Measuring during the running process.

Safe control in industrial production.
**Utilising synergies**

With the merger of companies, we have expanded our competence considerably and therefore also offer optimal assistance and consultation in all matters relating to measuring, control, and closed-loop control technologies.

We are capable of offering a complete product portfolio for requirements of the broadest range of segments:

- Process measurement technology
- Laboratory measurement technology
- Industrial electronics / closed-loop control technology
- Industrial measurement technology
- Test stand measurement technology
- Customer-specific developments

**Quality from Germany**

All products from GHM Messtechnik are developed and produced in Germany. Through the consolidation of companies, the product range has expanded significantly. Renowned companies value the "Quality from Germany".

**Our claim – Your benefit**

As a specialist and complete measurement technology provider, we develop solutions tailored to our customers and markets which meet the highest demands in the industry.

**Our locations**
Flexibility and Innovation

These two terms are an inseparable part of the success of GHM Messtechnik. In addition to the extensive standard programme, tailored solutions are developed according to customer needs.

GHM stands for

- ✔ Competence
- ✔ Quality
- ✔ Service

Expertise in industrial measuring, control, and closed-loop technologies.

“Our measuring, control, and closed-loop products are manufactured according to an ISO-certified production process and meet the highest quality standards. The products also satisfy the required industrial standards for the widest range of applications.”

- CE Conformity
- ATEX Guidelines of the European Union
- Functional safety in accordance with IEC 61508/IEC61511
- EN14597 for heat generating systems
- Germanischer Lloyd
- Processing of measurement signals in accordance with NAMUR recommendations

Contents

1. Industrial control 4.0 with the GHM One Platform
   Page 6

2. Transducers and isolating amplifiers
   Page 10

3. Indicators and field measurement devices
   Page 16

4. Switching and monitoring devices
   Page 20

5. Power electronics
   Page 24
Modern industry places increasingly higher requirements on all systems and components involved in the production process. With modern systems there is an expectation that downtimes are reduced to a minimum and that maximum process efficiency is achieved. Furthermore, the cost savings and associated competitive ability of a new acquisition are important requirements and a major emphasis for every machine modernisation. We meet these requirements with our modern product platform which is produced using state-of-the-art development methods and production processes in our factory.

Industry is facing the upcoming Industry 4.0 future project in the coming years. After the first industrial revolution in the area of mechanisation and mass production, we now have the intelligent factory in the digital revolution. Work should take place in a resource-saving manner with better integration of customer requirements in the value-added chain. In order to achieve this goal, increasingly more process values from the widest variety of production processes will have to be combined without losing the information that is relevant for the users on site. GHM Messtechnik is also taking on this challenge and, in collaboration with its customers, developing highly efficient devices and systems for the next industrial revolution.

Our products

Our product spectrum in the area of industrial electronics extends from process value detection to signal processing, display, control and regulation, to actuators for intervening in the process. In this connection, our products always pursue the goal of being as efficient as possible in all areas of the product life cycle, and that applies particularly for:

- space-saving assembly
- quick and uncomplicated integration
- short wiring times
- simple commissioning without software, whenever possible
- use of intuitively operated configuration software, wherever it is necessary
- clear process information for operators in order to minimise downtimes
- fulfilment of necessary regulations, such as EN 14597 or SIL
- long service life

The true cost efficiency is evident over the entire period of use, beginning with the integration, followed by commissioning, and then long service times during the operation life. Our products satisfy this demand with solutions ranging from the simple sensor via standard isolating amplifier to the modular automation unit.

Our customers

Our customers come from a wide variety of areas in machinery and plant construction. The following areas are emphasised:

- Food and beverage
- Plant and machinery construction
- Industrial and laboratory furnace construction
- Gas and oil industry
- Ship construction
- Plastics industry
- Chemical and pharmaceutical industry

This broad spectrum is the basis for an outstanding product assortment which satisfies the widest variety of requirements of numerous sectors. And if we do not have the right product in our portfolio, we are capable of quickly developing and producing the right product for the task on short notice, thanks to our application-based development and in-house production depth.
Content

Multifunction controller MSR 9696H GHM-ONE ............................................................... 6
Transducers and isolating amplifiers ................................................................. 10
Displays and field measurement devices ......................................................... 16
Switching and monitoring devices ................................................................. 20
Power electronics ............................................................................................... 24
Industry is currently in the process of a changeover towards Industry 4.0 and the associated necessary changes of production processes. It is the task of control and feedback control technology to support this trend and provide the user with devices and systems to quickly implement the new requirements. The GHM-ONE multifunction platform approaches this challenge with a modern and innovative concept for measuring, controlling, computing, data recording, and closed-loop control.

Today’s process technicians look for possibilities to be able to quickly and efficiently integrate their process technology ideas into new systems, or for retrofitting older systems without long downtimes. A requirement for this is the implementation of an idea without circuitous routes over multiple systems, for example, or hurdles arising from different programming languages.

The GHM-ONE platform provides process technicians with the possibility of effectively putting their ideas in the area of automation and visualisation into practice without programming knowledge. Therefore, the platform is the ideal basis for applications in areas such as:

- Industrial furnaces
- Laboratory ovens
- Heat treatment plants
- Microbreweries
- Dryers
- Test stands
- Building automation
- Climate control
- Pasteurisation systems

The MSR 9696H – the first in its class

The GHM-ONE platform is the basis for the new generation of multifunction devices. The first multi-function unit of this platform is the MSR 9696H. Fully loaded with innovative hardware and software technologies, the MSR 9696H is our most important development in recent years in the area of multifunction units.

Today’s users must be capable of implementing ideas without being deterred by programming languages or battling with limitless depths of visualisation systems.

The MSR 9696H stands out from the masses of automation devices and impresses with its possibilities:

- Implementing measurement, control, and closed-loop control concepts and ideas without the requirement of programming skills for the user
- Creating operating and monitoring concepts entirely without knowledge in the area of control system or SCADA technology

The new type of application creation is realised in the MSR 9696H with the new “Configuration and Application Tool” CAT. CAT supports users in the intuitive implementation of their ideas and assures a smooth commissioning process.

With a high-performance modular hardware concept, everything is rounded out with:

- 3.5” TFT graphic colour touch display
- Standard 1/4DIN housing (96 x 96 mm)
- up to 8 internal analogue inputs
- up to 4 internal analogue outputs
- up to 12 internal digital inputs or outputs
- 4 relay outputs as standard in the device

The hardware concept is rounded out with a modular communications card with the possibility of connecting external I/O or other field bus participants using various field bus systems, such as:

- Modbus TCP
- Modbus RTU
- CanOpen

Of course, there are also interfaces available for the PLC and SCADA system level. For this purpose, MSR 9696H offers:

- Profinet
- Profibus DP
- Modbus TCP
- Modbus RTU

as possible connections. With this communications concept and the general layout, the MSR 9696H is ready to face the “Industry 4.0” challenge.
Put ideas into practice quickly and simply

Application creation with the MSR 9696H is child’s play. Based on the concept of wiring existing functional blocks, the user quickly creates applications comprising process control, mathematical calculations and process feedback control. For this purpose, the CAT configuration software provides a function library comprising more than 100 tested functions from the areas:

- Input and output signals
- Computing functions
- Logic functions
- Signal conversion
- Time functions
- Buffer functions
- Communications functions
- Profiling functions
- Closed-loop control functions

The user only has to compile and wire these functions in the editor and implement their idea without any programming skills. Testing of the individual functions can be omitted, because they were already available ready for use and were not created by the user. So the user can concentrate entirely on putting their idea into practice. The user is supported in the creating process with both the function library and the CAT configuration tool, which has some additional functions in the editor.

For example, the user can

- structure their application in order to avoid losing an overview when working on larger projects
- create individual function blocks in order to save time with recurring functions
- test sub-areas of their application with simulation functions independently of other project areas

With the consistent use of modern software architectures and functions, CAT make it possible for the user to realise their application without lengthy familiarisation times.

Feedback control technology, profiling, and data recording

The function library also represents the basis for complex structures in the area of closed-loop control technology. As a result, solutions such as

- Cascade regulation
- Limiting control
- Ratio control

and other closed-loop control strategies can be implemented using standard functions. Of course, all regulators have the possibility of self-optimisation. Therefore, the area of closed-loop control technology and process control is not finished yet. The library also provides a profiler, which is often necessary for the control unit to take over certain processes. This is necessary wherever the material structure must be influenced over the course of the process.

Typical examples of this can be found in the area of:

- Heat treatment shops
- Curing processes
- Sterilisers
- Biological growth processes
- Tempering systems
In order to satisfy the requirements in this area, as well as others, it is also necessary to save certain process data and transfer it later to protocol or control systems. The MSR 9696H covers this function with various library elements. For example,

- recording of process values
- creation of batch logs
- transmission of historical data via FTP
- reading of historical data via FTP or USB

are standard functions which the user only uses and does not have to program.

**Individual operating and monitoring concepts**

The creation of the pure process control and closed-loop control is not finished yet for modern machine and plant parts. The process technician must give the operator on site the opportunity to effectively monitor and easily operate the plant. In addition, the operator must be well informed in the event of an error in order to minimise the downtime of the plant. Standard operating concepts are of little help in this case. Therefore, the MSR 9696H utilises a concept which makes it possible to individualise the operation and visualisation. For this purpose, the CAT software provides an image editor which makes it possible to realise the widest range of operating and monitoring concepts with a few simple standard functions. In addition to the individual operating pages, there are also standard pages, such as:

- Regulator operation
- Profiler operation
- Trend visualisation
- Parameter dialogue

available in the screen editor. With the combination of standard operating screens and individually designed screens, an efficient interface between operator and process is created very quickly.
With the creation of an application and its use, the process technician is obviously not finished with their work. The application must still be tested and put into operation at a later time. For this important and often time-consuming phase, the new GHM platform provides various functions which make this phase more efficient.

A essential element is the PC simulation of the complete application. The entire application can be tested independently of the actual process on the PC. For this purpose, the CAT software has a simulation environment for the MSR 9696H, as well as for connected I/O assemblies. With this environment, the user is capable of testing the entire application, including operation on the PC, without endangering the plant. Application testing is performed right at the desktop without risk.

Additional testing functions are available to the user for the local commissioning phase at the plant. An essential component is an integrated online trend function which allows the user to view all analogue and digital signals online in a single trend and thus quickly and easily approve the desired functions. Of course, there are also debugging and various forcing functions available for the testing.

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Commissioning and testing made quick and easy

The simulation environment in CAT

The debugging environment with test functions for the entire application
Transducers and isolating amplifiers

The most important basis for a fault-free production process is clean measurements and clear status signals from the process. Moreover the unit signals for automation and measurement data recording are indispensable. Regardless of the size of the plant, errors and problems can often be traced back to flawed signals caused by a division of potentials, ground loops, or interference couplings. The remedy for this is usually the realisation of galvanic isolation of the measurement chain by means of an isolating amplifier. Our isolating amplifiers are available as active and passive devices in 1, 2, or 3-channel versions for DIN rail mounting. They can be universally equipped enabling the galvanic isolation of the measuring signal for nearly all devices, as well as conversion between the various unit signals. Therefore, it is no problem to quickly receive a 0 - 10 V signal from 4 - 20 mA, whereby the entire process is “cleanly” isolated from a harsh process environment. If no standard signal is available, signals such as Pt100, thermocouple, DMS, or resistance can also be converted with our transducers with direct scaling and into standard signals.

The new GHM generation

The long-term experience of GHM Messtechnik in a wide range of industrial sectors has given rise to consistent improvement of our isolating amplifiers and transducers. The latest generation of carrier rail mounted devices is provided in a sturdy, space-saving housing which also stands up to harsh environmental conditions. Removable terminals (spring-mounted or screw terminals) enable simple wiring and the easy-to-use DIP switches assure an intuitive, time-saving commissioning. The devices consistently provide high precision and long-term signal stability.

In operation, the devices distinguish themselves with a simple and useful integrated user interfaces. Depending on the device type, this begins with the simple LED and progresses up to graphic displays. The user interface clearly shows the status of the device and unmistakably displays events in the process.

The concept of our latest generation is precisely geared towards the fulfilment of the cost-efficiency required by modern industry through the entire product life cycle.
**Switch amplifier**

The isolating amplifier and transducer TV125M / ST125M can be used universal.

**Isolating amplifier**

The TV125L can be used as a 1-channel universal isolating amplifier.

**Switch amplifier**

The isolating amplifiers TS125 and TS225 are available in 1- and 2-channel versions.

---

**TV125M / ST125 M**

- **Inputs**: Voltage 0(2).10 V or current 0(4).20 mA switchable
- **Output**: Voltage 0(2).10 V or current 0(4).20 mA switchable
- **Load**: < 600 Ohm bzw. > 500 Ohm at voltage output
- **Step response**: 40 ms
- **Standard error**: < 0.2 % of final value
- **Auxiliary voltage**: 85...253 VAC, 20...125 VDC or 24 VDC +/-15%
- **Working temperature**: -10...60 °C
- **Housing dimensions**: 12.5 x 108 x 114 mm

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**TV125L**

- **Inputs**: Voltage 0.10 V or 2.10 V switchable or current 0.20 mA or 4.20 mA switchable
- **Output**: Current output 0.20 mA or 4.20 mA switchable
- **Load**: < 150 Ohm
- **Step response**: 40 ms
- **Standard error**: < 0.2 % of final value
- **Auxiliary voltage**: 10...30 V DC, < 0.5 V A and 20...250 V AC, (47...63Hz), max. 1.5 W
- **Working temperature**: -10...60 °C
- **Housing dimensions**: 12.5 x 108 x 114 mm

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**TS125 / TS225**

- **Inputs**: 1 or 2 measuring inputs in accordance with EN60947-5-6 Namur
- **Outputs**: TS125: 1 or 2 relay outputs as normally closed
  - TS225: 1 or 2 relay outputs as transformers
  - 250V AC <2 A
  - 30V DC <2 A
- **Switching frequency**: Maximum 5 Hz
- **Auxiliary voltage**: 24 V DC +/-15% max. 1.5 W or wide range power supply 20...125 V DC and 20...250 V AC, (47...63Hz), max. 1.5 W
- **Working temperature**: -10...60 °C
- **Housing dimensions**: TS125: 12.5 x 108 x 114 mm
  - TS225: 22.5 x 108 x 114 mm

---

- Potential isolation and conversion of unit signals
- The universal layout of inputs and output enables a wide range of uses with just a single device type.
- Safe 3-way galvanic isolation in accordance with the EN61010-1
- Operating display and status messages via two-colour LED
- Removable screw terminals
- Wide range power supply: AC / DC

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NEW

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**Transducer**

The PMT50 is available in different variants for cost-efficient adaptation to the process.

**PMT50**

- **Input**
  - PMT50-1: 0/2..10 V, 0/4..20 mA
  - PMT50-2: Resistance measurement 0,100 kΩ
  - Potentiometer measurement 1,100 kΩ
  - PMT50-3: Pt100 and thermocouples

- **Outputs**
  - Maximum 4 relay outputs: 250 V AC < 2 A / 300 V DC < 2 A
  - Analogue output: 0/4..20 mA Load ≤ 500 Ω or 0/2..10 V Load ≤ 500 Ω

- **Basic precision**
  - < 0,1% (except for PMT50-2 < 0,2%)

- **Transmitter feed**
  - 24V DC maximum 30 mA (only PMT50-1)

- **Auxiliary voltage**
  - 230 V AC ±10 %
  - 115 V AC ±10 %
  - 24 V DC ±15 %

- **Working temperature**
  - -10.55 °C

- **Housing dimensions**
  - 50 x 100 x 110 mm

- **Features**
  - PMT50-1 transducer for standard signals, PMT50-2 for resistance measurement, and PMT50-3 for temperature signals
  - Signal conversion / linearisation / characteristic curve offset
  - Linearisation and/or characteristic curve offset with 32 supporting points
  - Graphic LCD display with 128 x 64 pixels
  - Automatic error recognition in the measurement circuit
  - Optionally with intrinsically safe inputs
  - Optionally with Modbus or Profibus DP field bus connection

**Transducers**

The DMS50 converts the output signal from the DMS load cell into a standard signal.

**DMS50**

- **Input**
  - DMS - bridge sensitivity: 0,100..5,000 mV/V

- **Outputs**
  - Maximum 4 relay outputs: 250 V AC < 2 A / 300 V DC < 2 A
  - Analogue output: 0/4..20 mA Load ≤ 500 Ω or 0/2..10 V Load ≤ 500 Ω

- **Basic precision**
  - < 0,025 %

- **Bridge - feed**
  - 2,5 V 5/10 V DC, programmable, max. 120 mA

- **Bridge sensitivity**
  - 0,100..5,000 mV/V

- **Auxiliary voltage**
  - 230 V AC ±10 %
  - 115 V AC ±10 %
  - 24 V DC ±15 %

- **Working temperature**
  - -10.55 °C

- **Housing dimensions**
  - 50 x 100 x 110 mm

- **Features**
  - The DMS50 converts the output signal from the DMS load cell into a standard signal
  - Bridge sensitivity 0,1..5,0 mV/V
  - Tare function (internal/external)
  - Integrated bridge feed
  - Teach-in function for quick configuration
  - Automatic error recognition in the measurement circuit
  - Optional with intrinsically safe inputs
  - Optionally with Modbus or Profibus DP field bus connection
Overview. GHM isolating amplifiers and transducers

Isolating amplifiers

TVS01Ex

TW500

TV500Ex

TS500

Transducers

CT500

VT500

WM500

RT500

MU500Ex

Refer to the tables on the following pages for further product details.
## Isolating amplifiers

<table>
<thead>
<tr>
<th>Signal</th>
<th>Input</th>
<th>Output</th>
<th>Approval</th>
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</thead>
<tbody>
<tr>
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<td>0/4..20 mA</td>
<td>0/2..10 V</td>
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The details for all products can be found online at www.ghm-group.de

● = intrinsically safe
## Transducers

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<tr>
<th>Gerätytyp</th>
<th>Voltage</th>
<th>Current</th>
<th>Power</th>
<th>Frequency</th>
<th>DMS</th>
<th>Resistance</th>
<th>Profibus</th>
<th>Modbus</th>
<th>Temperature (Pt100)</th>
<th>Temperature (Thermocouple)</th>
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*The details for all products can be found online at www.ghm-group.de*
The flexible world of GHM indicators

GHM Messtechnik offers indicators for front panel installation or local / field installation. These indicators can process nearly all measurements without converters. The consistently implemented operating philosophy is the basis for the quick configuration via front buttons or even more easily via DIP switch. The wide range of variants of relays and/or analogue outputs enables a cost-efficient use of indicators. In addition, indicators are also available with protection rating IP65 for use in harsh environments.

- Speed
- Pressure
- Flow
- Processing time
- Conductivity
- Counter
- pH value
- Productivity
- Temperature
- Fill quantity
- Standard signals

Indicators in 24 x 48 format

**GIA 20 EB**

<table>
<thead>
<tr>
<th>Input</th>
<th>Standard signals, Pt100, Pt1000, thermocouples or frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outputs</td>
<td>2 switching outputs</td>
</tr>
<tr>
<td>Display / display range</td>
<td>4-digit LED display</td>
</tr>
<tr>
<td>Precision</td>
<td>Standard signal: &lt; 0.2 % (at 0..50 mV: &lt; 0.3 %)</td>
</tr>
<tr>
<td></td>
<td>Resistance thermometer: &lt; 0.5 %</td>
</tr>
<tr>
<td></td>
<td>Thermocouples: &lt; 0.3 % FS (with Type S: &lt; 0.5 % FS ±1Digit)</td>
</tr>
<tr>
<td></td>
<td>Frequency: &lt; 0.2 %</td>
</tr>
<tr>
<td>Protection rating</td>
<td>Front IP54 (optional IP65)</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>9..28 V DC</td>
</tr>
<tr>
<td>Working temperature</td>
<td>-20..+50 °C</td>
</tr>
<tr>
<td>Housing dimensions</td>
<td>24 x 48 x 65 mm</td>
</tr>
</tbody>
</table>

- The GIA 20 EB is a compact display, monitoring, and switching device
- Self-monitoring and diagnostic system
- 10 mm LED display
- Min/Max value buffer
- Removable terminals
**GIR300**

- **Input**: Universal input for standard signal, resistance thermometer, thermocouples, frequency, speed, or counters.
- **Outputs**: 2 potential-free relay switching outputs, Relay 1: normally open / Relay 2: normally closed.
- **Display / display range**: 4-digit LED display.
- **Precision**:
  - Standard signal: < 0.2 % (at 0..50 mV: < 0.3 %)
  - Resistance thermometer: < 0.5 %
  - Thermocouples: < 0.3 % FS (with Type S: < 0.5 % FS ± 1 Digit)
  - Frequency: < 0.1 %
- **Protection rating**: Front IP54.
- **Auxiliary voltage**: 9...28 V DC.
- **Working temperature**: -20...+50 °C.
- **Housing dimensions**: 36 x 72 x 75 mm.

- The GIR 300 is a universally applicable display, monitoring, and switching device.
- Self-monitoring and diagnostic system.
- Limit function.
- Digital filter.
- Min/Max value buffer.
- Alarm delay.

**EP9648**

- **Input**: Current input: 0/4..20 mA, \( R_i = 10 \, \Omega \); Voltage: 0.10 V, \( R_i = 100 \, \Omega \).
- **Outputs**: Voltage: 0.10 V DC, linearised, short-circuit-proof max. 5 mA.
- **Display / display range**: LED 14.2 mm yellow, green, blue, or 20.3 mm red.
- **Precision**: 0.1 % (0.2 % Pt100).
- **Protection rating**: Front IP65.
- **Auxiliary voltage**: 230 / 115 V AC 50/60 Hz ±10 %, 24 V DC ± 20 %.
- **Working temperature**: -10...+60 °C.
- **Housing dimensions**: 96 x 48 x 100 mm.

- The EP9648 is a cost-optimised indicator for standard signals and Pt100 sensors.
- LED display 14.2 mm red, yellow, green or blue, and/or 20.3 mm red.
- Freely programmable display range and decimal point.
- Optionally available with automatic dimming of display brightness.

**S9648**

- **Input**: Current: 0/4..20 mA, \( R_i = 10 \, \Omega \); Voltage: 0.10 V, \( R_i = 100 \, \Omega \); Potentiometer: 0.1 kΩ / 100 kΩ.
- **Outputs**: Relay: Changeover contact < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A; Transistor: max. 35 V AC / DC max. 100 mA, with electronic current limiting; Analogue: 0/4..20 mA Load ≤ 500 Ω, 0/2..10 V.
- **Display / display range**: LED red, 14.2 mm with a display scope of ±9999(0) digits with leading zero suppression.
- **Precision**: < 0.1 %
- **Protection rating**: Front IP65.
- **Auxiliary voltage**: 230 V AC ±10 %, 115 V AC ± 10 %, 24 V AC ±10 % or 24 V DC ± 15 %.
- **Working temperature**: -10...+55 °C.
- **Housing dimensions**: 96 x 48 x 100 mm.

- The Standard Signal Panelmeter S9648 is designed for the display of measured values which are available as a standard signal.
- Maximum of 4 outputs as relay changeover or transistor output.
- Integrated transmitter feed.
- 4-digit LED display 14.2 mm.
- Display range and decimal position are freely selectable.
- Additional “0” possible, whereby the display scope is expanded to ±99999(0) digits.

---

**Indicators in 36 x 72 format**

Compact indicator with multifunctional input.

**Indicators in 96 x 48 format**

With its universal design, the Economy Panelmeter EP9648 is suitable for numerous measurement tasks.

**Indicators in 96 x 48 format**

The X9648 indicator series includes a wide spectrum of input variants for individual adaptation to process requirements. The S9648 is shown as an example.
The X1010 indicator series includes a wide spectrum of input variants for individual adaptation to process requirements. The S1010 is shown as an example.

### S1010

**Input**
- Current: 0/4 – 20 mA, \( R_i = 10 \ \Omega \)
- Voltage: 0.10 V, \( R_i = 100 \ \Omega \)
- Potentiometer: 0.1 kΩ / 100 kΩ

**Outputs**
- Relay: Changeover contact < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
- Analogue: 0/4..20 mA Load ≤ 500 Ω; 0/2..10 V

**Display / display range**
- LED red, 14.2 mm with a display scope of ±9999(0) digits with leading zero suppression

**Precision**
- < 0.1 %

**Protection rating**
- IP65

**Auxiliary voltage**
- 230 V AC ±10 %; 115 V AC ± 10 %,
- 24 V AC ±10 % or 24 V DC ± 15 %

**Working temperature**
- -10..+55 °C

**Housing dimensions**
- 96 x 48 x 100 mm

- The Standard Signal Panelmeter S1010 is designed for the display of measured values which are available as a standard signal
- Maximum 2 outputs as relay changeover
- 4-digit LED display 14.2 mm
- Display range and decimal position are freely selectable
- Additional "0" possible, whereby the display scope is expanded to ±9999(0) digits
- Field housing with hinged cover
<table>
<thead>
<tr>
<th>Device type</th>
<th>Measuring principle / function</th>
<th>Panelmeter DIN 48x24</th>
<th>Panelmeter DIN 72x24</th>
<th>Panelmeter DIN 72x36</th>
<th>Panelmeter DIN 96x24</th>
<th>Panelmeter DIN 96x48</th>
<th>Field housing</th>
<th>Special devices</th>
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<tbody>
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<td>Monitoring</td>
<td>BCD</td>
<td>Voltage</td>
<td>Current</td>
<td>Power</td>
<td>Resistance</td>
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<td>Temperature</td>
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</table>

*The details for all products can be found online at www.ghm-group.de*
The protection of people, the product, and machinery has been based on a number of necessary risk considerations since long before the introduction of the Machinery Directive. In this connection, there are various approaches to how the necessary protection can be achieved. It begins with simple switching devices which are not subject to any standards, progressing to devices subject to DIN EN 14597, such as temperature limiters, and extends to devices subject to functional safety in accordance with DIN EN 61 508. The owner is responsible for making the appropriate selection in the scope of a risk assessment.

In this connection, the owner of a machine (plant) must take into account that the risk assessment must take place over the entire life cycle of a machine. Therefore, safety issues involved with retrofitting and expansion are also taken into consideration.

GHM Messtechnik offers a variety of devices which could be used. We would be happy to assist with the selection of a suitable device.

### The GHM answer to safety issues

GHM switching and monitoring devices guarantee the safe operation of a plant. Beginning with simple limit value switches, the programme also includes isolation monitors and safety temperature limiters with SIL2 classification, as well as temperature limiters in accordance with DIN EN 14597. Monitoring in Ex areas is also necessary, and so our devices also accommodate the connection of signals from the Ex area. The devices are freely configurable with a membrane keypad and display and are freely adaptable in their function. In order to guarantee the specific standards and regulations, GHM also offers the matching sensors for the monitoring devices.

- Limit value switch
- Isolation monitor
- Network monitoring
- Safety temperature limiter
- Temperature limiter

### Limit value switch

**GS125**

<table>
<thead>
<tr>
<th>Input</th>
<th>0/4...20 mA, 0/2...10 V DC, Pot, Pt100, thermocouple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outputs</td>
<td>max. 2 relay outputs: 250 V AC &lt; 2 A / 125 V DC &lt; 2 A, Analogue output: 0/4...20 mA, Load ≤ 500 Ω or 0/2...10 V Load ≤ 500 Ω</td>
</tr>
<tr>
<td>Display range</td>
<td>2-colored illuminated scales, colour changing of the scale lighting depending of the switch status</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>20...125 VDC, 20...253 VAC or 24 VDC +/- 15%</td>
</tr>
<tr>
<td>Working temperature</td>
<td>-10...+60 °C</td>
</tr>
<tr>
<td>Housing dimensions</td>
<td>125 x 114 x 108 mm</td>
</tr>
</tbody>
</table>

- The GS125 limit value switch is designed for the monitoring of measured values free from any standard
- Universal input
- Maximum 2 alarm outputs in universal connection
- Illuminated scales (green/red)

**MR50**

<table>
<thead>
<tr>
<th>Input</th>
<th>0/4...20 mA or 0/2...10 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outputs</td>
<td>Maximum 4 relay outputs: 250 V AC &lt; 2 A / 300 V DC &lt; 2 A, Analogue output: 0/4...20 mA Load ≤ 500 Ω or 0/2...10 V Load ≤ 500 Ω</td>
</tr>
<tr>
<td>Display / display range</td>
<td>Graphic LCD display with 128 x 64 pixels, with white background lighting</td>
</tr>
<tr>
<td>Precision</td>
<td>0,2 %</td>
</tr>
<tr>
<td>Protection rating</td>
<td>IP30</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>230 V AC ±10 %, 115 V AC ±10 %, 24 V DC ±15 %</td>
</tr>
<tr>
<td>Working temperature</td>
<td>-10...+55 °C</td>
</tr>
<tr>
<td>Housing dimensions</td>
<td>50 x 100 x 110 mm</td>
</tr>
</tbody>
</table>

- The MR50 limit value switch is designed for the monitoring of measured values free from any standard
- Input for standard signals
- Maximum 4 alarm outputs as changeover relay
- Fully graphic display
- Galvanically isolated analogue output
- Optionally available with intrinsically safe inputs (only 2 relay outputs possible)
- Integrated transmitter feed
**Temperature limiter**

The TB225 can be used as a temperature limiter or temperature monitor according to EN14597.

**Temperature limiter**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>0/4..20 mA oder 0/2..10 V DC oder 1 Pt100 or double thermocouple</td>
</tr>
<tr>
<td>Outputs</td>
<td>2 relay changeovers: &lt; 250 V AC &lt; 500 VA &lt; 2 A / &lt; 30 V DC &lt; 60W &lt; 2 A</td>
</tr>
<tr>
<td>Display / display range</td>
<td>Graphic LC display with 32 x 90 pixels, with white/red background lighting</td>
</tr>
<tr>
<td>Precision</td>
<td>&lt; 0,3 %</td>
</tr>
<tr>
<td>Protection rating</td>
<td>IP20</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>18..230 V AC/DC</td>
</tr>
<tr>
<td>Working temperature</td>
<td>-10..+55 °C</td>
</tr>
<tr>
<td>Housing dimensions</td>
<td>22.5 x 108 x 114 mm</td>
</tr>
</tbody>
</table>

- The TB225 temperature limiter is used wherever thermal processes must be monitored and the plant must be brought to a safe operating state in case of a fault.

**Safety temperature limiter**

The STL50 conforms to the requirements in accordance with EN14597 and SIL 2.

**Safety temperature limiter**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>1 Pt100 or double thermocouple</td>
</tr>
<tr>
<td>Outputs</td>
<td>Relay: Changeover contact</td>
</tr>
<tr>
<td>Display / display range</td>
<td>Graphic LC display with 128 x 64 pixels, with white background lighting</td>
</tr>
<tr>
<td>Precision</td>
<td>&lt; 0,5 %</td>
</tr>
<tr>
<td>Protection rating</td>
<td>IP20</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>230 V AC ±10 %</td>
</tr>
<tr>
<td>Working temperature</td>
<td>-10..+55 °C</td>
</tr>
<tr>
<td>Housing dimensions</td>
<td>50 x 100 x 110 mm</td>
</tr>
</tbody>
</table>

- The STL50 safety temperature limiter is used wherever there is an increased requirement of the safety of a plant.
- Certified according to DIN EN 14597 SIL 2
- Optionally with intrinsically safe inputs

**Isolation monitor**

The IW1000 isolation monitor is designed for isolation monitoring in systems with unearthed voltage supply.

**Isolation monitor**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>0.690 V AC/DC; from UN &gt;400 V with terminal cover</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>16 2/3..400 Hz</td>
</tr>
<tr>
<td>Switching hysteresis</td>
<td>10..100 % of the switching point configurable</td>
</tr>
<tr>
<td>System leakage capacitance</td>
<td>max. 500 µF</td>
</tr>
<tr>
<td>Outputs</td>
<td>Relay: Changeover contact 250 V AC &lt; 250VA &lt; 5A 300V DC &lt; 50W &lt; 2A</td>
</tr>
<tr>
<td>Display / display range</td>
<td>LCD dot matrix, 2 lines of 8 characters each, Character height 5 mm, background lighting</td>
</tr>
<tr>
<td>Precision</td>
<td>± 5 % ± 1 kΩ in the range 1 kΩ..5 MΩ</td>
</tr>
<tr>
<td>Protection rating</td>
<td>IP20</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>230 V AC</td>
</tr>
<tr>
<td>Working temperature</td>
<td>-10..+55 °C</td>
</tr>
<tr>
<td>Housing dimensions</td>
<td>55 x 75 x 110 mm</td>
</tr>
</tbody>
</table>

- The IW1000 isolation monitor is designed for isolation monitoring in systems with unearthed voltage supply
- Monitoring of AC and DC systems

---

**TB225**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>0/4..20 mA oder 0/2..10 V DC oder 1 Pt100 or double thermocouple</td>
</tr>
<tr>
<td>Outputs</td>
<td>2 relay changeovers: &lt; 250 V AC &lt; 500 VA &lt; 2 A / &lt; 30 V DC &lt; 60W &lt; 2 A</td>
</tr>
<tr>
<td>Display / display range</td>
<td>Graphic LC display with 32 x 90 pixels, with white/red background lighting</td>
</tr>
<tr>
<td>Precision</td>
<td>&lt; 0,3 %</td>
</tr>
<tr>
<td>Protection rating</td>
<td>IP20</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>18..230 V AC/DC</td>
</tr>
<tr>
<td>Working temperature</td>
<td>-10..+55 °C</td>
</tr>
<tr>
<td>Housing dimensions</td>
<td>22.5 x 108 x 114 mm</td>
</tr>
</tbody>
</table>

- Fully graphic display
- "White / Red" display colour change in case of alarm
- 3-way isolation
- Wide range power supply unit

**STL50**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>1 Pt100 or double thermocouple</td>
</tr>
<tr>
<td>Outputs</td>
<td>Relay: Changeover contact</td>
</tr>
<tr>
<td>Display / display range</td>
<td>Graphic LC display with 128 x 64 pixels, with white background lighting</td>
</tr>
<tr>
<td>Precision</td>
<td>&lt; 0,5 %</td>
</tr>
<tr>
<td>Protection rating</td>
<td>IP20</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>230 V AC ±10 %</td>
</tr>
<tr>
<td>Working temperature</td>
<td>-10..+55 °C</td>
</tr>
<tr>
<td>Housing dimensions</td>
<td>50 x 100 x 110 mm</td>
</tr>
</tbody>
</table>

- Fully graphic display
- Cause of error in plain text
- Additional LEDs for alarm
- Self-diagnosis function

**IW1000**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>0.690 V AC/DC; from UN &gt;400 V with terminal cover</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>16 2/3..400 Hz</td>
</tr>
<tr>
<td>Switching hysteresis</td>
<td>10..100 % of the switching point configurable</td>
</tr>
<tr>
<td>System leakage capacitance</td>
<td>max. 500 µF</td>
</tr>
<tr>
<td>Outputs</td>
<td>Relay: Changeover contact 250 V AC &lt; 250VA &lt; 5A 300V DC &lt; 50W &lt; 2A</td>
</tr>
<tr>
<td>Display / display range</td>
<td>LCD dot matrix, 2 lines of 8 characters each, Character height 5 mm, background lighting</td>
</tr>
<tr>
<td>Precision</td>
<td>± 5 % ± 1 kΩ in the range 1 kΩ..5 MΩ</td>
</tr>
<tr>
<td>Protection rating</td>
<td>IP20</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>230 V AC</td>
</tr>
<tr>
<td>Working temperature</td>
<td>-10..+55 °C</td>
</tr>
<tr>
<td>Housing dimensions</td>
<td>55 x 75 x 110 mm</td>
</tr>
</tbody>
</table>

- Optional in variants for railway vehicles and medical technology
- Time-optimised pulse measurement process
- Automated and manual self test
- Acoustic alarm in case of device fault
## Switching and monitoring devices

<table>
<thead>
<tr>
<th>Device type</th>
<th>Function</th>
<th>Input</th>
<th>Measurement / display range</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR50</td>
<td>Limit value switch, 4 alarm outputs, Analogue output</td>
<td>0/4..20 mA, 0/2..10 V DC</td>
<td>±9999 Digit</td>
</tr>
<tr>
<td>MR50Ex</td>
<td>Limit value switch, 2 alarm outputs, Analogue output</td>
<td>0/4..20 mA, 0/2..10 V DC</td>
<td>±9999 Digit</td>
</tr>
<tr>
<td>TG50</td>
<td>Limit value switch, 4 alarm outputs, Analogue output</td>
<td>Pt100, Pt1000, Thermoelement Type: J, K, N, S</td>
<td>-100...+600°C, -100...+300°C, -150...+1600°C</td>
</tr>
<tr>
<td>TG50Ex</td>
<td>Limit value switch, 2 alarm outputs, Analogue output</td>
<td>Pt100, Pt1000, Thermocouple Type: J, K, N, S</td>
<td>-100...+600°C, -100...+300°C, -150...+1600°C</td>
</tr>
<tr>
<td>BW500</td>
<td>Battery monitor, 1 alarm output</td>
<td>12, 24, 48, 60 V DC</td>
<td>11..14 V 22..28 V 44..56 V 55..70 V</td>
</tr>
<tr>
<td>GS125</td>
<td>Limit value switch, max. 2 alarm outputs, Analogue output</td>
<td>0/4..20 mA, 0/2..10 V DC, Poti, Pt100 Thermocouple J, K, S</td>
<td>16 selectable measuring ranges, z.B. 0..100 %; -50..50°C; 0...1500°C</td>
</tr>
<tr>
<td>GS500</td>
<td>Limit value switch, 1 alarm output</td>
<td>0/4..20 mA, 0/2..10 V DC</td>
<td>0.100 %</td>
</tr>
<tr>
<td>GS1000</td>
<td>Limit value switch, 2 alarm outputs, Analogue output</td>
<td>0/4..20 mA, 0/2..10 V DC Pt100 Thermocouple J, K, S</td>
<td>0.100 % 0..600°C 0..1600°C</td>
</tr>
<tr>
<td>CVG500</td>
<td>Limit value switch, 1 alarm output</td>
<td>0..1 A AC / 0..5 A AC 0..125 V AC / 0..250 V AC</td>
<td>0.100 %</td>
</tr>
<tr>
<td>STL50</td>
<td>Safety temperature limiter/monitor, 1 alarm output</td>
<td>Pt100, Thermocouple J, K, N, S</td>
<td>-100..600 °C -100..1600 °C</td>
</tr>
<tr>
<td>STL50Ex</td>
<td>Safety temperature limiter/monitor, 1 alarm output</td>
<td>Pt100, Thermocouple J, K, N, S</td>
<td>-100..600 °C -100..1600 °C</td>
</tr>
<tr>
<td>IW1000</td>
<td>Isolation monitor</td>
<td>Isolation resistance</td>
<td>1 kΩ..5,5 MΩ</td>
</tr>
<tr>
<td>TB225</td>
<td>Temperature limiter/monitor, 2 alarm outputs, Analogue output</td>
<td>0/4..20 mA, 0/2..10 V DC Pt100, Thermocouple J, K, N, S</td>
<td>0.100 % -100..600 °C -100..1600 °C</td>
</tr>
</tbody>
</table>

The details for all products can be found online at www.ghm-group.de
BW500
Battery monitor,
1 alarm output

GS1000
Limit value switch,
2 alarm outputs,
Analogue output

GS500
Limit value switch,
1 alarm output

CVG500
Limit value switch,
1 alarm output

MR50Ex
Limit value switch,
2 alarm outputs,
Analogue output

GS500
Limit value switch,
1 alarm output
Power electronics

The power electronics as a converter of electrical energy is assuming an increasingly central role in every switch cabinet. Direct current supplies with high-quality and faultlessly switching actuators close the circuit of feedback control processes and guarantee stable processes. We offer effective power modules ranging from short-circuit-proof power supply units to 3-phase thyristor power controllers enable the "contact-free" intelligent switching of high currents.

### Power modules

The LM series of power modules can switch loads of up to 80 amperes

- **Control circuit**: 3-32 DC
- **Load circuit**: 24V AC to 530 V AC
- **Load currents**: 20, 40, and 80 A
- **Test voltage**: 4 kVeff
- **Approval**: CE, UL and CSA
- **Installation**: Carrier rail mounting TS35
- **Dimensions**: Type-dependent

- Input / output galvanic isolation
- Zero-voltage switch
- Suitable for loads of up to cosφ 0.5
- Isolated housing
- Aluminium cooling element in block design

### Current monitoring

With a current measurement range of 1..80 A, the H2CM covers a broad spectrum.

- **Metering range**: 1..80 A, 50/60 Hz
- **Alarm output**: PNP transistor open collector
- **Alarm delay**: 0..60 seconds adjustable
- **Control input**: From < 1 V DC, On 3..28 V DC
- **Auxiliary voltage**: 10..30 V DC
- **Working temperature**: -10..+60 °C
- **Dimensions**: 46 x 75 x 32 mm

- H2CM heat current monitoring modules designed for quality assurance in process engineering
- Input / output galvanic isolation
- Bistable control circuit

### Heat current monitoring module

<table>
<thead>
<tr>
<th>Heat current monitoring module</th>
<th>H2CM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metering range</strong></td>
<td>1..80 A, 50/60 Hz</td>
</tr>
<tr>
<td><strong>Alarm output</strong></td>
<td>PNP transistor open collector</td>
</tr>
<tr>
<td><strong>Alarm delay</strong></td>
<td>0..60 seconds adjustable</td>
</tr>
<tr>
<td><strong>Control input</strong></td>
<td>From &lt; 1 V DC, On 3..28 V DC</td>
</tr>
<tr>
<td><strong>Auxiliary voltage</strong></td>
<td>10..30 V DC</td>
</tr>
<tr>
<td><strong>Working temperature</strong></td>
<td>-10..+60 °C</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>46 x 75 x 32 mm</td>
</tr>
</tbody>
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# Device overview

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<tr>
<th>Device type</th>
<th>Function</th>
<th>Input</th>
<th>Measurement / display range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power supplies</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NG1000</td>
<td>Power supply</td>
<td>24..230 V AC/DC</td>
<td>5..24 V max. 2 A</td>
</tr>
<tr>
<td>DR</td>
<td>Power supply</td>
<td>115/230 V AC</td>
<td>24 V DC, max. 10 A</td>
</tr>
<tr>
<td><strong>Moduls</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LM</td>
<td>contactless power modules</td>
<td>driver circuit 3..28 V DC</td>
<td>load circuit 48..530 V AC, max. 80 A</td>
</tr>
<tr>
<td>CKRD2340</td>
<td>contactless power modules</td>
<td>driver circuit 4.5..32 V DC</td>
<td>load circuit 24..280 V AC, max. 65 A</td>
</tr>
<tr>
<td>CMRD</td>
<td>contactless power modules</td>
<td>driver circuit 4,5..32 V DC</td>
<td>load circuit 48..660 V AC, max. 30 A</td>
</tr>
<tr>
<td>D2425</td>
<td>SSR-Relay</td>
<td>driver circuit 3..32 V DC</td>
<td>load circuit 24..280 V AC, max. 25 A</td>
</tr>
<tr>
<td>D2450</td>
<td>SSR-Relay</td>
<td>driver circuit 3..32 V DC</td>
<td>load circuit 24..280 V AC, max. 45 A</td>
</tr>
<tr>
<td>HD4850</td>
<td>SSR-Relay</td>
<td>driver circuit 3..32 V DC</td>
<td>load circuit 48..530 V AC, max. 50 A</td>
</tr>
<tr>
<td>SC869110</td>
<td>SSR-Relay</td>
<td>driver circuit 3..32 V DC</td>
<td>load circuit 48..530 V AC, max. 125 A</td>
</tr>
<tr>
<td>DS3TP50D</td>
<td>SSR-Relay</td>
<td>driver circuit 3..32 V DC</td>
<td>load circuit 48..530 V AC, max. 50 A</td>
</tr>
<tr>
<td>H2CM</td>
<td>heating current - monitoring module</td>
<td>driver circuit 3..28 V DC</td>
<td>dependent from SSR-Relay</td>
</tr>
<tr>
<td>STM40</td>
<td>control module for SSR-Relay</td>
<td>driver circuit 0/4..20 mA, 0..10 V Potentiometer</td>
<td>dependent from SSR-Relay</td>
</tr>
<tr>
<td>STU500</td>
<td>control module for SSR-Relay DIN-rail housing</td>
<td>driver circuit 0/4..20 mA, 0..10 V Potentiometer</td>
<td>dependent from SSR-Relay</td>
</tr>
<tr>
<td>DC30-D3</td>
<td>SSR-Relay for inductive loads</td>
<td>driver circuit 3..24 V DC</td>
<td>load circuit max. 30 V DC, 3 A</td>
</tr>
<tr>
<td>K20, K40</td>
<td>cooling element for SSR-Relays</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Switching relays</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RT424</td>
<td>coupling Relay</td>
<td>24 V DC, 24 V..230 V AC</td>
<td>2 Relay changer max. 8 A</td>
</tr>
<tr>
<td>PT570</td>
<td>coupling Relay</td>
<td>24 V DC, 24 V..230V AC</td>
<td>4 Relay changer max. 8 A</td>
</tr>
<tr>
<td><strong>Current transformer</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASW</td>
<td>moulded</td>
<td>50..1000 A AC</td>
<td>1/5 A AC</td>
</tr>
<tr>
<td>WSW</td>
<td>winding current transformers</td>
<td>1..40 A AC</td>
<td>1/5 A AC</td>
</tr>
</tbody>
</table>

*The details for all products can be found online at [www.ghm-group.de](http://www.ghm-group.de)*
The GHM Messtechnik GmbH Group was founded in 2009. However, the history of the traditional brands that are bundled under the umbrella brand goes back much further. In its current formation as the GHM GROUP, the enterprise is still obligated to the shared philosophy of the founders: Absolute customer orientation, speed, and first-class product quality!

Innovation with method:
An increasing number of tasks in terms of the global economy and in technology reach the limits of feasibility and beyond. We meet this challenge with a broad-based enterprise structure. The Centers of Competence under the umbrella of the GHM GROUP cover a wide range of market-specific solutions for all important areas of application with their respective areas of expertise.

With the GHM GROUP our customers benefit from over 200 years of combined experience. With this expertise, our engineers at the various “Centers of Competence” are quickly and flexibly in a position to develop solutions that meet the specific requirements of our customers and are in-line with market demand.

It is an advantage of our enterprise, which is unrivalled.

### INDUSTRIAL
- Sensors for a variety of process variables such as temperature, flow, level and pressure
- Transmitters and isolators for various input/output variables
- Indicators and controllers in various formats and performance classes

### ENVIRONMENTAL
- Measuring stations for climate and environmental data with the connection to cloud-systems
- Mobile measurement technology for climate, water and gas analysis

### TESTING & SERVICES
- Test bench measurement technology with up to 40,000 measurement in the secondary
- Stationary and mobile systems for universal use
- Modular systems for individual adaptation to the process needs

---

Asia and India
- Subsidiary in Mumbai
- Numerous certified partners

Europe
- 12 locations, including sales centers
- 5 production locations and specialized sales locations

Americas
- Subsidiary in São Paulo
- Qualified partners

Africa
- Subsidiary in Johannesburg
- Reliable partners

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Your contact to us.

**Sales Center Export**

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- +49 2191 9672-0
- +49 2191 9672-40
Your ideas and requests are our inspiration.
Challenge us.

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