

# ~ product catalogue ~ <sup>2021</sup>

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ATMOSPHERIC PRESSURE	LEAFLET
Mercury Barometers Barographs and Microbarograph	111,0 E 113 0 E and 113 1E
Digital Barometers	DB278 and DB-X and HD3114B
TEMPERATURE	
Meteorological Thermometers	121,0 E
Thermograph Temperature and Humidity Sensor	125,0 E
Digital Thermometer	123,0E
HUMIDITY	
Psychrometers type August, Assmann and Sling	131,0 E
Psychrometer	
Siing Psychrometer (whiriing Hygrometer) Hair-Hygrograph	131,1 E 139.0 E
Thermohygrograph	133,0 E 142,0 E
WEATHER-SHELTER (STEVENSON SCREEN)	
Weather-Shelters made by wood	143,1 E
Weather Shelters of the series WS (Segment-Shelter)	144,0 E
WIND	
Wind vane with force indicator, Wild-type	212,4 E
Counter Anemometer	212,4 E and 212,5 E
Anemograph "Universal" Wind Measuring System	214,0 E
Wind Measuring System Portable Anemometer	
Ultrasonic Wind Sensor	8371UM
Wind Monitoring System	AMS16-W
Airport Wind and Pressure Monitoring System	AMS16-WP
MASTS	
Alumium Masts	
PRECIPITATION	
Precipitation gauges	221,0 E
Precipitation Pulse Transmitter	RE2
Data Logger Type Tinytag	TGRP-1200
Sufface-wetness Recorder, woelfie Type	224,0 E 225.0 E
Snow Depht Sensor	SHM 30
EVAPORATION	
Evaporimeter, Piche Type	231.0 E
Evaporigraph, Piche Type	231,0 E
Evaporation Pan "Class A"	232,0 E
Floating Maximum-Minimum Thermometer	122,0E and 232,0E
RADIATION	
Sunshine Recorder, Campbell-Stokes Type	242,0 E
Bimetallic Actinograph, Robitzsch-Fuess Type	251,2 E
Robitzsch Type Radiation Recorder - Actinograph	251,0 E
RECORDING DRUMS	700,0E

#### **ATMOSPHERIC PRESSURE**

#### Mercury Barometers (leaflet 111,0 E) - only on special request

#### **Overview:**

No.	Type of Barometer	Type of cistern	Range (hPa)	Resolution (hPa)
11A9	Station Barometer	one-limb	8001070	0.1
	for local heights up to 1500 m above sea level			
11B9	Station Barometer	one-limb	5801025	0.1
	for local heights up to 4000 m above sea level			
11AB	Station Barometer	one-limb	5801070	0.1
	for local heights up to 4000 m above sea level			
111	Test Barometer	one-limb	551090	0.1
	calibration instrument with extended measuring range			
2K	Standard Barometer	two-limb	8651090	0.05
	calibration instrument, qualified for testing other barometers as two-			
	limbed cistern barometer with variable cistern volume for elimination			
	of the zero level variations, the degree of the vacuum can be			
	checked by the barometer itself			
20K	Control Barometer	two-limb	551090	0.05
	calibration instrument as No. 2K, but with extended measuring range			



#### Barographs and Microbarograph (leaflets 113,0 E and 113,1E)

- precision instruments for continous recording of atmospheric pressure
- measuring values are independent of the ambient temperature and gravitational acceleration so that corrections are not necessary
- used everywhere, where there's quick determination of momentary atmospheric pressure of interest, in connection with observation and documentation of barometric pressure
- as mean atmospheric pressure decreases with increasing height, barographs must always be adjusted to the height of the place of mounting
- optional: in order to make possible a far-reaching range of utility for each instrument, the barographs are so designed that they may be adjusted to several measuring ranges, without readjustment
- with high precision mechanical clockwork, made from brass, resistant varnished
- time of drum rotation: daily or weekly
- Accessories: one set of 100 recording charts and 2 fiber pens (alternative: metal pen with ink)

#### Overview

No.	name	range in hPa	recording height in mm for one hPa	recording drum	height of installation over NN	recording height total	accuracy of reading (limits of Error) / quantity of aneroid boxes
78A	Normal	445-1060	0.75	Ø 93.3 mm	-505700	79 mm	± 0.3 hPa
	Barograph	(105 each)		height: 93 mm			7/8 pcs.
78BM	Large	685-1060	1.5	Ø 133 mm	-502700	160 mm	± 0.2 hPa
	Barograph	(105 each)		height: 174 mm			12 pcs.
78M	Micro-	532-1198	3.8	Ø 133 mm	-12004600	247.5 mm	± 0.1 hPa
	Barograph	(66 each)*		height: 259 mm			15 pcs.

\* If occasionally occurs extrema of pressure variation the customer can use the above described device to select the suitable range of 66 hPa (mbar) within the total range of 146 hPa (mbar).

#### No. 78a Normal Barograph

- preferently used type in weather stations and in other places of climatological interest
- used by WMO and German Meteorological Services since decades



- stainless steel casing, which has been provided with a very resistant grey hammertone finish
- equipped with a high quality set of eight aneroid boxes as well as complete temperature compensation in the total pressure measuring range
- dimensions: 290 x 125 x 205mm
- gross weight: 4.7 kg



#### No. 78bm Large Barograph

- double width of scale of recording in comparision to No. 78a: 1.5 mm for 1 hPa
- heigher measuring accuracy through larger number of aneroid-boxes (12 pieces)
- the limits of error amount are ±0.2 hPa
- optional: in a special version the Large Aneroid Barograph is designed to cover six resp. four different
  measuring ranges, which can be changed over without any readjustment. Thus, it is possible to use the
  same apparatus at various heights above see-level, ranging from

No.	local height above sea level in m	adjustable measuring ranges	complete range in hPa
78bm-1	-50 725	6 (105 hPa each)	885 1060
78bm-2	700 1850	6 (105 hPa each)	765 970
78bm-3	1800 2700	4 (105 hPa each)	885 850

- dimensions of casing of 78b: 400 x 195 x 300 mm
- gross weight of 78bm: 10.3 kg



#### No. 78m Microbarograph

- highly sensitive measuring instrument for especially sensible and precise recording of atmospheric pressure
- standard execution: in casing of wood with solid light-metal socle (model 78m)
- supplied in 12 types for different site of installation between -1200 and +4600 meters

Version	Height above sealevel in m	Range adjustable between hPa (mbar)
78m03	-1200 650	10521198
78m02	-750 200	10021148
78m01	-450+100	9621108
78m 1	0+600	9071053
78m 2	+350+950	8671013
78m 3	+800+1450	812958
78m 4	+1150+1800	772918
78m 5	+1650+2350	722868
78m 6	+2100+2800	682828
78m 7	+2650+3400	627773
78m 8	+3100+3900	587733
78m 9	+3700+4600	532678



- the adjustment of the seven ranges for the place of installation is effected in a way, which is as quick and easy, as it is sensitive, by turning the setting screw arranged above the set of aneroid cells which is equipped with a correspondingly numbered, divisioned disc arrangement
- if occasionally occurs extrema of pressure variation the customer can use the above described device to select the suitable range of 66 hPa (mbar) within the total range of 146 hPa (mbar)
- imensions of casing of 78m: 450 x 230 x 385 mm
- weight of 78m: 10.5 kg

#### **Digital Barometers**

#### No. DB278 D - Digital Barometer

- Digital Barometer with 5 LED Display
- Measuring Range:
  - 600 ... 1100 hPa or
  - 800 ... 1100 hPa ( on special request)
- Accuracy:
  - at 18 ... 28°C: better than +/- 0.2 hPa at 0 ... 40°C: better than +/- 0.5 hPa (16 step linearity)
- Resolution: 0.1 hPa
- Long Term Stability: 0.1 hPa/yr
- Operating Temperature: 0 ... 50°C
- Storage Temperature: -40 ... +60°C
- To show the barometric pressure on an other altitude e.g. QNH an offset can be entered and the display can be altered by a switch.

#### No. DB-X- Digital Barometer (type: DB-1, DB-2 and DB-3)

The application range of the series DB-X are the measurements of pressure in meteorological stations, aviation use and in laboratories. Depending on the technical requirements and of the needed redundancy the user can select the specific model of DB-X, namely DB-1 with one, DB-2 with two or DB-3 with three independent working pressure transducers. The implemented software allows the convenient calculation and presentation of the measured pressure values according the specific application, as QNH, QFE, pressure tendence and historical values.

The used barometric pressure sensor is designed for measurements that require excellent accuracy, fast dynamic response and long-term stability and reliability. All barometers of the series DB-X are operable in temperatures from  $-40^{\circ}$ C to  $+60^{\circ}$ C.

The sensor and the electronic units consume low levels of power while in operation.

- Digital Barometer with aviation features with high reliability and redudance
- with 1, 2 or 3 pressure sensor
- 12x6 cm touch display
- indicating local pressure, QNH, QFE, TRL
- analoque tendency display
- Measuring range: 600...1100 hPa (standard) on special request available: 500...1100 hPa or 800...1100 hPa
- Resolution changeable betw 1 / 0.1 / 0.01 hPa



- Power supply: 12 V DC
- Optional with rechargeable batteries
- Incl. Work Certificate
  - Output options: RS 232 interface analogue outputs 0...10V or 0/4...20mA



- Accuracy: type DB-1 : at 18...28°C: ± 0.2 hPa type DB-2 : at 18...28°C: ± 0.1 hPa type DB-3 : at 18...28°C: ± 0.1 hPa
- Long Term Stability: 0.1 hPa/yr
- Power supply: mains / rechargeable battery
- with internal 17 steps calibration
- Rechargeable battery pack as UPS (standard with 3 accumulators, optional with 6 / 9 / 12 accumulators available for extended mobile use)

#### No. HD3114B Digital Precision Air-Pressure Measuring Instrument (handheld barometric data logger)

- Sensor: Precision piezo-resistive
- Measuring range: 0...1350 hPa ( 500...1200 hPa)
- Resolution: 0.01 hPa
- Accuracy @ 23 °C: ± 0.1 hPa (500...1200 hPa) / ± 0.2 hPa (remaining range)
- Accuracy @ full temperature range: ±0.3 hPa (500...1200 hPa) / ±0.4 hPa (remaining range)
- Long-term stability: 0.25 hPa / year
- Available units of measurement: Pa, hPa, kPa, mbar, bar, atm, mmHg, mmH2O, kgf/cm2, PSI, inHg, inH2O
- Power supply: rechargable
- USB-Connection
- RS232C Connection
- large (43 x 58 mm) color graphic LCD display
- calculation of the following barometric and altimetric derived parameters: barometric tendency (numerical) and trend (decrease, steady, increase), altitude, QNH (atmospheric pressure at mean sea level)
- the instrument can display the internal temperature of the barometric sensor





#### TEMPERATURE

#### Meteorological Thermometers (leaflet 121,0 E)

# Standard Thermometers for measuring air temperature and for use with Psychrometer August type to measure relative humidity

#### Thermometer

with mercury free filling, ø15 mm, length 370 mm

**No. AUG-20+60/0,2** range -20 °C to +60 °C, division in 1/5 °C **No. AUG-30+50/0,2** range -30 °C to +50 °C, division in 1/5 °C **No. AUG-35+40/0,2** range -35 °C to +40 °C, division in 1/5 °C (on special request)

#### Extreme thermometers:

These thermometers are designed for measuring the highest and lowest temperatures over a particular time, generally a day. They are suitable for government testing, according to DIN 58654 and DIN 58653. The Maximum Thermometers have a Hg-filling and the Minimum thermometers have an alcohol filling **Maximum thermometer** 

	Divisions	1/2 °C	1/5 °C
Туре	Length	290 / 300 mm	370 / 360 mm
	Diameter	17 / 18 mm	17 / 18mm
	Range	No.	No.
Maximum	- 30 + 50 °C	42/50	43c/50
Thermometer	20 1 60 °C	12/60	13c/60
	- 20 + 00 C	42/00	430/00

#### **Minimum thermometer**

Art. Nr.	range	division	diameter in mm	lenght in mm
MIN-40+40/0,2	-40+40°C	0.2°C	17 / 18	370 / 360
MIN-30+50/0,2	-30+50°C	0.2°C	17 / 18	370 / 360
MIN-40+40/0,5 (only on special request)	-40+40°C	0.5°C	17 / 18	290 / 300
MIN-30+50/0,5 (only on special request)	-30+50°C	0.5°C	17 / 18	290 / 300



#### T23 UG14 Combined holder (support) for Maximum and Minimum Thermometer



Maximum and Minimum Thermometers with Support T23 UG14

#### T23 UG01 Tripod with rod

for carrying Psychro- and Extreme Thermometers

TH48 UG03 Holder for one maximum- or minimum-thermometer

T23 UG35Thermometer Support consisting of:<br/>- tripod with rod (T23 UG01)<br/>- Combined holder for Maximum and Minimum<br/>Thermometer (T23 UG14)<br/>- Holder for one Thermometer for measuring<br/>air temperature (RM34 T118)<br/>(without thermometers)



#### Grass Thermometer No. 52gk Holder for Maximum or Minimum Thermometer

- for measuring the maximum or minimum air temperature close to the earths surface
- with support rod, combined holder for two thermometer (T23 UG14) and radiation screen
- measuring height adjustable from 2 to 12 cm

0

No. 52g as No. 52gk but with holder for only one thermometer (TH48 UG03)

#### **Soil Thermometer**

- Divisions: 0.2°C
- Range: -25...+60°C
- total length: 345 mm
- diameter 17 resp. 18 mm
- Filling: free of mercury with propylene carbonate = Prop with ACCU-SAFE technology

No.	Depth in cm
ST/0	0
ST/2	2
ST/5	5
ST/10	10
ST/15	15
ST/20	20
ST/30	30







#### Iron Stand for Soil Thermometer

- No.
- 51 for 1 Thermometer
- 51a for 2 Thermometers
- 51b for 3 Thermometers
- **51c** for 5 resp. 6 (on request) Thermometers



#### **Deep-Soil Thermometer**

- in plastic sheath, with protective cap and insertion tube
- filling: Propylene carbonate = Prop
- standard range: -10°C ... +30°C, divisions 0.1°C
- on special request available with alternative ranges:
   e.g. -20 ... +60°C / 0.2°C

No.	depth
61/30k	for 10 / 20 / 30 cm
61/50k	50 cm
61/100k	100 cm
61/200k	200 cm
61/300k	300 cm





#### Spare Thermometer for deep soil thermometer:

- length: 330 mm, diameter: 16 mm, filling: Propylene carbonate = Prop
- No. DS-10+30/0,1 range: -10 ... +30°C, division: 0.1°C
- No. DS-20+60/0,2 range: -20 ... +60°C, division: 0.2°C

#### No. T23 UG37 Six Thermometer

- range : -30°C ..+ 50°C
- division: 1°
- accuracy: ± 1°C •
- aluminium, silver •
- for wall attachment •
- with push button
- mercury-free
- dimensions : 50 x 24 x 220 mm, 104g

#### Thermometer for Psychrometer Assmann Type

for use with Aspiration Psychrometer and for calculation of humidity

#### **Spare Thermometers**

No. AS-35+40/0,2 range: -35 °C to +40 °C, division in 1/5°C range: -10 °C to +60 °C, division in 1/5°C No. AS-10+60/0,2

- length: 280 mm
- diameter: 8 mm
- acc. DIN 58661
- free of mercury with Propylen-Carbonat filling (colour blue)

#### No. 53c - Water Thermometer in nickel holder with scoop (consisting of: No. 53f and 53d)

- Tank and Dipping Precision Thermometers with integrated dipper for sampling and simultaneous temperature measurements
- Range: -5 ... +40 °C (or -10...+50°C on special request) •
- Divisions 1/5 °C
- Length: 30 cm

#### Thermometer inserts (No. 53f) (without protection case)

- suitable for official certification •
- length of thermometer: 350 mm •
- filling free of mercury: Propylene carbonate, ACCU-Safe technology •
- available ranges: No. 53f: - 5 ... + 40 : 0,2°C (standard) No. 53g: -10 ... + 50 : 0,2°C
  - No. 53e: 0 ... + 50 : 0,2°C
- Divisions 0.2°C
- Error Max: ±0,4°C resp. acc. certificate
- Total-length of internal thermometer: 350 mm ± 5 mm
- column: blue
- immersion: total
- Ø upper part: 17 ± 1 mm •
- Ø lower part: 8-9 mm

#### optional available:

with traceable DAkkS-calibration (DIN EN ISO IEC 17025)

@ 2 calibration points (-5°C and +40°C) (additional points on special request possible)

#### Protection case with rotary scale cover (No. 53d)

- completely mounted in slotted brass armour with scoop vessel, double protection subject to a second rotatable metal sheath
- dipper: length 75 mm, 32 mm diameter •
- total length of thermometer with protection case: 385 mm
- top part dimensions: height 300 mm. •
- Ø 20 mm internal tube and Ø 22 mm external tube
- for insert thermometer length: 350 mm (Art. No. 53f) •
- with suspension ring
- standard: nickel plated version optional: brushed and lacquered brass version



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#### No. 79 Thermograph (leaflet 125,0 E)

The Thermograph No. 79 is a precision instrument for continuous recording of temperature to scientific and technical ends, for outdoors and indoors installation, alike. It is used in meteorological and climatological measurement, in aviation, in agricultural and horticultural enterprises, industrial and working premises, recreation rooms, hospitals, drying plants, refrigerating plants, storage rooms, laboratories, test stands, etc.

A measuring element serves a ring-shaped bimetal, which stretches or bends itself with changes in temperature. These changes of shape are transmitted to the arm carrying the pen, by means of a lever system. All bearing beds consist of corrosion-resistant materials. The pen rests on the chart with constant and equal pressure, by the proper weight of the pen arm and may be lifted-off from without.





- with external high quality bimetal-measuring element for measurement and recording of temperature values
- in light grey lacquered and weatherproof metal casing
- deliverable measuring ranges:
   5...+50 °Cor -25...+55 °C or -35 ... +45 °C
   further ranges available on special request
- stainless steel casing, which has been provided with a very resistant grey hammertone finish
- with high precision mechanical clockwork, made from brass, resistant varnished
- time of drum rotation: daily or weekly
- Recording drum: Ø 93.3 mm \* height 93 mm height of recording: 80 mm time of running: app. 9 days
  - Dimensions of casing: 350 x 130 x 205 mm
- Weight: 3.4 kg
- Accessories:
  - 1 spare cartridge pen (alternative: metal pen with ink) 1 set of recording charts (100 pcs for daily rotation or weekly rotation)

#### **Temperature and Humidity Sensor**

consisting of:

#### MP102H-030300 Transmitter with voltage output

- 0...1V = 0...100 %rh
- 0...1V = -40...+60°C
- Supply voltage: 15 ... 24 VDC

#### HC2-S3 Meteorological probe for temperature and humidity

- Range of application: -50..100 °C / 0..100 %rh
- Accuracy: ±0.1°C, at 23 °C ±5°C / ±0.8 %rh
- Digital interface (UART) and scalable analog outputs, 0..1 V
- incl. Polyethylene dust filter and works certificate

#### AC1003 Multi-Plate Radiation Shield

- Easy-to-install protective shield
- Multi-plate system for natural ventilation, number of plates: 14

#### Specification of HC2-S3

- Probe type: Meteorological probe
- Dimensions: ø 15 x 83 mm, weight: 10 g
- Operating range electronics: -50...100 °C / 0...100 %rh
- Accuracy at 23 ±5 °C: ±0.8 %rh / ±0.1 K
- Accuracy w. adjustment profile "standard": at 23 °C / 10, 35, 80 %rh ± 0.8 %rh / ± 0.1 K
- ong term stability: <1 %rh / year
- Humidity sensor: Hygromer IN-1
- Temperature sensor: PT100 1/3 DIN Class B
- Probe protection: Polycarbonate plastic cage, white
- Filter cartridge: Polyethylene dust filter, white, 40 um
- Psychrometric calculations: Dew or frost point
- Data processing via HW4: with interface cables (optional, please see AC3001 connecting cable)
- Type of output signals: 2 x 0...1 VDC
- Max. cable length service cable: 5 m
- Enclosure material: Polycarbonate
- FDA/GAMP compatibility: FDA 21 CFR Part 11 and GAMP compatible

#### optional accessories:

#### AC3001 Connecting Cable

• to connect the HC2 Probe with a computer (necessary to use the HW4 Software)

#### **ER-15 Push-on calibration device**

- Gasket with o-ring and thumb screw
- for 1 probe, brass, nickel-plated
- for porbes with ø 14 ... 15 mm

#### NSP-PCW-PE Spare filter cartridge for HC2-S3

• Polyethylene dust filter









# No. MIN-MAX-G1710 Electronic thermometer for the measurement of minimum and maximum temperature (leaflet 125,0 E)

- as modern alternative for the conventional minimum and maximum thermometers, free of mercury the digital thermometer could be placed in a weather shelter (Stevenson screen)
- the primary focus in the development of this instrument was place on the essential functions of the measurement technology
- pure measurement with a focus on precision, speed and reliability packaged in a compact housing distinguish an impressive price/performance ratio, Made in Germany
- the handheld measuring devices also impress with their ergonomic design, dust and water-protected design in accordance with IP 65/67 and the illuminated display
- Measuring range: -70 ... +250 ° C
- Accuracy: (at nominal temperature = 25 ° C)
   -20 ... +100 ° C: ± 0.1 K ± 1 digit
   -70 ... +250 ° C: ± 0.2% of mv ± 2 digit
- Resolution: 0.1 °C
- **Power supply:** 2 x AA batteries, >5000 h operating time
- Protection rating: IP65/IP67
- Sensor: Immersion sensor Ø 3 mm,
- Pt1000 permanent 2-wire connection, V4A, 1 m cable
- **Response time T 90 :** Ø 3 mm: water 0.4 m / s <2 s;
- **Scope of supply:** Device with integrated sensor, calibration log, 2 x battery, manual
- further details:
- Break-proof ABS housing
- Dimensions: 108 x 54 x 28 mm (H x W x D) without sensor connection
- Weight: 130 g (without sensor)
- 3-line display with background light, battery change indicator, protected by an unbreakable pane
- Operating conditions: -20 ... +60 °C; 0... 95 % RH (non-condensing)



#### HUMIDITY

#### Psychrometers (leaflet 131,0 E)

Psychrometers consist of two equal thermometers, the bulb of one of which, i. e., the so-called "wet thermometer", is covered with a thin piece of muslin that is to be moistened, whilst the bulb of the second, the "dry thermometer", remains without covering. The dry thermometer indicates true temperature, while the wet thermometer, due to coldness of evaporation, indicates the lower a value, the drier the ambient air is. The two readings make possible accurate determination of relative and absolute humidity of the air, vapour pressure, and the dew point, either by calculation or by means of psychrometric tables.

The difference between both temperatures, i.e., the "psychrometric difference", is, additionally, depending upon the speed, with which the air flows past the wet thermometer. Only above 2 m/sec further increase of speed will no longer be noticeable. The relevant equations for compensation and the psychrometric tables in use are based on a speed of ventilation of, at least, 2 m/sec. In the case of psychrometers with artificial ventilation, one is to take care therefore that this speed is guaranteed during measurement.



a: No. 28 plus two like thermometers

b: No. 28 plus two like thermometers and holder T23 UG14 with maximum and minimum thermometer c: No. 28/2 plus two like thermometers

d: No. 28/2 plus two like thermometers and holder T23 UG14 with maximum and minimum thermometer (on the pictures c and d the mechanical aspirator is shown, this type is out of production, and the instrument is equipped with electrical aspirator)

#### to use with a pair of equal thermometers:

with mercury free filling, ø15 mm, length 370 mm

**No. AUG-20+60/0,2** range -20 °C to +60 °C, division in 1/5 °C **No. AUG-30+50/0,2** range -30 °C to +50 °C, division in 1/5 °C **No. AUG-35+40/0,2** range -35 °C to +40 °C, division in 1/5 °C (on special request)

#### No. 28 Psychrometer (as per fig. a)

Tripod complete, without ventilating device (without thermomters) consisting of:

No. T23 UG16	2 thermometer holder
No. T23 UG04,1	1 water vessel
No. T23 T007	1 holder for water vessel
No. T23 UG01	1 tripod with bar
No. 31LD	1 set muslin sleeve and wick
No. T23 T072 (2x)	2 stoppers

#### No. 28/2E Psychrometer, August-Type (as per fig. c)

Tripod complet with electrical ventilating device for both thermometers (without thermomters), consisting of:

T23 UG25E	1 large electrical aspirator, only
T23 UG06	2 thermometer enveloping tubes with cemented-on threaded rings
T23 UG09A	1 holder for large aspirator
T23 UG16	1 holder for thermometer
T23 UG01	1 tripod with bar
31L/8	1 muslin sleeve
T23 UG21	1 set of 3 stoppers
T23 T090	1 moistening glass

Extreme thermometers : Minimum / Maximum Thermometer for use with Psychrometers, please see thermoeters above at "TEMPERATURE" and leaflet 121.0E

Large aspirator with electric drive and rechargeable accumulators

for spare parts please indicate with order.				
Manufacturer	Psychrometer Type	Connection part		
Lambrecht / Thies / Amarell		double adapting connector:		
	Assmann	- thread M22x0,75		
	August	<ul> <li>bayonet connection R22x1</li> </ul>		
Dr. Müller / R. FUESS	Assmann	Art. No. TH47 BG04		
<ul> <li>production before year 2021</li> </ul>		- thread M22x0,5		
<ul> <li>production after year 2021</li> </ul>		- thread M22x0,75		
Dr. Müller / R. FUESS	August	Art. No. T23 UG25E		
	_	<ul> <li>bayonet connection R22x2</li> </ul>		
		with screw		
Ketterer		to clarify at time of order		
Thermoschneider		to clarify at time of order		

#### for spare parts please indicate with order:

The power supply takes place through four pieces 1.2 V build-in rechargeable Ni/Mh accumulators. These can be loaded by a recharger on main connection for 100 - 240 V AC, 50-60 Hz. The electric aspirator for artificial ventilation is easy to assemble at the Psychrometer. It consists of an electric drive, which rotates a small blower, design of which latter guarantees the required speed of air flow past the thermometer bodies.

- Material: Aluminium
- Surface: RAL9006, shiny
- Spring winding time: > 6 minutes
- Air speed: > 2 m/s (5-7 m/s)
- Weight: 0.6 kg
- Dimensions: Ø 9 cm, height 11cm
- incl. EU-Adapter (others available on request)
- protected against deep discharging



#### Aspiration Psychrometer, Assmann Type



32E:	Aspiration Psychrometer, Assmann Type, with wetting device and holder, in transport-box
	incl. 4 new resolution No. 1 H47 DG04,
	Incl. 4 pcs. rechargeable ballenes and main connection for 220 -
	240 V AC, 50-60 HZ
32E/40	range: -30 °C to +40 °C, division in 1/5°C
32E/60	range: -10 °C to +60 °C, division in 1/5°C
	dimensions of case: 47 x 26 x 22 cm

#### Spare Thermometers

AS-35+40/0,2 range: -35 °C to +40 °C, division in 1/5°C AS-10+60/0,2 range: -10 °C to +60 °C, division in 1/5°C

- length: 280 mm
- diameter: 8 mm
- acc. DIN 58661
- free of mercury with Propylen-Carbonat filling (colour blue)





• for the determination of relative humidity, vapour pressure and dew point

#### No. SP10 Whirling Hygrometer ("Sling Psychrometer")

- as per leaflet 131.1E
- range of thermometers at buyer's option: -35 ... +40°C or -10 ... +60°C
- consisting of:
  - 1 "dry" Thermometer in the division 0,2°C
  - 1 "wet" Thermometer in the division 0,2°C
    - Filling: free of mercury with propylene carbonate = Prop
    - ACCU-SAFE technology
    - Acc. DIN58661 made in Germany
    - highest quality
  - 1 stainless steel frame with whirling handle
    - flexible installation for right and left hander
  - 1 moistening device (Art. No. TH47 UG38)
  - 1 meter muslin sleeve
  - 1 psychrometer table (Art. No. 33T)
  - 1 transportation case (Art. No. SP10-CASE)
    - water- & dustproof: IP67
    - dimensions: 350 x 230 x 86 mm
    - material: special thick Polypropylene



#### No. 77h Hair-Hygrograph (leaflet 139,0 E)

Hair-Hygrograph 77h serves for continuous recording of relative atmospheric humidity, the knowledge of which is of importance in meteorology, climatology and hygiene, in the storing of victuals and other goods, and in many industrial branches





- in light grey weatherproof lacquered metal casing
- with outside arranged hair harp
- measuring range: 0...100% relative humidity
- Time of drum rotation: daily or weekly
- Recording drum:
  - Ø 93.3 mm \* height 93 mm height of recording: 80 mm time of running: app. 9 days
- Dimensions of casing: 290 x 135 x 205 mm
- Weight: 3.3 kg
  - Accessories:
    - 1 spare cartridge pen
    - 1 wetting cloth
    - 1 set of 100 recording charts for daily or weekly rotation

#### No. 79t Thermohygrograph (leaflet 142,0 E)

The Thermohygrograph 79t records temperature and relative humidity of the atmosphere on a common chart. These two important climatic factors play a decisive role in the meteorological and climatological investigation, in the storing of raw-materials, victuals and stimulants, in the processing of tobacco, textiles, paper, wood, furthermore in agriculture and horticulture, for the human wellbeing in meeting places, theatres, schools, hospitals, restaurants etc.

	Measuring extent Temperature:55°C Rel. humidity:100%	Measuring extent Temperature:80°C Rel. humidity:100%
Temperature:	-3025°C -2035°C -1045°C <b>055°C</b>	-4535°C -3545°C <b>-2555°C</b> -1565°C -575°C
Rel. humidity:	0100%	0100%

- Time of drum rotation: daily or weekly
- Recording drum:
- Ø 93.3 mm \* height 186 mm height of recording: 2 x 80 mm time of running: app. 9 days
- in light grey weatherproof lacquered metal casing
- with outside arranged measuring elements
- Dimensions of casing: 340 x 130 x 290 mm
- Weight: 4.9 kg
- Accessories:
  - 2 spare cartridge pens
  - 1 wetting cloth
  - 1 set of 100 recording charts for daily or weekly rotation





#### WEATHER-SHELTER (STEVENSON SCREEN)

#### Weather-Shelters made by wood (leaflet 143.1E)

#### No. 170T-P Weather-Shelter - large size - (Stevenson Screen) - complete set consisting of screen, stand and steps

- constructed in accordance with the WMO recommendations
- walls of the screen are double-louvred
- floor is made of staggered boards
- roof of the screen is doublelayered, with provisions for ventilation of the space between the two layers
- stand height is about 185 cm, which allows to make measurements at a height of 200 cm above the ground level
- screen is made of from dried pinewood, that has been protected against the harsh weather conditions, fungi and insects by impregnation, followed by application of layers of white oil (alkyd) paint
- the entire construction is made with high precision to eliminate the problem of getting to the inside of direct sunlight
- metal stand and steps are protected against corrosion by professional, resistant to mechanical damage, acrylic paint, forming a flexible coating
- the steps are non-slip even in wintertime conditions

#### Weather Shelters of the series WS (Segment-Shelter) (leaflet 144.0E)

- segment construction of this series of weather shelters is based on customers' needs for different sizes and applications
- different widths, depths, and heights
- this type of weather shelter offers sufficient space for thermometers and psychrometers, mechanical recording instruments like thermographs, hygrographs, thermo-hygrographs or meteographs as well electrical sensors and data loggers for measurement of different parameters.
- it protects the equipment from damage caused by precipitation like rain, hail and snow
- the core task is the elimination of radiation effects due to direct solar radiation as well as negative influences of wind, which would directly affect the meteorological measuring instruments without the weather shelter
- double lamella structure of all four side walls guarantees good air circulation inside the shelter through all-sided passive ventilation
- outer lamellas made of whiteweather-resistant and UVresistant plastic, which best reflect impacting radiation
- inner lamellas, made of black plastic, which has proven to be the best measuring environment in studies
- overlapping arranged slats, so that air can ventilate the weather shelter, but no direct sun radiation can penetrate.
- slats are surrounded by a stabile powder-coated aluminium profile frame, which is mounted with UV-resistant plastic connectors

-	1	-			
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- the double floor of the weather shelter, like the roof, offers ventilation without direct radiation incidence and is designed in such a way that animals cannot use the shelter as a nesting opportunity
- the upper roof is slanted, so that impacting rainwater can easily run backwards without damaging the sensors.
- the two roofs, as well as the two floors, are made of white, radiation-reflecting UV-resistant PVC panels for small shelters like WS-1 or aluminium resp. stainless steel for middle sized and large sized shelters.



- the economical small sized shelters WS-1 and WS-1-50 are specially created for installation of electronical sensors and centuple used at agricultural weather stations, educational institutions and for ecologies
- this kind of weather shelter is equipped as standard with two toothed galvanized mast clamps, so that the shelter can be easily attached on free-standing poles or the appropriately available mounting rod in telescopic design (WS-1-H1). In general, the attachment is possible by using the attached stainless steel thread rods with the mast clamps on rods up to 60 mm in diameter
- the measurement of temperature and humidity with this equipment is usually carried out at a height of two metres, with installation in such a way that the lower floor of the free-standing weather hut is at a height of two metres
- the middle-sized shelter WS-2/1-50 is used for installation of thermometers and psychrometer August type, they could be fixed on masts or bars
- for the middle and deeper sized shelter WS-2/2-50 which is used for installation of psychrometers or single recording instruments as well as the large weather shelter WS-4/2-50 for installation of recording instruments like thermographs, hygrographs, thermo-hygrographs, freestanding frames are available to install the shelter in the correct observation height
- stairs with three steps and handrail are deliverable

		exterior	dimension	s in cm	interio	r dimens cm	ions in	weight
Art. No.	description	width with / without roof	depth with / without roof	height with / without roof	width	depth	height	in kg
WS-1 (small)	for Installation of electronical sensors	24,5 / 30	27 / 32	24,5 / 31	17	18	20	5.3
							· · · ·	
WS-1-50 (small + hight)	for installation of electronical sensors like thermo-hygro- sensors, datalogger or vertical thermometers	24,5 / 30	27 / 32	55 / 61	17	18	50	7
WS-2/1-50 (middle)	for installation of psychrometers, with maximum and minimum thermometers	46,5 / 49	27 / 32	55 / 61	39	18	50	15
WS-2/2-50 (middle + deep)	for installation of psychrometers, minimum or maximum thermometers, recording instruments like hygrograph or pumps	46,5 / 52	49 / 54	55 / 61	39	40	50	30

			exterior	r dimension	s in cm	interio	r dimens	ions in	weight
Art. No.	description	1	width	depth	height	width	depth	height	in kg
			with /	with /	with /				
			without	without	without				
			roor	roor	root				
++									
WS-4/2-50 (large)	for installation large record instruments thermograph hygrographs thermo-hygr	on of ling like hs, s, rographs	93 / 116	50 / 72	61 / 71	86	41	50	42
WS-1-H1		free-star weather	nding poles shelters	(mounting ro	od) in telesc	opic desi	gn for ins	tallation c	of small
WS-2/2-STA	ND	Frame for made of	or middle we powder-coa	eather shelte ated or galva	er WS-2/2 Inized steel	with cros	s bars		
WS-4/2-STA	ND	Frame fo	or weather s	shelter WS-4	/2	with cros	s hars		
made of powder-coated or galvanized steel with cross bars           WS-STAIRS         freestanding stairs (3 pcs) for use together with the weather shelter, with handrail, it can be taken apart for transport			h						

#### WIND

#### No. 98 wind vane with force indicator, Wild-type (leaflet 211,0 E)

- weatherproof lacquered steel finish
- for determination of wind direction and wind force
- the wind vane turns the force indicator to the protractor direction
- wind direction is determined by the position of the wind vane to the • direction-cross
- the force of the wind or the wind speed is determined by means of . the position of the force indicator to the protactor bearing the marks
- for fastening on wooden mast or steel mast •
- dimensions: 950 x 950 mm, 1370 mm height
- weight: 7 kg

#### No. 91g Counter Anemometer (leaflet 212,4 E)

- for continuous measurement of wind run
- weatherproof finish
- with built-in, inclined, seven digit reel counter
- usable for velocities up to 60 m/s
  - Starting velocity •
  - Measuring range of counter : 0...999999.99 km of wind run
  - Counting unit : 10 m of wind run
  - Height of the figures : 8 mm •
  - Counter incline : 30° .
  - Socket for steel tube mast : R ½″
  - Height
  - Diameter of cup wheel : 220 mm •
  - Weight : 1.3 kg
- No. 91ge Counter Anemometer (for use with evaporation pan "Class A") (leaflet 212,5 E)

: 0.6 m/s

: 250 mm

- for continuous measurement of wind run
- weatherproof finish •
- with built-in, inclined, seven digit reel counter •
- usable for velocities up to 60 m/s •
- it is meant for continuous operation in the open and is used to measure air currents in heights from appr. 1.5 m on downwards
- actual position of the counter may be read directly, through the upwards, i. e., at an angle of 30° inclined window
  - Starting velocity •
  - Measuring range of counter •
  - Counting unit •
- : 10 m of wind run

: 0...999999.99 km of wind run

: 0.6 m/s

- Height of the figures : 8 mm •
- Socket for steel tube mast : R ½″
- Height : 250 mm •
- Diameter of cup wheel : 220 mm : 1.3 kg
- Weight

#### No. 86-2 ANEMO Portable Anemometer

- portable cup anemometer for accurately determining wind strength and speed with handle
- weatherproof design
- Measuring ranges:
  - 0 120 km/h
  - 0 35 m/s
  - 0 70 knots
  - 0 12 Bft
- with pointer stop (pointer remains on the measured value)









#### No. 82a Anemograph "Universal" (leaflet 214,0 E) (on special request only)

 with mechanical and pneumatic transmission for continuous recording of wind direction, wind run and gusts, consisting of:

#### No. 82aG Transmitter

Maximum wind speed

Diameter of flange Diameter of cup wheel

Total height

Weight

• with wind vane pitot tube and cup wheel, in grey lacquered weatherproof design, with flange for fastening on a steel tube mast

Specifications: Starting velocity

: < 0.5 m/s : 60 m/s resp. 0 .... 334 km/h (special version for highest wind forces) : 190 mm : 520 mm : 1180 mm : 19.5 kg

#### No. 82aT Recorder

in grey lacquered metal cabinet with glazed door as well as applied container with float for the recording of the gusts, recording system with 4 recording pens, ink recording on drum.

#### Specifications:

opcomoutions.	
Measuring range:	
wind speed	: 040 m/s
	special ranges on request:
	0 60 m/s resp.
	0 334 km/h for highest wind forces
wind run	: 10 km each as continuous curve traces
wind direction	· NI_E_S_\//

wind direction : N-E-S-W

Recording height: wind speed: 96 mm wind run: 25 mm wind direction: 62 mm Recording drum: Ø187 mm, 228 mm height Drum rotation: 1 day Paperfeed: 22.5 mm/h Running time: 8 days Dimensions of cabinet: 420 mm width x 460 mm height x 250 mm depth Total height: 1010 mm Weight: app. 21.5 kg

#### Accessories:

transmission rods pressure tubes connection elements 1 set of recording charts 1 bottle of recording ink 4 capillary pens 1 spare ink bowl 1 operating and mounting instruction 1 evaluation scale for reading the medium wind velocity in m/s

# No. 82b Anemograph "Universal" with continuous chart recording (leaflet 214,0 E)

as above but with continous chart recorder different ranges possible:

- 0 ... 40 m/s
- 0 ... 60 m/s
- 0 .... 334 km/h for highest wind forces (special range)

#### No. 82m Special Pipe Mast for No. 82A and 82B (leaflet 214,0 E)

consisting of steel pipe with upper fixing flange, ladder support, clamp to take up three bracing wires, two lower clamps for fastening to wall of building and relief, every item with rustproof coating, incl. 40 m of bracing wires and the corresponding cable clamps and thimbles, as well as three zinc-coated turnbuckles. Length: 6 m (for installation on building for total height of 10 meters, see figure 10 of leaflet).







#### No. AEDW20 Wind Measuring System

consisting of:

- AE402-D: analogue digital display for wind direction and wind speed including housing for wall mounting
- W20-1/CL: wind speed sensor with current loop interface
- W20-2/CL: wind direction sensor with current loop interface
- W20-3 crossarm for sensor mounting and mast adapter

This modern electonic equipment can be used for measuring of highest wind speed up to 100 m/s. Using the 4...20 m/A interface the standard range is 0...60 m/s. Without any additional configuration the instrument can be operate up to 100 m/s because of the high quality of the materials and the special construction in connection with the display AE402-D

#### Display AE402-D

The display unit AE402-D will be delivered inclusive housing for wall mounting but can be used for panal mounting too. It shows wind direction by a LED-ring with 36 LED's with a resolution of 10 degrees and wind speed by a large LCD-display with 18 mm high characters. The wind speed can be displayed as instantaneous or 2 min average value. The measuring unit is selectable between m/s and knots.



The **sensors W20-1/CL and W20-2/CL** have been designed to provide accuracy, sensitivity and reliability using modern technology for construction and materials for operation under all climatic conditions for highest wind forces. The wind sensors are supplied with thermostatic controlled heating device for trouble-free operation up to -50°C, if ordering the options W20-1/CL/H and W20-2/CL/H. The sensor contains a standard 4 to 20 mA two wire current loop amplifier for long distance data transfer to a display unit.



#### Wind speed sensor W20-1/CL and W20-1/CL/H

This sensor W20-1/CL is designed for measuring of wind speed with low threshold (0.5 Kn.) up to strongest wind. The rugged 3-cup anemometer is completely made of anodised aluminium, durable and lightweight. A labyrinth prevents dust and water from bearings. A water-proof 7-pin plug provides a safety cable connection. Eight small magnets attached to the axis produce in a fixed dry-reed contact pulses frequency proportional to wind speed, which are transformed to a DC current by a current loop amplifier with a Butterworth filter. In the standard version 4...20 mA corresponding to 0...60 m/s. The maximum wind speed is 100 m/s.

The heating requires a supply voltage of 200...250 V AC.

#### Wind direction sensor W20-2/CL and W20-2/CL/H

The wind direction sensor has been designed for measuring of wind direction at very low threshold (0.5 kn) using a wire-wound potentiometer with very low torque and high linearity (0.3 %). When vane axis turns, the coupled potentiometer changes the output current from 4 to 20 mA corresponding to the vane direction from 0 to 360°. The vane can be removed from the cross arm for maintenance and reinstalled without new orientation, because of assembled pin and key which allow mounting in the original position only.

#### No. AE400 Portable Anemometer

The wind display AE402-D was designed to operate with the combined windsensor AE402 but can be used with the separate wind sensors W400-1 and W400-2 too. Together with its power pack, a transport case and compass it forms the portable wind measuring equipment AE400 with large applicability. All single designed for rough, components are external use. Besides its use as portable reference wind equipment it can be used together with a portable mast as wind measuring station as well as mounted on motor vehicles or on ships or used as a permanent land station.

The display AE402-D is placed in a build-in housing  $135 \times 135$  mm and contains the sensor interfaces, the display-driver, the accumulators and the battery charger. The display can be supplied by any direct voltage between 9 and 15 Volt.





As long as the display is supplied with external voltage, the accumulators will be charged. The display can also be operated with external voltage, without containing accumulators. The operating time after recharging the accumulators is 80 h with normal brightness of the direction LED's, switching the LED's to bright reduces the operating time to 35 h.

The display unit AE402-D shows wind direction by a LED-ring with 36 LED's with a resolution of 10 degrees and wind speed by a large LCD-display with 18 mm high characters. The wind speed can be displayed as instantaneous or 2 min average value. The measuring unit is selectable between m/s and knots.

The wind sensor W400-1 and W400-2 are small, sensors for wind direction and wind speed. It consists of anodised aluminium, polyamide and stainless steel. As wind speed sensor, it uses a tri-cup anemometer and a reed contact output. 4 magnets give 4 impulses per revolution. 1 m/s = 4 Hz.

As direction sensor, it uses a vane together with a ring-potentiometer with 5 k-Ohms. The sensor has a 6m long connection cable with plug; extension cables up to 20 m are available. To fix the sensor on the tripod, it has an 8 mm female thread.

#### Specifications of Wind Speed Sensor W400-1

: Cup wheel anemometer with dry-reed contact and 4 Alpha magnets Sensor type Measuring Range : 0...50 m/s rsp. 0...100 kn Accuracy : 3% of measuring value : 0.3 m/s Threshold point Distance per revolution :1 m Impulses per revolution · 4 Distance per impulse : 0.25 m Frequency / speed : 4 Hz / m/s Cup diameter : 45 mm Cup wheel diameter : 160 mm Connection : 6 m cable (extention availlable on request) with 5 pin circular plug dry - reed - contact between pin 4 and pin 5 : -40°C...+60°C Ambient temperature Ambient humidity : 0...100 % RH Fastening : female thread M8 Body dimensions : 35 mm (D) x 142 mm (H) Weight : 0.5 ka

#### Specifications of Wind Direction Sensor W400-2

Sensor type Range Accuracy Damping ratio: Overswing Potentiometer linearity Potentiometer resistance Potentiometer supply Vane turning radius: Connection	<ul> <li>Wind vane with ring potentiometer</li> <li>1°359°</li> <li>+/- 2°</li> <li>0.3 m/s</li> <li>&lt; 10°</li> <li>0.3 %</li> <li>5 k Ohm</li> <li>50 V / 10 mA max.</li> <li>130 mm</li> <li>6 m cable (extention availlable on request) with 5 pin circular plug</li> </ul>
Ambient temperature Ambient humidity Fastening Body dimensions Weight	pin 1 : poti 3 / pin 2 : poti 2 / pin 3 : poti 1 : -40°C+60°C : 0100 % RH : female thread M8 : 35 mm (D) x 142 mm (H) : 0.5 kg

#### No. 8371UM Ultrasonic Wind Sensor

Extremely precise and maintenance-free measurement of wind velocity and wind direction as well as calculation of acoustic virtual temperature.

#### **Specifications:**

Dimensions: Ø approx. 150 mm, height approx. 170 mm Weight: approx. 1.62 kg

Wind direction Principle: Ultrasonic Measuring range: 0 ...359.9 ° Accuracy: < ± 2 ° RMSE >1.0 m/s

#### Wind speed

Principle: Ultrasonic Measuring range: 0...75 m/s Accuracy:  $\pm 0.2$  m/s or  $\pm 2\%$  RMSE (bigger value)

#### Virtual temperature

Principle: Ultrasonic Measuring range : -50 °C...+70 °C Resolution: 0.1 °C Accuracy: ± 2.0 C (without heater and without sun exposure or wind >4m/s) Measuring rate: 60 partial measurement, 15 full measurements per second



#### Pressure

MEMS (Micro-electromechanical systems) capacitive Range: 300 ... 1200 hPa Accuracy:  $\pm$  1.5 hPa resp.  $\pm$  0.5 hPa in 0 ... +40°C

Ambient temperature: -40..+60 °C (with heating) -20..+60 °C (without heating) Bus operation: up to 32 devices Operating voltage: 24 VDC ± 10% or 24 VDC /1.2VA Electronics: without heating: 12 VDC with heating: 24 VDC, max. 240 VA (140 W + 100 W) Electr. connection: 8 pole plug Housing material: Aluminium, seawater-proof Protection type: IP 66 Ø mounting pole: 50 mm / 2" Factory certificat: yes

#### **Optional accessories**

Surge protection: 8379.USP-V Connection cable, 15m: 8371.UK015 Connection cable, 50m: 8371.UK050

#### No. AMS16-W Wind Monitoring System

It is designed to perform wind measuring on international, domestic and military airports in compliance with WMO standard No. 49 and the ICAO rules. Its main merits are: Big and rugged wind sensors, big and clear arranged display unit, digital data transmission by telephone cable or radio modem.



A typical wind measuring system consists of the following components:

1. 2. 3. 4. 5. 6.	Wind Display Display Connecting Box Outstation with sensor interface Wind speed sensor Wind direction sensor Crossarm for wind sensors	AMS16-D AMS16-CB AST16-2 W20-1 W20-2 W20-3
	optional:	
7.	Needle printer for endless paper with parallel interface	AMS-P80
8.	Mast, 10 m height, for wind sensors with span ropes, lightning protection, ostruction light at the top of the mast, security painted in red and white	W20-4/A
9.	Telephone underground cable for data transmission	AMS16-TC1
10a. 10b.	Pair of Radiomodems for long distance transmission Pair of Yagi-directional antenna for use of radiomodems	AMS16-RM2 YAA2-2C
11.	Windsensor-Heating	W20-1/H and W20-2/H

#### Special Version: No. AMS16-WP Airport Wind and Pressure Monitoring System

Has the ability to show additional values for QNH (air pressure on sea level) QFE (air pressure on runway level) and TRL (transition level), if a pressure sensor is installed in the outstation. For airport application equipped with triple pressure sensor S278-T.

#### Wind Display AMS16-D

The airport wind display AMS16-D, distinguished by its compact design and clear display, based on a PC compatible embedded processor board (PC/104) and a 10 inch TFT colour display with 640 x 480 pixels, CFL background illuminated. The display shows wind values according to the ICAO rules and WMO standard



- bar graph for Instant. values 0...35 m/s or 0...70 kt or 0...140 km/h
- Wind direction: arrow on compass rose 1...360°<br/>digital 2 or 10 minute average respectively variation
- Airport warning: trouble of speed sensor<br/>trouble of direction sensor<br/>10 min average value of wind speed > 20 knots<br/>gust > 30 knotsSpeci alarm: variation of wind direction more then 60° during the last 10 min<br/>10 minute average of wind speed changes more then 10 knots<br/>gust increases more then 10 knots
  - ŬRB <> ASD

Dimension : 280mm x 225mm x 100mm (WxHxL)

The warning-, alarm- and error-message will remain on the display till it will be set back by the menu point "conformation". The display AMS16-D receives its data by RS232. The wind values can be plotted as diagram on a printer by a parallel printer port with different paper speeds.

#### MASTS

#### Aluminum telescopic masts, tiltable

The masts described below impress with a high degree of flexibility in the possibilities of construction and fastening, the cost-effective logistical property as well as in financial aspects. They offer solutions for various applications in which sensors, antennas or flags are to be installed at a height of up to 10 meters. Extensions are also available on request, so that the masts can also be used for applications up to 14 meters.

The telescopic design makes it possible to transport masts easily to the site without having to use a forwarding agent or a transporter. The maximum packing size is 1.2 meters, which significantly minimizes the costs of transport and packaging and also makes shipments abroad possible at good prices.

The setup can be easily carried out by two people without special erecting aids or a lift. Due to the tilting principle, the attached wind sensor or alternatively other sensors, antennas or flags can be installed quickly and easily. This function creates a special ease of maintenance, as the tilting function of the mast makes lifting platforms completely unnecessary.



Telescopic construction principle using clamping clamps

The mast is made of weather-resistant durable aluminium, with essential connecting components such as clamps and fittings made of stainless steel. Depending on the construction base, the mast can be fixed on a floor nail in the ground or can be dimped on to concrete surfaces with a U-mast foot. The tilting function is given in both variants. The mast can be used free-standing with a double 3-sided clamping or can be attached to a building or an existing wall with wall brackets.

Depending on the design, the mast can carry weights from 1 to 3.5 kg without any problems. On request, versions with a higher load capacity are also possible.

- Standard height: infinitely up to 10 meters,
  - shorter versions available (e.g. for 4 or 6 meters)
  - Mast extensions possible (e.g. up to 14 meters)
  - Load capacity depending on the design
    - o **1 kg**

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- o 3.5 kg
- Mast segment diameter at 10 meter mast
  - o with 1 kg load capacity: (10 segments) 70 / 65 / 60 / 55 / 50 / 45 / 40 / 35 / 30 / 25 mm
  - with 3.5 kg load capacity: (11 segments) 70 / 65 / 60 / 55 / 50 / 55 / 50 / 55 / 50 / 55 / 50 mm
- Material thickness of the segments: 2 mm
- Material: aluminium segments, stainless steel connectors, plastic strains
- Installation variants:
  - o free-standing solution with clamping ropes
  - building-bound solution with wall brackets
- Fixing variants:
  - Ground nail for fixing in the ground
  - U-mast foot for dosing on stone and concrete
- Function: tiltable given in all versions
- Pack size: 120 x 25 x 30 cm<sup>3</sup>

Load capacity: 3,5 kg	<u>Art. Nr.</u>
free-standing mast with clamping ropes 10 m	M-A-10-L
building-bound mast 10 m	M-C-10-L
free-standing mast with clamping ropes 6-7 m building-bound mast 6-7 m	M-C-6/7-L M-A-6/7-L
free-standing mast with clamping ropes 4-5 m	M-C-4/5-L
building-bound mast 4-5 m	M-C-4/5-L
Load capacity: 1 kg	
free-standing mast with clamping ropes 10m	M-A-10
building-bound mast 10m – lateral assembly	M-C-10
building-bound mast 10m – frontal assembly free-standing mast with clamping ropes 6m	M-Cf-10 M-A-6

The construction of a mast depends on the local conditions. Various design alternatives are available so that an optimal solution can be chosen in line with local conditions. Optionally, both installation variants are available in the version for load-bearing weights up to 1 kg or 3.5 kg.

#### " Free-standing solution with clamping ropes"

A 10 meter telescopic mast with double clamping is used. It is anchored to the ground with a floor nail or fastened to concrete with a u-foot and screws. The mast is tiltable and the clamping is fixed in the ground with the help of three earth nails within a radius of 3 to 3.5 m.



#### "Building-bound solution"

This mast uses a 10 meter telescopic mast without clamping. It is anchored to the ground with a floor nail or fastened to concrete with a u-foot and screws. The mast is tiltable and attached to an adjacent building by connecting clamp with a telescopic crossbar or directly with a wall bracket. The wall bracket with a set of dowels and screws (usable for stone and wood) is already attached. It should be noted that with a completely extended 10 meter mast, the mast bracket must be mounted at a minimum height of 6 m. If the prerequisite is technically not technically possible locally at a sufficient height, the mast tip may swing. In this case, we recommend the use of an additional two- or three-sided clamping of the mast tip with attachment to the building or floor. (optionally available).



# Additional free standing mast systems are available on special request, but not part of this catalogue

#### No. W20-4 and W20-4/A Alumium Mast

That strong and rugged mast is placed on a swiveling bearing in the mast base which has to be rooted in a concrete foundation. The standard high is 10 m with 3 stainless steel span ropes. An instrument carrier at the top for 2 wind sensors is standard. Other instrument carriers are optional. To service the wind sensors the mast can be equipped with a counterweight (option /CW) for easy bending down or with climbing steps (option /CS). The whole mast is made from aluminum and the screws are made from stainless steel. The mast base has to be placed into a concrete foundation  $(1m \times 1m \times 0.5m)$  at a depth of 0.5 m.

Preconfigured version: W20-4/A:

Mast 10 m height for wind sensors with span ropes, lightning protection, obstruction light at the top of the mast, security painted in red and white and counterweight for easy handling of bending down

Free configurable options of the aluminum mast: W20-4/.../...

LP	: lightning protection
CW	: counterweight for easy handling of bending down
CS	: climbing steps for entering the mast
RW	: security painted in red and white
OL	obstruction light at the top of mast

Specifications of mast W20-4:

Height Diameter of the tube Cross bar at the top Rigging Weight Material Required foundations Optional attachments	<ul> <li>10 m (* 6.6 m)</li> <li>120 mm (* 100 mm)</li> <li>for wind sensors W20, length 1.30 m</li> <li>by 3 span ropes from stainless steel</li> <li>approx. 40 kg (*33kg)</li> <li>aluminum</li> <li>concrete socket for mast and concrete groundings for span ropes</li> <li>cross arms for further sensors</li> </ul>
Optional attachments	: cross arms for further sensors

\*for optional version with 6.60 m height

#### No. CRM-10 Fiber Glass Mast

#### **Specifications:** Height: up to 10.5 m

Material: lightweight fibre glass tubes

- easy transport
- resistant to lightning strikes
- highly resistant to corrosion
- suited to marine or coastal environments



Guy: at two levels for stability in higher winds Maximum head load: 7 kg Wind Resistance:140 km/h Number of sections: 9 Diameter of tubes: 47 mm Colour : green or available in red/white Weight: 17.4 kg Packing dimensions: 150 cm x 20 cm x 20cm



#### PRECIPITATION

#### Precipitation gauges (leaflet 221,0 E)

#### No. 69d Rain Gauge, Hellmann Type (leaflet 69d-)

- consists of a double layer cylindrical upper part, serving as receiver, whose aperture forms the receiving area as well as a lower part with the collecting can
- the rain which falls through the aperture is led into the inner collecting can via a funnel
- a special construction of the funnel mounting, optimised by the company Dr. Müller Meteorologische Instrumente KG avoid the stop of waterdrops on the inner sides of the upper part. To avoid an extreme evaporation of the collected rain water in the collecting can, the latter is set up free all round, so that a direct heat conduction from the radiated casing to the collecting can is prevented by the surrounding air
- made of stainless steel 316 L 1.4404 and 316 1.4401
- receiving area of 200 cm<sup>2</sup>
- according to the requirements of the German meteorological service and WMO standard
- consisting of:
  - 1 upper part with bevelled ring
    - Ø = 17.8 cm; h = 29.5 cm; Ø of receiving ring = 15.9 cm
  - 1 lower part
    - Ø = 17.6 cm; h = 19.0 cm
  - 1 collecting can
    - Ø = 11.8 cm; h = 16.0 cm,
    - capacity 1.4 litres corresponding to 70 mm rainfall
  - 1 support
  - 1 measuring cylinder for raingauge with 200 cm<sup>2</sup> receiving area
    - corresponding 10 mm of rainfall
    - divisioned in 0.1 mm rainfall
    - according DIN 58667B
    - made from Polystyrol
- complete dimensions:  $\emptyset = 17.8$  cm; h = 44.7 cm

#### No. 69 Rain and Snow Gauge, Hellmann Type

- as above, but consisting of:
  - 2 upper and lower parts
  - 2 collecting vessels
  - 2 snow crosses
  - 1 protective cover
  - 1 holder
  - 1 measuring cylinder







#### No. 95 Rain Recorder, Hellmann Type (leaflet 221,0 E)

- whilst simple rain gauges and rain recorders, solely, indicate the total quantity of precipitation during the period of observation, the structure of rainfall is to be seen additionally from the diagram of a rain recorder; i. e., the timely division, intensity, etc.
- consisting of galvanied grey hammertone finished stainless steel casing
- with receiving ring and built-in float measuring system with siphoning device
- recording system with drum recording



- Receiving area: 200 cm<sup>2</sup>
- Measuring range: 0...10 mm of rainfall
- Drum rotation at your choice: daily or weekly
- Recording drum: Ø133 mm Height: 93 mm Recording height: 78 mm Running time: app. 9 days
- Dimensions of casing: body: 240 mm diameter total diameter: 370 mm height: 1000 mm
- Weight: 11.0 kg (without packing)
- Accessories:
  - 1 set of recording charts
    - (100 charts for daily or weekly rotation)
  - 1 spare-cartridge-pen
  - 1 collecting vessel (capacity 3 litres)
  - 1 spare glass siphon
  - 1 protective cover
  - 1 measuring cylinder RM25 T171
  - (for 10 mm rainfall, divisioned in 0.1 mm of rainfall, according DIN 58667B, made from Polystyrol)

#### No. 95c Rain Recorder with Continuous Chart Recording (leaflet 221,0 E)

- utilization of this rain recorder is to be recommended when it is necessary to, quantitatively, cover precipitation over a longer period of time or to record, most accurately, the timely course.
- consisting of:
  - lacquered grey hammertone finished stainless steel casing with receiving ring,
  - built-in float measuring system
  - with siphoning device
  - continous chart recorder with running period: 32 days (1 month)
- Diagram no.: 95/20N
- Receiving area: 200 cm<sup>2</sup>
- Graduation: 0.1 mm of rainfall
- Measuring range: 0...10 mm of rainfall
- Incl. accessories:
  - 10 rolls of diagram paper
  - 1 spare fiber-pen or alternative metal pen with recording ink
  - 1 measuring class
  - 1 collecting vessel
  - 1 spare glass siphon
  - 1 measuring glass
    - capacity 200 cm<sup>3</sup>
    - corresponding to 10 mm of rainfall,
    - divided in 0.1 mm
- The instruments are manufactured in Germany and are produced according DIN specifications and WMO standards according the "Guide to Meteorological Instruments and Methods of Observation -WMO No. 8.



#### No. 95y Large Rain Recorder Hellmann Type for heavy rain areas (leaflet 221,0 E)

- this instrument differs from model 95 in the essential by twice as large values of drum diameter, float vessel section, and effective recording height. By these measures, resolution of heavy rains is better by the factor 8, whilst recording is effected about four times enlarged. 40 mm of rainfall correspond to 156 mm of recording. In the case of daily rotation, intensities up to 20 mm/min are resolved
- consisting of:
  - lacquered grey hammertone finished stainless steel casing with receiving ring,
  - built-in float measuring system
  - with siphoning device
- recording system with drum recording acc. to DIN 58658
   recording drum Ø 264 mm
- Receiving area: 200 cm<sup>2</sup>
- Recording period: 1 day or 1 week (please indicate with order)
- Graduation: 0.1 mm of rainfall
- Measuring range: 0...40 mm of rainfall
- Incl. accessories:
  - 1 set of charts
  - 1 spare fiber-pen or alternative metal pen with recording ink
  - 1 measuring class
  - 1 collecting vessel
  - 1 spare glass siphon
  - 1 measuring glass
    - capacity 200 cm<sup>3</sup>
    - corresponding to 10 mm of rainfall,
    - divided in 0.1 mm
- The instruments are manufactured in Germany and are produced according DIN specifications and WMO standards according the "Guide to Meteorological Instruments and Methods of Observation -WMO No. 8.



#### No. RE2 Precipitation Pulse Transmitter (leaflet 22110 E)



The precipitation pulse transmitter is a sensor to measure rain and equipped with a heating devise (option RE2/H) snow and hail as well. Catchment area of 200 qcm and measurement resolution of 0.1 mm meets the recommendations of the WMO.

The RE2 has a dry reed contact, which can be connected to any counter or data logger. It is also available with a build in battery powered data logger for independent measurement on any location (option TGRP-1200).

The RE2 has a water tight 5 pin connector to read out the data from the data logger via its RS 232 interface (pin 3 RX, pin 4 COM, pin 5 TX). Furthermore, the dry reed contact is connected to it (pin 1 and pin 2).

Sensor type: Tipping bucketPower suppCatchment area: 200 cm²Ambient tenMeasuring range 0...180 mm/hheatedResolution: 0.1 mmDimension:Accuracy:Weight: 3.21% up to 25 mm/hheated (I3% above 25 mm/hMaterial: statedSignal outputdelrinaBasic version: dry reed contactOption TGRP-1200: data logger with RS 232 interface

Power supply(RE2/H): 24 V / 2.5 A Ambient temperature: 4... + 50 °C heated (RE2/H): -20...+50 °C Dimension: 440 x 185 mm (HxD) Weight: 3.2 kg heated (RE2/H): 3.6 kg Material: stainless steel, alumnium, delrina



#### Data Logger Type Tinytag TGRP-1200

The data logger Tinytag TGRP-1200 together with the Precipitation Pulse Transmitter RE2 serves as a rain recorder with long recording intervals. The data logger is supplied by a 3.6 V Lithium battery which serves up to 5 years. Its serial Interface is within easy reach by a connector at the bottom of the Precipitation Pulse Transmitter RE2 without opening the housing. Its wide temperature range from - 40°C up to +85°C makes it usable for quite all over the world. The Tinytag Explorer Software (working under Windows) helps you to start or stop the logger and to download the data from it. It shows you the data as a diagram. On the other hand, the files including the data can be imported by EXCEL.

Specifications

Input		Data Storage	
Range	: 0255 counts / interval	Memory Size	: 16k (Non – volatile)
'Divide by' counter	: 1255	No. of Readings	: 16000 (approx)
Input	: Digital, or volt-free	Resolution	: 8 bit
	switch contact	Delayed Start	: Relative / Actual up to 45 days
Max. Error	: +/- divisor / 2	Stop options	: When Full After n Readings
<u>Digital</u>		Logging Interval	· 1 sec to 10 days
Low level	: -0.5V+1V	Offload	: While stopped or when logging
High level	: 2.5V10V	Omodu	in minute multiples
Min pulse width	: 150 µs (at 5V)	Alarms	· Two fully Programmable
Min pulse	: 150 µs (at 5V)	Functional Range	· -40°C +85°C
separation	: High – Low transition	Battery Life	up to 5 years
Edge			
Contact	: Normally Open (with	Accessory's	
Туре	Minimal debounce)	For data transfer	: Interface cable IGPR-C
	: 150 µs	For power supply	: Lithium battery 3.6V Size 1/2 AA
Min closed time	: 0.5 ms		
Min open time	: Open to closed		
Edge detection			

#### No. 64b Surface-Wetness Recorder, Woelfle Type (leaflet 224,0 E) - only on special request

- for recording of chronological progress of the wetting of vegetation cultures by rain, dew or wetting fog
- with hempen strings, serving as receiving elements
- in weatherproof, rainproof design for outdoor installation
- with drum recording





- Graduation of diagram: 0...50 relative
- Drum rotation: daily or weekly
- Recording drum:
   Ø 93.3 mm
   Height 93 mm
   Recording height: 50 mm
   Running time: app. 9 days
- Dimension: 495 mm x 140 mm x 170 mm
- Weight: 2.8 kg
- Accessories:
  - 1 spare cartridge-pen
  - 1 pair of spare hempen strings
  - 1 set of recording charts
    - (100 charts for daily or weekly rotation)

#### No. 64a Dew Recorder, Kessler Type (leaflet 225,0 E) - only on special request

- grey lacquered, hammertone finished metal casing
- with plastic plate serving as receiving element
- balance measuring system with adjustable oil damping



- Measuring range: 0...6 g (divided in 0.1 g)
- Drum rotation: daily or weekly
  - Recording drum: Ø 93.3 mm Height 93 mm Recording height: 80 mm Running time: app. 9 days
- Dimension: 285 mm x 130 mm x 190 mm
- Weight: 3.4 kg
- Accessories:
  - 1 work test certificate
  - 1 spare cartridge-pen
  - 1 set of recording charts (100 charts for daily or weekly rotation)

#### No. 64a3 Dew Recorder, Kessler Type

- as above, but Measuring range: 0...3 g
- divided in 0.05 g



#### No. SHM 30 Snow Depht Sensor

The snow depth sensor SHM30 reliably determines snow depths up to 10 meter within seconds and with millimeter precision. Based on an opto-electronic distance sensor emitting visible eve-safe laser light, the sensors allow probing distances up to 10 meter to detect the surface level. Unlike snow depth sensors using ultrasonic methods, the laser distance measuring technique is independent of temperature changes.



Measuring accuracy Time to measure Measuring interva Laser classification Data interfaces Client software

**Operating parameters** Temperature range Relative humidity Heating activity

Range for snow depth : 0.0 m ... 10 m : 5 mm (snow), 1 mm (natural surfaces) : < 10 s I: 1 s ... 600 s (programmable) : Laser Class 2 (IEC825-1/EN 60825 : RS232, analog output : any terminal program

> : -40 °C ... +50 °C :0% ... 100%

: < 0 °C (programmable)

#### **EVAPORATION**

#### No. 72c Evaporimeter, Piche Type (leaflet 231,0 E)

- glass measuring tube with etched graduation, hanger, porous paper disc, serving as measuring element and disc support
- measuring range: 0...25 mm evaporation height •
- graduation of measuring tube: 0...30 ml •
- dimensions of measuring tube: Ø14 mm x 310 mm length
- accessories: 1 set of porous paper discs Ø30 mm (100 pcs.)

#### No. RM34 T118 Support

- consisting of hook-screw and support
- No. T23 UG01 Tripod with bar

#### No. 73p Evaporigraph, Piche Type (leaflet 231,0 E)

- grey lacquered hammertone finished, rain proof metal casing for installation in the open air
- with porous cardboard disc, hose connection to the vessel of the float, float with recording device for the recording of the height of evaporation.
- Option: Extension of the measuring range by connection of a second vessel



4 measuring ranges:

height of evaporation / diameter of disc

without additional vessel: 15 mm / ø 50 mm 37,5 mm / ø 26 mm

with additional vessel: 75 mm / ø 50 mm 187,5 mm / ø 26 mm

- Division of chart: 0.2...2.5 mm height of evaporation according to the measuring range
- Drum rotation: daily or weekly
- Recording drum: ø 93,3 mm
  - Height 93 mm Recording height: 75 mm Running time: app. 9 days

- Dimensions: 360 x 160 x 200 mm
- Weight: 6.2 kg
- Accessories:
  - 1 set (100 pcs.) porous cardboard discs (30 or 50 mm diameter)
  - 1 spare-cartridge-pen
  - 1 set of recording charts
    - (100 charts for daily or weekly rotation)



#### No. 73EP - Evaporation Pan "Class A" (leaflet 232,0 E)

- the evaporation pan is made of stainless steel and will be filled with water for exposition to the open air
- when water evaporates the level falls
- the differences of the level are measured by using the suspension measuring rod suspended in the smoothing pipe (No. 73 EB)
  - Diameter: 1206,5 mm = 47.5 "
  - Height: 254 mm = 10 "
  - Material: stainless steel
  - Weight: 32 kg

## No. 73EB - Smoothing Pipe with suspension measuring rod (stilling well with hook gauge) (leaflet 232,0 E)

- instrument to determine the water level in the evaporation pan
- by using the suspension measuring rod (hook gauge) suspended in the smoothing pipe (stilling well) the variation of water level can be measured very accurately by using the micrometer scale on the measuing rod



- Measuring range : 0 ... 100 mm
  - Graduation : 0.02 mm
  - Height of level : 177.8 mm = 7 "
- Material

of hook gauge: stainless steel and German Silver of stilling well: anodised aluminium

- Dimensions
  - of stilling well : Ø 90 x 200 mm
  - Weight : 1.7 kg

#### No. FT2 Floating Maximum-Minimum Thermometer (leaflets 122,0E and 232,0 E)

- Six's type thermometer mounted on an inclined non-magnetic frame
- supported in water by two aluminium floats which allow the thermometer to rest just below the water surface
- used to measure the maximum and minimum temperature reached in water in an evaporation tank since the previos reading was made
- thermometer bulbs are protected by an anti-radiation shield
- each thermometer is graduated in 1°C readable with an resolution of 0.5°C
- the maximum and minimum temperatures are registrated by metal indices which are reset by a magnet after the temperatures have been read

٠	Range	: - 40 to + 50 °C
•	Divided to	· 1 °C

- Divided to : 1 °C
- Accuracy of reading : 0.5 °C
- Scale length : 108 mm
- Dimensions : 140 x 280 x 55 mm
- Weight : 0.26 kg





#### RADIATION

#### No. 96c Sunshine Recorder, Campbell-Stokes Type (leaflet 232,0 E)

- Sunshine recorders automatically registering time and duration of insolation are used at meteorological and climatological research centres, observatiories, spas and health resorts, in agriculture, horticulture, viticulture and vegetable gardening
- the type of instrument to be chosen depends on the latitude of the place installation
- for installation in northern or southern equatorial zones
- grey lacquered hammertone finished design
- with polished glass sphere, box level and levelling plate



- Installation range : 5°S to 45°N or 5°N to 45°S
- Period of recording : 14 hours
- Weight : 5.2 kg
- Dimensions\* : 205 mm x 185 mm x 290 mm \*depending from operation position including base plate
- Accessories
   1 year's supply = 400 cards (100 pcs. for spring and autumn, 150 pcs. for summer, 150 pcs. for winter)

#### No. 96d Sunshine Recorder, Campbell-Stokes Type (leaflet 232,0 E)

• as above, but for installation in northern or southern latitudes between 25 and 65°

No. 96H Heating device for glass shere of No. 96c and No. 96d

#### No. SO19 T039 Spare glass sphere

#### No. 58dc Bimetallic Actinograph, Robitzsch-Fuess Type (leaflet 251,2 E)

- grey lacquered hammertone finished design
- weatherproof casing made of light metal cast
- with glass hemisphere
- built-in bimetallic measuring system with recording device for the recording of the radiation intensity as a sum of the sun- and skyradiatio
- with vibrator and box level
- refind model with enlarged recording width measures the global radiation with the highest accuracy because of separated room for clockwork and registration mecanism



Measuring range: 0...2 cal/cm<sup>2</sup>min

Divisions of chart: 0.05 cal/cm<sup>2</sup>min

Drum rotation: daily or weekly

Recording drum: Ø 93.3 mm height: 93 mm height of recording: 65 mm time of running: app. 9 days writing width: 65 mm

Dimensions: 180 x 200 x 400 mm Weight: 6.2 kg

Accessories:

- 1 spare cartridge pen
- 1 set of recording charts
- (100 charts for daily or weekly rotation)
- 1 bottle of silica gel
- 1 small transformer 220/8 VAC





#### No. 58c Robitzsch Type Radiation Recorder - Actinograph (leaflet 251,0 E)

- measures the total of direct solar and diffuse celestial radiation reduced to a horizontal plane
- measuring accuracy of about ± 5 % is sufficient for all fields of application
- measuring system consisting of three symmetrically arranged bimetallic strips, a black one in the middle between two whitened strips
- due to differential absorbtion a temperature difference is created between the strips which serves as a measure of radiation intensity
- the position of the recording pen depends only on the temperature difference of the strips and is not influenced by the actual temperature level

The sensitivity range comprises the entire spectrum of solar an celestrial radiation; only the longwave range > 2  $\mu$  is not included, this, however, contributes only very little to the total energy. The total radiation during measuring time in cal<sup>-2</sup> is obtained by integrating the radiation curve. The radiation recorder in its present form has been considerably improved as compared with former models. These improvements are:

a) Greater measuring accuracy and independence of disturbing effects by the elimination of scattered radiation

(Protective cap after Götz and Casparis).

- b) Direct recording of radiation intensity in cal cm<sup>-2</sup> min<sup>-1</sup>.
- c) Device for conveniently applying time marks.
- d) Set-to-zero without affecting the adjustment of the instrument.
- e) Reduction of bearing friction by build in virbator.

Measuring range: 0 ... 2.0 cal/cm<sup>2</sup>/min Diagram divisioned in: 0.1 cal/cm<sup>2</sup>/min

#### Recording-drum:

Ø 93,3 mm, 93 mm height writing width: 50 mm time of running: app. 9 days time of drum rotation: 1 day / 1 week, (according to choice)

Accessories:

- 1 set of recording charts
- 1 spare fibre-pen
- 1 bottle of silica gel
- 1 set of recording charts(100 charts for daily or weekly rotation)

### No. 58a Radiation-Intensity Meter, Robitzsch type (leaflet 121,0 E) – some last units only on special request!

- consisting of a black and a white bulb thermometer
  - with calibration sheet
- range: -5 ... +100 °C
- division: 1/2°C
- weight: 0.6 kg

#### No. 58b

Stand with bracket for No. 58a



#### **RECORDING DRUMS**

#### Recording drums with clockwork (leaflet 700,0 E) deliverable for recording instruments of Dr. Müller / R.FUESS, as well as original spare instruments of manufacturers Lambrecht, Thies and Ketterer

- drum rotation: 1 day or 1 week
- changeable by exchange gears (option)
- clock drive: spring wounded
- high quality mechanical spring driven movement
- in coloured brass drum
- running time of each spring driven movement more than 8 days





#### Overview about recording drums with clockwork

Art. No.	drum rotation	dimensions of the recording drum in mm	standard gear ratio	used for instruments of Dr. Müller / R.FUESS with article No.	with special adaption of gears used for Lambrecht meteo instruments with article No.	with special adaption of gears used for Adolf Thies GmbH & Co. KG instruments with article No.	with special adaption of gears used for Franz Ketterer Feinmechanik instruments with article No.
306D	daily	Ø133 x 93	56/58	95	1507	5.4011.xx.000	5.002/1/2
306W	weekly	Ø133 x 93	14/96	95	1507	5.4010.xx.000	5.002/1/2
307D	daily	Ø264 x 178	14/96	95y	-	-	-
307W	weekly	Ø264 x 178	56/58	95y	-	-	-
309D	daily	Ø93,3 x 93	48/49	58dc	-	-	-
309W	weekly	Ø93,3 x 93	14/96	58dc	-	-	-
901D	daily	Ø93,3 x 93	48/49	58c, 64a, 64b, 73c, 77h, 78a, 79	250 251 290	1.0610.xx.xxx 2.0600.10.xxx 3.0800.10.xxx	1.008/1-2 2.013/1 3.014 7.007
901W	weekly	Ø93,3 x 93	14/96	58c, 64a, 64b, 73c, 77h, 78a, 79	250 251 290	1.0610.xx.xxx 2.0600.10.xxx 3.0800.10.xxx	1.008/1-2 2.013/1 3.014 7.007
		~					
902D	daily	Ø133 x 174	56/58	78b, 78bm	292	-	-
90200	weekly	Ø133 x 174	14/96	78b, 78bm	292	-	-
		<i></i>					
903D	daily	Ø133 x 265	56/58	78m	-	-	-
903W	weekly	Ø133 x 265	14/96	78m	-	-	-
904D	daily	Ø93,3 x 186	48/49	79t	252	1.0660.xx.xxx 3.0810.20.000	3.015/1-5
904W	weekly	Ø93,3 x 186	14/96	79t	252	1.0660.xx.xxx 3.0810.20.000	3.015/1-5
910D	daily	Ø187 x 228	48/49	82a	-		

• for recording instruments of companies Lambrecht / Thies / Ketterer etc. special gears, distance washers and axis will be adapted.