GOSSEN METRAWATT

# METRA HIT | 28c *light*
# Calibrator

3-349-316-03
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- **Universal calibrator and simulator**
  mA / mV … V / °C (Pt100/1000, Ni100/1000, type J, L, T, U, K, E, S, R, B and N thermocouples) / 5 … 2000 Ω
- Frequency and pulse generator: 1 Hz ... 1000 Hz
- Simulation in absolute terms, and as percentages (scaled)
- Ramp and step functions
- Procedure memory
- Easy handling
- Interface and METRAwin®90-2 calibration software
- Transmitter simulator (sink: 0 … 24 mA)
- DKD calibration certificate included
- Rugged, EMC compliant design

CE

Deutscher Kalibrierdienst DKD-K-19701
DKD

**Calibration Certificate included**

QUALITY MANAGEMENT SYSTEM
DQS certified per
DIN EN ISO 9001 Reg. No.1262


## Components and Range of Applications

The **METRA HIT** | **28c *light*** calibrator is a precision calibration and simulation instrument for electrical and physical quantities. It can be used on-site as a hand-held instrument for accurate calibration and inspection work, as well as for testing and laboratory applications.
A multitude of functions allow for use of the highly flexible instrument in process engineering applications, the equipping of control rooms, device manufacturing, general measuring technology and a wide variety of other areas. As an integral element of a calibration system, it serves to calibrate measuring transducers, instrument transformers, insulation amplifiers, transmitters, temperature meters, recorders, controllers, signalling devices and display instruments.

With a **BD232** or **USB-HIT** plug-in interface adapter (see "Accessories", page 4), calibration sequences and complete, measuring point specific calibration cycles can be uploaded to a PC, and can be stored and queried via the keyboard. This substantially shortens set-up at the calibrator and prevents the selection of incorrect settings.

**METRAwin®90-2** software, (included with the CP1 package, see Order Information) simplifies programming, controls the transmission of data to the calibrator, logs measurement data provided by a multimeter (if used) from the output of a measuring transducer or an instrument transformer, and compares setpoints and actual values. The recorded values can be printed out from a PC as a calibration report.

### Universal Calibration Source

Integrated electronics generate mV, V and mA signals. Beyond this, the electronics are capable of simulating thermovoltages for various types of thermocouples for predefined temperatures (°C or °F), as well as for Pt and Ni temperature sensors.

### Frequency and Pulse Generator

Continuous frequency signals can be generated by the METRA HIT | **28c *light*** for testing PLCs, energy metering devices, flow rates and more. Amplitude is adjustable for the generated square-wave pulses, which are used to simulate sensor pulses. Predefined pulse runs are also generated at a chosen frequency.

### Calibration and Simulation

Measuring transducers with a wide variety of input signals (voltage, thermovoltage, RTD and 2-wire resistance sensors etc.) can be directly connected and calibrated. If a multimeter is used (e.g. METRA HIT 26S), respective values can be measured at the measuring transducer's output, transmitted to a PC via an adapter if desired, displayed with the help of METRAwin®90-2 software and compared with the appropriate calibration specifications. Setpoint values and actual values are displayed, or printed as a certificate. When operated in the "mA sink" mode, the METRA HIT | **28c *light*** simulates a 2-wire transmitter and pulls the selected current value from the device under test.

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## Read-Out Modes for Source and Sink Functions

Calibration signals can be read out either manually (numerically with key entries), or automatically by means of intervals with intermediate steps, or as a ramp signal.
The METRA HIT | **28c *light*** can thus be used as a precision pulse generator for dynamic testing.
Depending upon individual needs, desired dynamic response can be based upon full-scale value and the number of intermediate steps (intervals), or rise and dwell periods (ramp). This is especially helpful for long-term testing of laboratory and panel recorders, as well as measuring transducers, and for "one-man" control rooms.

### Numeric Read-Out

Calibration values are set and read out manually with the help of the instrument's keypad immediately after the calibration function has been selected.

### Interval

Continuous read-out of calibration values is triggered in steps between the minimum and maximum values selected at the device to be calibrated in this read-out mode. The following step can be triggered automatically (time per step: 1 s … 60 minutes), or manually.

### Ramp

Continuous read-out of calibration values is triggered in a stepless fashion between the minimum and maximum values selected at the device to be calibrated in this read-out mode. Ramp duration for rising and falling ramps can be set within a range of 1 second to 60 minutes.

## Temperature Simulation

The ten most common sensor types are available for the simulation of thermovoltages. Thermovoltages can be generated with reference to an internal (0 °C), or an external reference junction.
Temperature for the external reference junction can be set at the calibrator or with a PC. This eliminates the need to connect the device to be calibrated with the calibrator via the respectively required compensating lead. A copper conductor between the calibrator and the device to be calibrated is sufficient in this case.

## Applicable Regulations and Standards

| | |
|---|---|
| **IEC 61010-1/EN 61010-1/ VDE 0411-1** | Safety requirements for electrical equipment for measurement, control and laboratory use |
| **EN 60529 VDE 0470 Part 1** | Test instruments and test procedures Protection provided by enclosures (IP code) |
| **DIN EN 61326 VDE 0843 Part 20** | Electrical equipment for measurement, control and laboratory use – EMC requirements |

## Characteristic Values

| Calibration Function | Simulation Range | Resolution 30,000 Digits (4¾ places) | with a Load of | Intrinsic Error | Overload |
|---|---|---|---|---|---|
| **Direct Voltage Simulator** | | | | ±(% rdg. + mV) | $I_{max}$ |
| **V** | 0…±300 mV | 0.01 mV | 700 Ω | 0.05 + 0.02 | 18 mA |
| | 0 … 3 V | 0.1 mV | 1000 Ω | 0.05 + 0.2 | |
| | 0 … 10 V | 1 mV | 1000 Ω | 0.05 + 2 | |
| | 0 … 15 V | 1 mV | 1000 Ω | 0.05 + 2 | |
| **Pulse / Frequency Generator** Keying Ratio: 50% Amplitude: 10 mV ...15 V | | | | ±(% rdg. + Hz) | $I_{max}$ |
| **Hz** | 1 Hz … 1 kHz | 0.1 …8 Hz[1)] | 1000 Ω | 0.05 + 0.2 | 18 mA |
| **Current Source** | | | max. load | ±(% rdg. + µA) | |
| **mA** | 4 … 20 mA | 1 µA | 20 V | 0.05 + 2 | |
| | 0 … 20 mA | | | | |
| | 0 … 24 mA | | | | |
| **Current Sink** | | | | ±(% rdg. + µA) | $U_{max}$ |
| **mA** | 4 … 20 mA | 1 µA | $V_{in}$ = 4 ... 27 V | 0.05 + 2 | 27 V |
| | 0 … 20 mA | | | | |
| | 0 … 24 mA | | | | |
| **Resistance-Type Sensors** | | | Sensor Current [mA] | ±(% rdg. + Ω) | $I_{max}$ |
| Ω | 5…2000 $\Omega_2$ | 0.1 Ω | 0.05...0.1..4...5 | 0.05 + 0.2 | 5 mA |

[1)] Frequencies from 29 Hz onwards can only be set within a limited grid

**Simulator for Temperature Sensors (Resolution: 0.1 °K)**

| | Sensor Type | Simulation Range in °C | Simulation Range in °F | Intrinsic Error | Overload |
|---|---|---|---|---|---|
| **°C / °F** | **Resistance Thermometer per IEC 751** | | | ±(% of s. + K) | $I_{max}$ |
| | Pt100 | –200 …+850 | –328…+1562 | 0.1 + 0.5 | 5 mA |
| | Pt1000 | –200 …+300 | –328 …+572 | 0.1 + 0.2 | |
| | **Resistance Thermometer per DIN 43760** | | | ±(% of s. + K) | $I_{max}$ |
| | Ni100 | –60 …+180 | –76 …+356 | 0.1 + 0.5 | 5 mA |
| | Ni1000 | –60 …+180 | –76 …+356 | 0.1 + 0.2 | |
| | RTD Sensor Current: 0.05 ... 0.1 ... 4 ... 5 mA | | | * | |
| | **Thermocouples per DIN and IEC 584-1** | | | ±(% of s. + K) ** | $I_{max}$ |
| | K (NiCr/Ni) | –250…+1372 | –418…+2501 | 0.1 + 0.5 | 18 mA |
| | J (Fe/CuNi) | –210…+1200 | –346…+2192 | | |
| | T (Cu/CuNi) | –270…+400 | –454…+ 752 | | |
| | B (Pt30Rh/Pt6Rh) | +500...+1820 | +932…+3308 | | |
| | E NiCr/CuNi) | –270…+1000 | –454…+1832 | | |
| | R (Pt13Rh/Pt) | –50…+1768 | –58…+3214 | | |
| | N (NiCrSi/NiSi) | –270…+1300 | –454…+2372 | | |
| | S (Pt10Rh/Pt) | –50…+1768 | –58…+3214 | | |
| | L (Fe/CuNi) | –200…+900 | –328…+1652 | | |
| | U (Cu/CuNi) | –200…+600 | –328…+1112 | | |

* Without internal reference junction
** Relative to fixed reference temperature °C and thermovoltage of the thermocouple
Reference junction, internal: 2 °K intrinsic error
Reference junction, external: entry of –30 … 40 °C

### Key

rdg. = reading (measured value)
s. = setting
d = digit

## Real-Time Clock

| | |
|---|---|
| Accuracy | ±1 minute per month |
| Temperature Influence | 50 ppm/K |

## Reference Conditions

| | |
|---|---|
| Ambient Temperature | +23 °C ±2 K |
| Relative Humidity | 40 … 60% |
| Battery Voltage | 4.5 V ±0.1 V |

## Display

LCD panel (65 mm x 30 mm) with display of up to 3 values, simulator unit and various special functions

| | |
|---|---|
| Display / Char. Height | 7-segment characters<br>Main display: 12 mm<br>Auxiliary displays: 7 mm |
| Resolution | 4¾ digit ≙ 30999 counts |
| Overflow Display | "OL" appears |
| Polarity Display | "–" sign is displayed in the DC voltage simultor range –300 mV |
| LCD Test | All display segments available during operation are activated after the instrument is switched on. |

## Power Supply

| | |
|---|---|
| Battery | 3 ea. 1.5 V mignon cells alkaline-manganese batteries per IEC LR6, or equivalent rechargeable battery. Rechargeable batteries must be charged externally. |
| Service Life | With alkaline-manganese batteries (2200 mAh) |

| Calibration Function | | Service Life |
|---|---|---|
| mV, thermocouple | 48 mA | 40 h |
| 15 V | 85 mA | 20 h |
| Ω, RTD | 95 mA | 18 h |
| Sink, 20 mA | 175 mA | 10 h |
| Source, 20 mA | 140 mA | 12 h |

If voltage drops below 2.7 V, the instrument is switched off automatically.

| | |
|---|---|
| Battery Test | "⊣⊢" is displayed automatically if battery voltage drops to below approx. 3.5 V. |
| Mains Power | When mains power pack NA5/600 is connected, the power supply comes from the mains power pack; battery power is not consumed; there is no risk of batteries being charged. |

### Power Saving Circuit

The device is switched off automatically if none of the controls are activated for a period of approximately 10 minutes. The simulator is switched off after a period of only 5 minutes (sockets are current and voltage-free). Automatic shutdown can be deactivated.

## Fuse

| | |
|---|---|
| Fuse link | M125mA/250V, 5 mm x 20 mm switching capacity 1.5 kA at 250 V AC and ohmic load |

## Electrical Safety

| | |
|---|---|
| Safety Class | II per EN 61010-1:2001/VDE 0411-1:2002 |
| Operating Voltage | max. 50 V |
| Contamination Degree | 2 |
| Test Voltage | 500 V~ per EN 61010-1:2001/ VDE 0411-1:2002 |

## Electromagnetic Compatibility (EMC)

| | |
|---|---|
| Interference Emission | EN 61326:2002 class B |
| Interference Immunity | EN 61326:2002<br>IEC 61000-4-2: 8 kV atmosph. discharge<br>4 kV contact discharge<br>IEC 61000-4-3: 3 V/m |

## Data Interface

| | |
|---|---|
| Data Transmission | optical via infrared light through the housing |

*with interface adapter as accessory*

| | |
|---|---|
| Type | RS 232C, serial, per DIN 19241 |
| Bidirectional baud rate (read data and parameter configuration) | |
| (DMM ↔ PC) | BD232, USB-HIT: 9600 baud |

## Ambient Conditions

| | |
|---|---|
| Accuracy Range | 0 °C … +40 °C |
| Operating Temperature | –10 °C … +50 °C |
| Storage Temperature | –25 °C … +70 °C (without batteries) |
| Relative Humidity | 40% … 75%, no condensation allowed |
| Elevation | to 2,000 m |

## Mechanical Design

| | |
|---|---|
| Dimensions | 84 mm x 195 mm x 35 mm |
| Weight | approx. 420 g with batteries |
| Protection | IP 50 |

Extract from table on the meaning of IP codes

| IP XY (1st digit X) | Protection against foreign object entry | IP XY (2nd digit Y) | Protection against the penetration of water |
|---|---|---|---|
| 0 | not protected | 0 | not protected |
| 1 | ≥ 50.0 mm Ø | 1 | vertically falling drops |
| 2 | ≥ 12.5 mm Ø | 2 | vertically falling drops with enclosure tilted 15° |
| 3 | ≥ 2.5 mm Ø | 3 | spraying water |
| 4 | ≥ 1.0 mm Ø | 4 | splashing water |
| 5 | dust protected | 5 | water jets |

# METRA HIT | 28c *light*
# Calibrator

## Standard Equipment

1 METRA HIT | **28c *light*** calibrator with 3 batteries per IEC LR6
1 KS17 cable set (yellow and black)
1 operating instructions
1 GH18 protective rubber holster
1 DKD calibration certificate

## Warranty

3 years for material and workmanship
1 year for calibration

## Accessories

### BD232 Interface adapter

With the help of the bidirectional adapter BD232 the METRA HIT | **28c *light*** multimeter can be configured via PC and the live simulator data can be transmitted to the computer. The adapter has no memory of its own, but can be used to read out data from the memory of the METRA HIT | **28c *light***.


### USB-HIT Interface adapter

This adapter offers the same functions as the BD232 interface adapter, however, bidirectional transmission takes place between the IR and the USB interface in this case.

*A 2x series multimeter which can be optionally embedded in a calibration system can be connected via another USB-HIT adapter with a second USB interface at the PC.*


### METRAwin®90-2 Calibration Software

This software allows for paperless documentation and management of calibration results, the creation of calibration procedures and remote control of the calibrator.
METRA HIT | **28c *light*** sequence controls can be implemented online, or off-line after downloading complete calibration procedures.

### Cordura Belt Pouch HitBag

for multimeters of the METRA HIT (with/without protective rubber cover) and METRAport series


### Hard case HC20

for multimeters (with/without protective rubber cover GH18) and accessories


## Order Information

| Description | Type | Article Number |
|---|---|---|
| Calibrator, see standard equipment for METRA HIT \| **28c *light*** | METRA HIT \| **28c *light*** | M232A |
| **Hardware Accessories** | | |
| Mains power pack 230 V~/5 V, 600 mA | NA5/600 | Z218F |
| Calibrator pack consisting of: bidirectional interface METRA*Hit*®BD232, interface cable RS232 METRAwin®90-2 calibration software and installation instructions | CP1 | GTZ 3231 100 R0001 |
| Bidirectional interface adapter | BD232 | GTZ 3242 100 R0001 |
| Bidirectional interface adapter IR/USB | USB-HIT | Z216A |
| Imitation leather carrying pouch for METRA HIT | F829 | GTZ 3301 000 R0003 |
| Cordura belt pouch for METRA HIT multimeters | HitBag | Z115A |
| Imitation leather ever-ready case with cable compartment | F836 | GTZ 3302 000 R0001 |
| Ever-ready case for 2 METRA HIT, 2 adapters and accessories | F840 | GTZ 3302 001 R0001 |
| Hard case for one METRA HIT and accessories | HC20 | Z113A |
| Hard case for two METRA HIT and accessories | HC30 | Z113B |
| Fuse link | M125mA/250V | Z109G |

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