

When such a command is sent to the oscilloscope it responds with the repetition of the syntax followed by a colon and the requested parameters.

Depending on the command this can be binary data or ASCII data.

The number of data that will be received depends on the command and can be taken from the command description.

Example: command to the oscilloscope: VERS?
reply: VERS:FC1.01 DG1.02

Setting parameters

With these commands parameters of the oscilloscope can be influenced.

One differentiates between commands with parameters and commands without.

Example: command to the oscilloscope: LK=1
reply: return code

Example: command to the oscilloscope: RES
reply: return code

All commands either give back parameters or a RETURNCODE in ASCII format (see command description). Before a new command can be sent to the oscilloscope all outstanding parameters regarding the preceding command must be awaited. WORD-parameters expect the low-byte first, then the high-byte. The adjustment of the oscilloscope takes place through the Device Data Field (DDF) as *binary array*. Every Byte of this data field can also be reached through single commands (DDF2 excluded).

The structure of the Device Data Field and the associated single commands are shown in the following chart.

Sign definition for commands

Enquiry	?	enquires parameters
Allocation	=	sets parameters
State	:	Specifies current parameters
Binary data	b	data field are binary data 1 Byte
ASCII-data	a	data field are ASCII-data 1 Byte
WORD (2 Byte)	w	data field composed of 2 Byte (Low-, High-Byte)
ASCII-data	ARRAY	
Binary data	array	
Terminator	CR LF	Carriage Return and/or Linefeed
Return code	R	ASCII parameter (see end of command chart)
Parameter	x	x stands for A resp. B
Parameter	z	z stands for 1 resp. 2
Parameter	n	n stands for 1,2 resp. 3



Command Table:

Command: PC -> oscilloscope	reply oscilloscope -> PC	description
AUTOSET(CR LF)	(R CR LF)	AUTO SET function to be executed
AVRNM? ⁽³⁾	AVRNM:(b)	AVERAGE NUMBER OF ACQUISITIONS provides number of signal acquisitions, that are used to average the mean value b = 01 hex.: 2 ¹ = 2 acquisitions b = 02 hex.: 2 ² = 4 acquisitions ... b = 09 hex.: 2 ⁹ = 512 acquisitions
AVRNM=(b) ⁽³⁾	(R CR LF)	AVERAGE NUMBER OF ACQUISITION sets number of signal acquisitions, that are used to average the mean value
BELL=(a)	(R CR LF)	beep output a = 0: buttons OK beep a = 1: buttons ERROR beep a = 2: ERROR (long beep) a = 3: 2 short beeps a = 4: 3 short beeps

Command: PC -> oscilloscope	reply oscilloscope -> PC	description
		a = 5: 6 short beeps
CALCMAT:SET= <a>(CR LF) ^{(3 (5.30)}	(R CR LF) new since FC 5.00	CALCULATE MATH SET calculates math waveform, with the math theorem specified in SET HM507: always SET=1, for there is only one math theorem
CALSEL?	CALSEL:(b) new since FC 5.00	Provides CALIBRATOR SELECTION b = 0: DC b = 1: 1 Hz b = 2: 10 Hz b = 3: 100 Hz b = 4: 1 kHz b = 5: 10 kHz b = 6: 100 kHz b = 7: 1 MHz b = FF: dependent on TB (HM507 since FC5.15)
CALSEL=(b)	(R CR LF) new since FC 5.00	sets CALIBRATOR SELECTION
CH<z>?	CH<z>:(b)	provides CH1/2 adjustments see chart Device Data Field DDF
CH<z>=(b)	(R CR LF)	sets CH1/2 adjustments see chart Device Data Field DDF
CH<z>VAR?	CH<z>VAR:(b)	provides CH1/2 VARI-GAIN adjustment b = FF hex.: CH<z> (1 or 2) calibrated
CH<z>VAR=(b)	(R CR LF)	sets CH1/2 VARI-GAIN adjustment
CTRLBP?	CTRLBP:(a)	provides CONTROL BEEP adjustment a = 0: Off (button confirmation without control beep) a = 1: On
CTRLBP=(a)	(R CR LF)	sets CONTROL BEEP adjustment
CURMODE?	CURMODE:(w) new since FC 5.00	reads CURSOR MODE (see chart MEASDDF)
CURMODE=(w)	(R CR LF) new since FC 5.00	sets CURSOR MODE (see chart MEASDDF)
CURPOS?	CURPOS: (array) new since FC 5.00 in digital mode cursor does not glue!	provides CURSOR POSITION in 1000 Bit/DIV (x10 not taken into account) 1. Word: main cursor 1 2. Word: main cursor 2 3. Word: auxiliary cursor 1 4. Word: auxiliary cursor 2 see chart MEASDDF
CURPOS= (array)	(R CR LF) new since FC 5.00	sets CURSOR POSITION
DDF?	DDF:(array)	provides DEVICE DATA FIELD see chart Device Data Field DDF (4 Byte command + 14 Byte parameter)
DDF=(array)	(R CR LF)	sets new DEVICE DATA FIELD see chart Device Data Field DDF
DDF1?	DDF1:(array)	provides DEVICE DATA FIELD1 see chart Device DataField1 DDF1 (5 Byte command + 16 Byte parameter)
DDF1=(array)	(R CR LF)	sets new DEVICE DATA FIELD1 see chart Device DataField1 DDF1
DDF2? ⁽³	DDF2:(array) new since FC 5.00	provides DEVICE DATA FIELD2 see chart Device Data Field 2 DDF2 (5 Byte command + 16 Byte parameter)
DDF2=(array) (3 (4	(R CR LF) new since FC 5.00	sets new DEVICE DATA FIELD2 see chart DeviceDataField2 DDF2
DELPOS?	DELPOS:(w)	provides DELAY POS. (12 Bit)
DELPOS=(w)	(R CR LF)	sets DELAY POS. (12 Bit)
ERRBP?	ERRBP:(a)	provides ERROR BEEP adjustment a = 0: Off (no Error-beep output) a = 1: On (with Error-beep output)

Command: PC -> oscilloscope	reply oscilloscope -> PC	description
ERRBP=(a)	(R CR LF)	sets ERROR BEEP
ERRMSG?	ERRMSG:(a)	provides ERROR MESSAGE adjustment a = 0: Off (Error messages are sent only to interface) (Error messages are represented with the Readout and sent to the interface) (remains only until POWER OFF)
ERRMSG=(a)	(R CR LF)	sets ERROR MESSAGE adjustment
FCCMD?	FCCMD:(a)	FRONT CONTROLLER COMMAND Informs if oscilloscope was operated manually Reset with each enquiry a = 0: oscilloscope was not operated manually a = 1: oscilloscope was operated manually
FORMULA? <Parameter> (CR LF) ^{(3 (5.30)}	FORMULA: <Parameter> new since FC 5.30	provides FORMULA of the in <Parameter> delivered formula set and formula number (50 Byte ASCII, see description at the end)
FORMULA: <Parameter> (CR LF) ^{(3 (4 (5.30)}	FORMULA: <Parameter> new since FC 5.30	sets FORMULA of the in <Parameter> delivered formula set and formula number (see description at the end)
HOLDOFF?	HOLDOFF:(b)	provides HOLD OFF value b = 00 hex.: shortest Holdoff-time
HOLDOFF=(b)	(R CR LF)	sets HOLD OFF value
HORMODE?	HORMODE:(b)	provides HORIZONTAL MODE adjustment see chart Device Data Field DDF
HORMODE=(b)	(R CR LF)	sets HORIZONTAL MODE adjustment see chart Device Data Field DDF
HLDWFM? ⁽³	HOLDWFM:(a)	HOLD WAVE FORM provides HOLD function adjustment in the store mode a = 0: Off (HOLD inactive) a = 1: On (HOLD active)
HLDWFM=(a) ⁽³	(R CR LF)	HOLD WAVE FORM sets HOLD adjustment
ID?	ID: (ARRAY)(CR LF)	IDENTIFICATION (hardware) provides name of device and hardware identification (3 Byte command + 27 Byte parameter)
INT<x>?	INT<x>:(b)	provides INTENS A/B⁽⁹⁾ value b = 00 hex.: time base <x> blank (A or B ⁽⁹⁾)
INT<x>=(b)	(R CR LF)	sets INTENS A/B⁽⁹⁾ value
INTRO?	INTRO:(b)	provides INTENS READ OUT value b = 00 hex.: Readout not visible
INTRO=(b)	(R CR LF)	sets INTENS READ OUT value
LK?	LK:(a)	provides function of LOCAL LOCK OUT button (AUTO SET) a = 0: locked a = 1: free (press AUTOSET key to exit remote mode 'ESC RM0' (ESC = 1B hex) sent to interface)
LK=(a)	[R](CR LF)	setting of LOCAL LOCK OUT function
MATUNIT: <n>,<Unit> (CR LF) ^{(3 (4 (5.30)}	(R CR LF) new since FC 5.30	sets MATHE UNIT 1/2/3 to specified scale unit <Unit>: unit of the math formula as ASCII character (PC character set 437) (select with MAT<n>PRP)
MAT<n>P:(w) new since FC 5.30		provides MATH 1/2/3 POSITION Y position of the math waveform in digital mode in 1000Bit/DIV (math waveform must be visible!)
MAT<n>P=(w) (3 (4 (5.30)	MAT<n>P? ^{(3 (4 (5.30)}	sets MAT 1/2/3 POSITION

Command: PC -> oscilloscope	reply oscilloscope -> PC	description
MAT<n>PRP? (3 (5.30	MAT<n>PRP: <array> new since FC 5.30	provides MATH 1/2/3 PROPERTY 1. Byte: Y/DIV value of a DIV in Y direction (Prefix to Unit) as locator on Prefix chart (see appendix) 2. Byte: Y Unit as ASCII (PC character set 437) 3. Byte: X/DIV value of a DIV in direction n seconds as locator on Prefix chart (see appendix) 4. Byte: LB DC reference reference as integer value applying to tube centre. Ascertain resolutions for X and Y direction with command REF<n>PRE? in Bit/DIV.
MEASAM?	MEASAM:(array) new since FC 5.00	provides MEASURE AUTO MODE 4 Byte D0 - D31 = 0: Off D0: Trigger frequency D1: Trigger period D2: DC D3: Peak Peak D4: Peak+ D5: Peak- D6: Trigger level [V] D7: Trigger level [DIV] D8: rms ^{(3 (5.15} D9: avg ^{(3 (5.15} D10: Wave Form Frequency ^{(3 (5.15} D11: Wave Form Period ^{(3 (5.15} D12 - D31 not used
MEASAM=(array)	(R CR LF) new since FC 5.00	sets MEASURE AUTO MODE (for HM50x only one mode possible)
MEASCM?	MEASCM:(array) new since FC 5.00	provides MEASURE CURSOR MODE 4 Byte D0 - D31 = 0: Off D0: Δt D1: 1/Δt D2: Rise Time D3: ΔV D4: V to GND D5: Ratio X D6: Ratio X [%] D7: Ratio X [°] D8: Ratio X [II] D9: Ratio Y D10: Ratio Y [%] D11: Gain D12: GAIN [%] D13: GAIN [dB] D14: GAIN 1->2 D15: Gain 1->2 [%] D16: Gain 1->2 [dB] D17: Gain 2->1 D18: Gain 2->1 [%] D19: Gain 2->1 [dB] D20: Peak Peak Volt ^{(3 (5.15} D21: Peak+ ^{(3 (5.15} D22: Peak- ^{(3 (5.15} D23: avg ⁽³ D24: rms ⁽³ D25: Count rise ^{(3 (5.15} D26: Count fall ^{(3 (5.15} D27: Pulse Count pos. ^{(3 (5.15} D28: Pulse Count neg ^{(3 (5.15} D29: V marker ^{(3 (5.15} D30: t marker ^{(3 (5.15} D31: Peak Peak Time ^{(3 (5.15}

Command: PC -> oscilloscope	reply oscilloscope -> PC	description
MEASCM=(array)	(R CR LF) new since FC 5.00	sets MEASURE CURSOR MODE (at HM50x only one mode possible)
MEASDDF?	MEASDDF: (ARRAY) new since FC 5.00	provides MEASURE DEVICE DATA FIELD see chart MEASDDF
MEASDDF= (array)	(R CR LF) new since FC 5.00	sets MEASURE DEVICE DATA FIELD see chart MEASDDF
MEASDS?	MEASDS: (ARRAY) new since FC 5.00	provides MEASURE DISPLAY STRING of the displayed Measure Mode 20 Byte + 7 Byte command e.g.: p+:Y1 1.23mV values that can not be displayed are represented with n/a
MEASDV?	MEASDV: (ARRAY) new since FC 5.00	provides MEASURE DISPLAY VALUE of the displayed Measure Mode 10 Byte + 7 Byte command e.g.: 1.23mV values that can not be displayed are represented with n/a
MEASDC?	MEASDC: (ARRAY) new since FC 5.00	provides MEASURE DC values in volt (independent from adjusted MEASURE MODE, always applies to triggering channel) 10 Byte e.g.: 123E-03
MEASFRQ?	MEASFRQ: (ARRAY) new since FC 5.00	provides MEASURE Trigger FREQUENCY values in Hz (independent from MEASURE MODE, always applies to triggering channel) 10 Byte e.g.: 123.4E+03 If the oscilloscope does not initiate or is in a mode (SINGLE, XY, CT, alt. Trigger), in which it is not possible to count the trigger frequency n/a = no applicable is displayed. At extremely low trigger frequencies up to 22 scan pass in NORM trigger and 3,5s in AUTO trigger until a full measure cycle is finished!
MEASPER?	MEASPER: (ARRAY) new since FC 5.00	provides MEASURE Trigger PERIODE values in seconds (independent from MEASURE MODE, always applies to triggering channel) 10 Byte e.g.: 8.104E-06 see MEASFRQ
MEASP+?	MEASP+: (ARRAY) new since FC 5.00	provides MEASURE PEAK + values in volt originating from trigger channel (independent from MEASURE MODE, always applies to triggering channel) 10 Byte e.g.: 123E-03
MEASP-?	MEASP-: (ARRAY) new since FC 5.00	provides MEASURE PEAK - values in volt originating from trigger channel (independent from MEASURE MODE, always applies to triggering channel) 10 Byte e.g.: 123e-03
MEASPP?	MEASPP: (ARRAY) new since FC 5.00	provides MEASURE PEAK PEAK values in volt from triggering channel (independent of MEASURE MODE, always applies to triggering channel) 10 Byte e.g.: 123e-03
PSINT?	PSINT:(a) changed since FC 5.00	provides PULSE SWITCH INTENS rotary encoder function: INTENS a = 0: INT A (Intens. trace A) a = 1: INT RO (Intens. Readout) a = 2: INT B (Intens. trace B) ⁽⁹⁾ a = 3: FOCUS a = 4: TRACE ROTATION (read only)
PSINT=(a)	(R CR LF) changed since FC 5.00	sets PULSE SWITCH INTENS rotary encoder function: INTENS

Command: PC -> oscilloscope	reply oscilloscope -> PC	description
PSY1POS?	PSY1POS:(a) changed since FC 5.00	provides PULSE SWITCH Y 1 POSITION rotary encoder function: Y-POS. I a = 0: Y1- position adjustment a = 1: REF / Math- position adjustment a = 2: RO Cursor-position adjustment a = 3: Y-position adjustment on time basis B (Trace sep.) in alternating time basis mode ⁽⁹⁾
PSY1POS=(a)	(R CR LF) changed since FC 5.00	sets PULSE SWITCH Y 1 POSITION rotary encoder function: Y-POS. I
PSY2POS?	PSY2POS: (a CR LF) changed since FC 5.00	provides PULSE SWITCH Y 2 POSITION rotary encoder function: Y-POS. II a = 0: Y2-position adjustment a = 2: RO Cursor-position adjustment
PSY2POS=(a)	(R CR LF) changed since FC 5.00	sets PULSE SWITCH Y 2 POSITION rotary encoder function: Y-POS. II
PSTB?	PSTB:(a)	provides PULSE SWITCH TB rotary encoder function: TIME/DIV. a = 0: COARSE (1-2-5 sequence) a = 1: FINE (variable, dependent on time bases mode A or B)
PSTB=(a)	(R CR LF)	sets PULSE SWITCH TB rotary encoder function: TIME/DIV.
PSCH<z>?	PSCH<z>:(a) changed since FC 5.00	provides PULSE SWITCH CH1/2 function of the rotary encoder: VOLTS/DIV (CH I or CH II) a = 0: CHI or CHII COARSE (1-2-5 sequence) a = 1: CHI or CHII FINE (variable) a = 2: CHI rotary encoder changes math waveform ^(5.15)
PSCH<z>=(a)	(R CR LF)	sets PULSE SWITCH CH1/2 function of the rotary encoder: VOLTS/DIV (CH I or CH II)
QUICKST?	QUICKST:(a)	provides QUICK START MODE a = 0: QUICK START Off a = 1: QUICK START On
QUICKST=(a) ^(1.05)	(R CR LF)	sets QUICK START MODE
RDMAT<n> (CR LF) ^{(3) (5.30)}	RDMAT<n>:(array) new since FC5.30	READ MATH 1/2/3 provides signal data from math store <n> (1,2 or 3) array: 0x800 hex words as 16 Bit Integer values (applying to AD modifier centre) regulation: -∞ = -32767 +∞ = 32767 not a number = -32768
RDREF<n>: (w w) ⁽³⁾ 1.WORD Offset hex. (2 KByte) 2.WORD length hex. (2 KByte)	RDREF<n>: (W W array) changed since FC 5.30	READ REFERENCE 1/2 since ^(5.30) /3 Provides signal data from reference memory <n> (1, 2 or 3), from Offset address (first WORD) with specified length (second WORD) Offset + max. length 2 k Byte See 'RDWFM<z>'
RDWFM<z>: (w w) ⁽³⁾ 1.WORD Offset hex. (2 K Byte) 2.WORD length hex. (2 K Byte)	RDWFM<z>: (W W array)	READ WAVE FORM 1/2 Provides signal data from channel <z> (1 or 2), from Offset address (first WORD) with specified length (second WORD) applying to AD modifier centre Offset + max. length 2 k Byte complete transfer from channel 1: Offset=0, length=2048 decimal (2 k Byte) 'RDWFM1:00000008' (numbers in hex.) data from right waveform half of channel 2: Offset=1024 decimal, length=1024 decimal 'RDWFM2:00040004' (numbers in hex.) (see appendix!)
READOUT?	READOUT:(a)	provides READOUT adjustment a = 0: Readout Off a = 1: Readout On
READOUT=(a)	(R CR LF)	sets READOUT adjustment

Command: PC -> oscilloscope	reply oscilloscope -> PC	description
RECDF=(a)	(R CR LF)	RECALL DDF reads Device Data Field out of "SAVE/ RECALL-store" (a = 1 ... 9) and adjusts oscilloscope accordingly
REF<n>P? ^{(3 (5.30)}	REF<n>P:(w) new since FC 5.30	provides REF 1/2/3 POSITION Y reference waveform position in digital mode in 1000 Bit/DIV Integer values
REF<n>P=(w) (3 (5.30	(R CR LF) new since FC 5.30	sets REF 1/2/3 POSITION
REF<n>PRE? ⁽³	REF<z>PRE: (array)	REFERENZ 1/2 since ^{(5.30} / 3 PRECONFIG The oscilloscope is set into the state that saved the reference waveform and displays it. Furthermore, information is sent to the PC. array: 1.WORD: store address of the trigger (two's complement) 2.WORD: X-resolution = 200 Bit/DIV 3.WORD: Y-resolution = 25 Bit/DIV 4.WORD: Y1-position standardized to value of WORD 3 (Integer value) 5.WORD: Y2-Position standardized to value of WORD 3 (Integer value)
REF<n>PRP? ^{(3 (5.30}	REF<n>PRP: (array) new since FC 5.30	provides REFERENZ 1/2/3 PROPERTY 1. Byte: Y/DIV value of a DIV in Y direction (Prefix to Unit) as locator on Prefix chart (see appendix) 2. Byte: Y Unit as ASCII (PC character set 437) 3. Byte: X/DIV value of a DIV in X direction as locator on Prefix chart (see appendix) 4. Byte: LB DC reference 5. Byte: HB DC reference as integer value relative to CRT centre. (25 Bit/DIV) Ascertain resolutions for X and Y direction with command REF<n>PRE? in Bit/DIV.
REF<n>PRP= (array) ^{(3 (4 (5.30}	(R CR LF) new since FC 5.30	sets REFERENCE 1/2/3 PROPERTY
RES(CR LF) ⁽²	(R CR LF)	sets RESET function in SINGLE-mode
RM0(CR LF)	(R CR LF)	REMOTE Exit remote state
RREFPRE(CR LF) ⁽³	(R CR LF) changed since FC 5.30	RECALL REFERENCE PRECONFIG Places oscilloscope in state that saved the current reference (HM1507/1507-2: If several reference curves are active, the REF Preconfig is loaded with the lowest reference number)
SAVEDF=(a) ⁽⁴	(R CR LF)	SAVE DEVICE DATA FIELD Saves current device adjustment in "SAVE/RECALL-store" in memory cell a (a=1..9) SAVE9 will be overwritten at POWER DOWN!
SAVEWF: <SRC>,<DST> (CR LF) ^{(3 (4 (5.30}	(R CR LF) new since FC 5.30	SAVE WAVEFORM <SRC>,<DST> Saves in STORE MODE current signal data in reference <DST> store SRC: CH1; CH2; MAT1; MAT2; MAT3; ALLDSPL DST: REF1; REF2; REF3; - (All Displayed) Example: SAVEWF:CH1,REF3(CR LF) SAVEWF:ALLDSPL,-(CR LF) at all displayed MAT<n> always in REF3.
TB<x>?	(R CR LF)	TIMEBASE A/B Sets time basis A/B adjustment see chart Device Data Field DDF
TB<x>=(b)	TB<x>:(b)	TIMEBASE A/B Provides time basis A/B adjustment see chart Device Data Field DDF

Command: PC -> oscilloscope	reply oscilloscope -> PC	description
TB<x>VAR?	TB<x>VAR:(w)	provides TIMEBASE A/B VAR adjustment (10 Bit) w = 000 hex.: TB<x> (A or B) calibrated w = 001 .. 3FF hex.: TB<x> not calibrated
TB<x>VAR=(w)	(R CR LF)	sets TIMEBASE A/B VAR adjustment(10 Bit)
TRIG?	TRIG:(b)	provides TRIGGER parameter see chart Device Data Field DDF
TRIG=(b)	(R CR LF)	sets TRIGGER parameter see chart Device Data Field DDF
TRGPOSx?	TRGPOSx:(w)	provides Y TRIGGER POSITION A/B 1000 Bit/DIV in two's complement relative to grid centre not applicable to: HF-, TV-, LINE- trigger coupling, alternating or external trigger
TRGPOSx=(w)	(R CR LF)	sets Y TRIGGER POSITION A/B 1000 Bit/DIV in two's complement relative to grid centre
TRSEP? ⁽⁹⁾	TRSEP:(b)	provides TRACE SEP. Y position of B-time basis relative to Y-position of A-time basis b = 00 hex.: B at most above A b = FF hex.: B at most below A b = 80 hex.: Y-position B = Y-position A
TRSEP=(b) ⁽⁹⁾	(R CR LF)	sets TRACE SEP.
TRGSTA?	TRGSTA:(b) TRGSTA:(a) ^(1.17)	provides TRIGGERSTATUS a(resp. b) = 0: device does not trigger a(resp. b) = 1: device triggers a(resp. b) = 2: device in SINGLE RESET MODE or acquisition not yet complete
TRGSTA(CR LF)	(R CR LF)	TRIGGERSTATUS reset Automatic-Mono-Flop (≈200ms) allows immediate enquiry with 'TRGSTA?'.
TRGVAL?	TRGVAL:(array)	TRIGGERVALUE provides Trigger signal- voltage values (measured at trigger amplifier) 1.WORD: positive peak value (* 2.WORD: negative peak value (* 3.WORD: arithmetic mean value 4.WORD: reserved valuation: 1000 Bit/DIV (* applying to arithmetic mean value ext. Trigger sensitivity = 250mV/DIV Caution: note the system settling time!(depending on input signal up to 2s)
TRGLEV<x>?	TRGLEV<x>:(w)	provides TRIGGER-LEVEL A/B adjustment (10Bit) w = 3FF hex.: max. positive (fully right position) w = 000 hex.: max. negative (fully left position)
TRGLEV<x>=(w)	(R CR LF)	sets TRIGGER-LEVEL A/B adjustment (10 Bit)
UEPROM? ^{(4 (5.30)}	UEPROM:(array) new since FC 5.30	sets USER EPROM with any values (4 Byte)
UEPROM=(array) ^{(3 (5.30)}	(R CR LF) new since FC 5.30	provides USER EPROM values (4 Byte)
VERMODE?	VERMODE:(b)	provides VERTICAL MODE vertical adjustment see chart Device Data Field DDF
VERMODE=(b)	(R CR LF)	sets VERTICAL MODE vertical adjustment see chart Device Data Field DDF
VERS?	VERS:(ARRAY)	provides SOFTWARE VERSION 5 Byte command + 15 Byte parameter

Command: PC -> oscilloscope	reply oscilloscope -> PC	description
WFMPRE? ⁽³⁾	WFMPRE:(array)	WAVE FORM PREAMBLE provides data stored with waveform array: 1.WORD: store address of the trigger (two's complement) 2.WORD: X-resolution = 200 Bit/DIV 3.WORD: Y-resolution = 25 Bit/DIV 4.WORD: Y1-position standardized to value of WORD 3 (integer value) 5.WORD: Y2 Position standardized to value of WORD 3 (integer value)see appendix
WFMEAS? <Mode>,<SRC> (CR LF) ^{(3) (5.30)}	new since FC 5.30	WAVE FORM MEASURE MODE values always apply to source <SRC> specified in the command SRC: CH1; CH2
Mode: AVG,<SRC> (CR LF) ^{(3) (5.30)}	WFMEAS? AVG,<SRC>: (ARRAY) new since FC 5.30	provides WAVE FORM MEASURE AVG value of CH<z> in volt (independent of adjusted MEASURE MODE) 10 Byte e.g.: 123E-03
Mode: P+,<SRC> RC> (CR LF) ^{(3) (5.30)}	WFMEAS? P+,<SRC>: (ARRAY) new since FC 5.30	provides WAVE FORM MEASURE PEAK + value of CH<z> in volt (independent of adjusted MEASURE MODE) 10 Byte e.g.: 123E-03
Mode: P-,<SRC> (CR LF) ^{(3) (5.30)}	WFMEAS? P-,<SRC>: (ARRAY) new since FC 5.30	provides WAVE FORM MEASURE PEAK - value of CH<z> in volt (independent of adjusted MEASURE MODE) 10 Byte e.g.: 123e-03
Mode: PP-,<SRC> (CR LF) ^{(3) (5.30)}	WFMEAS? PP,<SRC>: (ARRAY) new since FC 5.30	provides WAVE FORM MEASURE PEAK PEAK value of CH<z> in volt (independent of MEASURE MODE) 10 Byte e.g.: 123e-03
Mode: RMS,<SRC> (CR LF) ^{(3) (5.30)}	WFMEAS? RMS,<SRC>: (ARRAY) new since FC 5.30	provides WAVE FORM MEASURE RMS value of CH<z> in volt (independent of adjusted MEASURE MODE) 10 Byte e.g.: 123E-03
Mode: FRQ,<SRC> (CR LF) ^{(3) (5.30)}	WFMEAS? FRQ,<SRC>: (ARRAY) new since FC 5.30	provides WAVE FORM MEASURE FREQUENCY value of CH<z> in Hz (independent of adjusted MEASURE MODE) 10 Byte e.g.: 123e-03
Mode: PER,<SRC> (CR LF) ^{(3) (5.30)}	WFMEAS? PER,<SRC>: (ARRAY) new since FC 5.30	provides WAVE FORM MEASURE PERIOD value of CH<z> in seconds (independent of adjusted MEASURE MODE)10 Byte e.g.: 123e-03
WRREF<n>: ^{(3) (4) (6)} (w w array) 1.WORD Offset hex. (2 K Byte) 2.WORD length hex. (2 K Byte)	(R CR LF) changed since FC 5.30	WRITE REFERENCE 1/2 since ^{(5.30) /3} Writes signal data in reference store <n> (1, 2 or 3), from offset address (first WORD) with specified length (second WORD) Offset + max. length 2 K byte see 'RDWFM<n>'
XPOS?	XPOS:(w)	provides X-POSITION adjustment w = 3FF hex.: "fully right position" w = 000 hex.: "fully left position" 16 Bit INTEGER values in two's complement applying to grid centre (1000 Bit/DIV) ⁽¹⁰⁾
XPOS=(w)	(R CR LF)	sets X-POSITION adjustment 16 Bit INTEGER
Y<z>POS?	Y<z>POS:(w)	Y 1/2 POSITION provides CH<z> (z = 1 or 2) position adjustment 16 Bit INTEGER values in two's complement applying to grid centre (1000 Bit/DIV) ⁽¹⁰⁾
Y<z>POS=(w)	(R CR LF)	Y 1/2 POSITION sets CH<z> position adjustment

All commands are internally checked and the result is returned to the PC.
The following RETURN_CODES (ASCII characters) are implemented:

0 = no error
1 = syntax error
2 = data error
3 = buffer overflow
4 = bad data set
5 = adjustment error
6 = timing error (internal data-transfer FC /STORE)
7 = SIO data format error (stop bit not recognized)

DeviceDataField (DDF)

	D7	D6	D5	D4	D3	D2	D1	D0
CH1	GND	AC	INV1	ON	VOLT/DIV - counter 0-13 0000(1mV/DIV) 1101(20V/DIV)			
CH2	GND	AC	INV2	ON	VOLT/DIV - counter 0-13			
VERMODE	Alt.- TRG	probe CH1: 0 = 1:1 1 = 10:1	BWL 0 = OFF 1 = ON (13	CHOP	ADD	probe CH2: 0 = 1:1 1 = 10:1	TR-SOURCE 00 = CH1 01 = CH2 1x = EXT	
TBA	Z Input 0 = ON 1 = OFF	0	ANA SING DIGI SING	MODE TIME/DIV - counter Analogue: 00hex. - 15hex. {SEA:11hex} 50ns/DIV - 0,5s/DIV {SEA:20ms} Store: 04hex. - 1Chex 100ns/DIV - 100s/DIV Store XY: 06{05 ⁽⁸⁾ }hex. - 1Chex 40MS{100MS ⁽⁸⁾ }/s - 2S/s Store ROLL: 12hex. - 1Chex 50mS/s - 100S/s				
TBB	B /- (1=neg Trigger- slope)	B-TR	0	MODE TIME/DIV - counter Analogue: 00hex. - TBA(max.11hex.) 50ns - TBA(max.20ms/DIV) Store: 04{03 ⁽⁸⁾ }hex. - TBA(max.11hex.) 1μs{500ns ⁽⁸⁾ }/DIV -TBA(max.20ms/DIV)				
HORMODE	CT (Compo- nent- tester)	XY	x10	STORE	PP detect 0 = OFF 1 = ON	TB-MODE HM1507/1507-2 HM504/507 000: TBA TBA 001: TBA + TBB reserv. 010: TBA alt. TBB SEARCH 011: TBB DELAY		
TRIG	+/- (1=neg trigger slope)	0	P-P	NORM	0	coupling 0-7 HM1507/1507-2 HM504/507 000: AC AC 001: DC DC 010: HF HF 011: NR LF 100: LF TV Line 101: TV Line TV Field 110: TV Field LINE 111: LINE reserv.		
STRMODE (use DDF2!)	REF2	REF1	PRE TRIGGER 000 = -75% 001 = -50% 010 = -25% 011 = 0% 100 = 25% 101 = 50% 110 = 75% 111 = 100% up to 5.20 write only since 5.21 selected values are rounded to these percent data!			STOREMODE 000 = REF 010 = ROL (TB=100s..50ms) 011 = ENV 100 = AVR		
CH2 VAR	8-BIT							
CH1 VAR	8-BIT							
TRSEP ⁽⁹⁾	8-BIT							
HOLD OFF	8-BIT							
INTENS A	8-BIT							
INT B ⁽⁹⁾	8-BIT							

DeviceDataField 1 (DDF1)

[illegible]

DeviceDataField 2 (DDF2)

[illegible]

Measure data field (MEASDDF) (new) ^(5.00)

	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Calsel and RO Int.	CALSEL								INT - ROUT							
CURMODE	auxilia cursor	auxilia cursor 1 sel	main cursor 2 sel	main cursor 1 sel	Cur. Source 000 CH1 001 CH2 111 MAT1 011 MAT2 ^(5.30) 010 MAT3 ^(5.30) 101 REF1 110 REF2 100 REF3 ^(5.30)			Trg Cur EN (14)			Track EN	CurEN			DrgY at Cur	GLUE
CURPOS Main cur. 1 1000 Bit/DIV	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CURPOS Main cur. 2 1000 Bit/DIV	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CURPOS Auxiliary cur. 1 1000 Bit/DIV	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CURPOS Auxiliary cur. 2 1000 Bit/DIV	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MEASCM LW HW	see command description MEASCM															
MEASAM LW HW reserved	see command description MEASAM															

Prefix chart

No.	Prefix	
0	1*10 ⁻¹⁸	1 a 1 Atto
1	2*10 ⁻¹⁸	2 a 2 Atto
2	5*10 ⁻¹⁸	5 a 5 Atto
3	10*10 ⁻¹⁸	10 a 10 Atto
4	20*10 ⁻¹⁸	20 a 20 Atto
5	50*10 ⁻¹⁸	50 a 50 Atto
6	100*10 ⁻¹⁸	100 a 100 Atto
7	200*10 ⁻¹⁸	200 a 200 Atto
8	500*10 ⁻¹⁸	500 a 500 Atto
9-17	see above 10 ⁻¹⁵	1-500 f 1-500 Femto
18-26	10 ⁻¹²	1-500 p 1-500 Pico
27-35	10 ⁻⁹	1-500 n 1-500 Nano
36-44	10 ⁻⁶	1-500 µ Micro
45-53	10 ⁻³	1-500 m Milli
54-62		1-500 no Prefix
63-71	10 ³	1-500 k Kilo
81-89	10 ⁹	1-500 G Giga
90-98	10 ¹²	1-500 T Tera
99-107	10 ¹⁵	1-500 P Peta
108-111	10 ¹⁸	1-500 E Exa
112-253		Unused
254		Unknown
255		Invalid

Math-formula

Enquire formula

"FORMULA?[SET=1,]NO=(1..5)"

SET: number of formula set (HM507 only 1), without specification is SET = 1

NO: formula number in chosen formula set (HM507: 1...5), without specification is NO = 1

Reply

The reply is always composed of 50 ASCII-characters of a determined length.

"FORMULA:SET=1, NO=(1..5), ON|OFF, *dest=func(source1, source2)*"

SET: number of formula (HM507 only 1), without specification is SET=1

NO: formula number in chosen formula set (HM507: 1...5), without specification is NO=1

ON|OFF: Formula is activated (ON) or deactivated (OFF)

dest: MAT1 or MAT2 or MAT3, Syntax like oscilloscope

func: functions same name as on the oscilloscope

source: same name as on the oscilloscope including constants

Examples

"FORMULA?NO=3"

"FORMULA? SET = 1, NO = 5"

In case of error

"FORMULA:ERROR: *description*" write formula

"FORMULA:[SET=1,][NO=(1...5),][ON|OFF,][*dest=func(source1[, source2])*]"

SET: number of formula (HM507 only 1), without specification is SET=1

NO: formula number in chosen formula set (HM507: 1...5), without specification is NO=1

ON|OFF: formula is activated/deactivated, without specification value will not be changed

dest: MAT1 or MAT2 or MAT3, Syntax like oscilloscope

func: functions same name as on the oscilloscope

source1: same name as on the oscilloscope including constants

source2: presence dependent on *func*

Maximum length: 50Byte

Reply

The reply is 3 characters return code (R CR LF).

Examples

"FORMULA:NO=2 , MAT3 = MUL(CH1, CH2)"

"FORMULA:MAT1 = ABS(MAT1)"

"FORMULA:SET = 1, NO = 3, ON, MAT2 = ADD(1.23mA , 500uA)"

"FORMULA: NO = 4, OFF, MAT1 = MUL(CH1 , 0.5_m)"

"FORMULA: NO=5, OFF"

(5.15 since FC - Version 5.15

(5.30 since FC - Version 5.30

(2 ANALOG SINGLE MODE: RES = 1 -> prepares for trigger event

STORE MODE: RES = 1 -> starts a new
digital acquisition

(exception SINGLE-mode: trigger event required)

(3 only valid for Digital oscilloscopes

⁽⁴⁾ Data is loaded into an EEPROM, which only has a finite number ($\approx 1\,000\,000$) of write cycles. For this reason the command should not be used unless essential.

⁽⁵⁾ This function is reset after the counter reaches zero (ca. 5s). Each further output before the counter reaches zero will initialise it again and prolongs the time until reset.

⁽⁶⁾ Between the sending of each waveform byte no more than 2s may pass or the oscilloscope will exit remote state.

⁽⁸⁾ only HM1507 and HM1507-2

⁽⁹⁾ only for devices with 2. time bases

(10) 16 Bit INTEGER value in two's complement applying to grid centre.

(1000 Bit/DIV)

Example 1: adjusts Y position to grid centre
output: 0 dec. = 0 hex.

Example 2: adjusts Y position to +1 division
output: 1000 dec. = 3E8 hex.

Example 3: adjusts Y position to -1 division
output: 64536 dec. = FC18 hex.

⁽¹³⁾ only HM200x

⁽¹⁴⁾ Read only

⁽¹⁵⁾ Read only below FC - Version 5.30

Examples

The following examples are detailed command explanations.

Most commands are ended with the characters **CR** (ENTER)= 0Dhex and **LF** = 0Ahex, resp.

The oscilloscope ends each returned character string with these characters.

Command parameters (displayed in brackets) can be ASCII-characters (a), as well as binary values (b).

BELL=(a)

Explanation:

This command issues beep 2 (long beep).

Character string to oscilloscope: BELL=2 CR

Character string in Hex depiction: 42 45 4C 4C 3D 30 0D

Reply from oscilloscope: 0 CR LF

Reply from oscilloscope in Hex depiction.: 30 0D 0A

CH1=(b)

Explanation: This command switches on channel 1 and adjusts it to 5mV and AC.
also see Byte 1 of DDF.

Character string to oscilloscope: CH1= (52hex) CR

Character string in Hex depiction: 43 48 31 3D 52 0D

Reply from oscilloscope: 0 CR LF

Reply from oscilloscope in Hex depiction.: 30 0D 0A

ERRBP?

Explanation:

This command enquires the state of the control beep for errors.

This command enquires the control beep state, after an error has occurred.

1 means Error beep is on, conversely 0 is off.

Character string to oscilloscope:	ERRBP? CR
Character string in Hex depiction:	45 52 52 42 50 3F 0D
Reply from oscilloscope:	ERRBP:1
Reply from oscilloscope in Hex depiction.:	45 52 52 42 50 3A 31

RDWFM1:(ww)

Explanation:

reads a signal waveform from channel 1.

Parameter 1: start address in acquisition store = 0 dec. = (00 00)hex.

Parameter 2:

Number of Bytes to be read = 2048 = (08 00) Hex.

Note that during output of word data, low byte is issued first.

Through other values of start address and number of Bytes to be read it is possible to read only parts of the acquired waveform.

Character string to oscilloscope:

RDWFM1:(00hex)(00hex)(00hex)(08hex) CR

Character string in Hex depiction:	52 44 57 46 4D 31 3A 00 00 00 08 0D
---------------------------------------	-------------------------------------

Reply from oscilloscope in Hex depiction:	52 44 57 46 4D 31 3A 00 00 00 08 XX XX XX ;(2048 Byte XX)
--	--

WFMPRE?

Character string to oscilloscope: WFMPRE?

Reply from oscilloscope as Hex depiction:	57 46 4D 50 52 45 3A XX XX C8 00 19 00 YY YY ZZ ZZ
--	--

Explanation:	Byte 1 to 7:	WFMPRE:
	Byte 8 & 9:	(XX XX) Byte number of the Trigger in two's complement
	Byte 10 & 11:	resolution in X-direction per Div. (200)
	Byte 12 & 13:	resolution in Y-direction per Div. (25)
	Byte 14 & 15:	(YY YY) Y1-position as 16Bit integer variable standardized to 25 per Div., whereas the value 0 means no shifting, 25 means shifted one division up and -25 shifted one division down.
	Byte 16 & 17:	(ZZ ZZ) Y2-position standardized to 25 per Div.

Voltage calculation of scanned waveform:

It is:	UN :	voltage value of N-ten scanning
	25 :	Y-resolution per Div. (see WFMPRE?)
	Y1Pos :	Y1-position of acquired waveform (see WFMPRE? YY YY)

Byte N : value of waveform byte (see RDWFM1 XX)
V/Div : position of attenuator (e.g.: 5mV)

Calculation without notice of Y1-Position:

$$UN = (\text{Byte N} - 128) / 25 * V/Div$$

With this method it is merely possible to determine difference voltage values of the acquired waveform, because the reference (ground potential) is missing.

To determine the absolute voltage value of the sample(s), the Y-position must be included into the calculation.

$$UN = (\text{Byte N} - 128 - Y1Pos) / 25 * V/Div$$

The deviation coefficient (V/DIV) can be learned from DDF Byte 1 or with the command CH1?.

Evaluate mathematical waveform:

Read mathematic waveform:

Character oscilloscope: RDMAT1 (CR LF)

Reply from oscilloscope: RDMAT1:(array)
(array) contains 2048 words
(heed LB before HB)

Read Math Properties:

Character string to oscilloscope: MAT1PRP?

Reply from oscilloscope: MAT1PRP=(array)

1. Byte: Y/DIV value of a DIV in Y direction (Prefix to Unit)
as locator on Prefix chart
2. Byte: Y Unit ASCII (PC character set 437)
3. Byte: X/DIV value of a DIV in X direction
as locator on Prefix chart
4. Byte: LB DC reference
5. Byte: HB DC reference as Integer value (applying to tube centre).

The Prefix to Y/DIV and X/DIV arises from the Offset to the Prefix chart.
Notifies Y/DIV e.g.: value 5, amounts to Prefix 50 a (Atto).

Calculation of the mathematical waveform:

It is:

XN : Value of the N th scanning
Y/DIV : value of a DIV in Y-direction (see MAT1PRP?)
Y Unit: Unit of math waveform (see MAT1PRP?)
25 : Y-resolution per DIV (see WFMPRE? or REF<n>PRE?)
DC_{Ref} : DC reference (see MAT1PRP?)
Word N : value of math waveform (see RDMAT1)
XN = (Word N - DC_{Ref}) / 25 * Y/DIV * Y Unit

Example

The following values were read from oscilloscope:

RDMAT1:D430 D430 ... (values in Hex depiction LB before HB)

MAT1PRP:32 56 2B 00 00 (values in Hex depiction)

XN = 30D4hex = 12500dez
 Y/DIV = 32hex = 50dez (as Offset to Prefix chart) \Rightarrow 50e-3
 Y Unit = V (ASCII)
 DC_{Ref} = 0000hex = 0 decimal

Inserted into formula specified above:

$$XN = (12500 - 0) / 25 * 50e-3 * V = 25V$$

The following commands are still partially supported for reasons of compatibility to older devices. Do not use for new designs!

command: PC -> oscilloscope	Reply Oscilloscope -> PC	description
HLD<z>POS? ⁽³⁾	HLD<z>POS:(b) Dropped since ^(5.30)	Provides HOLD 1/2 POSITION Y-position shift takes place after HOLD is activated -applying to store position b = 00 hex.: maximum up-shift of position always reads 80 Hex
HLD<z>POS=(b) ⁽³⁾	(R CR LF) dropped since ^(5.30)	sets HOLD 1/2 POSITION no function
REF<z>POS? ⁽³⁾	REF<n>POS:(b) Since ^(5.30) with REF<n>P? replaced	provides REF 1/2 POSITION Y Position of the reference curves in digital mode b = FF hex. REF<n> max. up deferral b = 80 hex. REF<n> not deferred b = 0 hex. REF<n> max. down deferral values are relative to current position.
REF<z>POS=(b) ⁽³⁾	(R CR LF) since ^(5.30) replaced REF<n>P=(w) with	sets REF 1/2 POSITION
RODDF?	RODDF:(array)	provides READ OUT DEVICE DATA FIELD (RO-Device Data Field) (6 Byte command + 10 Byte parameter) see chart Readout data field RODDF
RODDF=(array)	(R CR LF)	sets new READ OUT DEVICE DATA FIELD (RO-Device Data Field)
SAVREF<z> (CR LF) ⁽³⁾	(R CR LF)	SAVE REFERENCE 1/2 Saves in STORE MODE current signal data in reference <z> (1 or 2)store Is only one channel on it is saved in REF<z> In DUAL mode CH1 is saved in REF1 and CH2 in REF2.
STRMODE? ⁽³⁾ (use DDF2)	STRMODE:(b)	provides STORE MODE see chart STRMODE
STRMODE=(b) ⁽³⁾ (use DDF2) Overwrites values in DDF2!	(R CR LF)	sets STORE MODE see chart STRMODE

