

CHARACTERISTICS

3

CHARACTERISTICS

CONTENTS

3.0	Characteristics.....	3-1
3.1	Cathode ray tube.....	3-2
3.2	Signal acquisition.....	3-3
3.3	Channels A and B.....	3-4
3.4	Triggering.....	3-8
3.5	Time base.....	3-10
3.6	Memory.....	3-11
3.7	Display.....	3-12
3.8	Setting memory.....	3-13
3.9	Analyze facilities.....	3-14
3.10	Auto setting.....	3-14
3.11	Cursors.....	3-17
3.12	Calibrator.....	3-17
3.13	Power supply.....	3-18
3.14	Interfaces and options.....	3-18
3.15	Sundries.....	3-19
3.16	Mechanics.....	3-21
3.17	Environmental.....	3-22
3.18	Safety.....	3-25
3.19	Accessories.....	3-26
3.20	Optional versions.....	3-27

3.0 CHARACTERISTICS

General

This instrument has been designed and tested in accordance with IEC publication 348 for Class I instruments.

This specification is valid after the instrument has warmed up for 30 minutes.

Properties expressed in numerical values with tolerances stated, are guaranteed by the manufacturer.

Numerical values without tolerances or limits are typical and represent the characteristics of an average instrument.

For definition of terms, reference is made to IEC publications 351, 395 and 548.

	CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.1	CATHODE RAY TUBE		
3.1.1	Type	Philips D18-190GH/129	180 mm rectangular single beam tube.
3.1.2	Usefull screen area (h. x w.)	100 mm x 120 mm	For graticule see 3.1.7.
3.1.3	Screen type	GH (P31)	
3.1.4	Total acceleration voltage	16 kV	
3.1.5	Spot size	0,3 mm	Tube only.
3.1.6	Maximum trace distortion		Deviation from straight line.
	-@ screen periphery 1 mm		Outside central 80 mm (vert.) x 100 mm (hor.)
3.1.7	Graticule	Internal, fixed	
	-Illumination	Continuously variable	
	-Size (h. x w.)	80 mm x 100 mm	Centered @ 50 mm from top of CRT screen (hor.) and @ 50 mm from left edge of CRT screen (vert.).
	-Engravings		
	division lines	@ 10 mm	Horizontal and vertical.
	2 mm tick marks	@ 2 mm	On vertical and horizontal central axes.
	0.5 mm tick marks	@ 2 mm	On horizontal lines # 2,3,4,6,7,8.
	dots	@ 2 mm	On dotted lines @ 1,5 div. and 6,5 div. from top of graticule.
	percentages	100-90-10-0 %	To facilitate rise and fall time measurements.
3.1.8	Orthogonality	$90 \pm 0,5^\circ$	Measured @ centre of screen. (Angle between X and Y axes, when traces are written in X and Y direction alternately).
3.1.9	Intensity	Blank to max. intensity	Separate front panel controls for trace and text.

	CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.1.10	Focus	Manually set	Common screwdriver control on front for trace and text.
3.1.11	Trace rotation		Screwdriver control on front; direction of screwdriver rotation same as direction of trace rotation.
	-Minimum range	14°	Either X or Y trace can be aligned with graticule, when environmental magnetic field is within 0,1 mT.
3.2	SIGNAL ACQUISITION		
3.2.1	Sampling type	Equivalent time	Sequential sampling
3.2.2	Sources	Channel A Channel B	
3.2.3	Modes		Both channels sampled simultaneously.
	-Source select	Single channel Dual channel Added	
	-Polarity	Inverted Non inverted	Each channel can independently be inverted.
	-Processing	Eye-pattern Average Multiple sampling Absolute Min/Max	} } } Channels simultaneously } in Single and Dual mode } }
3.2.4	Range		
	-Vertical		
	Single channel	}	Signal A and Signal B (including offset) and
	Dual channel	} 10 div	Added signal should remain within screen. Overflow
	Added	}	signal A or B indicated in Added signal.
	-Horizontal	10,2 x time/div	Display in unmagnified position.

	CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.2.5	Resolution		
	-Vertical	1:1024	10 Bits
	-Horizontal	64...512 sampl./acq.	Both channels have same resolution
	Normal display	512 sampl./acq. 256 sampl./acq. 128 sampl./acq.	
	Fast display	64 sampl./acq.	
	Eye pattern		
	-Single Channel	4096 sampl./acq.	Acquired over 512 positions.
	-Dual Channel	2048 sampl./acq.	Each Channel, acquired over 512 positions.
3.2.6	Minimum Acquisition time		Acquisition time = Hor. Resolution x sample processing time.
	-512 sampl/acq.	< 25 ms	} Minimum acquisition time
	- 64 sampl/acq.	< 10 ms	} supposes trigger delay =
			} zero and hold off time =
			} minimum.
3.2.7	Max. time difference between Channels	35 ps	
3.3	CHANNELS A AND B		
3.3.1	Input connector	N-type With probe read out	Probe read out causes instrument to change V/div indication (when probe fitted with a probe indicator).
3.3.2	Input impedance	50 ohm \pm 1%	
	-Max. VSWR		
	Upto 1 GHz	1:1,3	Referred to $Z_0 = 50$ ohm
	Upto 2 GHz	1:1,4	Referred to $Z_0 = 50$ ohm
3.3.3	Input coupling	d.c.	
3.3.4	Spurious emission		
	-Max. strobe emission (pk...pk)	< 100 mV	
	-Max. trigger emission (pk...pk)	< 100 mV	

	CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.3.5	Max. non destructive input voltage		
	-d.c.	5 V	
	-a.c. (r.m.s.)	5 V	
	-a.c. (peak)	5 V	
3.3.6	Deflection coefficient		
	-Steps		
	Normal modes	1 mV/div...200 mV/div	In 1-2-5 sequence of 8 steps.
	Limits of error (Ambient 15...35°C)		After first hor. div. Add 1,5% for ambient: 0...50°C.
	-Up to memory	+ 1,5%	} Error limit input } impedance excluded
	-Overall	+ 1,5%	
	-Eye pattern mode	5 mV/div...200 mV/div	In 1-2-5 sequence of 6 steps.
	Limits of error (Ambient 15...35°C)		Add 5% for ambient: 0...50°C.
	-Up to memory	+ 10%	
	-Overall	+ 10%	
	-Vernier		
	Ratio	3,0 : 1	
	Resolution	1 : 4096	12 Bits
	Limits of error	+ 3%	
3.3.7	Dynamic range	+0,8 V	Center of dynamic range can be positioned by d.c. Offset control. Compression at limits of dynamic range: In normal mode less than 1% In eye pattern mode less than 5%.
3.3.8	D.C. offset		
	-Range	+ 1,6 V	
	-Resolution	0,01 div.	
3.3.9	Frequency response	d.c....2,0 GHz	

CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.3.10 Pulse response		
-Rise time (Ambient 15...35°C)	175 ps or less	Tested with a 70 ps rise time pulse. Calculated from Bandwidth x Risetime=0,35. Add max. 25 ps for ambient: 0...50°C.
-Aberrations		
Overshoot	4% or less	
Tilt	2% or less	
Ringing after transient	4% or less	
3.3.11 Visible signal delay	9 ns	
3.3.12 Max. base line instability		
-Jump (Ambient 15...35°C)		Conditions: No signal at inputs A and B. Offset channel A is zero. Offset channel B is zero. Add 100% for Ambient: 0...50°C.
When switching to ADD mode	0,3 div	
When switching from 5 mV/div to 200 mV/div position	0,4 div	
When using invertor switch	0,5 div	Variable vernier is cal. position
When rotating vernier	0,25 div	
When switching from 20 us/div to 1 ns/div in 5 mV/div	0,6 div	
-Drift	< 1 mV/h	
-Temperature coefficient	< 1 mV/K	Measured in 5 mV/div.

	CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.3.13	Common mode rejection ratio		} Both channels at same } attenuator setting; } vernier of V/div } adjusted for best CMMR. } Measured with max. 8 div } input at each channel } (± 4 div around zero).
	-Up to 100 MHz	40:1	
	-Up to 500 MHz	10:1	
3.3.14	Minimum channel isolation	1000:1	Measured with full scale input signal in 200 mV/div.
3.3.15	Maximum noise	0,5 mV (RMS)	In 1 mV/div and 2 mV/div automatic smoothing.
3.3.16	Average		Average formula after the first front change: $Si(N) = Si(N-1) + (Si(N) - Si(N-1)) / C$ 1-th sample; N-th sweep; C is average constant. In powers of 2.
	-Average constant C 2...64		
	-Smooth C=4		
3.3.17	Multiple sampling		Number of samples at each position is selectable in powers of 2.
	-Number of sampling 1...32		

	CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.4	TRIGGERING		
3.4.1	Sources		
	-Internal	A, B	
	Coupling	a.c. (150 kHz, -3dB)	Time constant: 1 us.
	-External	EXT	
	Input connector	BNC	
	Input impedance	50 ohm + 1%	
	Coupling	a.c. (150 kHz, -3dB)	Time constant: 1 us.
	Max. non-destructive input voltage	+ 5 V	
3.4.2	Modes		
	-Manual	TRIGGER SYNCHRONIZE COUNTDOWN	
	-AUTO	AUTO SELECT	Selects automatically between TRIGGER, SYNCHRONIZE, COUNT DOWN and SENS HIGH or LOW, depending on input frequency and amplitude.
3.4.3	Sensitivity (peak to peak) (Ambient 15...35°C)		Min. signal required is equal or less than indicated values. Add 10% for 0...50°C.
	-TRIGGER mode		
	SENS HIGH		
	-Up to 100 MHz	10 mV	
	-Up to 200 MHz	20 mV	
	SENS LOW		
	-Up to 100 MHz	100 mV	
	-Up to 200 MHz	200 mV	
	-SYNCHRONIZE mode	2 mV	Up to 100 MHz.
	-COUNT DOWN mode		See figure 3.1.
	SENS HIGH	50 mV	
	SENS LOW	200 mV	

	CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.4.4	Dynamic Range		
	-TRIGGER mode		
	SENS HIGH	200 mV	
	SENS LOW	2 V	
	-SYNCHRONIZE mode	100 mV	
	-COUNT DOWN mode		
	SENS HIGH	200 mV	
	SENS LOW	2 V	
3.4.5	FREQUENCY RANGE		
	-TRIGGER MODE		
	Max. trigger frequency	> 200 MHz	
	-SYNCHRONIZE mode		
	Max. synchronize frequency	> 100 MHz	
	-COUNT DOWN mode		
	Min. count down frequency	< 160 MHz	
	Max. count down frequency	> 2 GHz	
3.4.6	Level		
	-Range		
	SENS HIGH	+ 4 mV	
	SENS LOW	± 40 mV	
	-Resolution	1 : 16.384	14 Bits
3.4.7	Slope Selection		In TRIG mode (for COUNT DOWN, SYNC only positive going).
		Positive going (+)	
		Negative going (-)	
3.4.8	Jitter	< 7 ps (RMS)	Time-base of 1 ns/div.

	CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.5	TIME BASE		
3.5.1	Acquisition modes	Recurrent Single scan Multiple scan Multiple eye Save/Stop on Difference	
3.5.2	Deflection coefficient		
	-Time-base steps	1 ns/div...20 us/div	In a 1-2-5 sequence.
	Limits of error (Ambient 15...35°C)	$\pm 3\%$	Measured between + and - 4 div from graticule center. Add 0,5% of full scale for ambient 0...50°C.
	-Magnifier steps	x1...x50	In a 1-2-5 sequence.
	Limits of error	add 2%	to time-base limits of error.
3.5.3	Delay		
	-Range		
	20 ns/div...	0...10 div	}
	20 us/div		}
	10 ns/div	-1...9 div	}
	5 ns/div	-2...8 div	} Time-base magnifier: x1.
	2 ns/div	-4...5 div	}
	1 ns/div	-9...0 div	}
	-Resolution	1 div	
	-Limits of error	$\pm 1 \text{ ns } \pm 3\%$	
3.5.4	Hold-off		
	-Range (approx.)		
	512 sampl./acq.	47 us...85 us	
	512 sampl./acq. and average	47 us...85 us	
	256 sampl./acq.	47 us...85 us	
	128 sampl./acq.	90 us...150 us	
	64 sampl./acq.	150 us...230 us	
	-Resolution	1 : 2048	11 bits

CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.8 SETTING MEMORY		
3.8.1 Memory size	Max. 251 front settings	
3.8.2 Functions		
	Save	Actual settings are stored in memory, replacing contents of memory cell indicated on CRT.
	Insert	Actual settings are stored in memory; insertion is after memory cell indicated on CRT.
	Delete	Contents of memory cell indicated on CRT is deleted.
	Recall	Actual settings are replaced by contents of memory cell indicated on CRT. Actual settings are saved in "last setting" memory (= memory cell #0).
	(Recall) Next	Actual settings are replaced by contents of memory cell indicated on CRT increased by 1. Actual settings are saved in "last setting" memory (= memory cell #0).
	(Recall) Previous	Actual settings are replaced by contents of memory cell indicated on CRT decreased by 1. Actual settings are saved in "last setting" memory (= memory cell #0).

CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.9	ANALYZE FACILITIES	
3.9.1	Measure	
-Amplitude	RMS voltage Mean voltage Peak to Peak voltage Peak to Zero voltage Overshoot Preshoot	}} Including or excluding }} offset voltage. } Result calculated from } part between cursors or } markers if LOCATE is } choosen.
-Time	Risetime Pulse width Duty cycle Frequency Phase	
-Mathematics	Add Substract Multiply Divide Differentiate Integrate Delay Channel Histogram F.F.T. Filter	} } Result of calculation } displayed in selected } register and scalable } for optimum display. } } Amplitude density versus absolute amplitude of an input signal.
3.10	AUTO SETTING	
3.10.1	Setting time	Typical 3 s During plot: AUTO SET not possible.
3.10.2	CRT functions	
-Focus	}	
-Trace intensity	} Not influenced	
-Text intensity	}	

CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.10.3 Display functions		
-Select	To register #0	
-X-position	Zero	
-Y-position	Zero	
-Invert	Off	Only for register #0.
-X-expand	x1	Vernier calibrated.
-Y-expand	x1	
-A versus B	Off	Only for register #0.
-Dots	Joined	
3.10.4 Cursors	Off	
-Calculation	Off	
3.10.5 Text		
-Reduced	Off	
-Bottom text lines	Not affected	
3.10.6 Vertical acquisition		
-Y-deflection source	Every source having a triggerable signal at its input	Channel A if no trigger is found.
-Y-deflection coefficient		Each channel is independently set.
Input voltage > 10 mV	Approx. 4 div	
Input voltage < 10 mV	Channel at 5 mV/div	} Vernier in calibrated position.
-Modes		
Invert	Off	
Add	Off	
Average	Off	
Eye pattern	Off	
Multiple sampling	Off	
-Offset	Zero	
-Y baseline position		
In single channel display	Centre of screen $\pm 0,3$ div	
In dual channel display		
-Ch. A	$2 \pm 0,3$ div above centre screen	
-Ch. B	$2 \pm 0,3$ div below centre screen	

	CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.10.7	Horizontal acquisition		
	-Mode	Recurrent 512 sampl./acq.	
	-TB deflection coefficient		
	80 kHz < signal freq. < 2 GHz	Min. 2, max 6 signal periods over 10 div	
	When no trigger found	100 ns/div	
3.10.8	Triggering		
	-Delay	Off	
	-Source		
	Triggerable signal at EXT	Ext	If Extern was selected.
	No trig. signal at EXT but trig. signal at channel A or B	Channel A or B	Channel with lowest input frequency is selected. Default: Channel A.
	No triggerable signal at any input	Channel A	
	-Mode	AUTO SELECT	
	-Level	Zero	
	-Slope	Positive going	

	CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.11	CURSORS		
3.11.1	Cursor intensity control	Independent of trace intensity but combined with text intensity	
3.11.2	Resolution		
	-Horizontal	1:512	
	-Vertical	1:1024	
	-Read out	3 digits	
3.11.3	Voltage cursors		
	-Limits of error (Ambient 15...35°C)	$\pm 1,5\%$	Referred to input at N-connector, error of probes etc. excluded. Add 3% for ambient: 0...50°C.
	-Cursor Range	Visible part of signal	Cursors cannot pass each other (to avoid negative readings).
3.11.4	Time cursors		
	-Limits of error	$\pm 3\%$	
3.12	CALIBRATOR		
3.12.1	Wave form		
	-Shape	Square wave	
	-Duty cycle	50 \pm 0,01%	
	-Rise time	< 1,5 ns	Add 0,4 ns for ambient 0...50°C.
	(Ambient 15...35°C)		
	-Max. overshoot and ringing	$\pm 3\%$	
3.12.2	Output		
	-Connector	BNC	
	-Impedance	50 ohm \pm 1%	
	-Voltage (peak to peak)	1V \pm 1%	Into 50 ohm.
	-Current	20 mA \pm 2 %	Into 50 ohm.
	-Frequency	100 kHz \pm 0,1%	

	CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.13	POWER SUPPLY		
3.13.1	Source voltage a.c. (r.m.s)		
	-Nominal	100 V...240 V	
	-Limits of operation	90 V...264 V	
3.13.2	Source frequency		
	-Nominal	50 Hz...400 Hz	
	-Limits of operation	45 Hz...440 Hz	
3.13.3	Source waveform characteristics		@ Nominal source voltage.
	-Max. waveform deviation factors	10%	
	-Max. Total Harmonics	10%	
	-Max. Individual harmonic	5%	
	-Crest Factor	1,27...1,56	
3.13.4	Allowable power source interrup- tion	At least 20 ms	@ Nominal source voltage. After this time oscillo- scope settings are saved before instrument goes down. Automatic power up after restoration of Power line voltage. (For setting retention: see 3.15.1).
3.13.5	Power consump- tion (a.c. source)	135 W	@ Nominal Source Voltage

3.14 INTERFACES AND OPTIONS

For specification of interfaces and options refer to the separate manuals of these.

CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.15	SUNDRIES	
3.15.1	Data and settings retention	When instrument is switched off or during line power failure.
-Memory back up voltage	$2\text{ V} < \text{MBUV} < 3,5\text{ V}$	
-Memory back up current drain	Typical 12 uA	@ 25°C.
-Recommended Batteries:		
type	LR 6	According to IEC 285, (= Alkaline manganese penlight battery), e.g. PHILIPS LR6 (9299 000 20734) or DURACELL MN 1500.
quantity	2 pcs	
-Temperature rise of batteries	20°C	After warming up period of instrument.
-Retention time	Typical 2 years	@ 25°C, with recommended (fresh) batteries.
-Temperature Range	0...+70°C	@ -40...0°C settings retention is uncertain. It is advised to remove batteries from instrument when it is stored during longer periods (> 24 h) below -30°C or above 60°C. UNDER NO CIRCUMSTANCES BATTERIES SHOULD BE LEFT IN THE INSTRUMENT AT TEMPERATURES BEYOND THE RATED RANGE OF THE BATTERY SPECIFICATION.

CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.15.2 Probe Read Out		With Philips probe provided with indicator ring.
-V/div read out		
Passive 10:1 probe	10x higher	}
Passive 10x attenuator	10x higher	}
Passive 100:1 probe	100x higher	} Offset read out is
Passive 100x attenuator	100x higher	} changed accordingly.
-Cursor Read Out		}
Passive 10:1 probe	10x higher	}
Passive 10x attenuator	10x higher	}
Passive 100:1 probe	100x higher	}
Passive 100x attenuator	100x higher	}
3.15.3 Analog plot output		
-Connector	DIN 5 pole 45°	
-Functions	Screen dump Memory dump	Included channel identifiers. Register selectable.
-Sensitivity	1 V/Full screen + 3% 1 V/Full memory + 3%	} } Horizontal and vertical. } }
-Pen lift	TTL compatible	Pen-up is selectable (0 or 1). Open collector output; max. 12 V.
-Plot time per dot	20 ms...2 s	Software selectable, signal dependent.
-Plot order	Channel A first	In dual channel operation; with more registers starting with the lowest number.
Registers	0,1,2,3	Skipping non selected register.
Channels	A,B	Within one register, skipping non selected channel.

	CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.16	MECHANICS		
3.16.1	Height		Fits 5E in 19 inch rack.
	-Without feet and accessory pouch	176 mm (6,9 inch)	Add 15 mm (0,6 inch) for feet.
	-Feet and accessory pouch included	250 mm (9,8 inch)	
3.16.2	Width without handle	419 mm (16,5 inch)	Add 46 mm (1,8 inch) for handle.
3.16.3	Depth		
	-Handle excluded	570 mm (22,5 inch)	Add 35 mm (1,4 inch) for protective cover.
	-With extended handle	670 mm (26,4 inch)	
3.16.4	Mass	18,7 kg	
3.16.5	Operating position	Horizontal	Standing on feet; may be tilted by handle.
		Vertical	Standing on rear feet.
		Tilt	By means of tilt boil handle.
	-Maximum stock pile 3		
3.16.6	Finish	Epoxy powder coated	
3.16.7	Printed circuit boards	Glass laminate epoxy	
3.16.8	Cooling	Fan aided convection	Maintenance free.

	CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.17	ENVIRONMENTAL		
3.17.1	General		
	The characteristics are valid if instrument is checked in accordance with the official checking procedure. Details on these procedures and failure criteria are supplied on request.		
3.17.2	Meets environmental requirements of:	MIL-T-28800D Type III Class 5, Style D	
3.17.3	Temperature		Memory back-up batteries removed from instrument, unless batteries meet temperature specifications (see also 3.15.1).
	-Operating		
	Min. low temperature	0°C	Cf. MIL-T-28800D par. 3.9.2.3 tested cf. par. 4.5.5.1.1.
	Max. high temperature	+ 50°C	Cf. MIL-T-28800D par. 3.9.2.4 tested cf. par. 4.5.5.1.1.
	-Non operating (Storage)		
	Min. low temperature	-40°C	Cf. MIL-T-28800D par. 3.9.2.3 tested cf. par. 4.5.5.1.1.
	Max. high temperature	+ 75°C	Cf. MIL-T-28800D par. 3.9.2.4 tested cf. par. 4.5.5.1.1.
3.17.4	Maximum humidity		Cf. MIL-T-28800D par. 3.9.2.2 tested cf. par. 4.5.5.1.1.
	-Operating and non-operating (storage)	95% Relative humidity	
3.17.5	Recovery time	2 h	

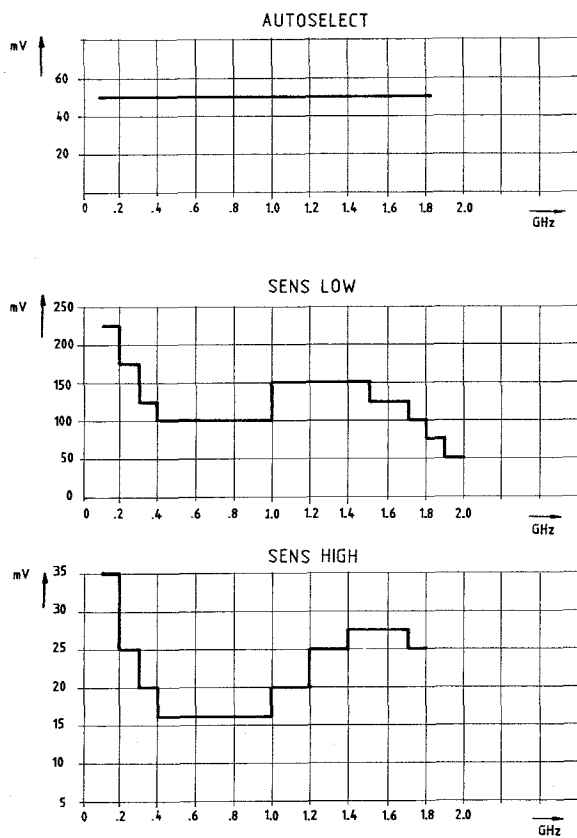
CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.17.6 Maximum altitude		Cf. MIL-T-28800D par. 3.9.3 tested cf. par. 4.5.5.2. Memory Back-up batteries removed from instrument, unless batteries meet maximum altitude specs.
-Operating	4,5 km (15000 feet)	Maximum operating temperature derated 3°C for each km (for each 3000 feet) above sea level.
-Non-operating (storage)	12 km (40000 feet)	
3.17.7 Vibration (operating)		Cf. MIL-T-28800D par. 3.9.4.1 tested cf. par. 4.5.5.3.1.
-Freq. 5...15 Hz		
Sweep time	7 min	
Excursion (pk to pk)	1,5 mm	
Max. acceleration	7 m/s ² (0,7 x g)	15 Hz
-Freq. 15...25 Hz		
Sweep time	3 min	
Excursion (pk to pk)	1 mm	
Max. acceleration	13 m/s ² (1,3 x g)	25 Hz
-Freq. 25...55 Hz		
Sweep time	5 min	
Excursion (pk to pk)	0,5 mm	
Max. acceleration	30 m/s ² (3,0 x g)	55 Hz
-Resonance dwell	10 min	@ each resonance freq. (or @ 33 Hz if no resonance was found). Excursion cf. 3.17.7.
3.17.8 Shock (operating)		Cf. MIL-T-28800D par. 3.9.5.1 tested cf. par. 4.5.5.4.1.
-Amount of shocks		
-Total	18	
-Each axis	6	(3 in each direction).
Shock wave form	half sine wave	
Duration	11 ms	
Peak acceleration	300 m/s ² (30 x g)	

CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.17.9 Bench handling		Cf. MIL-T-28800D par. 3.9.5.3 tested cf. par. 4.5.5.4.3.
-Meets requirements of:	MIL-STD-810 method 516, proced. V	
3.17.10 Salt atmosphere		Cf. MIL-T-28800D par. 3.9.8.1 tested cf. par. 4.5.6.2.1.
-Structural parts meet requirements of:	MIL-STD-810 method 509, proced. I salt solution 20%	
3.17.11 EMI (Electro magnetic interference) meets requirements of:	MIL-STD-461 Class B VDE 0871 and VDE 0875 Grenzwertklasse B	Applicable requirements of Part 7: CE03, CE07, CS01, CS02, CS06, RE02, RS02, RS03.
3.17.12 Magnetic radiated susceptibility		Tested conforming IEC 351-1 par. 5.1.3.1.
-Maximum deflection factor	7 mm/mT (0,7 mm/gauss)	Measured with instrument in a homogeneous magnetic field (in any direction with respect to instru- ment) with a flux inten- sity (peak to peak value) of 1,42 mT (14,2 gauss) and of symmetrical sine wave with a frequency of 45...66 Hz.
3.17.13 Packing		
Meets requirements of:	NLN-L88	

CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.17.14 Transportation		
Meets requirements of:	AN-D628	
-Packaged transportation drop		
Meets requirements of:	Nat. safe transp. ass. procedure 1A-B-2	
-Packed transportation vibration		
Meets requirements of:	Nat. safe transp. ass. procedure 1A-B-1	
3.18 SAFETY		
3.18.1 Meets requirements of:	IEC 348 Class I VDE 0411 Class I UL 1244 CSA 556B	
3.18.2 Approvals	VDE 0411 (applied for) UL 1244 (applied for) CSA 556 (applied for)	When shipped with universal European plug. When shipped with North American power plug. When shipped with North American power plug.

CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.19	ACCESSORIES	
3.19.1	Accessories furnished with instrument	500 ohm, 10:1 passive probe (1,5m) with read out and N (male) connector.
	2x PM8911/08	
	2x PM9063	Adapter N (male) - BNC (female).
	1 x PM9353	Probe tip to BNC adaptor
	Blue contrast filter	Factory installed.
	Cable for analog plot out	With Amphenol plug: option /.03. With 6 banana plugs: option /.04.
	Operating manual	
	Instruction manual	
	Quick operating guide	
	Front cover	
3.19.2	Optional accessories	
	-Signal input (passive)	Passive probe with read out and N (male): 500 ohm, 10:1 5 kilo-ohm 100:1
	-Signal input (active)	1 Meg-ohm 1:1, 10:1 and 100:1 FET probe.
	-GPIB	IEEE488 to IEC625 adaptor plug.
	PM2296/05	0,5 m }
	PM2296/10	1,0 m } IEEE488 cables.
	PM2296/20	2,0 m }
	-Mechanical	Oscilloscope trolley. Accessory pouch.
	-Documentation	Service manual. Operating manual.

CHARACTERISTIC	SPECIFICATION	ADDITIONAL INFORMATION
3.20	OPTIONAL VERSIONS	
3.20.1	Power cord	General: these options can be factory installed only. Length 2,1 m (82,7 inch).
	Universal European	VDE, KEMA listed (option .01).
	North American	CSA, UL listed (option .03).
	United Kingdom	BSI listed (option .04).
	Swiss	SAV listed (option .05).
	Australian	SAA listed (option .08).
3.20.2	Cabinet	
	Rack mount	Fits 5E in 19 inch rack (option 80).



MAT3277

Figure 3.1 Trigger sensitivity count down