

Reference Measuring Instruments



High-precision measuring

The new reference measuring instruments ensure very high levels of resolution, precision, and linearity. They are thus ideally suitable as reference instruments in calibration laboratories and quality assurance procedures. They measure with an accuracy up to 0.001 % of the measured

value. These devices are offered in a set including sensor. They come in a compact design (with an optional variant with protective class IP54), an illuminated graphics display, and easy and convenient operation by soft-keys and the cursor block. There are two output sockets

which can be used for connection to a PC or for networking. There is also a plug-on measured value memory available as an option. Delivery includes evaluation software, data cable, temperature sensor, DKD calibration certificate, mains unit, and measuring instrument case.

Reference Measuring Instruments

ALMEMO® 1030-2



Reference measuring instrument for temperature.
High-precision measuring with Pt100 sensors
Resolution 0.001 K

- Temperature measurement with very high resolution, precision, and linearity, using Pt100 sensors
- Suitable as reference device in calibration laboratories and quality assurance procedures
- Very high accuracy thanks to multi-point adjustment of the Pt100 temperature sensor
- 2 electrically isolated measuring inputs for Pt100 sensors
- Resolution can be set to 0.001 or 0.01 K.
- Units °C, °F, K
- High-resolution A/D converter, delta-sigma, 24-bit, 1.25 mops (measuring operations per second)
- Two output sockets for digital interface, ALMEMO® memory connector
- Compact, modern, ergonomic design
- Graphics display, illuminated with white light
- Easy and convenient to operate by means of 4 soft-keys and cursor block
- Measured value display 2 measured values and differential
- Measuring functions: Zero-setting, smoothing, maximum / minimum values, individual value memory for 100 values
- Data logger with ALMEMO® memory connector (accessory)
- Sensor programming: Smoothing, designation, units, resolution
- Device configuration: Illumination, contrast, device address, baud rate
- Choice of language: German, English, French

Technical data

Measuring inputs	2 ALMEMO® input sockets for Pt100 sensors	Power supply	
Electrical isolation	Semiconductor relay (50 V)	Battery set	3 AA alkaline batteries
A/D converter	Delta-sigma, 24-bit, 1.25 mops	Mains adapter	ZA1312NA7 230 VAC to 12 VDC, 1 A, electrically isolated
Measuring range	Pt100, -200 to +400 °C	Current consumption (without input and output modules)	approx. 20 mA
Resolution	0.001 K or 0.01 K	With illumination	approx. 40 mA
Measuring current	1 mA	Housing	127 x 83 x 42 mm (LxWxH) ABS (maximum 70 °C) 290 g
Accuracy	±0.010 K ±1 digit in range -50 to +400 °C	Pt100 temperature sensor FPA923L0250	
Nominal conditions	23 °C ±2 K, 1013 mbar, battery mode	Measuring element	Pt100 as per DIN EN 60751
Temperature drift	typical 2 ppm / K	Class	1/10 B (DIN EN 60751) at 0 °C
Outputs	2 ALMEMO® sockets for interface cable and ALMEMO® memory connector	Measuring tip	Operative range -50 to +400 °C
Standard equipment		Response time T ₉₀	5 seconds
Display	Graphics display, 128 x 64 pixels, 8 rows	Nominal length	250 mm
Illumination	2 white LEDs	Shaft	Stainless steel, diameter 3 mm
Keypad	7 silicone keys (of which 4 soft-keys)	Connecting cable	2 meters, FEP / silicone
Date and time-of-day	Real-time clock, buffered by device battery	ALMEMO® plug	Resolution 0.001 K
Individual value memory, internal	100 measured values	Other sensor designs are available on request.	

Accessories	Order no.	Order no.
Ethernet data cable	ZA1945DK	Rubberized impact protection, gray ZB2490GS2
ALMEMO® memory connector with micro SD	ZA1904SD	DIN rail mounting ZB2490HS

Standard delivery

Reference measuring instrument for temperature measurement with accessories, evaluation software, and Pt100 temperature sensor. Complete set including DKD calibration certificate:

Reference measuring instrument ALMEMO® 1030-2 including 3 AA alkaline batteries, Desktop mains unit ZA1312NA7, USB data cable ZA1919DKU, Instrument case, evaluation software ALMEMO® View SW5500AV (see page 06.06) and Pt100 temperature sensor FPA923L0250 with DKD calibration certificate (2 temperature points at 0 and 100 °C, including adjustment)



ALMEMO® 1020-2



Reference measuring instrument for temperature
High-precision measuring by means of thermocouples
Types N, S, R, B
Resolution 0.01 K, up to 1800 °C

Technical features

- Temperature measurement with very high levels of resolution, precision, and linearity, using thermocouples Types N, S, R, B
- Suitable as reference device in calibration laboratories and quality assurance procedures
- Very high accuracy thanks to multi-point adjustment of the thermocouple temperature sensor
- Each temperature sensor has its own cold junction stored in the ALMEMO® plug or externally. The cold junction temperature in the ALMEMO® plug is measured to a very high resolution of 0.001 K by means of an NTC sensor.
- Two electrically isolated measuring inputs for thermocouples, types N, S, R, B
- Resolution 0.01 K
- Units °C, °F, K
- High-resolution A/D converter, delta-sigma, 24-bit, 1.25 mops (measuring operations per second)
- Two output sockets for digital interface, ALMEMO® memory connector
- Compact, modern, ergonomic design
- Graphics display, illuminated with white light
- Easy and convenient to operate by means of 4 soft-keys and cursor block
- Measured value display : 2 measured values, differential, measuring point list, cold junction temperature
- Measuring functions : Zero-setting, smoothing, maximum / minimum values, individual value memory for 100 values
- Data logger with ALMEMO® memory connector (accessory)
- Sensor programming : Smoothing, designation, units
- Device configuration : Illumination, contrast, device address, baud rate
- Choice of language : German, English, French

Technical data ALMEMO® 1020-2

Measuring inputs	2 ALMEMO® input sockets for thermocouples	Outputs	2 ALMEMO® sockets for interface cable and ALMEMO® memory connector
Electrical isolation	Semiconductor relay (50 V)	Standard equipment	
A/D converter	Delta-sigma, 24-bit, 1.25 mops	Display	Graphics display, 128 x 64 pixels, 8 rows
Measuring ranges		Illumination	2 white LEDs
NiCrSi-NiSi Type N	-200 to +1300 °C	Keypad	7 silicone keys (of which 4 soft-keys)
PtRh10-Pt Type S	-50 to +1768 °C	Date and time-of-day	Real-time clock, buffered by battery
PtRh13-Pt Type R	-50 to +1768 °C	Individual value memory, internal	100 measured values
PtRh30-PtRh6 Type B	+250 to +1820 °C	Power supply	
Resolution	0.01 K	Battery set	3 AA alkaline batteries
Accuracy	±0.1 K ± 1 digit in range	Mains adapter	ZA1312NA7 230 VAC to 12 VDC, 1 A, electrically isolated
Type N	-200 to +1300 °C	Current consumption (without input and output modules)	
Type S	+50 to +1760 °C		approx. 20 mA
Type R	+100 to +1760 °C	With illumination	approx. 40 mA
Type B	+500 to +1800 °C	Housing	127 x 83 x 42 mm (LxWxH)
Nominal conditions	23 °C ±2 K, 1013 mbar, battery mode		ABS (maximum 70 °C), 290g
Temperature drift	typical 10 ppm / K		
Cold junction temperature	Measuring operations with 0.001 K resolution		

Accessories

Ethernet data cable
 ALMEMO® memory connector with micro SD
 Rubberized impact protection, gray
 DIN rail mounting

Order no.

ZA1945DK
 ZA1904SD
 ZB2490GS2
 ZB2490HS

Reference Measuring Instruments

Variants

Complete set comprising reference measuring instrument for temperature plus accessories, evaluation software, thermocouple sensor, with DAkks / DKD calibration certificate

Reference measuring instrument ALMEMO® 1020-2, including 3 AA alkaline batteries, desktop mains unit ZA1312NA7, USB data cable ZA1919DKU, instrument case, and evaluation software ALMEMO® View SW5500AV (see page 06.16)

Set with high-precision sheathed thermocouple sensor type N



Set

with sheathed thermocouple sensor type N FTAN926L0500P2
with DAkks / DKD calibration certificate at 0 / 100 / 500 /
1000 °C, including adjustment

Order no.

SP10202ND

Technical data:

Sheathed thermocouple sensor type N FTAN926L0500P2	
Measuring element	NiCrSi-NiSi, type N, class 1
Measuring tip	Mineral-insulated sheathed line, d = 6 mm, L = 500 mm
Operative range	-200 to +1150 °C
Connecting cable	1.5 meters, thermal line (stranded wire) FEP / silicone (-50 to +200 °C)
ALMEMO® plug	Resolution 0.01 K with integrated cold junction compensation sensor

Set with high-precision thermocouple sensor type S



Set

with thermocouple sensor type S FTAS918L0500P2
Case for sensors ZB9000TK1 with DAkks / DKD calibration
certificate at 500 / 1000 / 1200 °C,
including adjustment

Order no.

SP10202S1D

Technical data:

Thermocouple sensor type S FTAS918L0500P2	
Measuring element	PtRh10-Pt, Type S, Class 1
Measuring tip	Thermowire, d = 0.5 mm in ceramic protective tube diameter = 8 mm, length = 500 mm
Operative range	up to +1400 °C
Connecting cable	1.5 meters, compensation line FEP / silicone (-50 to +200 °C)
ALMEMO® plug	Resolution 0.01 K with integrated cold junction compensation sensor

Set with precision thermocouple sensor type S, with external cold junction



Set

with thermocouple sensor type S, with external cold junction
FTAS908L0500P2 Case for sensors ZB9000TK1 with
DAkks / DKD calibration certificate at 500 / 1000 / 1200
°C, including adjustment

Order no.


SP10202S2D

Technical data:

Thermocouple sensor type S, with external cold junction FTAS908L0500P2	
Measuring element	PtRh10-Pt, Type S, Class 1
Measuring tip	Thermowire, d = 0.5 mm in ceramic protective tube diameter = 8 mm, length = 500 mm
Operative range	up to +1600 °C
Connecting cable	0.75 meters, insulated, thermo-wires PtRh10-Pt as far as cold junction
Cold junction	Stainless steel protective tube diameter = 5 mm, length = 250 mm
Connecting cable	2 meters, stranded copper wire
ALMEMO® plug	Resolution 0.01 K

Certificates

Calibration certificate for ALMEMO® 1020-2 with precision sheathed thermocouple sensor type N (Example)



Kalibriergegenstand
1 Thermoelementfühler NiCrSi-NiSi, Typ N, Ø 6 mm Länge 760 mm, angeschlossen an ein Temperaturanzeigergerät ALMEMO 1020-2, Serien-Nr. H12070031

Object of calibration
1 thermocouple probe NiCrSi-NiSi, type N, Ø 6 mm length 760 mm, connected with one temperature measuring device ALMEMO 1020-2, Serial-No. H12070031

Messergebnisse / Test Result

Kanal Channel	Serien-Nr. Serial No.	Prüftemperatur Test Temperature °C	Anzeige Indication °C	Abweichung Deviation K	Messunsicherheit Uncertainty K
M0	-	1150,00	1150,00	0,00	3,0
		1000,00	1000,00	0,00	1,5
		500,00	500,00	0,00	1,0
		100,00	100,00	0,00	0,3

Die Werte beziehen sich auf die Internationale Temperaturskala von 1990 (ITS-90).
The values are based on the International Temperature Scale of 1990 (ITS-90).

Kalibriergegenstand
1 Thermoelementfühler NiCrSi-NiSi, Typ N, Ø 6 mm Länge 760 mm, angeschlossen an ein Temperaturanzeigergerät ALMEMO 1020-2, Serien-Nr. H12070031


Object of calibration
1 thermocouple probe NiCrSi-NiSi, type N, Ø 6 mm length 760 mm, connected with one temperature measuring device ALMEMO 1020-2, Serial-No. H12070031

Messergebnisse / Test Result

Kanal Channel	Serien-Nr. Serial No.	Prüftemperatur Test Temperature °C	Anzeige Indication °C	Abweichung Deviation K	Messunsicherheit Uncertainty K
M0	-	1150,00	1150,00	0,00	3,0
		1000,00	1000,00	0,00	1,5
		500,00	500,00	0,00	1,0
		100,00	100,00	0,00	0,3

Die Werte beziehen sich auf die Internationale Temperaturskala von 1990 (ITS-90).
The values are based on the International Temperature Scale of 1990 (ITS-90).

Calibration certificate for ALMEMO® 1020-2 with precision thermocouple sensor type S, with external cold junction (Example)



Kalibriergegenstand
1 Thermoelementfühler Pt10%Rh-Pt, Typ S, Schutzrohr: Keramik, Ø 8,2 mm, Länge 500 mm, mit externer Vergleichsstelle, angeschlossen an ein Temperaturanzeigergerät ALMEMO 1020-2, Serien-Nr. H12070031

Object of calibration
1 thermocouple probe Pt10%Rh-Pt, type S, Sheath tube: ceramics, Ø 8,2 mm, length 500 mm, with external cold-junction, connected with one temperature measuring device ALMEMO 1020-2, Serial-No. H12070031

Messergebnisse / Test Result

Kanal Channel	Serien-Nr. Serial No.	Prüftemperatur Test Temperature °C	Anzeige Indication °C	Abweichung Deviation K	Messunsicherheit Uncertainty K
M0	12050001	1200,00	1200,00	0,00	1,5
		1000,00	1000,00	0,00	1,0
		500,00	500,00	0,00	0,5

Die Werte beziehen sich auf die Internationale Temperaturskala von 1990 (ITS-90).
The values are based on the International Temperature Scale of 1990 (ITS-90).

Die Korrektur der Messkette erfolgte über die Mehrpunktjustage-Funktion!
The correction of the measuring system was realized by the multiple point function!

Bedingungen während der Kalibrierung
Calibration Conditions

Kalibriergegenstand
1 Thermoelementfühler Pt10%Rh-Pt, Typ S, Schutzrohr: Keramik, Ø 8,2 mm, Länge 500 mm, mit externer Vergleichsstelle, angeschlossen an ein Temperaturanzeigergerät ALMEMO 1020-2, Serien-Nr. H12070031

Object of calibration
1 thermocouple probe Pt10%Rh-Pt, type S, Sheath tube: ceramics, Ø 8,2 mm, length 500 mm, with external cold-junction, connected with one temperature measuring device ALMEMO 1020-2, Serial-No. H12070031

Messergebnisse / Test Result

Kanal Channel	Serien-Nr. Serial No.	Prüftemperatur Test Temperature °C	Anzeige Indication °C	Abweichung Deviation K	Messunsicherheit Uncertainty K
M0	12050001	1200,00	1200,00	0,00	1,5
		1000,00	1000,00	0,00	1,0
		500,00	500,00	0,00	0,5

Die Werte beziehen sich auf die Internationale Temperaturskala von 1990 (ITS-90).
The values are based on the International Temperature Scale of 1990 (ITS-90).

Die Korrektur der Messkette erfolgte über die Mehrpunktjustage-Funktion!
The correction of the measuring system was realized by the multiple point function!

Bedingungen während der Kalibrierung
Calibration Conditions

Other certificates for measuring instruments and sensors (see chapter „Calibration certificates“)

Reference Measuring Instruments

ALMEMO® 1036-2



Reference measuring instrument for humidity
High-precision measuring with Pt100 psychrometer
Resolution Temperature 0.001 K
Relative humidity 0.01 %
Dew point 0.01 K

Technical features

- Humidity measurement with very high resolution, precision, and linearity, using Pt100 psychrometer
- Suitable as reference device in calibration laboratories and quality assurance procedures
- Very high level of accuracy using the Pt100 psychrometer thanks to multi-point adjustment of the two temperature sensors
- Pt100 psychrometer optimized for measuring operations involving high humidity levels performed over long periods
- new:** Automatic atmospheric pressure compensation is provided for pressure-dependent humidity variables by means of a digital atmospheric pressure sensor integrated in the ALMEMO® device.
- new:** Humidity calculation on the basis of formulae as per Dr. Sonntag and the enhancement factor as per W. Bögel (correction factor fw(t,p) for real mixed gas systems). This substantially widens the measuring range and improves the accuracy of humidity variable calculations.
- Resolution : Temperature Pt100 0.001 K, Relative humidity 0.01%, Dew point 0.01 K
- The humidity variables are calculated from the three primary measuring channels (real measurable variables). Dry temperature (°C), humid temperature (°C), atmospheric pressure (mbar)
- Three humidity variables displayed simultaneously, freely selectable : Relative humidity (%), dew point (°C), mixture (g/kg),

- new:** Absolute humidity (g/m³), vapor pressure (mbar), enthalpy (kJ/kg)
- Two electrically isolated measuring inputs for Pt100 sensors
- High-resolution A/D converter, delta-sigma, 24-bit, 1.25 mops (measuring operations per second)
- Two output sockets for digital interface, ALMEMO® memory connector
- Compact, modern, ergonomic design
- Graphics display, illuminated with white light
- Easy and convenient to operate by means of 4 soft-keys and cursor block
- Measured value display : Sensor display (up to 4 measured values), measuring points list, atmospheric pressure
- Measuring functions : Zero-setting, smoothing, maximum / minimum values, individual value memory for 100 values
- Data logger with ALMEMO® memory connector (accessory)
- Sensor programming : Smoothing, designation, measuring range selection, locking
- Device configuration : Illumination, contrast, device address, baud rate, atmospheric pressure
- Choice of language : German, English, French
- Humidity measurement in temperature range -100 to +200 °C, with precision digital capacitive temperature / humidity sensors FHAD 36 Rx, with ALMEMO® D6 connector (Accessories, see chapter „Atmospheric humidity“). Configuration of ALMEMO® D6 sensors on ALMEMO® device itself

Technical data ALMEMO® 1036-2

Measuring inputs	Two ALMEMO® input sockets for Pt100 psychrometer FPA 836-3P3 or Precision digital capacitive temperature / humidity sensors FHAD 36 Rx	Outputs	Two ALMEMO® sockets for interface cable and ALMEMO® memory connector
Electrical isolation	Semiconductor relay (50 V)	Standard equipment	
A/D converter	Delta-sigma, 24-bit, 1.25 mops	Display	Graphics display, 128 x 64 pixels, 8 rows Illumination 2 white LEDs
Measuring range	Pt100, -200 to +400 °C	Keypad	7 silicone keys (of which 4 soft-keys)
Resolution	0.001 K	Date and time-of-day	Real-time clock, buffered by battery
Measuring current	1 mA	Individual value memory, internal	100 measured values
Accuracy	±0.010 K ±1 digit in range -50 to +400 °C	Power supply	
Nominal conditions	23 °C ±2 K, 1013 mbar, battery mode	Battery set	3 AA alkaline batteries
Temperature drift	typical 2 ppm / K	Mains adapter	ZA1312NA7 230 VAC to 12 VDC, 1 A, electrically isolated
Calculated humidity quantities	Analytic equation (not an approximation)	Current consumption (without input and output modules)	approx. 20 mA
Digital atmospheric pressure sensor (integrated in the device)		With illumination	approx. 40 mA
Measuring range	700 to 1100 mbar	Housing	127 x 83 x 42 mm (LxWxH)
Accuracy	±2.5 mbar (at 0 to +65 °C)		ABS (maximum 70 °C), 290g

Reference Measuring Instruments



Psychrometer FPA 836-3P3

Technical data Pt100 psychrometer FPA 836-3P3

Operating temperature	up to +90 °C (no ice)	Dimensions	175 x 50 x 75 mm (LxWxH)
Humidity measuring range	approx. 10 to 100 % RH	Ventilator power supply	12 VDC via mains unit cable, approx. 1.5 meters (included in delivery)
Measuring system	psychrometric	Connecting cables	2 cables, each 5 meters, FEP / silicone
Accuracy	< ±1 % RH under nominal conditions	ALMEMO® plug	Pt100, resolution 0.001 K
Nominal conditions	23 °C ±2 K, 1013 mbar, 50 % RH		
Temperature sensors	2 x Pt100, class B, ALMEMO® adjusted		
Housing	Plastic PMMA		

Accessories

Order no.

Ethernet data cable	ZA1945DK
ALMEMO® memory connector with micro SD	ZA1904SD
Rubberized impact protection, gray	ZB2490GS2
DIN rail mounting	ZB2490HS
Spare wicks (2 pieces)	ZB98462ED
Extension cable for mains units, 3-pin bayonet coupling, length 5 meters	ZB5090VK05

Variants

Order no.

Reference measuring instrument for humidity measurement with accessories, evaluation software, and Pt100 psychrometer, Complete set including DAkKS / DKD calibration certificate

Reference measuring instrument ALMEMO® 1036-2, with integrated digital atmospheric pressure sensor including 3 AA alkaline batteries, desktop mains unit ZA1312NA7, USB data cable ZA1919DKU, instrument case, and evaluation software ALMEMO View SW5500AV (see page 06.16) and Pt100 psychrometer FPA 836-3P3 including mains unit, water bottle, pair of wicks with DAkKS / DKD calibration certificate
Temperature at approx. +25 °C, relative humidity at approx. 30 % / 70 % RH, and atmospheric pressure in range 700 to 1100 mbar (5 points)

SP10362D