reduces the display on the X axis by the factor 2 (repeated actions possible). → Shifts the center of the X axis of the new coordinates to the value of the o-cursors (CURSor1) without expanding the X axis. → The end points of the expanded X axis are determined by the X values of the two cursors → Cancels the last action.	2.10.2 **Softkey** F10 (ZOOM) → F10 (UNZOOM) → F6 (AT o UP) → F7 (ATo DOWN) → F8 (CEN TO o) → F9 (o TO *) → F11 (UNDO)
DISPlay[:WINDow]:**TRAC**e[1|**2**]:***MARK****er*:**MODE**	 ***MAX****imum* ***CURS****or* ***OFF***		Markers for FFT spectrum display → Sets the first marker to the maximum of TRACe1 or TRACe2. → Sets the first marker to the value defined by the o-cursor. TRACe1 or TRACe2 is used. → No markers	2.10.2 **Softkey** F11 (MARKER) F6 (TRACE A) or F7 (TRACE B). → MAX → CURSOR → VIEW OFF
DISPlay[:WINDow]:**TRAC**e[1|**2**]:***MARK****er*:***HARM****onics*	**ON** **OFF**		→ Sets markers for harmonics (frequency multiples) of MARKer1 (FFT only). Values marked in TRACe1 or TRACe2. → No harmonics markers.	2.10.2 **Softkey** F11 (MARKER) F6 (TRACE A) or F7 (TRACE B) → F10 (HARM) on/off

Command	Parameter	Basic unit	Meaning	Section
DISPlay[:WINDow]**:TRAC**e[]**:*AUT*oscale**			Rescales the X and the TRACe1 axis. When active also the axis of TRACe2.	2.10.2 **Softkey** F7 (AUTOSCALE) F6 (ALL)
DISPlay[:WINDow]**:TRAC**e[]**:*LAB*el**	**ON** **OFF**		→ Activates user title and units. → Deactivates user title and units.	2.10.2 **DISP panel** User Label → ON → OFF
DISPlay[:WINDow]**:TRAC**e**:X:*LAB*el**	**"string"**		Specification of a string determining a user-definable label (unit and title) for the X axis.	2.10.2 **DISP panel** Unit/Label
DISPlay[:WINDow]**:TRAC**e**[1]:Y:*LAB*el**	**"string"**		Specification of a string determining a user-definable label (unit and title) for the Y1 axis.	2.10.2 **DISP panel** Unit/Label
DISPlay[:WINDow]**:TRAC**e**2:Y:*LAB*el**	**"string"**		Specification of a string determining a user-definable label (unit and title) for the Y2 axis.	2.10.2 **DISP panel** Unit/Label
DISPlay[:WINDow]**:TRAC**e[]**:IND**ex	**<n>** 1 to 17		Selects the nth single trace or curve pair. In the graphics display a circle marks the intersection of the vertical cursor line and the selected trace.	2.9.3.3 **Keys** PAGE UP / PAGE DOWN

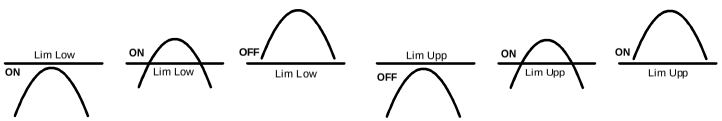
Command	Parameter	Basic unit	Meaning	Section
DISPlay:***CONF**iguration*	***P*** ***SP*** ***AP*** ***GP*** ***FP*** ***DP*** ***OP*** ***GAT*** ***GAO*** ***GAD*** ***FAT*** ***FAO*** ***FAD*** ***SHON*** ***SHOF**f*		Configuration of screen display after switchover to LOCAL: → Full-screen graphics display (plot) → Status panel and graphics window → Analyzer panel and graphics window → Generator panel and graphics window → File panel and graphics window → Display panel and graphics window → Options panel and graphics window → Generator, analyzer and filter panel → Generator, analyzer and options panel → Generator-, analyzer and display panel → File, analyzer and filter panel → File, analyzer and options panel → File, analyzer and display panel → Show IO graphics on → Show IO graphics off	2.3.1 Keys — Ext. UPL keyboard GEN — ALT+G ANLR — ALT+A FILT — ALT+T FILE — ALT+F DISP — ALT+D GRAPH — ALT+R ZOOM — ALT+Z SHOW I/O — ALT+I OPTIONS — ALT+O
DISPlay[:WINDow]**:TRAC**e[]***:CURS**or*[]***:DATA1?*** **DISP**lay[:WINDow]**:TRAC**e[]***:CURS**or*[]:***DATA2?*** **DISP**lay[:WINDow]**:TRAC**e[]***:CURS**or*[]***:DATA3?***	Query only		Return the values of the cursor position. Depending on DISPlay:TRACe[]:CURSor[1|2]:MODE and DISPlay:TRACe:CURSor[1|2]ACTive the following values are available: DATA1 — DATA2 — DATA3 with CURSor1 and CURSor2 ACTive N12 — A — X — B D12 — A-B — X — - OFF — - — - — - only with CURSor2 ACTive: C12 — A-oA — X-oX — B-oB HL1 — XAL — y — XAR HL2 — XBL — Y — XBR HLD1 — XAL — A-Y — XAR HLD2 — XBL — B-Y — XBR	2.10.2 **Display in graphics window**

1) Depending on DISPlay:TRACe:FEED and (with SENSe1) of SENSe1:FUNCtion
2) Depending on the sweep selected for generator and analyzer
3) Same units as with DISPlay:TRACe[]:X:UNIT permitted.

3.10.6.1 Commands for Limit Check

See also Sections 2.10.7 Limit Check, 3.10.9 Commands for Input/Output of Data and 3.10.9 Commands for Input/Output of Data, for the transfer of limit curves and limit check results in the form of block data.

Command	Parameter	Basic unit	Meaning	Section
CALCulate:**LIM**it:***ON***	***TRACe1*** ***TRACe2*** ***TR1And2***		→ TRACe1 or bargraph 1 monitored. → TRACe2 or bargraph 2 monitored. → Both traces (bargraphs) monitored together.	2.10.7 **DISP panel** Check → TRACE A → TRACE B → TRACE A+B
CALCulate:**LIM**it:**UPP**er:**STATe**	**ON** **OFF**		→ Upper limit monitoring switched on. → Upper limit monitoring switched off.	2.10.7 **DISP panel** LIMIT CHECK Mode → LIM UPPER Mode → OFF
CALCulate:**LIM**it:**UPP**er:**VAL**ue	**<nu>**	*)	Specifies a single upper limit value.	2.10.7 **DISP panel** Lim Upper → VALUE:
MMEMory:**LOAD:*LIST***	***LIMUpper*,** **"filename"**		→ Defines a file containing the upper limit curve.	2.10.7 **DISP panel** Lim Upper → FILE + filenam"

Command	Parameter	Basic unit	Meaning	Section
CALCulate:**LIM**it:**LOW**er:**STATe**	**ON** **OFF**		→ Lower limit monitoring switched on. → Lower limit monitoring switched off.	2.10.7 **DISP panel** LIMIT CHECK Mode → LIM LOWER Mode → OFF
CALCulate:**LIM**it:**LOW**er:**VAL**ue	**<nu>**	*)	Specifies a single lower limit value.	2.10.7 **DISP panel** Lim Lower → VALUE:
MMEMory:**LOAD:*LIST***	***LIML**ower,* **"filename"**		→ Defines a file containing the lower limit curve.	2.10.7 **DISP panel** Lim Lower → FILE + filename
CALCulate:**LIM**it:**FAIL?**	**<n>** Query only		Returns ON if Lim Upper values are exceeded or Lim Lower values are not attained, otherwise OFF. 	2.10.7 **No manual control**

*) Same units as with DISPlay:TRACe[1|2]:Y:UNIT permitted.

3.10.6.2 PROTOCOL Analysis

Command	Parameter	Basic unit	Meaning	Section
DISPlay:***PROT**ocol*:***SEL**ect*	**LCHannel**status **RCHannel**status **LUS**erdata **RUS**erdata		Selects the protocol data of the AES/EBU interface to be displayed. → Left channel: status data → Right channel: status data → Left channel: user data → Right channel: user data	2.10.8 **DISP panel** Source → CHAN STAT L → CHAN STAT R → USER DATA L → USER DATA R
DISPlay:***PROT**ocol*:***FORM**at*	**BIN**ary **HEX**adecimal **ASCii** **FILE**		Format selects the interpretation mode for user data. → User data displayed as 0101 sequence. → User data displayed as hexadecimal figures → User data displayed as plain text → Interpretation file for user data loaded with MMEMory:LOAD:PAU "filename".	2.10.8 **DISP panel** Format → BIN → HEX → ASCII → FILE DEF
MMEMory:**LOAD:*PAU***	**"filename"**		Selects the interpretation file for user data if DISPlay:PROTocol:FORMat FILE has been set.	2.10.8 **DISP panel** Proto File
MMEMory:**LOAD:*PAC***	**"filename"**		Selects the interpretation file for channel status data.	2.10.8 **DISP panel** Proto File
DISPlay:***PROT**ocol*:***ERR**or*:***GEN**eral***?**	Query only Response: UBB SQB NSYN PRMB SQLR RERR NONE		Query only Indicates errors occurred. "UBB" : unexpected preamble for beginning of block (too early) "SQB" : no preamble (blank) for beginning of block "NSYN" : no preamble for beginning of block "PRMB" : preamble invalid "SQLR" : error in the channel sequence (L/R) "RERR" : measured and set rate differ by more than 200 ppm "NONE" : no error	2.10.8 **GRAPH panel** **Display**

Command	Parameter	Basic unit	Meaning	Section
DISPlay:***PROT***ocol:***ERR***or:***PAR***ity**?**	Query only		Query only Displays the sum of all occurred parity errors. Zero reset by reselecting the analyzer or pressing the start key.	2.10.8 **GRAPH panel Display**
DISPlay:***PROT***ocol:***ERR***or:***LCRC***?**	Query only		Query only Internal counter of CRC errors (left)	2.10.8 **GRAPH panel Display**
DISPlay:***PROT***ocol:***ERR***or:***RCRC***?**	Query only		Query only Internal counter of CRC errors (right)	2.10.8 **GRAPH panel Display**
DISPlay:***PROT***ocol:***CHST***atus***?***	Query only NO LTC YES		Query only Indicates changes in the channel status data. "NO" : No changes "LTC" : Changes in local-time-code only (bits 112 to 143) and CRC (bits 184 to 191). "YES" : Changes at another bit position.	2.10.8 **GRAPH panel Display**
DISPlay:***PROTocol:LR?***	Query only EQUAL DIFF		Query only Channel status data between left and right channel are ... "EQUAL": same "DIFF" : different	2.10.8 **GRAPH panel Display**
DISPlay:***PROT***ocol:***LVAL***bit***?***	Query only Y0 N1		Query only Indicates the position of the validity bit in the left channel.	2.10.8 **GRAPH panel Display**
DISPlay:***PROT***ocol:***RVAL***bit***?***	Query only Y0 N1		Query only Indicates the position of the validity bit in the right channel.	2.10.8 **GRAPH panel Display**

3.10.7 Commands for Printing/Plotting of Screen and Storing in Files

Command	Parameter	Basic unit	Meaning	Section
HCOPy:**DEST**ination	***PRSP**c alias **PRIN**ter* ***PLHP**gl alias* ***PLOTter*** ***PRPS*** ***PRHP**gl* ***FIPC**x,* *'filename.PCX'* *alias* ***PCXF**ile, 'name.PCX'* ***FIHP**gl, 'filename.GL'* *alias* ***HPGL**file, 'name.GL'* ***FIPS**, 'filename.PS'* ***FIEPs**, 'filename.EPS'* For reasons of compatibility with existing programs the replys are as follows: PRIN PLOT PRHP PRPS PCXF HPGL FIPS FIEP		Screen copy → to printer in the specified printer format (PR**SPC** = **SP**e**C**ial printer format) → to plotter in HPGL format → to printer in PostScript format → to printer in HPGL format taking into account the content of the prolog file C:\UPL\REF\GL_PRO.LOG and the epilog file C:\UPL\REF\GL_EPI.LOG. → to file in PCX format → to file in HPGL format → to file in PostScript format → to file in Encapsulated PostScript format	**2.14** **OPTIONS panel** Destin (**destination/format**) → PRINTR/SPC → PLOTTR/HPGL → PRINTR/HPGL → PRINTR/PS → FILE/PCX → FILE/HPGL → FILE/PS → FILE/EPS

Command	Parameter	Basic unit	Meaning	Section
HCOPy:**DEV**ice:**COL**or	**ON** **OFF**		→ PCX information stored in colors in the file specified by HCOP:DEST PCXFile, 'filename'. → PCX information stored in black/white in the file specified by HCOP:DEST PCXFile, 'filename'.	**2.14** **OPTIONS panel** COLOR → ON → OFF
HCOPy:**ITEM**	***ALL*** ***GRAT****icule* ***TRAC****e*		Effective only with HCOPy:DESTination PLOTter|HPGLfile → The complete screen is output, ie all labels and cursors as well as traces/bargraphs with scales. In the case of graphics windows the result display and a panel are output in addition. → Stores the traces/bargraphs with scales and scale labels but not the cursors and other labelling. → Only the trace(s) displayed is (are) transferred.	**2.14** **OPTIONS panel** Copy → SCREEN → CURVE/GRID → CURVE
HCOPy:**ITEM:LAB**el**:STATe**	**ON** **OFF**		→ Hardcopy with comment → Hardcopy without comment	**2.14** **Key** H COPY or Ctrl F8
HCOPy**:DEV**ice**:*PRIN****ter***	**<n>**		Effective only with HCOPy:DESTination PRINter Selects a printer driver. The number <n> to be specified for the desired printer driver can be obtained from the printer-driver box "List of installable Printers" opened under "Printname" in the OPTIONS panel.	**2.14** **OPTIONS panel** Printname

Command	Parameter	Basic unit	Meaning	Section
HCOPy:**ITEM**:**FRAM**e	***WHITe*** ***FDEF**ined*		Effective only with HCOPy:DESTination PRSPc|FIPCx|PRPS|FIPS|FIEPs Selection of background color of GRAPH panel frame and result panel for hardcopies on a printer or storage in a .PCX file. WHITE should be selected when the characters cannot be clearly distinguished on the grey background. → White → Color defined via file For HCOP:DEST PRSPc|FIPCx: Color No. 2 (backgrnd frames) defined in files \UPD\REF\PRN_BW.PLT (BW printer) and \UPD\REF\PRN_CL.PLT (color printer) is used. For HCOP:DEST PRPS|FIPS|FIEPs: The color information for the frames of the GRAPH panel is taken from the PostScript configuration file \UPD\REF\PS.CFG, key word "Background Color" "Frame:" and "Plane:" and available as RGB information for color PostScript pictures and as shades of grey for black/white PostScript pictures. Examples in file PS.CFG show the RGB combination for different background colors.	**2.14** **OPTIONS panel** Frame → WHITE → FILE DEF
HCOPy:***PLP**ort*	**COM2** **LPT1** **IEC**		Effective only with HCOPy:DESTination PLOTter → Hardcopy via serial interface 2. → Hardcopy via parallel printer interface. → Hardcopy via IEC/IEEE-bus interface.	**2.14** **OPTIONS panel** Plot on → COM 2 → LPT 1 → IEC BUS
HCOPy:***PLAD**dress*	**<n>**		Sets the IEC/IEEE-bus address of the plotter when HCOPy:DESTination PLOTer and HCOPy:PLPort IEC has been selected.	**2.14** **OPTIONS panel** → IEC Adr
HCOPy:**PAGE**:**LMAR**gin	**<n>** 0 to 80		Margin of hardcopy (number of spaces)	**2.14** **OPTIONS panel** LEFT MRGN

Command	Parameter	Basic unit	Meaning	Section
HCOPy:**DEV**ice**:RES**olution	***HIGH*** ***MED****ium* ***LOW***		Sets the printer resolution. Whether a resolution can be set and which one depends on the printer used. → High resolution (eg 300 dpi) → Medium resolution (eg 150 dpi) → Low resolution (eg 75 dpi)	**2.14** **OPTIONS panel** Prn Resol → HIGH → MEDIUM → LOW
HCOPy:**PAGE**:**SCAL**e**:X**	**<n>** 0.1 to 10		Scaling of X axis of hardcopy	**2.14** **OPTIONS panel** X-SCALING
HCOPy:**PAGE**:**SCAL**e**:Y**	**<n>** 0.1 to 10		Scaling of Y axis of screen hardcopy	**2.14** **OPTIONS panel** Y-SCALING
HCOPy:**PAGE**:**ORI**entation	**LAND**scape **PORT**trait		→ Hardcopy in upright format → Hardcopy in landscape format	**2.14** **OPTIONS panel** ORIENTATION → LANDSCAPE → PORTRAIT
HCOPy**:PAGE:WIDT**h**?**	Query only		Indicates the hardcopy width in cm. The width of a hardcopy depends on the following settings: - HCOPy:DEVice:PRINter (selected printer) - HCOPy:PAGE:SCALe:X (X scaling) - HCOPy:DEVice:RESolution (resolution)	**2.14** **OPTIONS panel** Prn Width,
HCOPy**:PAGE:LENG**th**?**	Query only		Indicates the hardcopy length in cm. The length of a hardcopy depends on the following settings: - HCOPy:DEVice:PRINter (selected printer) - HCOPy:PAGE:SCALe:Y (Y scaling) - HCOPy:DEVice:RESolution (resolution)	**2.14** **OPTIONS panel** Prn Height

Command	Parameter	Basic unit	Meaning	Section
HCOPy:**SIZE**	**A4** **LETT**er		Form feed for a screen copy in PostScript format → UPL images are optimally positioned on format A4 (21 cm * 29.6 cm). → UPL images are optimally positioned on format LETTER (21.6 cm * 27.9 cm).	**2.14** **OPTIONS panel** Paper Size → A4 → LETTER
HCOPy:**PLOT**s	**<n>** 1 to 6		Number of UPL plots to be printed on a PostScript page.	**2.14** **OPTIONS panel** Plots/Page
SYSTem:***PRIN****t* ***TRAC****e1* ***TRAC****e2* ***EQU****alize* ***ERR****ors* ***DWEL****l* ***LIML****ower* ***LIMU****pper* ***LIST1*** ***LIST2*** ***TR1A****nd2* ***OFF***			Printout of numerals in ASCII code (including X axis). → Printout of TRACe1. → Printout of TRACe2. → Printout of equalization values → Printout of values violating limits → Printout of timing values → Printout of lower limit values → Printout of upper limit values → X axis (eg sweep) → Z axis (eg sweep) → Printout of both traces → Switched off	2.14.5 **OPTIONS panel** PRINT------ Type → TRACE A → TRACE B → EQUALIZATN → LIM REPORT → DWELL → LIM LOWER → LIM UPPER → X AXIS → Z AXIS →TRACE A+B → OFF

Command	Parameter	Basic unit	Meaning	Section
HCOPy[:IMMediate]	Without parameter		Starts printout of the screen content Depending on command HCOP:DEST ... the current screen content is printed, plotted, or stored in a PCX or HPGL file or as a PostScript file, In the case of IEC/IEEE-bus and RS-232 control, only the result window and REMOTE are printed. A **remedy** is a HCOPY command with specified parameters which permits a hardcopy with preceding screen configuration to be printed.	**HCOPy** command via IEC/IEEE bus, RS-232 or Universal Sequence Controller UPL-B10

	CNF
	CF
	NCNF
	NCF
			With setting
			HCOPy:DESTination PRINter
			
			One of the four parameters CNF, CF, NCNF or NCF can be added to the HCOP command for printing the screen content with a comment:
			CNF: Hardcopy with comment*, without form feed
			CF: Hardcopy with comment*, with form feed
			NCNF: Hardcopy without comment, without form feed
			NCF: Hardcopy without comment, with form feed
			Thus a specific screen configuration (3-panel, split-screen or full-screen display) can be output to the printer via IEC/IEEE bus, RS-232 or through UPL-B10 control.
			The desired screen configuration has to be selected before with command DISP:CONF ... (see end of section 3.10.6, Commands for Graphical Display of Results).
			The HCOP command with one of the 4 parameters switches the UPL from REMOTE to manual control, builds up the screen with the selected configuration, scans the screen content and starts the hardcopy.
			The next IEC/IEEE-bus command switches the UPL back to the REMOTE mode.
			
			Program example:
			`:`
			`IECOUT 20,"HCOPy:DESTination PRINter"`
			`IECNREN:' Inhibits the LOCAL key ...`
			`IECREN:'... releases key blocking.`
			`IECOUT 20,"DISP:CONF GAT":' GEN, ANLR and FILTER panel`
			`IECOUT 20,"HCOP CF":' Triggers a hardcopy with comment`
			`'  and form feed`
			`IECLLO:' Reactivates blocking of the LOCAL key.`
			`:`	

Command	Parameter		Meaning	Section
Cont'd **HCOPy**[:IMMediate]	***CONF**ig*		Cont'd: **HCOPy:DESTination PRINter** If a screen copy without comment is output (HCOP:ITEM:LAB:STAT OFF), the desired screen configuration is first set with command DISP:CONF and then the HCOP command with parameter **CONF** is given. Program example: : **IECOUT 20,"HCOPy:DESTination PRINter"** **IECNREN**:' Inhibits the LOCAL key ... **IECREN**:'... releases key blocking. **IECOUT 20,"DISP:CONF GAT"**:' GEN, ANLR and FILTER panel **IECOUT 20,"HCOP CONF"**:' Trigg. a hcopy without comment **IECLLO**:' Reactivates blocking of the LOCAL key. :	**HCOPy** command via IEC/IEEE bus, RS-232 or Universal Sequence Controller UPL-B10
	***CONF**ig*		**With setting** **HCOPy:DESTination PCXFile,'filename':** The desired screen configuration has to be selected first with command DISP:CONF ... see end of section 3.10.6, Commands for Graphics Display of Results). The HCOP command with parameter **CONF** switches the UPL from REMOTE to manual control, builds up the screen with the selected configuration, scans the screen content and starts a hardcopy into the file. The next IEC/IEEE-bus command reset the UPL to the REMOTE mode. Program example: : **IECOUT 20,"HCOPy:DESTination PCXFile,'filename'"** **IECNREN**:' Inhibits the LOCAL key ... **IECREN**:'... releases key blocking **IECOUT 20,"DISP:CONF GAT"**:' GEN, ANLR and FILTER panel **IECOUT 20,"HCOP CONF"**:' Triggers a hardcopy without comment **IECLLO**:' Reactivates blocking of the LOCAL key. :	

Command	Parameter		Meaning	Section

Cont'd
HCOPy[:IMMediate]
	***TITL**e*
	***SUPP**lement*
			With settings
			HCOPy:DESTination PRPS
			HCOPy:DESTination FIPS, 'filename.PS'
			HCOPy:DESTination FIEPs, 'filename.EPS'
			
			A comment* can be added to the PostScript plot as a **TITLe** or caption (**SUPP**lement).
			
			Thus a specific screen configuration (3-panel, split-screen or full-screen display) can be output to the PostScript printer or a PostScript file via IEC/IEEE bus, RS-232 or through UPL-B10 control.
			A selection can be made with command HCOPy:ITEM ALL|GRAT|TRAC whether the whole screen content (ALL), only traces and scales (GRAT) or only traces (TRAC) are output as PostScript plot or stored in a PostScript file.
			When a hardcopy of traces is to be made (HCOP:ITEM GRAT|TRAC) make sure that the screen configuration selected with DISP:CONF P|SP|AP|GP|FP|DP|OP allows traces to be plotted.
			The HCOP command with one of the three parameters
			switches the UPL from the REMOTE to the manual control mode,
			builds up the selected configuration,
			scans the screen content and starts the hardcopy.
			The next IEC/IEEE-bus command resets the UPL to REMOTE.
			
			Program example:
			`:`
			`IECOUT 20,"HCOPy:DESTination FIPS, 'filename.PS'"`
			`IECNREN:' Inhibits the LOCAL key ...`
			`IECREN:'... disables key blocking.`
			`IECOUT 20,"DISP:CONF GAT":' GEN, ANLR and FILTER panel`
			`IECOUT 20,"HCOP TITL":' Triggers a hardcopy with a comment as a title`
			`IECLLO:' Reactivates blocking of the LOCAL key.`
			`:`
				HCOPy command via IEC/IEEE bus, RS-232 or Universal Sequence Controller UPL-B10

Command	Parameter		Meaning	Section

Cont'd
HCOPy[:IMMediate]
	CONFig		Cont'd:
			With settings
			HCOPy:DESTination PRPS
			HCOPy:DESTination FIPS, 'filename.PS'
			HCOPy:DESTination FIEPs, 'filename.EPS'
			
			If a screen copy without comment (HCOP:ITEM:LAB:STAT OFF) is output, the desired screen configuration is first set with command DISP:CONF and then the HCOP command with parameter CONF is triggered.
			
			Program example:
			`:`
			`IECOUT 20," HCOPy:DESTination FIPS, 'filename.PS' "`
			`IECNREN:' Inhibits the LOCAL key ...`
			`IECREN:'... disables key blocking.`
			`IECOUT 20,"DISP:CONF GAT":' GEN, ANLR and FILTER panel`
			`IECOUT 20,"HCOP CONF":' Trigg. a hcopy without comment`
			`IECLLO:' Reactivates blocking of the LOCAL key.`
			`:`
				HCOPy command via IEC/IEEE bus, RS-232 or Universal Sequence Controller UPL-B10

Command	Parameter		Meaning	Section
Cont'd **HCOPy**[:IMMediate]	***CONF**ig*		**With settings** **HCOPy:DESTination PLOTter** and **HCOPy:DESTination PRHP**gl **HCOPy:DESTination HPGLfile,'filename':** The default parameter **CONF** triggers a hardcopy to a plotter, a HPGL-compatible printer or a HPGL file with preceding screen configuration. A comment cannot be output. In addition to the screen configuration selected with DISP:CONF ... a selection can be made with command HCOPy:ITEM ALL|GRAT|TRAC whether the total screen content (ALL), only traces with scales (GRAT) or only traces (TRAC) are plotted or transferred to the HPGL file. When traces are to be plotted (HCOP:ITEM GRAT|TRAC) make sure that a screen configuration allowing traces to be plotted has been selected with DISP:CONF P|SP|AP|GP|FP|DP|OP. The HCOP command with one of the three parameters switches the UPL from REMOTE control to manual control, builds up the screen with the selected configuration, scans the screen content and starts the hardcopy. The next IEC/IEEE-bus command resets the UPL to REMOTE control. Program example: `:` **`IECOUT 20,"HCOPy:DESTination PLOTter"`** **`IECNREN`**`:' Inhibits the LOCAL key ...` **`IECREN`**`:'... releases key blocking.` **`IECOUT 20,"DISP:CONF GAT"`**`:' GEN, ANLR and FILTER panel` **`IECOUT 20,"HCOP CONF"`**`:' Triggers a hardcopy` **`IECLLO`**`:' Reactivates blocking of the LOCAL key.` `:` ***Note:*** *No further HCOP command may be given while a hardcopy is being executed (printed), since a command would abort the printout.*	**HCOPy** command via IEC/IEEE bus, RS-232 or Universal Sequence Controller UPL-B10
HCOPy:**WAIT**			Starts the printout (see above) The next Basic command is not carried out before printing (with optimum speed) in the background is completed.	**No manual control**
HCOPy**:ABOR**t			Aborts the hardcopy.	**2.14** **Key** H COPY or CTRL F8

3.10.8 Setting and Display of Auxiliary Parameters

3.10.8.1 IEC/IEEE-Bus Address

Command	Parameter	Basic unit	Meaning	Section
SYSTem:**COMM**unicate:**GPIB:ADDR**ess	**<n>** 0 to 31		IEC/IEEE bus address of UPL	2.15.1 **OPTIONS panel** UPL IECadr

3.10.8.2 Switching the Beeper On/Off

Command	Parameter	Basic unit	Meaning	Section
SYSTem:**BEEP**er:**STATe**	**ON** **OFF**		→ Beeper on → Beeper off	2.15.2 **OPTIONS panel** Beeper → ON → OFF

3.10.8.3 MACRO Operating

Command	Parameter	Basic unit	Meaning	Section
SYSTem:**PROG**ram:**EXEC**ute	**'filename'**		By means of this command any BASIC program with the name <filename> (preferred file extension: *.BAS) can be loaded and started. After the program has been quit, a 1 → 0 transition is generated in the RUN bit (#14) of the operation register. This is communicated to the controller via SRQ or serial poll so that it can fetch the measurement results. Data exchange between the external control program and the BASIC program can be performed via the measurement-result displays, the measurement-result buffers or the block data input/output by adding on the command SYST:PROG **<n>**{,**<n>**}. For a detailed example see 3.15.18 Call BASIC-Macro. Only in IEC/IEEE-bus or RS232-remote-control mode can a BASIC macro be started with this command. A program supplied by the Universal Autorun Control UPD-K1 **cannot** start a BASIC macro.	2.15.9 Selecting the Sampling Mode 2.16 **OPTIONS-Panel** Exec Macro <filename>
SYSTem:**PROG**ram[:DATA]	**<n>**{,**<n>**}		Up to 1024 various floating-point values can be transferred to the external control program from a BASIC macro. To do this, the values are written to the block buffer by the BASIC macro and then read by the external control program. For a detailed example see 3.15.18 Call BASIC-Macro	**No manual control**
SYSTem:**PROG**ram:**POIN**ts?	**<n>** 0 to 1024 Query only		Number of the available block-data values written to the block buffer by the BASIC macro.	**No manual control**

3.10.8.4 Transfer of Settings

Command	Parameter	Basic unit	Meaning	Section
SYSTem:***PAR**ameter**:LINK***	**<n>** *) 0 to 2047		Permits transfer of settings in the generator or analyzer to another signal or measurement function or to another instrument.	**2.15.7 OPTIONS panel** Param. Link

*)

Calculation of <n>:

Data bit	Weight	Function
d0 (LSB)	1	Changing generator function keeps FUNCTION parameters
d1	2	Changing generator instrument keeps Output Config
d2	4	Changing generator instrument keeps FUNCTION + Parameters
d3	8	Changing analyzer functiom keeps FUNCTION parameters
d4	16	Changing analyzer instrument keeps Input Configuration
d5	32	Changing analyzer instrument keeps START COND
d6	64	Changing analyzer instrument keeps INPUT DISP
d7	128	Changing analyzer instrument keeps FREQ/PHASE
d8	256	not used
d9	512	Changing analyzer instrument keeps FUNCTION + Parameters
d10 (MSB)	1024	Changing generator function (tracking Gen → Anl) the appropriate measurement function for the analyzer is set. (MDIST, DFD, POL, FM → W&F)

Example: Function of d0, d3, d9 and d10 required

Databit:	d10	d9	d8	d7	d6	d5	d4	d3	d2	d1	d0
Data word:	**1**	**1**	0	0	0	0	0	**1**	0	0	**1**
Weighting:	1024	512	256	128	64	32	16	8	4	2	1

n = Sum of the weighting of the set bits
n = 1 + 8 + 512 + 1024
n =1545

3.10.8.5 Selecting the Sampling Mode

CONFigure:**DAI**	***BRM***	When hardware option UPL-B29 (Digital Audio 96 kHz) is installed, UPL can be operated in two different sampling modes: → Base Rate Mode Option UPL-B29 (Digital Audio 96 kHz) generally functions like option UPL-B2 (Digital Audio I/O). Clock frequencies up to 55 kHz can be generated and analyzed. Maximum performance of UPL performance without reduction of functions.	**2.15.9 OPTIONS panel** Sampl Mode → BASE RATE → HIGH RATE
	HRM	→ High Rate Mode Option UPL-B29 (Digital Audio 96 kHz) permits generation and analysis in the High Rate Mode with clock frequencies up to 106 kHz. Some measurement functions in 2-channel operation are performed at lower speed. Analyzer functions are slightly reduced: • no RUB&BUZZ measurement • THIRD OCT measurement only analog • THIRD OCT, WAVEFORM, PEAK and QPEAK measurements only without filter • digital phase measurement not possible with all measurement functions *Note: In the HRM even the performance and functions of analog measurements are reduced. This mode should therefore only be selected when the higher sampling rate is really required in the generator or analyzer.*	

3.10.8.6 Parameters of COM2 Interface

The parameters to be set in this section apply to a screen printout on a plotter with COM2 interface selected.
(HCOP:DEST PLOT mit HCOP:PLP COM2).

Command	Parameter	Basic unit	Meaning	Section
SYSTem:**COMM**unicate:**SER**ial2:**FEED**:**BAUD**	**<n>** n = **2400** **3600** **4800** **7200** **9600** **19200** **38400** **56000**		Transmission speed in baud (bits/s) (default setting: 9600)	**2.15.1** **OPTIONS panel** Baud Rate → 2400 Baud → 3600 Baud → 4800 Baud → 9600 Baud → 19200 Baud → 38400 Baud → 56000 Baud
SYSTem:**COMM**unicate:**SER**ial2:**FEED**:**PAR**ity[:TYPE]	**NONE** **EVEN** **ODD**		Parity check → Parity check off → Check for even parity (default setting) → Check for odd parity	**2.15.1** **OPTIONS panel** Parity → NONE → EVEN → ODD
SYSTem:COMMunicate**:SER**ial**2:FEED:BITS**	**<n>** n = 7 | 8		Number of data bits (default setting: 7)	**2.15.1** **OPTIONS panel** Data Bits → 7 → 8
SYSTem:COMMunicate**:GTL**			Return to manual operation. This command is only required in case of remote control via RS-232 but can also be used for IEC/IEEE-bus operation and Universal Sequence Controller UPL-B10.	**LOCAL** **keystroke**

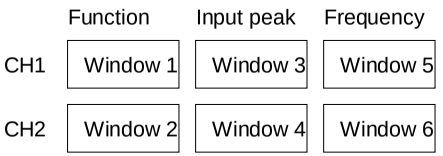
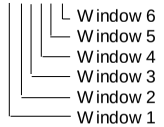
Command	Parameter	Basic unit	Meaning	Section
SYSTem:COMMunicate**:SER**ial**2:FEED:SBIT**s	**<n>** n = 1 | 2		Number of stop bits (default setting: 1)	**2.15.1** **OPTIONS panel** Stop Bits → 1 → 2
SYSTem:**COMM**unicate:**SER**ial2:**CONT**rol	**RTS** **XON**		Type of synchronization → Hardware handshake via RTS and CTS line (default setting) → Software handshake	**2.15.1** **OPTIONS panel** Handshake → RTS/CTS → XON/XOFF

3.10.8.7 Keyboard Settings

Command	Parameter	Basic unit	Meaning	Section
SYSTem:**KEY:*RRAT***e	**<nu>** 0 to 50 Hz	Hz	Repetition rate of UPL and AT keyboard	2.15.3 **OPTIONS panel** Reptn Rate
SYSTem:**KEY:*RDEL***ay	**<nu>** 0.25 to 1.0 s	s	Response delay of UPL and AT keyboard	2.15.3 **OPTIONS panel** Rep Delay

3.10.8.8 Display Settings

Command	Parameter	Basic unit	Meaning	Section
DISPlay:**MODE**	***INT**ern* ***COLB**oth* ***BWB**oth* **AUTO**		→ Display on internal LCD → Additional display on external color monitor → Additional display on external monochrome monitor → Additional display on external VGA monitor; the display mode (color or monochrome) is adapted to the built-in LCD. The display is thus optimized for the built-in LCD so that the contrast quality will not be affected.	2.15.5 **OPTIONS panel** Extrn Disp → INTERN ONLY → BOTH COLOR → BOTH B/W → BOTH AUTO
DISPlay**:*ANN**otation*[*:ALL*]	***ON*** ***OFF***		→ Display of measurement results and status → Result and status display cleared (FFT, sweep and IEC/IEEE-bus operation speeded up).	2.15.5 **OPTIONS panel** Meas Disp → ON → OFF Ext. Keyboard: CTRL D
DISPlay:***ACT**ualize*	***ON*** ***OFF***		This command may be called from Universal Autorun Control UPD-K1 or via the IEC/IEEE bus or by means of RS232 remote control. → Updates the graphics panel and repeats the update every time commands are output which change the graphics display in the UPL, eg DISPlay[:WINDow]:TRACe[]:X [:SCALe]:AUTO ON. → The graphics panel is not updated not even after commands changing the graphics display in the UPL. ***Note:*** *To enhance speed, it is best to **turn off the graphic when the remote-control mode is selected**. Graphics should only be activated when traces are to be displayed.*	**No manual control**

Command	Parameter	Basic unit	Meaning	Section
SYSTem:*DISP*lay*:READ*ing*:RATE	***MAXS*peed** **FSTS**peed **MEDS**peed **SLWS**peed		Presetting for manual control. Determines the rate for the output of measured values in the result windows. The setting is only effective in the continuous measurement mode. In the case of sweeps and triggered measurements as well as with all measurements via IEC/IEEE bus, results are always output at maximum speed. → Max. output speed → 6 results/second → 3 results/second → 1 result/second	2.15.5 **OPTIONS panel** Read Rate → MAX SPEED → 6/s → 3/s → 1/s
**SYSTem:*DISP*lay*:READ*ing*:RES*olution	**<n>**		Presetting for manual control. Sets the number of decimal digits for the display of measured values in the result windows. With measurements via IEC/IEEE bus results are always displayed with maximum resolution. Decimal digits for the 6 result windows are specified by 6 numbers between 0 and 6 (higher numbers are interpreted as 6). 0: Automatic display of decimal digits 1 to 6: 1 to 6 decimal digits Each number is assigned to a result window:  SYSTem:DISPlay:READing:RESolution 112244  Leading zeros may be omitted so that for <n> = 34, for example, the result in window 6 is displayed with 4 decimal digits, the result in window 5 with 3 and the results in windows 1 to 4 without any decimal digits at all.	2.15.5 **OPTIONS panel** Read Resol

Command	Parameter	Basic unit	Meaning	Section
SYSTem:**DISP**lay:**TRAC**e[]:**LOAD**	**MAN**ual **DEF**ault **ACOL**or **ALIN**e		→ For each scan of a trace group (to be selected with the subsequent command SYST:DISP:TRAC[1|2]:SEL <n>) a color and the line pattern can be selected for the display. → Automatic assignment of color and line pattern to max. 17 scans for Trace A and Trace B. All scans of Trace A are green uninterrupted with thin lines, those of Trace B yellow dotted with thin lines. → Automatic assignment of color to 17 scans for Trace A and Trace B. ALL scans of Trace A in uninterrupted thin lines, all scans of Trace B in dotted thin lines. → Automatic assignment of line pattern to 17 scans of Trace A and Trace B. All scans of Trace A in green, all scans of Trace B in yellow.	**2.15.5.4** **OPTIONS panel** Scan conf → MANUAL → DEFAULT → AUTO COLOR → AUTO LINE
SYSTem:**DISP**lay:**TRAC**e[1|**2**]:**SEL**ect	**<n>** 1 to17		Scan number of trace group to which a color or line pattern is to be assigned with the two subsequent commands SYST:DISP:TRAC[1|2]:COL and SYST:DISP:TRAC[1|2]:LINE for screen display.	**2.15.5.4** **OPTIONS panel** Scannr.(A) Scannr.(B)
SYSTem:**DISP**lay:**TRAC**e[1|**2**]:**COL**or	**GRE**en **YELL**ow **BLUE** **CYAN** **MAG**enta **WHIT**e **BLAC**k **DGR**ay **LGR**ay		Assignment of color to the scan number specified with command SYST:DISP:TRAC[1|2]:SEL <n> when color display is selected. Shades of grey with monochrome display selected. Newly assigned colors are only visible on the screen after the LOCAL mode has been restored.	**2.15.5.4** **OPTIONS panel** Color (A) / (B) → GREEN → YELLOW → BLUE → CYAN → MAGENTA → WHITE → BLACK → DARK GRAY → LIGHT GRAY

Command	Parameter	Basic unit	Meaning	Section
SYSTem:**DISP**lay:**TRAC**e[1|**2**]:**LINE**	**SSOL**id **SD** **SP** **SPD** **DSOL**id **DD** **DP** **DPD**		Line patterns for the scan number specified with command SYST:DISP:TRAC[1|2]:SEL <n>. → thin continuous line → dashed line → dotted line → dash-dot line → three-times-wide continuous line → dashed line → dotted line → dash-dot line The newly assigned line pattern is only visible on the screen after the LOCAL mode has been restored.	**2.15.5.4 OPTIONS panel** Line (A) / (B) → ——— → - - - - - - → . . . . . . → . - . - . - → ═══ → ====== → : : : : : : → : = : = : =

3.10.8.9 Version Display

Command	Parameter	Basic unit	Meaning	Section
SYSTem:***SOFT***ware:***VERS***ion**?**	***SOFT***ware ***SETU***p Query only Query: SYST:SOFT:VERS? SOFT SYST:SOFT:VERS? SETU The response is the number of a version (eg 3.05).		→ Version number of UPL software → Version number of setup	2.15.7 **OPTIONS panel** VERSIONS ------ Software Setup
SYSTem:***AHAR***dware:***VERS***ion**?**	***ABOard*** ***ACOD***e Query only Query: SYST:AHAR:VERS? ABO SYST:AHAR:VERS? ACOD The response is either the number of a version (eg 0.01) or -NA- (Not Available) if the board is not installed.		→ Version number of analog board → Version number of generator source impedance with the BAL output selected: Query reply 0.00: generator source impedance 200 Ω (standard value) 0.01: generator source impedance 150 Ω with the standard generator source impedance changed from 200 Ω to 150 Ω using the Modification Analog Generator UPL-U3 (Order No. 1078.4900.02)	2.15.7 **OPTIONS panel** VERSIONS ------ Anlg Board code

Command	Parameter	Basic unit	Meaning	Section
SYSTem:***DHAR***dware:***VERS***ion**?**	***CPU***board ***DBO***ard Query only Query: SYST:DHAR:VERS? CPU SYST:DHAR:VERS? DBO The response is the number of a version (eg 0.05).		→ CPU board 3.86 | 4.86 (386-CPU, 486-CPU) → Version number of digital board	2.15.7 **OPTIONS panel** VERSIONS ------ **CPU board** Digl. Board

SYSTem:***OPT***ions:***VERS***ion**?**	*alias* ***LDG*** ***B1*** ***REMO***te ***B4*** ***DAUDio*** ***B2 | B29*** **Answer:** 1.15 to 1.27 UPL16 (U8) 1.46 to 1.51 UPL-B2 2.16 to 2.23: UPL-B29 ***SPE***aker ***B5*** ***DAPR***otocol ***B21*** ***DAJ***Itter ***B22*** ***SQCO***ntrol ***B10*** ***B33*** ***B6*** *B8* The response is either the number of an option (eg 0.01), INST or -NA- (Not Available) if the board or option are not installed.		Version display of options → Low Distortion Generator (UPL-B1) → Remote Control (UPL-B4) → Digital Audio I/O (UPL-B2) Digital Audio 96 kHz (UPL-B29) Acoustic measurements on GSM mobile stations (UPL16) → Audio Monitor (UPL-B5) → Digital Audio Protocol (UPL-B21) → Jitter and Interface Test (UPL-B22) → Universal Sequence Controller (UPL-B10) → Line measurement to ITU-T33 (UPL-B33) → Extended analyzer functions (UPL-B6) → **Mobile Phone Test Set** (UPL-B8)	2.15.7 2.6.6 **OPTIONS panel** OPTIONS ------- B1 Low Dist B4 Rem Ctrl B2 DigAudio B5 Speaker B21 DA Prot B22 DA Jitt B10 Seq Ctrl ITU-T O33 B6 Coher B8 PhoneTst

3.10.8.10 Calibration

Command	Parameter	Basic unit	Meaning	Section
CALibrate:**LDG**:**AUTO**	**OFF** **ONCE**		→ No calibration of low-distortion generator → Triggers an automatic calibration of the low-distortion generator. This should be after one hour of operation at the earliest.	2.15.6 **OPTIONS panel** CALIBR. GEN LDG Auto → OFF → ONCE
CALibrate:**ZERO**:**AUTO**	**OFF** **ON** **ONCE**		→ No offset calibration → Offset calibration cyclic and after a change of analyzer/instrument. → Manual triggering of offset calibration; then reset to ON	2.15.6 **OPTIONS panel** CALIBR. ANL Zero Auto → OFF → ON → ONCE
CALibrate:**JITT**er:**AUTO**	**OFF** **ONCE**		→ No calibration of digital Phase to Ref measurement. → Manual triggering of automatic calibration of digital Phase to Ref measurement; then reset to OFF.	2.15.6 **OPTIONS panel** CALIBR. DIG PhaseToRef → OFF → ONCE
CALibrate	**OFF** **AUTO** **DCC** **LDG**		→ No offset calibration. Equivalent to CALibrate:ZERO:AUTO OFF. → Offset calibration cyclic and after a change of analyzer/instrument. Equivalent to CALibrate:ZERO:AUTO ON. → Manual triggering of offset calibration; then reset to AUTO. Equivalent to CALibrate:ZERO:AUTO ONCE. → Automatic calibration of low-distortion generator. This should be after one hour of operation at the earliest. Equivalent to CALibrate LDG:AUTO ONCE.	2.15.6

3.10.8.11 Loading Speed for Setups and Analyzer Measurement Functions

Command	Parameter	Basic unit	Meaning	Section
SYSTem:**LSP**eed	**FAST**		Speed for loading setups and analyzer measurement functions → Loading setups and analyzer functions can be speeded up while **FAST** is active. (considerably faster than SLOW), given the following minor restrictions: • During loading of setups and changing analyzer functions the graphics system is not initialized, IEC/IEEE-bus commands for the graphics systems have no effect and are rejected with an error message. K1 commands UPLGTLU und UPLGTLG cannot be used for graphic display (see section 3.16.4.3, Basic Extensions). • When analyzer measurement functions are changed, the currently set function is not stored, ie after switching back to the previously set function, the parameters of the slower mode (SYST:LSP SLOW) will be set. • When an *RST is performed, the output of measurement results is suppressed so as if the command DISP:ANN OFF were output. When the IEC/IEEE-bus is quit, (LOCAL key or IEC/IEEE-bus command GTL) the slower load mode is set without the above-mentioned restrictions.	**No manual operation**
	SLOW		→ without restrictions, therefore slower than FAST (default setting).	

3.10.9 Commands for Data Output

Command	Parameter	Basic unit	Meaning	Section
SENSe[1]**:DATA**1|**2?**	Query only	Depending on FUNC	Returns the measured value of the 1st analyzer for RMS, RMSS, PEAK, QPE, DC, THD, THDN, MDIST, DFD and WAF functions. DATA1 selects input channel 1 DATA2 selects input channel 2.	3.15.8 **No manual control** **Result display**
SENSe**2:DATA**1|**2?**	Query only	V/FS	Returns the measured value of the 2nd analyzer (peak voltage meter). DATA1 selects input channel 1 DATA2 selects input channel 2.	3.15.8 **No manual control** **Result display**
SENSe**3:DATA**1|**2?**	Query only	Hz	Returns the measured value of 3rd analyzer (frequency counter). DATA1 selects input channel 1 DATA2 selects input channel 2.	3.15.8 **No manual control** **Result display**
SENSe**4:DATA?**	Query only	DEG	Returns the measured value of the 4th analyzer (phase meter).	3.15.8 **No manual control** **Result display**

Write access to the measurement-result buffers is also possible with Universal Autorun Control (UPD-K1) or remote control (IEC/IEEE bus interface). This is of particular interest for operation with BASIC macros:

- The measurement results calculated by a BASIC macro can be displayed in the usual measurement-result window.
- Any floating-point parameters and measurement results may be exchanged between the BASIC macro and the controller via the measurement-result buffers.

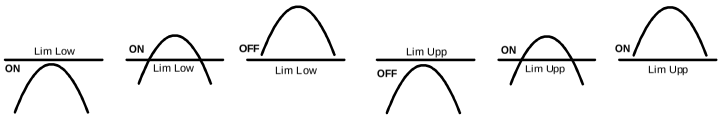
For a detailed example see 3.15.18 Call BASIC-Macro.

3.10.10 Commands for Input/Output of Block Data

Command	Parameter	Basic unit	Meaning	Section
FORMat[:DATA]	**ASCI**i **REAL**		→ Determines the numeric format for block data only. Output of numbers with sign, point and possibly exponent (default). → Determines the numeric format for block data only. Output in binary form. This setting is not stored in the setup and set to ASCII each time the UPL is switched on.	**No manual control**
SENSe[1]:**LIST:FREQ**uency **SOURce**:**LIST:FREQ**uency	**<n>**{,**<n>**} **<n>**{,**<n>**}	Hz	These two commands are identical and specify the block data for a frequency sweep or frequencies for a sequence of measurements. When limit or equalization curves are specified, the frequencies are to be sorted in ascending or descending order.	2.9.1.3 **No manual control**
SENSe[1]:**LIST:FREQ**uency:**POIN**ts**?** **SOURce**:**LIST:FREQ**uency:**POIN**ts**?**	**<n>** 0 to 1023 Query only		The two commands are identical and return the number of currently available block data for the frequency axis.	2.9.1.3 **No manual control**
SOURce:**LIST:VOLT**age	**<n>**{,**<n>**}	V	Specifies the block data for a voltage sweep or the output voltage for a sequence of measurements.	2.9.1.3 **No manual control**
SOURce:**LIST:VOLT**age:**POIN**ts**?**	**<n>** 0 to 1023 Query only		Returns the number of currently available block data for the voltage axis.	2.9.1.3 **No manual control**
SOURce:**LIST:*ONT****ime***	**<n>**{,**<n>**}	S	Specifies the block data for a sweep of the on-time and off-time ratio of the burst signal or of a sequence of measurements.	2.9.1.3 **No manual control**
SOURce:**LIST:*ONT****ime*:POIN**ts**?**	**<n>** 0 to 1023 Query only		Returns the number of currently available block data for the on-time axis.	2.9.1.3 **No manual control**
SOURce:**LIST:*INT****erval***	**<n>**{,**<n>**}		Specifies the block data for a sweep of the on-time to off-time ratio of the burst signal or a sequence of measurements.	2.9.1.3 **No manual control**

Command	Parameter	Basic unit	Meaning	Section
SOURce:**LIST:***INTerval*:**POIN**ts**?**	**<n>** 0 to 1023 Query only		Returns the number of currently available block data for the interval axis.	2.9.1.3 **No manual control**
SOURce:**LIST:DWEL**l	**<n>**{,**<n>**}	s	Specifies the block data for the dwell time of a sweep or a measurement sequence.	2.9.1.3 **No manual control**
SOURce:**LIST:DWEL**l:**POIN**ts**?**	**<n>** 0 to 1023 Query only		Returns the number of currently available block data for the dwell time.	2.9.1.3 **No manual control**
SOURce:**LIST:DWEL**l:**CONT**rol[:DATA]	**<n>**{,**<n>**}		X axis for the dwell time.	2.9.1.3 **No manual control**
SOURce:**LIST:DWEL**l:**CONT**rol:**POIN**ts**?**	**<n>** 0 to 1023 Query only		Returns the number of currently available block data for the dwell time.	2.9.1.3 **No manual control**
SOURce:**VOLT**age:**EQU**alize[:DATA]	**<n>**{,**<n>**}		Specifies the block data for the voltage axis of the equalization curve.	2.9.1.3 **No manual control**
SOURce:**VOLT**age:**EQU**alize:**POIN**ts**?**	**<n>** 0 to 1023 Query only		Returns the number of currently available block data for the voltage equalization list.	2.9.1.3 **No manual control**
SOURce:**EQU**alize:**CONT**rol[:DATA]	**<n>**{,**<n>**}		Specifies the block data for the frequency axis of the equalization curve.	2.9.1.3 **No manual control**
SOURce:**EQU**alize:**CONT**rol:**POIN**ts**?**	**<n>** 0 to 1023 Query only		Returns the number of currently available block data for the frequency axis of the equalization curve.	2.9.1.3 **No manual control**

Command	Parameter	Basic unit	Meaning	Section
SENSe:**VOLT**age:**EQU**alize[:DATA]	**<n>**{,**<n>**}		Block data for voltage axis of equalization curve for measurement functions THD+N and FFT.	2.9.1.3 **No manual operation**
SENSe:**VOLT**age:**EQU**alize:**POIN**ts**?**	**<n>** 0 to 1024 Query only		Returns the number of currently available block data values of the voltage equalization list for measurement functions THD+N and FFT.	2.9.1.3 **No manual operation**
SENSe:**EQU**alize:**CONT**rol[:DATA]	**<n>**{,**<n>**}		Block data for frequency axis of equalization curve for measurement functions THD+N and FFT.	2.9.1.3 **No manual operation**
SENSe:**EQU**alize:**CONT**rol:**POIN**ts**?**	**<n>** 0 to 1024 Query only		Returns the number of currently available block data values for the frequency axis of the equalization curve for measurement functions THD+N and FFT.	2.9.1.3 **No manual operation**
CALCulate:**LIM**it**:UPP**er[:DATA]	**<n>**{,**<n>**}	1)	Specifies the block data for the Y axis of the upper limit curve.	2.9.1.3 **No manual control**
CALCulate:**LIM**it:**UPP**er:**TRAC**e	**<n>**{,**<n>**}		Returns the block data for the y axis of the **upper** limit trace interpolated along the x axis. The command `trac:points? list1` gives the number of x values, which were used for interpolation. It is the same as the number of interpolated y values for the **upper** limit trace.	2.9.1.3 **Keine Handbedienung**
CALCulate:**LIM**it**:UPP**er:**POIN**ts**?**	**<n>** 0 to 1023 Query only		Returns the number of currently available block data for the Y axis of the upper limit curve.	2.9.1.3 **No manual control**
CALCulate:**LIM**it**:UPP**er:**CONT**rol[:DATA]	**<n>**{,**<n>**}		Specifies the block data for the X axis of the limit curves	2.9.1.3 **No manual control**
CALCulate:**LIM**it**:UPP**er:**CONT**rol:**POIN**ts**?**	**<n>** 0 to 1023 Query only		Returns the number of currently available block data for the X axis of the limit curves.	2.9.1.3 **No manual control**

Command	Parameter	Basic unit	Meaning	Section
CALCulate:**LIM**it:**LOW**er[:DATA]	**<n>**{,**<n>**}	1)	Specifies the block data for the Y axis of the lower limit curve.	2.9.1.3 **No manual control**
CALCulate:**LIM**it:**LOW**er:**TRAC**e	**<n>**{,**<n>**}		Returns the block data for the y axis of the **lower** limit trace interpolated along the x axis. The command `trac:points? list1` gives the number of x values, which were used for interpolation. It is the same as the number of interpolated y values for the **lower** limit trace.	2.9.1.3 **Keine Handbedienung**
CALCulate:**LIM**it:**LOW**er:**POIN**ts**?**	**<n>** 0 to 1023 Query only		Returns the number of currently available block data for the Y axis of the lower limit curve.	2.9.1.3 **No manual control**
CALCulate:**LIM**it:**LOW**er:**CONT**rol[:DATA]	**<n>**{,**<n>**}		Specifies the block data for the X axis of the limit curves.	2.9.1.3 **No manual control**
CALCulate:**LIM**it:**LOW**er:**CONT**rol:**POIN**ts**?**	**<n>** Query only		Returns the number of currently available block data for the X axis of the limit curves.	2.9.1.3 **No manual control**
CALCulate:**LIM**it:**FAIL?**	Query only		Returns ON if Lim Upper values are exceeded or Lim Lower values are not attained, otherwise OFF. 	2.9.1.3 **No manual control**
CALCulate:**LIM**it:**REP**ort[:DATA]**?**	**<n>**{,**<n>**}Query only		Returns the block data of limit violations. Corresponds to the contents of a Limt Report file as described in section 2.9.1.2 Loading and Storing of Series of Measured Values and Block/List Data	2.9.1.3 **No manual control**
CALCulate:**LIM**it:**REP**ort:**POIN**ts**?**	**<n>** 0 to 1023 Query only		Returns the number of currently available block data of limit violations.	2.9.1.3 **No manual control**

Command	Parameter	Basic unit	Meaning	Section
TRACe[:DATA]	**TRAC**e**1, <n>**{,**<n>**} Query: TRACe? TRACe1	1)	Specifies the block data of the first measurement sequence (Y1 axis).	2.9.1.3 **No manual control**
TRACe:**POIN**ts**?**	**TRAC**e**1** Query only Query: TRAC:POIN? TRAC1 Query reply <n> = 0 to 1023		Returns the number of currently available block data of the first measurement sequence (Y1 axis).	2.9.1.3 **No manual control**
TRACe[:DATA]	**TRAC**e**2, <n>**{,**<n>**} Query: TRACe? TRACe2	1)	Specifies the block data of the second measurement sequence (Y2 axis).	2.9.1.3 **No manual control**
TRACe:**POIN**ts**?**	**TRAC**e**2,** Query only Query: TRAC:POIN? TRAC2 Query reply <n> = 0 to 1023 Query only		Returns the number of the currently available block data of the second measurement sequence (Y2 axis).	2.9.1.3 **No manual control**
TRACe[:DATA]	**LIST1, <n>**{,**<n>**} Query: TRACe? LIST1	2)	Specifies the block data of the first sweep list (X axis).	2.9.1.3 **No manual control**
TRACe**:POIN**ts**?**	**LIST1 <n>** Query only Query: TRAC:POIN? LIST1 Query reply <n> = 0 to 1023 Query only		Returns the number of the currently available block data of the first sweep list (X axis).	2.9.1.3 **No manual control**
TRACe[:DATA]	**LIST2, <n>**{,**<n>**} Query: TRACe? LIST2	2)	Specifies the block data of the second (convoluted, nested) sweep list (Z axis).	2.9.1.3 **No manual control**

Command	Parameter	Basic unit	Meaning	Section
TRACe**:POIN**ts**?**	**LIST2** Query only Query: TRAC:POIN? LIST2 Query reply <n> = 0 to 1023		Returns the number of the currently available block data of the second (convoluted, nested) sweep list (Z axis).	2.9.1.3 **No manual control**
TRACe[:DATA]	**REF**erence**1**,**<n>**{,**<n>**} Query: TRACe? REF1		Loads the running reference values for the Y axis.	2.9.1.3 **No manual control**
TRACe:**POIN**ts**?**	**REF**erence1 Query only Query: TRAC:POIN? REF1 Query reply <n> = 0 to 1023		Returns the number of the currently available block data for the Y axis of trace A.	2.9.1.3 **No manual control**
TRACe[:DATA],	**REF**erence**2**,**<n>**{,**<n>**} Query: TRACe? REF2		Loads the running reference values for the Y axis of trace B	2.9.1.3 **No manual control**
TRACe:**POIN**ts**?**	**REF**erence**2** Query only Query: TRAC:POIN? REF2 Query reply <n> = 0 to 1023		Returns the number of the currently available block data for the Y axis of trace B.	2.9.1.3 **No manual control**
TRACe[:DATA],	**CREF**erence**1**,**<n>**{,**<n>**} Query: TRACe? CREF1		Loads the running reference values for the X axis of trace A.	2.9.1.3 **No manual control**

Command	Parameter	Basic unit	Meaning	Section
TRACe:**POIN**ts**?**	**CREF**erence1 Query only Query: TRAC:POIN? CREF1 Query reply <n> = 0 to 1023		Returns the number of the currently available block data for the X axis of trace A.	2.9.1.3 **No manual control**
TRACe[:DATA]	**CREF**erence**2**,**<n>**{,**<n>**} Query: TRACe? CREF2		Loads the running reference values for the X axis of trace B	2.9.1.3 **No manual control**
TRACe:**POIN**ts**?**	**CREF**erence**2** Query only Query: TRAC:POIN? CREF2 Query reply <n> = 0 to 1023		Returns the number of the currently available block data for the X axis of trace B.	2.9.1.3 **No manual control**

1) Depending on DISPlay:TRACe:FEED and (with SENSe1:DATA) of SENSe1:FUNCtion
2) Depending on sweep selected for generator and analyzer.

3.10.11 Commands for Status and Error Queries

Command	Parameter	Basic unit	Meaning	Section
STATus:**PRES**et			Resets the Enable registers of the OPERation, QUEStionable and XQUEstionable registers to 0. See 3.7.5 Resetting the Status Reporting Systems.	3.7.5 **No manual control**
STATus:**OPER**ation:**COND?**	Query only		Outputs the contents of the CONDition register as a decimal number (current value of Operating Status of UPL). For the weighting of the individual bits see 3.7.3.4 STATus:OPERation Register Reading out does not clear the register.	3.7.3.4 **No manual control**
STATus:**OPER**ation[:EVENt]**?**	Query only		Outputs the content of the EVENt register as a decimal number. A bit set in the EVENt register indicates a change of the corresponding bit in the CONDition register. The entry in the PTRansition and NTRansition registers determines whether a bit transition from 0 to 1 or from 1 to 0 causes an entry in the EVENt register. Reading out clears the register!	3.7.3.4 **No manual control**
STATus:**OPER**ation:**ENAB**le	**<n>** .... 0 0 **1** 0 0 **1** 0 0 ... .d7 d6 d5 d4 d3 d2 d1 d0 Example: d2 and d5 set: **<n>** = 36 (4 + 32)		Sets the ENABle mask which validates a bit in the EVENt register. Example: When d5 is set in the ENABle mask, the "Waiting for Trigger" event is set in the EVENt register provided the bit has changed. Dafault setting: every bit reset (0)	3.7.3.4 **No manual control**
STATus:**OPER**ation:**PTR**ansition	**<n>**		If a bit is set in the PTRansition register, the transition from 0 to 1 of the corresponding bit in the CONDition register causes 1 to be entered in the corresponding bit of the EVENt register provided the corresponding bit in the ENABle mask is set. Default setting: every bit reset (65535 or 0xFFFF)	3.7.3.4 **No manual control**
STATus:**OPER**ation:**NTR**ansition	**<n>**		If a bit is set in the NTRansition register, a transition from 1 to 0 of the corresponding bit in the CONDition register causes 1 to be entered in the corresponding bit of the EVENt register provided the corresponding bit in the ENABle mask is set. Default setting: every bit reset (65535 or 0xFFFF)	3.7.3.4 **No manual control**

Command	Parameter	Basic unit	Meaning	Section
STATus:**QUES**tionable:**COND?**	Query only		Outputs the status of the CONDition register (current value of Questionable Status of UPL) as a decimal number. For the weighting of the individual bits see 3.7.3.5 STATus:QUEStionable Register. Reading out does not clear the register.	3.7.3.5 **No manual control**
STATus:**QUES**tionable[:EVENt]**?**	Query only		Outputs the contents of the EVENt register as a decimal number. A bit set in the EVENt register indicates a change of the corresponding bit in the CONDition register. The entry in the PTRansition and NTRansition registers determines whether a bit transition from 0 to 1 or from 1 to 0 causes an entry in the EVENt register. Reading out clears the register!	3.7.3.5 **No manual control**
STATus:**QUES**tionable: **ENAB**le	**<n>**		See above.	3.7.3.5 **No manual control**
STATus:**QUES**tionable: **PTR**ansition	**<n>**		See above.	3.7.3.5 **No manual control**
STATus:**QUES**tionable: **NTR**ansition	**<n>**		See above.	3.7.3.5 **No manual control**
STATus**:XQUE**stionable:**COND?**	Query only		Outputs the content of the CONDition register as a decimal number (current value of XQuestionable Status of UPL). For the weighting of individual bits see 3.7.3.6 STATus:XQUEStionable Register. Reading out does not clear the register.	3.7.3.6 **No manual control**
STATus:**XQUE**stionable[:EVENt]**?**	Query only		See above.	3.7.3.6 **No manual control**
STATus:**XQUE**stionable: **ENAB**le	**<n>**		See above.	3.7.3.6 **No manual control**

Command	Parameter	Basic unit	Meaning	Section
STATus:**XQUE**stionable: **PTR**ansition	**<n>**		See above.	3.7.3.6 **No manual control**
STATus:**XQUE**Stionable: **NTR**ansition	**<n>**		See above.	3.7.3.6 **No manual control**
SYSTem:**VERS**ion**?**	Query only		Returns the number of the associated SCPI version by specifying the year with decimal point and one decimal digit.	2.15.7 **No manual control**
SYSTem:**ERR**or**?**	Query only		Returns the last error message out of the error message queue. Error messages consist of a number followed by text. Negative error numbers are SCPI-defined, positive numbers are device-specific. If no error occurred, the output is **0, "No error"** If the queue gets too long, the error message: -**350, "Queue overflow"** is output. With *CLS and upon power-on of the device, all error messages are cleared.	3.3.2 **No manual control**
SYSTem:**COMM**unication:**GTL**			Return to manual operation. This command is only required in the case of remote-control via the RS-232 interface but can also be used for IEC/IEEE-bus operation and Universal Sequence Controller UPL-B10.	LACAL keystroke

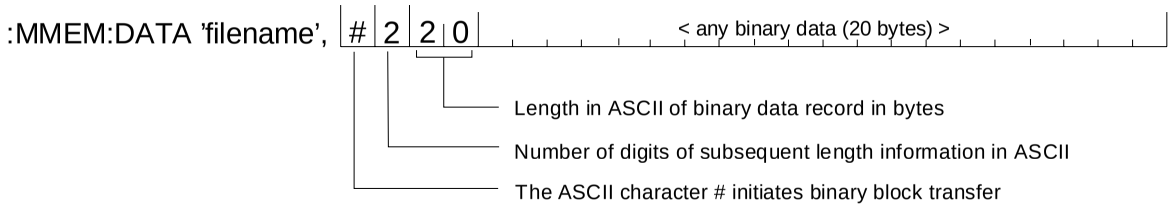
3.10.12 Commands for Synchronization

Command	Parameter	Basic unit	Meaning	Section
INITiate:**CONT**inuous	**ON** **OFF**		→ Presetting of continuous measurement. → Presetting of a single measurement which is triggered with INITiate[:IMMediate] (see next command)!	2.11 **START key** **SINGLE key**
INITiate[:IMMediate]			Starts a single measurement. Command INITiate:CONTinuous ON|OFF determines whether it is a continuous or a single measurement (see previous command). The two INITiate commands simulate the function of the START or SINGLE key. The following commands are to be entered: START key: INITiate:CONTinuous ON, INITiate[:IMMediate] SINGLE key: INITiate:CONTinuous OFF, INITiate[:IMMediate]	2.11 **START key** **SINGLE key**
INITiate:***FORC***e	***STAR***t ***SING***le ***STOP*** ***CONT***inuous		→ • A measurement in progress is immediately aborted. • Trailing pointer, average and peak values are reset. • A new continuous measurement is started. (identical with command "INIT:CONT ON") → • A measurement in progress is immediately aborted. • A new measurement is started. (identical with command INIT:CONT OFF) → An ongoing measurement is stopped as if the STOP/CONT key was pressed during the measurement (identical with command ABORt). The measurement is continued with INIT:FORC CONT. → • A new continuous measurement is started. • Trailing pointer, average and peak values are **not** reset. This is only effective if the measurement was interrupted with INIT:FORC STOP or ABOR or if the measurement was started with INIT:FORC SING or INIT:CONT OFF and completed.	**2.11** → **Taste START** → **Taste SINGLE** → STOP function of toggel key **STOP/CONT** → CONT function of toggel key **STOP/CONT**
INITiate:**NEXT**	**<n>**		Has the same effect as turning the spinwheel by <n> steps or pressing the cursor keys (n=1 or n= –1). Makes the next step in the case of a manual sweep or moves the graphics cursor provided the graphics panel is active.	2.11 **Spinwheel**
ABORt			Stops a measurement as if the STOP/CONT key were actuated during an ongoing measurement. With the command INIT:CONT ON the measurement is resumed.	2.11 **STOP/CONT key**

3.10.13 Binary Data via IEC/IEEE-Bus Interface

Command	Parameters	Meaning	Section
MMEMory:**DATA**	**'filename', #<lele><le><binary data>** <lele>: Length of subsequent length information of binary data <le>: Length of subsequent binary data <Binary data>: Any binary codes of any length	If 'filename' contains no path information, the command stores the subsequent binary data in the current working directory of the UPL. The current working directory of the UPL is the directory specified under `Work Dir` in the FILE Panel of the UPL. If 'filename' contains a path that exists in the UPL, the binary data are stored in this path. If 'filename' contains a path that does not exist in the UPL, the error message "Could not write to file" is output. This command therefore allows the transfer of any files of any length from the process controller to the UPL. If a data record to be transferred to the UPL is in the form of a file, its precise length can be determined by means of the DOS command DIR. The value thus obtained is to be specified in the command MMEM:DATA under "Length of subsequent binary data". To allow file transfer from a process controller to the UPL not only for experienced C- and IEC/IEEE-bus programmers, the DOS programs IEC_BT.EXE and UPMD5.EXE will be supplied with the UPL as from UPL software version 2.0 (see „Initial Steps", „Transfer of File to UPL" and following). Example: MMEM:DATA 'MYSETUP.SAC',#48561<any binary data> MMEM:DATA '\UPL\USER\MYSETUP.SAC',#48561<any binary data>	3.10.13 3.17.5 **No manual control**

Example:



Command	Parameters	Explanation	Section
MMEMory:CHECk?	**'filename'** **Query only**	This command determines the MD5 signature of a file. If `'filename'` contains no path information, the command determines the MD5 signature of the specified file in the current working directory of the UPL. The current working directory of the UPL is the directory specified under `Work Dir` in the FILE Panel of the UPL. If `'filename'` contains a path that exists in the UPL, the MD5 signature of the associated file is determined. If `'filename'` contains a path that does not exist in the UPL, the error message "Execution error" is output. A 32-digit signature of the specified file is returned in response to the query. To check whether the contents of a file were transferred error-free from the process controller to the UPL, the MD5 signature method can be used to generate, from the UPL path C:\UPL\IEC_EXAM and prior to the transfer, a digital signature of the file on the process controller using the program UPMD5.EXE. After the transfer of the file to the UPL via the IEC/IEEE bus, a digital signature of the transferred file is generated by means of the command `MMEMory:CHECk? 'filename'`. If the two signatures agree, it can be assumed that the file contents are identical and the transfer was therefore error-free. Moreover, it can be determined in this way whether any subsequent modifications have been made to a file. **Example:** `MMEM:CHEC?, '\UPL\USER\MYSETUP.SAC'` Reply (for example): `"4edb9481dc7b1fb27393c10c950cf9c1"`	3.10.13 3.17.5 **No manual control**

3.10.14 Settings without Corresponding IEC/IEEE-Bus Command

- Setting the contrast for UPL monochrome display
- Selection of remote control in the OPTIONS panel with remote via IEC/COM2