GHMGROUP
Specialists by Competence.

INDUSTRIAL ELECTRONICS
PRODUCT CATALOG

Industrial electronics.

Product catalog 2019.

Editorial. Specialists by Competence.

"Our industrial electronics are the foundation of successful process automation. From measuring transducers to isolating amplifiers, limit value transmitters, indicators, controllers, protective devices for thermal processes and mini-PLCs: we offer top quality expertise."

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GHMGROUP
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For further informations please visit:
https://www.ghm-group.de/geschaeftsfelder/industrie-elektronik/

Industrial electronics

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 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.

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.

Overview industrial electronic

Multifunctional controller / Displays / Controller

Page

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Product information

Multifunction controller

Features

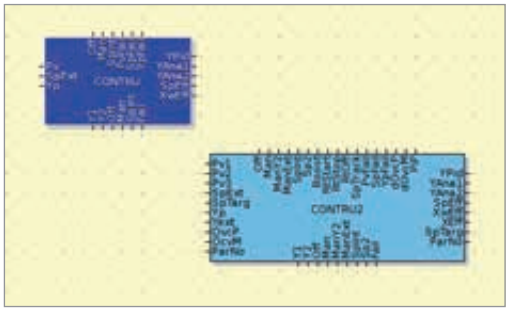
- PID control function
- Multi-Loop system
- Program controller function
- Process control with more than 100 functions
- Process calculations with mathematical library
- Screen recorder function
- Data logger function
- Communications card with various field buses
- Process visualisation with 3.5“ TFT display
- Process control with 4 function keys and touch display
- Modular I/O concept

Application areas

- Industrial plants
- Food industry
- Machine construction
- Power generation
- Water supply
- Hardening plants
- Plastics industry
- Shipbuilding
- Pharmaceutical industry

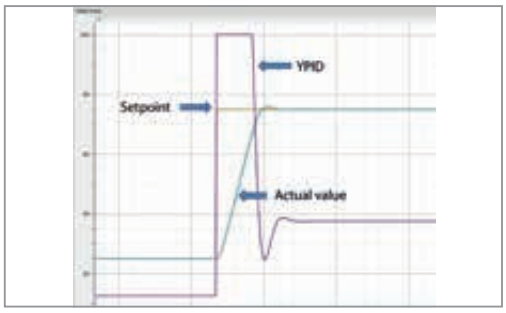
Function

The GHM ONE is the centrepiece of development for control technology in the GHM Group, and serves as a basis for further development in industrial compact controllers. The GHM ONE is a multifunction platform with a modern and innovative concept for measuring, controlling, computing, data recording, visualisation, operating and regulation. Adaptation to the requirements of the systems takes place with a single software package, “GHM CAT”, which can be operated without any programming skills.
The core of the GHM ONE is a high-precision PID controller with self-tuning that can be adapted for the widest range of control and regulation tasks. In the process, the aim is optimal regulation of the process according to the operating company‘s requirements. In this connection, product quality, process stability, and a minimisation of process times are emphasised. The GHM ONE offers various controller functions that can be combined using efficient function blocks to create an overall application in order to implement these requirements. (Fig. 1)



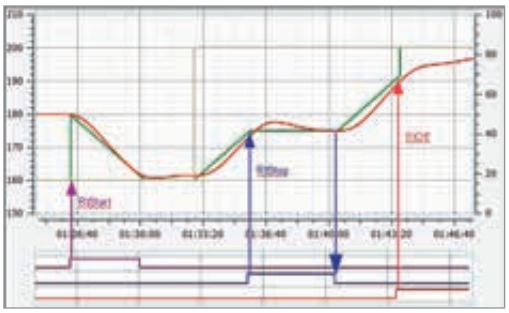
(Fig. 1)

The newly developed algorithm for self-tuning already uses the optimal controller parameters in numerous processes and thereby assures short commissioning times. The controller algorithm developed specially for the GHM ONE is the basis for short adjustment times with only minor deviations of the control variable. (Fig. 2)



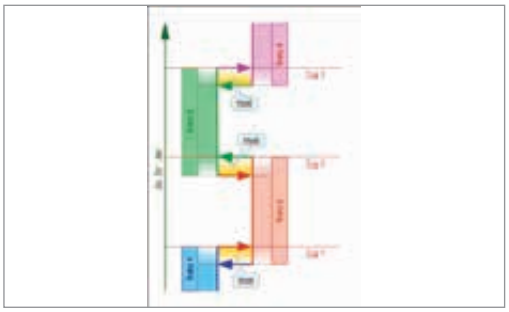
(Fig. 2)

The control quality can be influenced at any time by the user or even by the process in order to also continuously ensure the optimum utilisation of energy and material during the operating time. For instance, sensible adaptation of the setpoint is always a challenge in order to avoid putting product quality at risk or subjecting the switching equipment to excessive stress. The GHM ONE controller offers the possibility of a setpoint ramp for this purpose. The setpoint jump of the operator or the SCADA system is automatically implemented as a ramp. (Fig. 3)
The ramp function can be activated and deactivated again at any time. Normally, the regulation of non-linear segments or of systems with various load structures also poses a challenge. The GHM ONE supports the user in this connection with the possibility



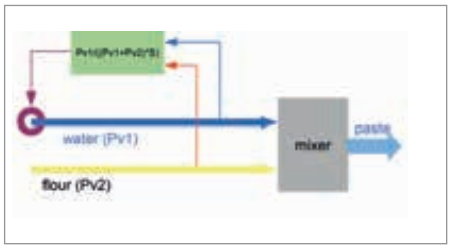
(Fig. 3)

of process-dependent PID parameters, among other things. Therefore, a suitable set of parameters can be used for various phases of the process.
(Fig. 4)

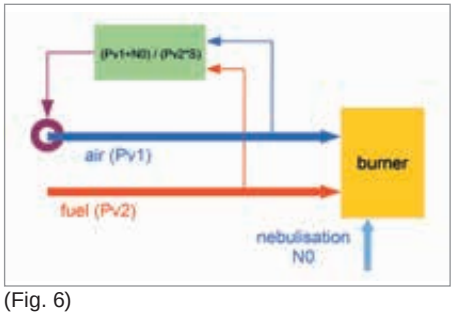


(Fig. 4)

In the process, the switching takes place either automatically or via operator command.
In addition to the regulation of a process factor, there is always the requirement of controlling the relationship of process factors. The control module supports the user in this connection with special functions for actual value processing. Therefore, the user can create a regulation of the mixture ratio of materials (Fig. 5) or even correct a stoichiometric combustion air ratio. (Fig. 6) The user can even implement the requirement of a three-component regulation without programming skills. (Fig. 7)

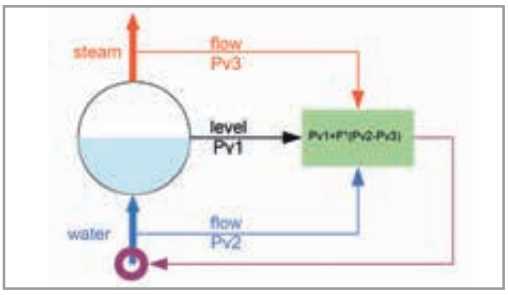


(Fig. 5)



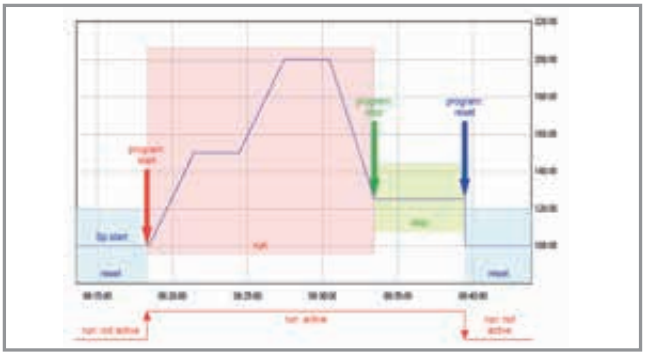
(Fig. 6)

Since the controller module can be used multiple times in GHM ONE, it is possible for the user to also build more complex control structures, such as cascade control to increase the control quality of intricate processes or an override control (forced control) to avoid excessive stress of components. Of course, it is also possible to build a multi-loop control system without difficulty.



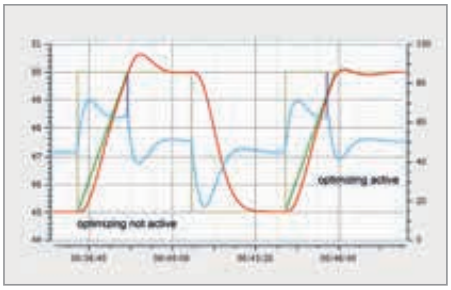
(Fig. 7)

In many processes a temperature profile or various mixture ratio play an important role during production. In order to ensure that the user does not have to create an elaborate profiler on their own, GHM ONE offers a profiler with profile editor. (Fig. 8)



(Fig. 8)

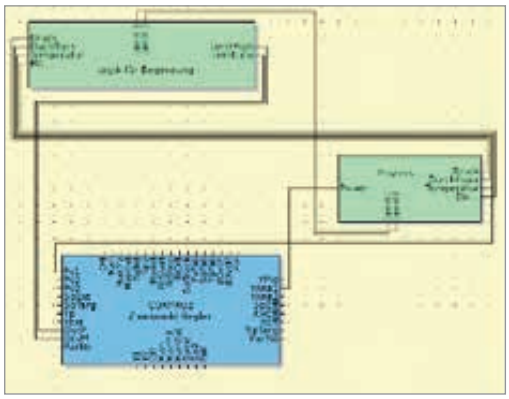
This profiler can be used multiple times within an application. An essential element for setpoint profiles is the ramp function. With an external profiler the user is repeatedly faced with the situation of a heavy overshoot occurring at the end of a ramp. GHM ONE knows to counteract this disadvantage with a connection between the profiler and the controller module. (Fig. 9)



(Fig. 9)

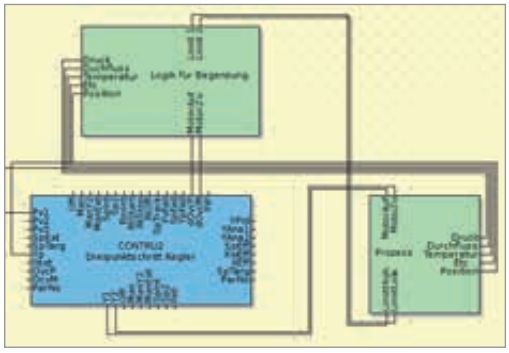
For this purpose, the controller module has a newly developed finish function. This function ensures that undesired jumps of the variable at the end of the ramp are avoided. Therefore, a gentle approach to the setpoint is realised. The computing functions of GHM ONE can be used for the calculation of process factors, such as a heat quantity. It is also possible to use the results for additional control processes.

For instance, a limit control can be effectively implemented in a chemical application (Fig. 10) or the regulation of the C-level in carbonisation processes.



(Fig. 10)

The logic modules can also be optimally used in this connection. (Fig. 11)



(Fig. 11)

Along with the functions for control technology that are expected in today's industry, the GHM ONE controller offers numerous additional functions such as individual adaptation of the operation and visualisation, the possibility of integration of process control, the recording and visualisation of process variables, and communications modules for integration into various process landscapes. This all makes GHM ONE the complete solution for smaller to medium-sized processes.

Product information Multifunction controller

Advantage

- Industrial controller and mini PLC in one device
- No programming skills required to create an application
- Individual operation and monitoring concepts for a wide variety of processes
- Modular hardware concept for optimal adaptation to the process
- Possible saving of individual controllers, data recorders, and visualisation systems

Equipment	Function	Input	Output	Installation	Page
GHM-ONE	Measure/Control/Regulate			control panel installation	**6**

Subject to errors and changes.

Multifunction controller GHM-ONE MSR9696H

- **Visualisation system with 3.5“ TFT display**
- **Control unit with 4 function keys and touch display**
- **Modular I/O concept**
- **PID control function**
- **Multi-Loop system**
- **Profiler function**
- **Process control with more than 100 functions**
- **Process calculation with mathematical library**
- **Screen recorder function**
- **Data logger function**
- **Communications card with various field buses**

Features

The GHM ONE is a multifunction unit that can be specifically adapted to process and control requirements with the GHM CAT configuration software. Therefore, the system becomes an ideal control, regulating, and operating unit.
The GHM ONE gives the user the possibility of effectively implementing their ideas in the areas of automation and visualisation without the need for programming skills. The platform is an ideal basis for a wide range of applications, including:

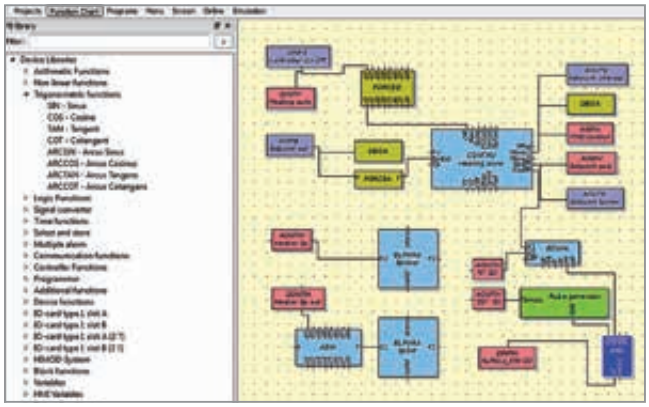
- Industrial furnaces
- Laboratory ovens
- Heat treatment systems
- Microbreweries
- Dryers
- Test stands
- Building automation
- Climate control
- Pasteurisation systems

The MSR9696H is based on a powerful processor which, in combination with a relay card and mains adapter card, serves as the base unit. The base unit can be adapted to applications with a communications card and up to 2 I/O cards. The number of physical inputs and outputs can be expanded with external I/O’s. This modular layout enables specific adaptation of the hardware to the automation task. The creation of the application itself takes place in the MSR 9696H with the ‚Configuration and Application Tool‘ CAT. The software assists the user with more than 100 complete function blocks and intuitive operation for the implementation of their ideas.

This saves time when creating applications with high operational reliability.

Quick and easy to put ideas into practice

The creation of applications is child’s play with the MSR 9696H. Based on the concept of connecting of existing function blocks, the user creates applications comprising process controls, mathematical calculations and process regulation in the shortest possible time. For this purpose the CAT configuration software provides a function library with more than 100 tested functions from the following areas:



- Input and output signals
- Computing functions
- Logic functions
- Signal conversion
- Time functions
- Memory functions
- Communications functions
- Profiler functions
- Regulating functions

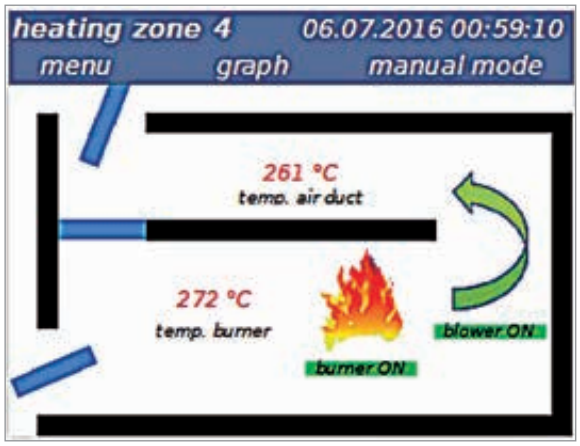
The user only has to combine and connect these functions in the editor and thereby implement their idea without the need for any programming skills. Testing of the individual functions is omitted, because they are provided ready-to-use, and were not created by the user. Therefore, the user can concentrate entirely on implementing their idea. In addition to the support provided to the user by the function library, the CAT configuration tool offers additional functions in the editor. For instance, the user can structure their application in order to maintain an overview, create their own function blocks for recurring functions in order to save time, and test sub-areas of their application independently of other project areas with simulation functions.

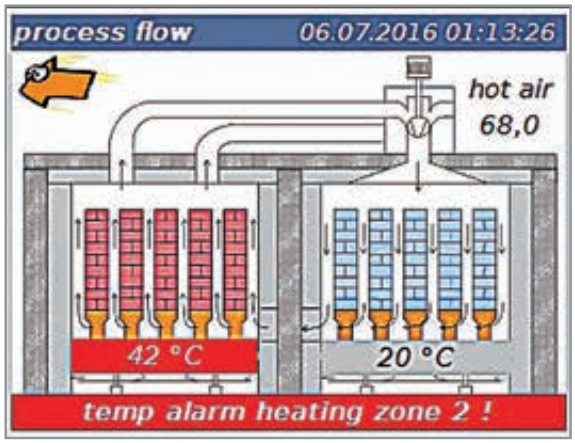
With consistent use of the latest software architectures and functions, it is possible for the user to realise their application with CAT without an extensive familiarisation period.

Individual operating and monitoring concepts

The work does not end with the creation of pure process control and regulation for modern machine and system parts. The process technician must provide the operator on site with the possibility of effectively monitoring and operating the system. The user must also remain well-informed in the event of a fault in order to keep the system downtime to an absolute minimum. Standard operating concepts are of little help in this connection. Therefore, the MSR 9696H is based on a concept that enables individual design of the operation and visualisation.
For this purpose, the CAT software provides an image editor that 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 screens, there are standards screens such as:

Regulator operation	Program controller operation
Trend visualisation	Parameter dialogue





available in the screen editor. With the combination of standard operating screens and individually designed screen, an efficient interface between the operator and the process is created in the shortest time.

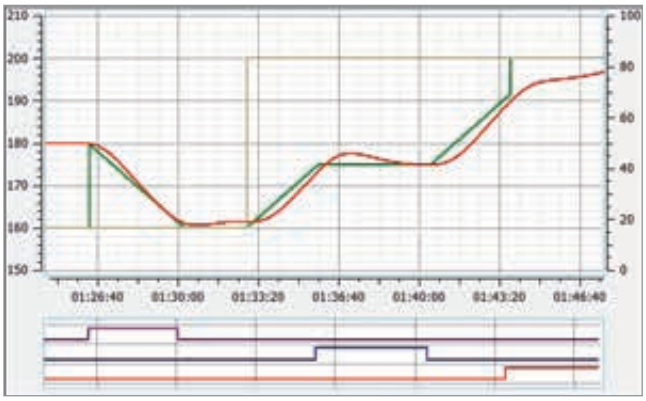
Thanks to the efficient software structure, even complex operating structures are easy to realise with the image editor.

Commissioning and testing quickly and easily

Of course, the process technician's work is not finished with the creation of an application and its operation. The application still has to be tested and commissioned afterwards. For this important and in some cases lengthy phase, the new GHM platform provides various functions to streamline this phase.

An essential point is the PC simulation of the complete application. The entire application can be tested on a PC independently of the actual process. For this purpose, the CAT software has a simulation environment for the MSR 9696H and 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 real process. Simply test the application at a desk without risk.

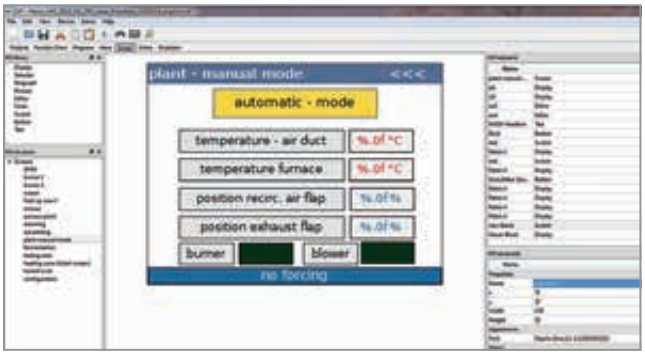
There are additional testing functions available to the user for the on-site system commissioning phase. An essential component is an integrated online trend function that allows the user to view all analogue and digital signals online in a trend and thereby quickly and easily monitor the desired functions. Of course, there are also debugging and various forcing functions available for the testing.



Simulation on a PC significantly shortens testing and commissioning times and increases system safety.

Application designer in CAT

CAT software configuration tool
The CAT (Configuration and Application Tool) tool enables the user to completely configure the GHM ONE. It essentially comprises the function plan editor, the HMI editor, the menu editor, the simulation, and commissioning assistance with debugging function and online diagrams.



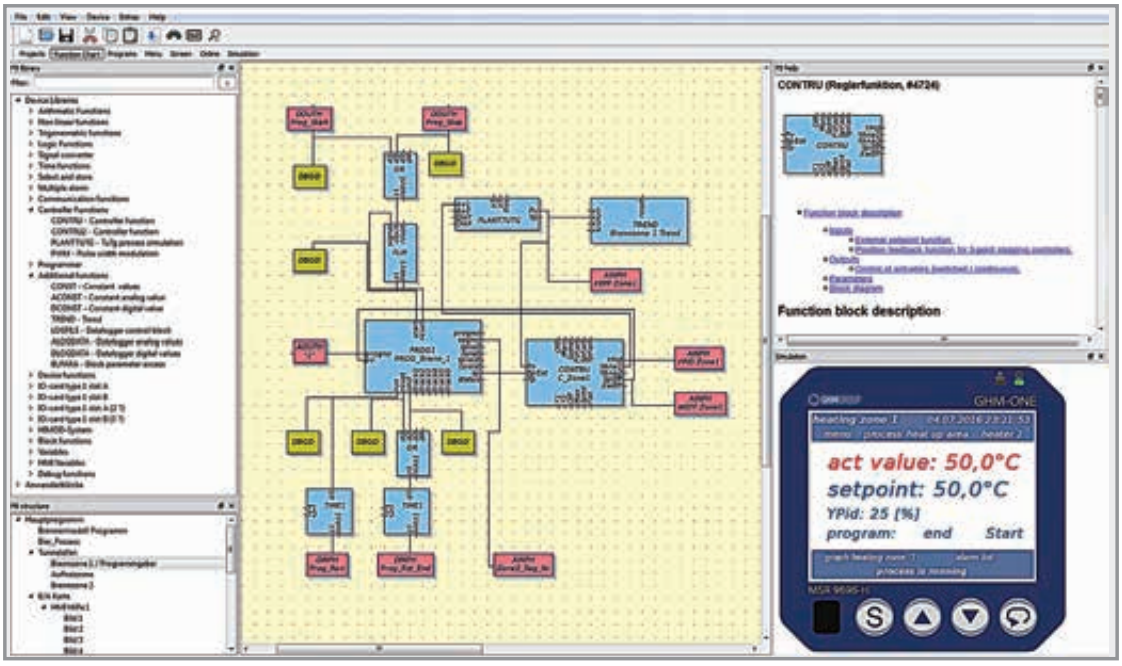
The major functions are:

- Creation of the application from finished functions found invarious libraries
- Graphic linking of functions in the function plan editor
- Automatic alignment of connections
- Parameterisation of functions
- Creation of operating structure and visualisation (HMI)
- Creation of test menus for parameterisation on the GHM ONE
- Creation of programs for the program controller
- Simulation of the overall application on the PC, including simulation of control paths
- Online device function with debugging functions for application testing
- Transfer of applications to the GHM ONE.
- Firmware update function
- Online help for all functions

The core of the application creation is the function plan editor with the function module library. With the help of the function modules, the user assembles their application without the need for any programming skills. Three are more than 100 tested functions in the library which can be easily placed on the desktop and connected using the mouse. Declaring of variables and complex assignment of functions are omitted. In this manner, the user can effectively create their system or process from finished modules. The application operating and monitoring screens are then created based on the function block application. Therefore, specific information can be displayed for the person on site and detailed screens can be created for service technicians. These screens are freely configurable. It is even possible to integrate process screens or other graphics. The user can also create text-based operating screens in order to enable efficient input of several types of process data.
After the application has been created, it can also be tested in the CAT tool. With the simulation, the software offers an exact representation of the device in all its functions. Even the hardware inputs and outputs can be simulated. Therefore, the user can test the application in an initial step without any risk for the system. Support of the user by the CAT software continues in the scope of the commissioning with various forcing and debugging functions and a refined online visualisation of analogue and digital values. With this wide variety of information and intervention possibilities, efficient commissioning is practically assured.

All configurations for the GHM One takes place in a single tool. The elaborate orientation in various software packages for controllers, data monitors, data loggers, mini-SCADA and mini-PLC can be dispensed with.

Application commissioning and testing times are minimised with a complete device simulation.



Communication channels

The expansion of the MSR9696H with additional analogue and digital signals from the field is possible with the optional communications card. The expansion can take place via the GHM I/O system, in which case no additional bus coupler is required in the field. The hardware concept of the MSR 9696H also provides the possibility of connecting external I/O and other field bus participants via various field bus system

- ModbusTCP
- Modbus RTU

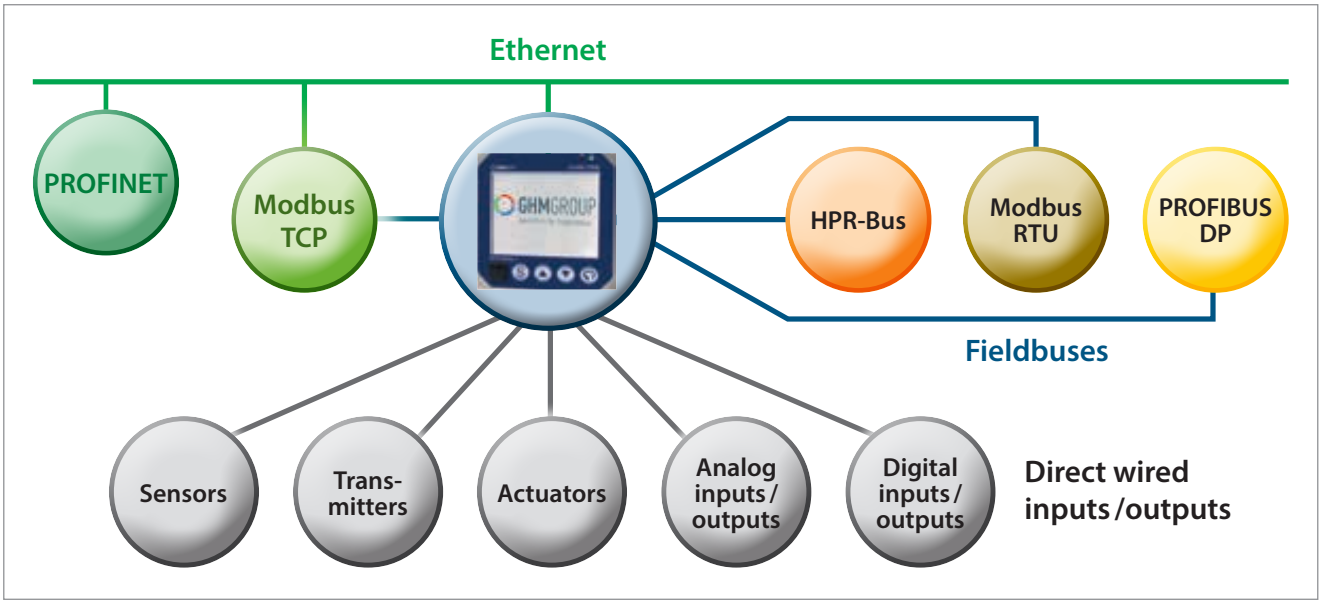
In the modern world of automation it is becoming increasingly important that devices exchange data with other devices M2M. The user can address this task with various interfaces to the PLC and control system level. For this purpose, the MSR 9696H offers

- ProfiNet (*currently without a certificate / certification pending)
- Profibus DP
- ModbusTCP
- Modbus RTU

as possible connections. With this communications concept, the device can be individually integrated into various process areas. In addition to I/O systems, field-bus compatible sensors and actuators connected directly to the MSR 9696H with the standard systems. The overall configuration of the process values for external communication is created exclusively in CAT.

The files required for the master systems such as ProfiNet and ProfiBus are included. Integration takes place with the standard systems of the respective manufacturer. Therefore, integration existing systems is possible without extensive additional work. The user relies on standards that are established in the market.

Time-saving integration of the MSR 9696H in superordinate SCADA or PLC worlds with the help of standard field buses. Simple expansion of the MSR 9696H I/O with external field bus systems.



Control technology, profiler

The function library provides controller modules as a basis for control-related tasks. These modules can be operated as

- 2-point controllers
- 3-point controllers
- Motor step controllers

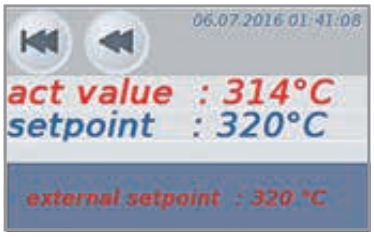
In the process, it is possible to operate the controllers as analog or switching controllers. A wide spectrum of setpoint and actual value functions and setpoint functions round out the scope of module functions. Additional functions are available for specific tasks, such as:

- Boost function
- Soft start
- Smooth switching
- PID parameter adaptation

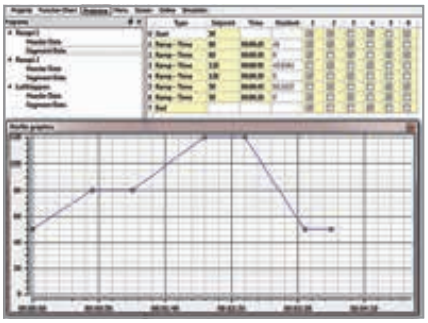
in order to assist the user in the realisation of tasks. With the help of several controller modules, even complex control technology structures can be implemented. This enables implementation of solutions such as

- Cascade regulation
- Limit control
- Ratio control
- Multi-Loop control / multi-variable control

and other control strategies with the assistance of standard functions. Of course, all controllers have the possibility of self-tuning.



But that is not all when it comes to control technology and process control. The library also provides a profiler that is needed in many cases to adopt the control for certain processes. This is necessary whenever the material structure must be influenced over the course of a process. The profiler comprises up to 20 programs with 60 segments each. One analogue and 6 digital tracks are available per segment. The program structure is realised in CAT with simple input of the segment times and setpoints.

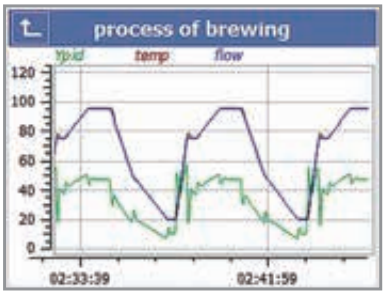


With the help of finished controller modules, realisation of control technology tasks is possible without extensive knowledge in the area of control technology.

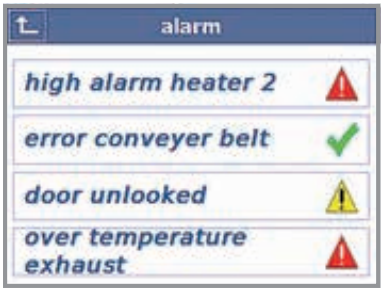
Data recording

In many areas of industry, the recording of process data is an essential element of quality assurance. The GHM One library offers the possibility of realising a data logger and a data recorder in the device. Configuration of the data logger takes place directly in CAT with function blocks. This makes it possible to log digital and analogue signals in various time periods.
The analogue data can be recorded as minimum, maximum or mean values over a specific time period. The data is saved in the device on an eMMC chip and can be read via the Ethernet port via FTP. The device has a data storage capacity of 2GB. The readout of data via USB ports on the front and rear sides is in preparation. The data is provided to the user in a standard ASCII format (csv) for further processing and analysis.

The trend representation on the device takes place on predefined operating screens. Up to 4 curves can be represented in one trend. By cascading the function, various time periods can be represented. Since the trend block can be opened multiple times in the HMI application, it is possible to use the GHM one as a multi-channel recorder.



The trend representation is independent of the logger function, and so various process signals can be displayed and recorded. The library also provides an alarm block. this block can be used to display alarm lists in plain text on the device. The alarms can be acknowledged on the device and even used for further processing within the application.



Data recording, data logging and alarming round out the performance spectrum of GHM ONE. No additional devices are required for visualisation and data backup.

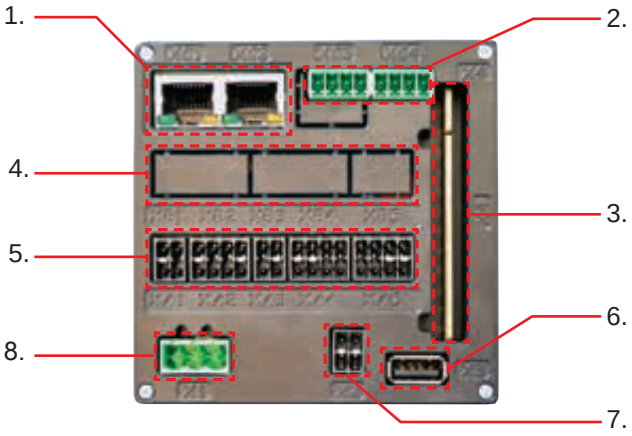
Product information Multifunction controller

Device front

1. Definable red/green status display LEDs
2. 3.5“ TFT colour touch display
3. 4 freely configurable operating keys
4. USB device
- Load / read application
- Debugging function (online representation)
- Write / read parameters

General
- Protection rating IP 65 (front side only! rear side IP 20)
- Outside dimensions 96mm x 96 mm x 115 mm (installation lengthwithout plugs and cables)

Device rear side

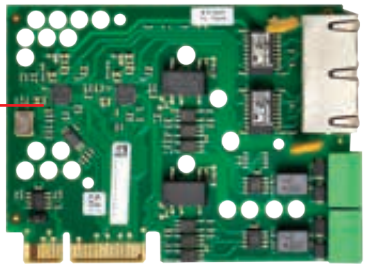


1. Ethernet communications interface (see detailed description under, Communication‘)
2. Serial RS485 Modbus / HPR bus communications interface
3. Relay card with 4 changeover contacts (see detailed description under ‚Relay outputs‘)
4. I/O card - slot B (see detailed description under ‚Standard I/O card‘)
5. I/O card - slot A
6. USB host (see detailed description under ‚Data transfer‘)
7. Transmitter power supply
8. Power supply

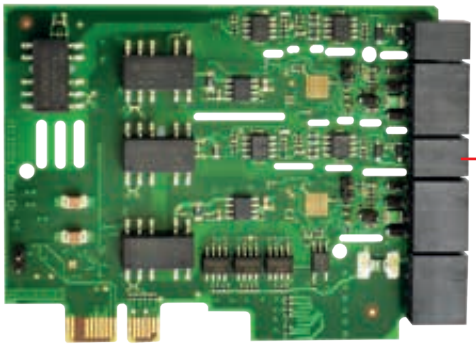
- Coding protection of terminals
- Easy to use spring-type terminals
- Lockable circuit board terminal for relay connections

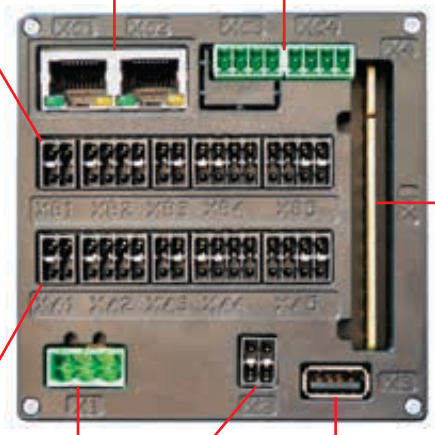
Overview of slots / rear side connections

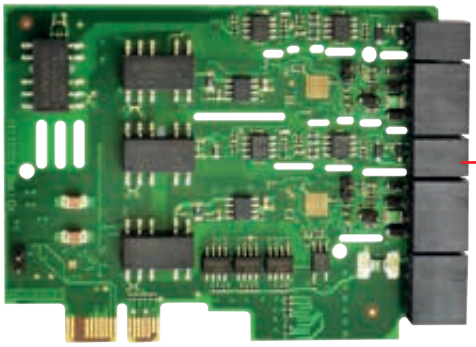
Communications card
Modbus / HPR bus



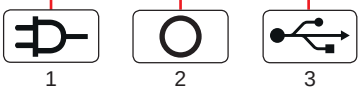
I/O card type 1 / slot B







I/O card type 1 / slot A



1 Power supply connection
2 Transmitter power supply
3 USB host

Relay card with 4 changeover contacts

Functions in detail

MSR9696H base unit

Base unit general technical data

Controls / device front

Keys	:	4 freely assigned keys
Touch function	:	Resistive touch display

Display

Front LEDs	:	1 red freely assigned LED 1 green freely assigned LED
Display	:	3.5“ TFT display 320 × 240 pixel QVGA resolution

Data logger

Storage medium	:	eMMC chip
Storage capacity	:	approx. 1 GB
Storage rate	:	>= 1 second

Auxiliary energy

Supply voltage	:	100 – 240 V AC or 24 V DC
Power consumption	:	Typically 10W
Electrical connection	:	Spring-type terminal, 3-pin
Conductor cross-section	:	0.25mm to 2.5mm
Galvanic isolation	:	I/O level / auxiliary energy / processor

Environmental conditions

Operating temperature	:	0..+55 °C
Storage temperature	:	-20..+70°C
Relative air humidity	:	95%, non-condensing

Air and creep distances

Degree of contamination	:	2
Overvoltage category	:	II
Maximum elevation	:	2000m
Rated voltage category a	:	230V
Test voltage category a	:	3000 VAC 1min.
Rated voltage category b	:	50V
Test voltage category b	:	520 VAC 1min.

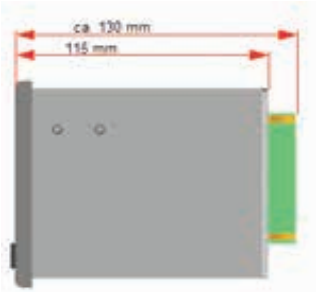
Housing

Type	:	Device for control panel installation
Protection rating	:	IP65 front side IP20 lens tube and rear side

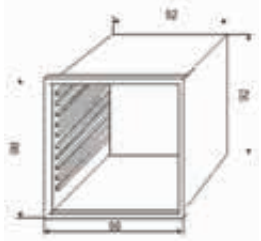
Dimensions

width / height / depth	:	98 mm × 98 mm × 115 mm (without plug) 98 mm × 98 mm × 130 mm (with plug)

Housing dimensions in mm



Dimensions for the control panel cutout



Minimum spacing between devices

Outputs (relay card)

The relay card is a base card with 4 relays designed as change-over contacts. It is not possible to exchange the relay card with other I/O cards.

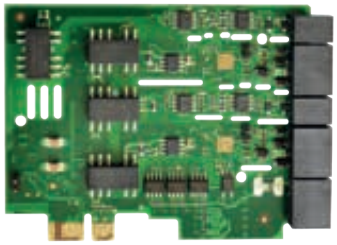
Relay

Type	:	Changeover contacts
Number	:	4
Electrical connection	:	Spring-type terminal
Conductor cross-section	:	0.25mm to 1.5mm
Switching voltage	:	<250V AC < 4A

Note:

If a control contactor is connected to a relay output, an RC protective circuit (RC snubber) required according to the contactor manufacturer specifications in order to prevent high voltage peaks. Varistor protective circuits are not recommended.

Option 1: I/O card type 1



Up to 2 I/O cards can be installed in the device.
The type ‚1' card has:

- 2 analogue universal inputs
  TC / RTD / -1000..+1000mV / 0..+20mA)
- 2 analogue standard inputs
  (0..+10V / 0..+20mA)
- 2 analogue standard outputs
  (0..+10V / 0..+20mA)
- 6 digital inputs or outputs

Analogue universal input
The card is equipped with 2 analogue universal inputs

Galvanic isolation
The two universal inputs are galvanically isolated from each other. There is also galvanic isolation for the power supply, the digital inputs and outputs, analogue outputs, and the processor and the communications. There is a galvanic connection to the corresponding analogue standard input (terminal X2 / terminal X4).

Converter resolution : > 18 Bit
Cycle time : 50ms
Galvanic isolation : corresponding to category a

RTD measurements
Input type : Resistance
Connection type : 3-wire

Measuring ranges

Pt100 / Pt1000	-200..+850°C
Ni100 / Ni1000	-60..+300°C
KTY 11-6	-50..+125°C

Measured current

Pt100 / Ni100	I < 0,5mA
Pt1000 / Ni 1000	I < 50µA
KTY 11-6	I < 50µA

Accuracy : ≤ 1K
Temperature drift : ≤ 0.08% / 10K
Measuring circuit monitoring : Short-circuit and interruption

Thermocouple measurements
Input type : Voltage measurement
Connection type : 2-wire
Input resistance : >10 MΩ

Thermocouples

Type	Measuring range	Accuracy	Resolution
L	-200..+900°C	≤ 2 K	0,05 K
J	-210..+1200°C	≤ 2 K	0,05 K
K	-270..+1370°C	≤ 2 K	0,08 K
N	-196..+1299°C	≤ 2 K	0,08 K
S	-50..+1760°C	≤ 2 K	0,07 K
R	-50..+1760°C	≤ 2 K	0,07 K
T	-270..+400°C	≤ 2 K	0,02 K
E	-270..+1000°C	≤ 2 K	0,04 K
B	+25..+1820°C	≤ 3 K	0,1 K
W	0..+2299°C	≤ 3 K	0,1 K

Temperature drift : ≤ 0.08% / 10K
Measuring circuit monitoring : Interruption
Cold-junction compensation : internal / auxiliary error < 2 K

Resistance measurement
Input type : Resistance measurement
Connection type : 2-wire
Measuring range : 0..20 kΩ
Detection range : Measuring range + 10%
Accuracy : ≤ 0.1%
Temperature drift : ≤ 0.08% / 10K
Measuring circuit monitoring : Exceeding the detection range

Current measurement
Input type : Current
Connection type : 2-wire
Measuring range : 0..20mA
Detection range : Measuring range + 10%
Input impedance : max. 50Ω
Accuracy : ≤ 0.1%
Temperature drift : ≤ 0.08% / 10K
Measuring circuit monitoring : Exceeding and/or undercutting the detection range

Analogue standard input
The card is equipped with 2 analogue standard inputs.

Galvanic isolation
The two standard inputs are galvanically isolated from each other. There is also galvanic isolation for the power supply, the digital inputs and outputs, analogue outputs, and the processor and the communications. There is a galvanic connection to the corresponding analogue universal input (terminal X2 / terminal X4).

Converter resolution : > 18 Bit
Cycle time : 50ms
Galvanic isolation : corresponding to category a

Current measurement
Input type : Current
Connection type : 2-wire
Measuring range : 0..20mA
Detection range : Measuring range + 10%
Input impedance : max. 50Ω
Accuracy : ≤ 0.1%
Temperature drift : ≤ 0.08% / 10K
Measuring circuit monitoring : Exceeding and/or undercutting the detection range

Product information Multifunction controller

Voltage measurement

Input type	: Voltage
Connection type	: 2-wire
Measuring range	: 0..10V
Detection range	: Measuring range + 10%
Input impedance	: typically 1.2MΩ
Accuracy	: ≤ 0.1%
Temperature drift	: ≤ 0.08% / 10K
Measuring circuit monitoring	: Exceeding and/or

Analog output

The card is equipped with 2 analogue standard outputs

Galvanic isolation

The two standard outputs are galvanically isolated from each other. There is also galvanic isolation for the power supply, the digital inputs and outputs, analogue outputs, and the processor and the communications.

Converter resolution	: 12 Bit
Linearity	: < 0.1%
Accuracy	: < 0.2%
Temperature drift	: ≤ 0.1% / 10K
Cycle time	: 50ms
Galvanic isolation	: corresponding to category a

Current output

Dynamic range	: 0..+22mA
Output resistance	: max. 500Ω

Voltage output

Dynamic range	: 0..+11V
Output load	: RL ≥ 1 kΩ

Digital inputs and outputs

The I/O card is equipped with six inputs/outputs; the function for the respective signal can be configured in CAT. The supply of the inputs/outputs must be provided externally.

Galvanic isolation

The inputs/outputs are not galvanically isolated from each other. There is galvanic isolation for the power supply, the analogue inputs and outputs and the processor and the communications.

Supply voltage	: 24V DC +/- 20%
Galvanic isolation	: corresponding to category a
Digital outputs	: maximum output current 100 mA

Counter input

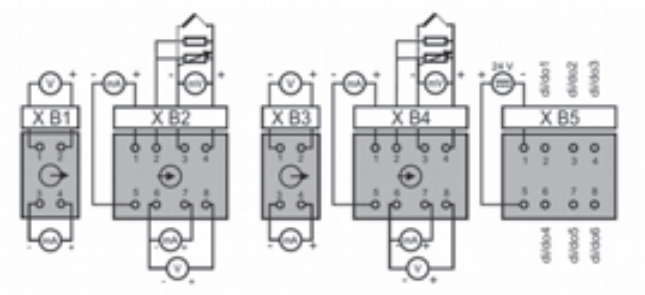
Two digital inputs (Inputs 1 and 3) can be configured as counter inputs

Limit frequency	: 10kHz
Output signal	: Pulses per time unit (configurable)

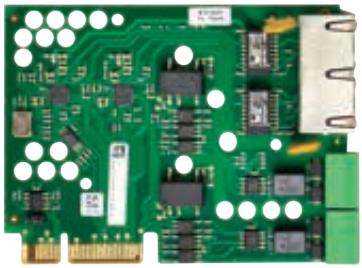
Electrical connections

Electrical connection	: Spring-type terminal
Conductor cross-section	: 0.25 mm to 1.5 mm (with wire end ferrule / without plastic sleeve)
Conductor cross-section	: 0.25 mm to 0.75 mm (with wire end ferrule / without plastic sleeve)

I/O card connections



Option 2: Modbus / HPR bus communications card



The communications card is equipped with 2 Ethernet ports (IEEE 802.3) and 2 RS485 interfaces.

Ethernet	
Connection	: RJ-45
Function	: 10/100 Mbit/s Auto-negation Auto-MDIX IP via DHCP or fix
LED	: Link / data
Protocol	: ModBusTCP Slave ModBusTCP Master FT server

Ordering code

GHM-ONE

MSR9696H - 1. ☐ - 2. ☐ - 3. ☐ - 4. ☐ - 5. ☐

GHM			
Multi-function controller			
1.	**I/O card slot A**		
	0	No card in slot A	
	1	I/O card with 2 universal inputs 2 standard signal inputs 2 analogue standard signal outputs 6 digital inputs or outputs	
	2	I/O card with 2 universal inputs 2 high-impedance mV inputs for O_2 measurement 2 analogue standard signal outputs 6 digital inputs or outputs	
2.	**I/O card slot B**		
	0	No card in slot B	
	1	I/O card with 2 universal inputs 2 standard signal inputs 2 analogue standard signal outputs 6 digital inputs or outputs	
	2	I/O card with 2 universal inputs 2 high-impedance mV inputs for O_2 measurement 2 analogue standard signal outputs 6 digital inputs or outputs	
3.	Communication card		
	0	No communication card	
	1	**Communication card with** 2 x Ethernet; 2 x RS485 (Modbus TCP / Modbus RTU and HPR-Bus)	
	2	PROFINET, Ethernet/Modbus RTU, HPR-BUS	
	3	1 x SUB-D (Profibus), 1 x Ethernet, 1 x RS485 (Modbus RTU and HPR-Bus)	
4.	**Auxiliary voltage**		
	1	230 V AC	
	2	24 V DC	
5.	**Options**		
	0	No options	
	Accessories		
	USB connecting cable for connection of a PC, length 1.5 m (Art. Nr. 190064)		

GHM-CAT software

GHM-CAT-LZ - 1. ☐

GHM			
1.	**Software licenses**		
	LZ1	One license dongle	
	LZ2	3 license dongle	
	LZ5	5 license dongle	
	LZ10	10 license dongle	

www.ghm-group.de

GHMGROUP
Specialists by Competence.

Product information

Displays

Characteristics

Display
- 7-segment
- 7.6, 10, 14, 20 mm
- Bar-graph, Red, green

Color
- Red, green, blue, yellow

Case
- Panel mounting

Front dimensionse
- 48x24 mm
- 48x48 mm
- 72x24 mm
- 96x48 mm
- Field case

Connection
- Slide-in terminals
- Clamp terminals

Applications

- **Industry metrology**
- **Indicating of process data**
- **Alarm display**
- **Indicating state for drum-, machineand tank-engineering**
- **Temperature measurement**

Function and advantages

Simple user-friendly programming, or, to be precise, the setting of the operating parameters of each digital display, makes the troublefree adaptation of the display systems and the fixed measuring instruments to the customized application possible. We also have large displays in our portfolio to display information on ongoing processes or to display key process data.
The multitude of modifiable settings of each display remains very clearly arranged and simple thanks to the menu-driven parametrization, even without separate parametrization software.

As manufacturer and supplier of digital displays, and the many years of experience gained there while, we provide our customers a high degree of flexibility and efficiency in start-up.
All devices built-in the instrument panel of this product group can be supplied in sturdy, closed plastic casings for front face panel installation in the prevalent casing dimensions of 48x24 mm, 48x48 mm, 72x24 mm, 96x24 mm and 96x48 mm. Auxiliary power of the field measuring devices, digital fixed measuring instruments and panel meter is potential-free from the measurement input.

General

Measuring Input – Sensor type
- Industry standard signal 0/4..20 mA
- Industry standard signal 0/2..10 V DC
- Voltage AC/DC
- Current AC/DC
- RTD Pt100/Pt1000
- Thermocouple type J, K, N

Instrumentation – Connection
- 2-wire connection
- 3-wire connection

Output
- Analogue output active 0/4..20 mA
- Analogue output active 0/2..10 V DC
- Impulse output 0/18 V DC
- Relay output change-over contact
- Transistor output PNP

Features
- 7-segment displays character height 7, 10, 14.2 and 20 mm
- Display color red, yellow, green, blue (EP9648)
- Loop powered displays
- Graphic recorder
- Large size displays LED dot matrix max. 100mm character height
- Large size displays 7-segment
- character height from 50 up to 150 mm

Device Overview

Measuring principle / Device	Monitoring	BCD	Voltage	Current	Power	Resistance	DMS	Temperature	Conductivity	pH / ORP	Impulse / Frequency	Rotary / Flow	Quantity / Level	Counting Counting	0/4..20 mA , 0/2..10 V DC	Page
Panelmeter DIN 48x24																
BA4824N															•	28
BCD4824		•														29
DP4824								•							•	30
DP4824A								•							•	31
DP4824B						•									•	32
SP4824						•									•	33
GIA0420															•	34
DP4848A						•		•							•	35
Panelmeter DIN 72x24																
BA7224N															•	36
BCD7224		•														37
Panelmeter DIN 96x24																
BA9624N															•	38
BA9624B	•														•	39
Panelmeter DIN 96x48																
GA9648								•			•	•		•	•	40
EP9648								•							•	42
SP9648															•	43
S9648	•					•									•	44
T9648	•							•								45
DMS9648	•						•									46
TA9648	•												•			47
DF9648	•											•				48
A9648	•			•												50
V9648	•		•													51
DR9648	•										•	•				52
PR9648	•										•	•	•			53
SZ9648	•										•			•		54
UZ9648	•										•			•		55
LF9648	•															56
pH9648	•								•							57
Connection diagram XX96										•						59
Field case																
S1010	•														•	60
TA1010	•												•			61
T1010	•							•								62
DR1010	•											•				63
PR1010	•											•				64
UZ1010	•														•	65
LF1010	•								•							66
GIA0420 VO	•														•	67
Special devices																
Integra 1530	•		•	•	•											68
migra SC/MC											•	•		•		69
migan												•			•	71

Mistakes reserved, technical specifications subject to change without notice.

Bar Graph Display BA4824N

- **Universal version for 0/4..20 mA, 0..10 V DC**
- **Red LED indicator (optionally green)**
- **Vertical and horizontal installation**
- **All areas can be selected via connecting terminal**
- **Display area adjustable via potentiometer**

Characteristics

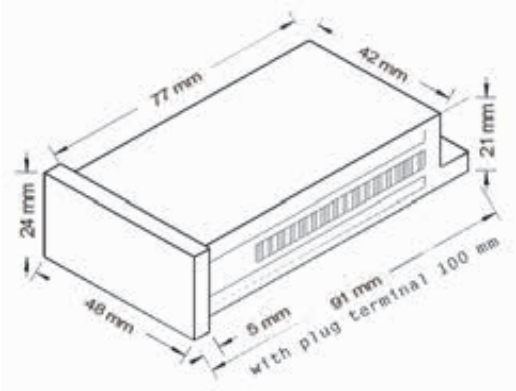
Series BA bar graph displays are especially well suited for representing continuously changing measurements. With their small design, they can be easily integrated into control panels and diagrams.

The version BA4824N is especially well-suited for processing input signals 0/4..20 mA, 0..10 V DC (limit value adjustable from 5..50 V DC). Adaptation to the corresponding input signal takes place via the connecting terminal. The display zero point and limit value can be adjusted via separate potentiometers.

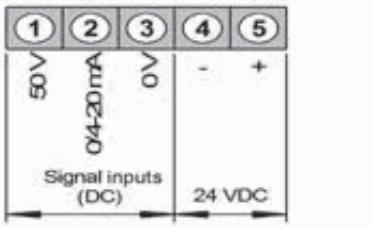
Technical data

Auxiliary power
Auxiliary voltage : 24 V DC ± 10 % isolated
Power consumption : approximately 1.5 VA
Operating temperature : 0..+60 °C
CE-conformity : EN 61326-1:2013; EN 61010-1:2010
Measurement input
Current input : 0/4..20 mA,
Voltage input : 0..10 V DC (adjustable limit value)
Input resistance : Ri at: 10 V = 100 kΩ, 20 mA = 100 Ω
Accuracy
Resolution : 10 digit
Basic precision : +/- 1 digit
Temperature coefficient : 100 ppm/K
Display
Range : 10 segments
Colour : red, optionally green
Housing : DIN 48 x 24 mm, installation depth 100 mm
Design : PC/ABS blend, black colour, UL94V-0
Panel aperture 42 x 21 mm
Fastening : locking screw element for wall thickness up to 50 mm
Weight : 60 g
Connection : rear plug terminals, max. 1.5 mm²
Protection class IP00
Ingress protection : Front IP54 or IP65

Dimensions



Connection diagram



Ordering code

	1.	2.	3.	4.	5.	6.	7.
BA		-		-		-		-		-		-	

1.	**Construction**	
	4824N	10 segments
2.	**Installation**	
	1	Vertical
	2	Horizontal
3.	**Bar colour**	
	1	Red display
	2	Green display
4.	**Auxiliary voltage**	
	5	24 V DC with electrical isolation
5.	**Input signal**	
	0	Universal version
6.	**Measuring range scale 0..100 %**	
	10	Universal version
7.	**Ingress protection**	
	1	IP54
	2	IP65

BCD Panelmeter BCD4824

- **Display red or green 3-digit**
- **LED 10 mm or 14.2 mm**
- **Input BCD parallel or multiplex**
- **Supply voltage 10..30 V DC, optional 5 V DC**

Characteristics

Digital Panelmeter BCD4824 was designed for monitoring and measurement applications, specially in connection with SPS automation. The multiplex mode minimize the number of input lines. The small case is suitable for installation in control units and panel boards.

Technical data

Power supply

Supply voltage	:	10..30 V DC
Power consumption	:	approx. 1.2 VA
Operating temperature	:	-10..+60 °C
CE-conformity	:	EN 61326-1:2013

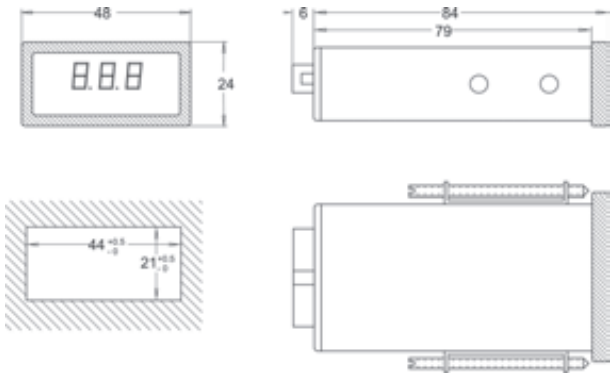
Display	:	3-digit LED 10 mm or 14.2 mm
Color	:	red or green
Decimals	:	single points selectable

Inputs

Control	:	Parallel or multiplex
Voltage level	:	Low-Signal 0..3 V DC; High-Signal 10..30 V DC, or TTL-level
Input resistance	:	approx. 20 kΩ minimal rise time of the Strobe inputs 10 ms

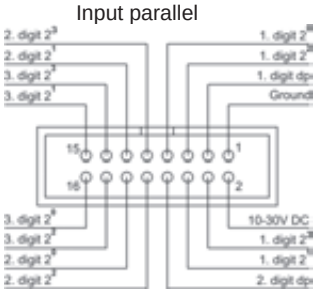
Case	:	DIN 48x24 mm, mounting depth 97 mm
Type	:	slide-in case according to DIN 43700, Noryl SE1 GFN2 panel cut-out 44x21 mm
Weight	:	approx. 60 g
Connection	:	terminal strip 16 pole,
Protection class	:	IP54 or IP65 terminals IP20 acc. to BGV A3

Dimensions

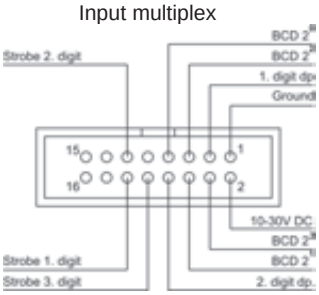


Connection diagram

Input parallel



Input multiplex



Ordering code

BCD 1. - 2. - 3. - 4. - 5.

1.	**Model**	
	4824	
2.	**Display**	
	1	LED red 10 mm
	2	LED green 10 mm
	3	LED red 14.2 mm
	4	LED green 14.2 mm
3.	**Supply voltage**	
	5	10..30 V DC
	7	5 V DC
4.	**Input**	
	1	0..3 V DC low; 10..30 V DC high, parallel
	2	5 V TTL-level, parallel
	3	0..3 V DC low; 10..30 V DC high, multiplex
	4	5 V TTL-level, multiplex
5.	**Protection class**	
	1	IP54
	2	IP65
	Accessories connection cable with terminal strip and pigtails	
	AK16K-AE-3	16x0.25 mm² length 3 m
	AK16K-AE-10	16x0.25 mm² length 10 m
	AK16K-AE-20	16x0.25 mm² length 20 m

Digital Panelmeter DP4824

- **Multipurpose input for 0/4..20 mA, 0..10 V, 0..100 Ω and PT100**
- **Adjustable display range -99..+999 Digit**
- **Conversion rate 4/s or 0.3/s selectable**

Merkmale

Digital Panelmeter DP4824 are designed for measurement applications in process technology and automation.
The small cases are suitable for installation in control units and panel boards. The universal input conception
allows indication of all physical dimensions, which can be converted to industry standard signal of 0...20 mA,
4...20 mA or 0...10 V DC.
Temperature measurement by RTD (Pt100)-sensors and 0...100 Ω potentiometers are possible as wel

Technische Daten

Power supply

Supply voltage	:	10,8..30 V DC
Stromaufnahme	:	< 50 mA
Arbeitstemperatur	:	-10..+60 °C
CE-Konformität	:	EN 61326-1:2013

Messeingang

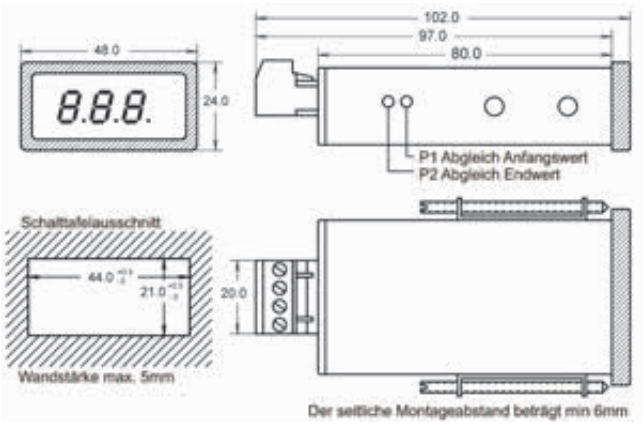
Spannungseingang	:	0..10 V DC
Eingangswiderstand	:	Ri = >8 MΩ
Überlast Spannung	:	max. 30 V DC
Stromeingang	:	0/4..20 mA
Eingangswiderstand	:	Ri = < 100 Ω
Überlast Strom	:	max. 60 mA
Widerstand		
Messtrom	:	ca. 3mA
Messbereich	:	0..100 Ω
Pt100	:	-99..+400 °C / -99..+700 °C
Messstrom	:	ca. 3 mA
Messstrom	:	ca. 0,2 mA (geringe Eigenerwärmung)
Grundgenauigkeit	:	0,5 % +/−1 Digit

Anzeige

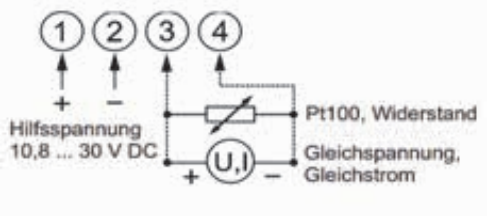
Messrate	:	4/Sekunde umschaltbar 0,3/Sekunde
Umfang / Farbe	:	3 Stellen, rot oder grün
Dezimalpunkt	:	einstellbar
Anzeigenhöhe	:	7,6 mm oder 10 mm
Überlaufanzeige	:	negativer Überlauf "-/ ", positiver Überlauf "/ "

Gehäuse	:	DIN 48x24 mm, Einbautiefe 97 mm
Ausführung	:	Kunststoffeinschubgehäuse nach DIN 43700, Noryl SE1 GFN2 Schalttafelausschnitt 44x21 mm
Gewicht	:	80 g
Anschluss	:	steckbare Klemmenleiste, max 1,5 mm² Schutzart IP20 gemäß BGV A3
Schutzart Front	:	IP54 bzw. IP65

Abmessungen



Anschlussbild



Bestellschlüssel

	1.		2.		3.		4.
DP4824	-		-		-		-

1.	**Anzeige**	
	1	3 ½-stellig LED rot 7,6mm
	2	3 ½-stellig LED grün 7,6mm
	3	3 ½-stellig LED rot 10,0 mm
	4	3 ½-stellig LED grün 10,0 mm
2.	**Ausführung**	
	1	Universalausführung
	2	Sondermessbereich (auf Anfrage)
3.	**Schutzart**	
	1	IP54
	2	IP65
4.	**Einheit** (erscheint als Gravur bzw Druck auf der Frontscheibe)	

Digital Panelmeter DP4824A

- **Multipurpose input for 0/4..20 mA, 0/2..10 V and potentiometer**
- **Input for RTD sensor Pt100/Pt1000**
- **Adjustable display range ± 1999 Digit**

Characteristics

The universal conception of the multipurpose input allows indication of all physical dimensions, which can be converted to 0/4..20 mA, 0/2..10 V DC. Other models of the DP4824A are for temperature measurement with Pt100 and Pt1000 sensors. The input configuration is switch selectable from the side, without opening the case. Input and supply voltage are isolated. The display range is adjustable with 20-turn trim pot´s for initial value and span.

Technical data

Power supply

Supply voltage	: 10.8..30 V DC; 17..30 V AC
Frequency AC	: 47..63 Hz
Power consumption	: approx. 1.2 VA
Working temperature	: -10..+60 °C
CE-conformity	: EN 55022, IEC 61000-4-2/4/11

Input

Voltage	: 0/2..10 V DC
Input resistance	: Ri = 40 kΩ
Overload	: max. 48 V
Current	: 0/4..20 mA
Input resistance	: Ri = 125 Ω
Overload	: max. 60 mA
Potentiometer	: min. 1 kΩ, max. 100 kΩ
Pt100	: -100.0..+199.9 °C / -100..+600 °C
Sensor current	: approx. 1 mA (low self heating)
Pt1000	: -50.0..100.0 °C
Sensor current	: approx. 0.2 mA (low self heating)
Accuracy	: < 0.05 % +/−1 Digit

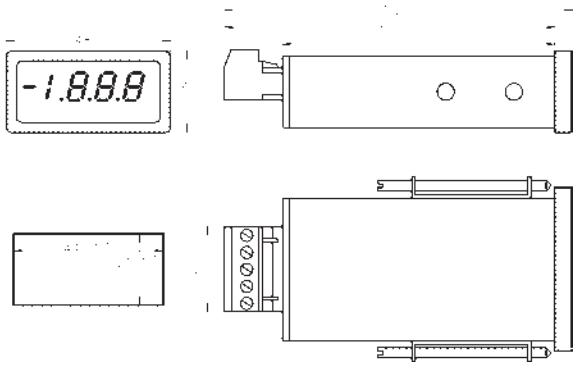
Display

Conversion rate	: approx. 2 / s
Range / color	: 3 ½ digit, red or green, 7.6 mm
Decimal point	: switch selectable
Overflow	: negative overflow " - - ", positive overflow " - "

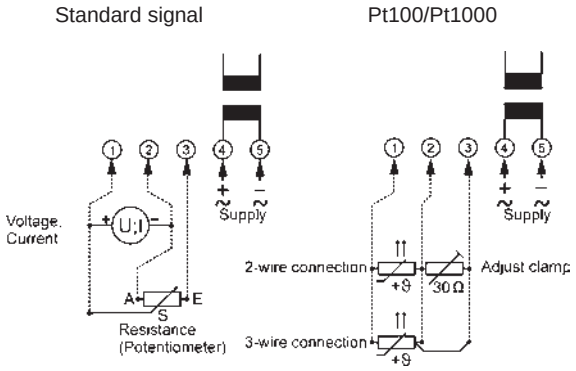
Case

Type	: DIN 48x24 mm, mounting depth 97 mm slide-in case acc. to DIN 43700, material Noryl SE1 GFN2 panel cut-out 44x21 mm
Weight	: 100 g
Connection	: plug-in terminal, max. 1.5 mm²
Protection class	: front IP54 or IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

DP4824A - 1. - 2. - 3. - 4.

1.	**Display**	
	1	3 ½-digit LED red 7.6mm
	2	3 ½-digit LED green 7.6mm
2.	**Input**	
	10	industry standard signal
	20	custom input (on request)
	50	Pt100
	53	Pt1000
3.	**Protection class**	
	1	IP54
	2	IP65
4.	**Unit** (appears on the face plate)	

Digital Panelmeter DP4824B

- **Multipurpose input for 0/4..20 mA, 0/2..10 V and potentiometer**
- **2 trim pot´s for initial and end value**
- **Adjustable display range ± 1999 Digit**

Characteristics

The universal conception of the multipurpose input allows indication of all physical dimensions, which can be converted to 0/4..20 mA, 0/2..10 V DC. The input configuration is switch selectable from the side, without opening the case. Input and supply voltage are isolated. The display range is adjustable with 20-turn trim pot´s for initial value and span.

Technical data

Power supply

Supply voltage	:	10.8..30 V DC
Power consumption	:	approx. 1.2 VA
Working temperature	:	-10..+60 °C
CE-conformity	:	EN 61326-1:2013

Input

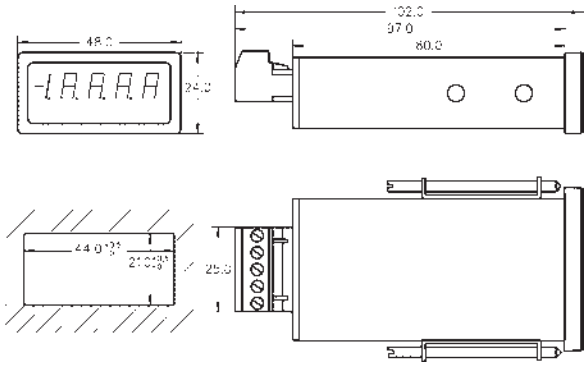
Voltage	:	0/2..10 V DC
Input resistance	:	Ri = 40 kΩ
Overload	:	max. 48 V
Current	:	0/4..20 mA
Input resistance	:	Ri = 125 Ω
Overload	:	max. 60 mA
Potentiometer	:	min. 1 kΩ, max. 100 kΩ
Accuracy	:	< 0.025 % +/−1 Digit

Display

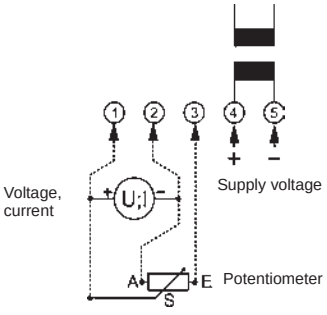
Conversion rate	:	approx. 2/s
Range / color	:	4 ½-digit, red or green, 8mm
Decimal point	:	switch selectable
Overflow	:	flashing " 0000„ with leading sign

Case	:	DIN 48x24 mm, mounting depth 97 mm
Type	:	slide-in case according to DIN 43700, material Noryl SE1 GFN2, panel cut-out 44x21 mm
Weight	:	100 g
Connection	:	plug-in terminal, max. 1.5 mm
Protection class	:	front IP54 or IP65 terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

	1.		2.		3.		4.
DP4824B	-		-		-	-	

1.	**Display**	
	5	4 ½-digit, LED red 8 mm
	2	4 ½-digit, LED green 8 mm
2.	**Input**	
	10	multipurpose device
	20	custom input (on request)
3.	**Protection class**	
	1	IP54
	2	IP65
4.	**Unit** (appears on the face plate)	

Loop Powered Panelmeter SP4824

- **LED-display without separate supply voltage**
- **Free adjustable indicating range**
- **Switch selectable conversion rate 3/s or 0,5/s**

Characteristics

Loop powered Panelmeter SP4824 can be used for indicating and measurement applications in process technology and automation. The small case is suitable for installation in control units and panel boards. The input allows indication of any physical dimension, which are stated in a signal of 4..20mA.

Technical data

Input

Current input	: 4..20 mA
Overload range	: -100..+150 mA
Voltage drop	: 2.5..3.4 V, depends on chosen display brightness
Accuracy	: 0.1 % , +/- 1 Digit
Operating temp.	: -10..+60 °C
CE-conformity	: EN 61326-1:2013

Display

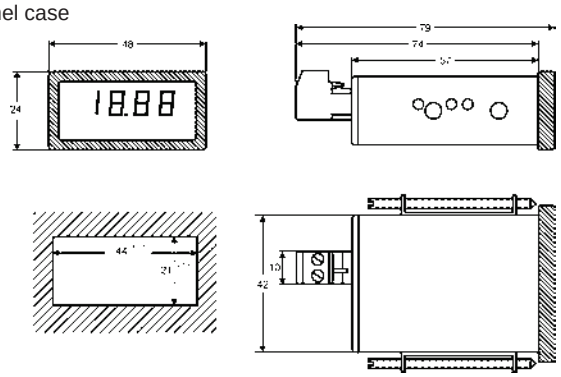
Indicating range	: -1999..+1999
Span	: adjustable 0..4000 Digits
Zero point	: adjustable -100..+25 % of the span
Brightness	: adjustable ≈ 40..100 %
Conversion rate	: 3/s switchable 0.5/s
Height	: 7.6 mm
Overflow indication	: "- / " for negative and " / " for positive overflow
Color	: red

Weight

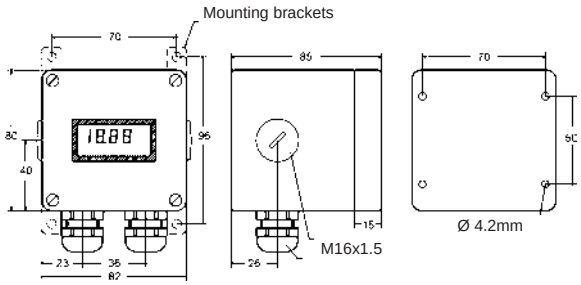
- Panel case	: approx. 50 g
- Field case	: approx. 270 g
Connection	: slide-in terminal strip, max. 1.5 mm², AWG16
Protection class	: front IP54 or IP65 terminals IP20 acc. to BGV A3

Dimensions

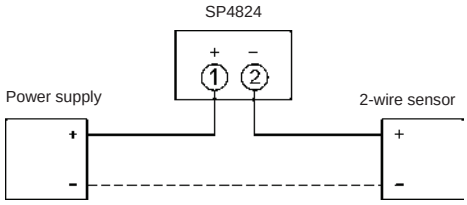
Panel case



Field case



Connection diagram



Ordering code

SP4824 - 1. - 2. - 3. - 4.

1.	**Device type**	
	1	panel case
	2	field case 82x80x85 mm (WxHxD)
2.	**Display characteristics**	
	S	increasing (Standard)
	F	decreasing
3.	**Protection class**	
	1	IP54
	2	IP65
4.	**Unit** (appears on the face plate)	
Accessories		
	10031201	mounting brackets

Display GIA 0420 N

- **Self-supplying, no additional auxiliary supply necessary**
- **Freely scalable**
- **Integrated self-diagnostic**

Characteristics

The GIA 0420 is a microprocessor-controlled displaying device for 4..20 mA standard signals.

Any transmitter (with 4..20 mA output) can be connected to the device. The range adjustment of the GIA 0420 to the transmitter is done by entering the initial and final value and the decimal point position. No additional auxiliaries are needed for this adjustment, but the three buttons on the back side of the device.

The GIA 0420 doesn't need a separate auxiliary supply but is directly supplied by the measuring current. It has an integrated self-diagnostic which checks the device that it works correctly. This self-diagnostic together with the transmitter's check for “sensor break” and “sensor short circuit” and range exceeding or falling below ensures an optimum of operational reliability.

Technical data

Measuring input

Input signal	:	4..20 mA (2-wire)
Accuracy	:	± 0.2 % FS ±1 digit
Measuring rate	:	5 measurements / seconds
Voltage load	:	3,5 V
Power supply	:	self-supplying: devices is supplied directly from measuring current
Working temperature	:	0..50 °C
Filter	:	adjustable in in 3 stages
Switching output	:	1x electrically isolated open collector switching output
Storage	:	min- / max-memory via buttons

Display

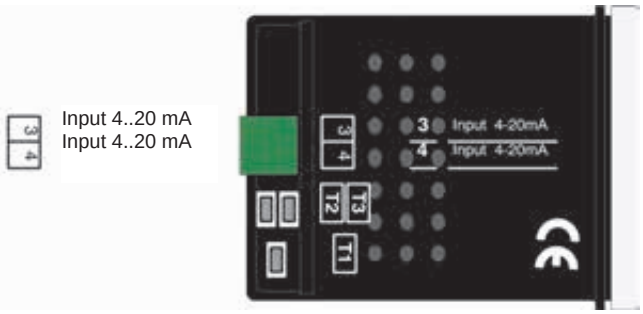
Display	:	LCD display
Height	:	10 mm
Display range	:	-1999..+9999 digit initial and final value adjustable

Connection	:	2-pole screw / clamp terminals, max. cross section up to 1.5 mm²
Housing	:	fibre-reinforced Noryl, front screen made of polycarbonate
Protection class	:	front IP54

Dimensions

Housing	:	24 x 48 x 65 mm (H x W x D)
Panel cutout	:	21.7 x 45 mm [±0.5 mm] (H x W)

Connection diagram



Design type

010N		Input signal: 0..20 V (3-wire) Input resistance: approx. 100 kOhm Power supply: 12..28 V, < 10 mA
ex	Ex	with ATEX protection for explosive areas

Ordering code

GIA 1. - 2.

1.	**Design type**	
	0420N	Display 0..20 mA
	010N	Display 0..10 V
	0420N-ex	Display 0..20 mA with Ex-protection
	010N-ex	Display 0..10 V with Ex-protection
2.	**Option**	
	00	without option

Digital Panelmeter DP4848A

- **Multipurpose input for 0/4..20 mA, 0/2..10 V and potentiometer**
- **Input for RTD sensor Pt100/Pt1000**
- **Adjustable display range -199..999 Digit**

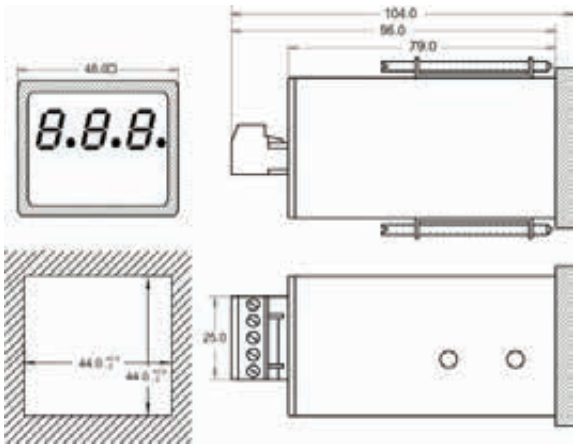
Characteristics

In spite of the small device size, the large display provides a good view from afar.
Other models of the DP4848A are for temperature measurement with Pt100 and Pt1000 sensors. The input configuration is switch selectable from the side, without opening the case. Input and supply voltage are isolated. The display range is adjustable with 20-turn trim pot's for initial value and span.

Technical data

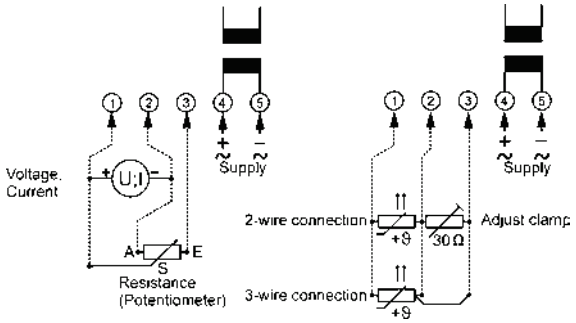
Power supply		
Supply voltage	:	10.8..30 V DC; 17..30 V AC
Frequency AC	:	47..63 Hz
Power consumption	:	approx. 1.2 VA
Working temperature	:	-10..+60 °C
CE-conformity	:	EN 61326-1:2013
Input		
Voltage	:	0/2..10 V DC
Input resistance	:	Ri = 40 kΩ
Overload	:	max. 48 V
Current	:	0/4..20 mA
Input resistance	:	Ri = 125 Ω
Overload	:	max. 60 mA
Potentiometer	:	min. 1 kΩ, max. 100 kΩ
Pt100	:	-19.9..+99.9 °C / -100..+600 °C
Sensor current	:	approx. 1 mA (low self heating)
Pt1000	:	-19.9..99.9 °C
Sensor current	:	approx. 0.2 mA (low self heating)
Accuracy	:	< 0.05 % +/−1 Digit
Display		
Conversion rate	:	approx. 2 / s
Range / color	:	3 digit, red or green, 7.6 mm
Decimal point	:	switch selectable
Overflow	:	display flashes with 2 Hz
Case	:	DIN 48x48 mm, mounting depth 96 mm
Type	:	slide-in case, acc. to DIN 43700, material Noryl SE1 GFN2 panel cut-out 44x44 mm
Weight	:	100 g
Connection	:	plug-in terminal, max. 1.5 mm
Protection class	:	front IP54 or IP65 terminals IP20 acc. to BGV A3

Dimensions



Connection diagram

Standard signal Pt100/Pt1000



Ordering code

DP4848A - 1. - 2. - 3. - 4.

1.	**Display**	
	3	3-digit LED red 14.2mm
	4	3-digit LED green 14.2mm
2.	**Input**	
	10	industry standard signal
	20	custom input (on request)
	50	Pt100
	53	Pt1000
3.	**Protection class**	
	1	IP54
	2	IP65
4.	**Unit** (appears on the face plate)	

Bar Graph Display BA7224N

- **Universal version for 0/4..20 mA, 0..10 V DC**
- **Red LED indicator (optionally green)**
- **Vertical and horizontal installation**
- **All areas can be selected via connecting terminal**
- **Display area adjustable via potentiometer**

Characteristics

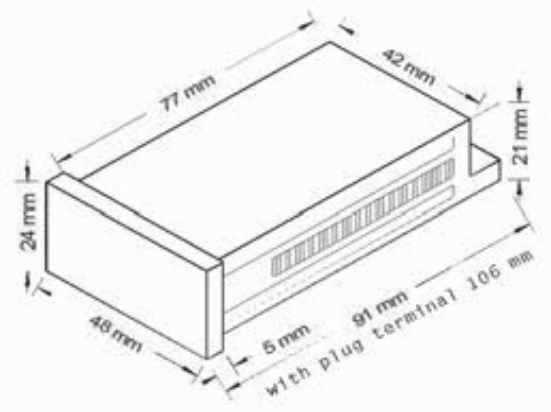
Series BA bar graph displays are especially well suited for representing continuously changing measurements. With their small design, they can be easily integrated into control panels and diagrams.

The version BA7224N is especially well-suited for processing input signals 0/4..20 mA, 0..10 V DC (limit value adjustable from 5..50 V DC). Adaptation to the corresponding input signal takes place via the connecting terminal. The display zero point and limit value can be adjusted via separate potentiometers.

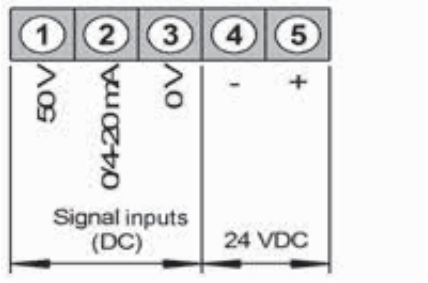
Technical data

Auxiliary power		
Auxiliary voltage	:	24 V DC ± 10 % isolated
Power consumption	:	approximately 1.5 VA
Operating temperature	:	0..+60 °C
CE-conformity	:	EN 61326-1:2013; EN 61010-1:2010
Measurement input		
Current input	:	0/4..20 mA,
Voltage input	:	0..10 V DC (adjustable limit value)
Input resistance	:	Ri at: 10 V = 100 kΩ, 20 mA = 100 Ω
Accuracy		
Resolution	:	20 digit
Basic precision	:	+/- 1 digit
Temperature coefficient	:	100 ppm/K
Display		
Range	:	20 segments
Colour	:	red, optionally green
Housing	:	DIN 72 x 24 mm, installation depth 106 mm
Design	:	PC/ABS blend, black colour, UL94V-0 Panel aperture 66 x 21 mm
Fastening	:	locking screw element for wall thickness up to 50 mm
Weight	:	80 g
Connection	:	rear plug terminals, max. 1.5 mm² Protection class IP00
Ingress protection	:	Front IP54 or IP65

Dimensions



Connection diagram



Ordering code

BA [1.] - [2.] - [3.] - [4.] - [5.] - [6.] - [7.]

1.	**Construction**	
	7224N	20 segments
2.	**Installation**	
	1	Vertical
	2	Horizontal
3.	**Bar colour**	
	1	Red display
	2	Green display
4.	**Auxiliary voltage**	
	5	24 V DC with electrical isolation
5.	**Input signal**	
	0	Universal version
6.	**Measuring range scale 0..100 %**	
	10	Universal version
7.	**Ingress protection**	
	1	IP54
	2	IP65

BCD Panelmeter BCD7224

- **Display red or green 5-digit**
- **LED 10 mm or 14.2 mm**
- **Input BCD parallel or multiplex**
- **Supply voltage 10..30 V DC, optional 5 V DC**

Characteristics

Digital Panelmeter BCD7224 was designed for monitoring and measurement applications, specially in connection with SPS automation. The multiplex mode minimize the number of input lines. The small case is suitable for installation in control units and panel boards.

Technical data

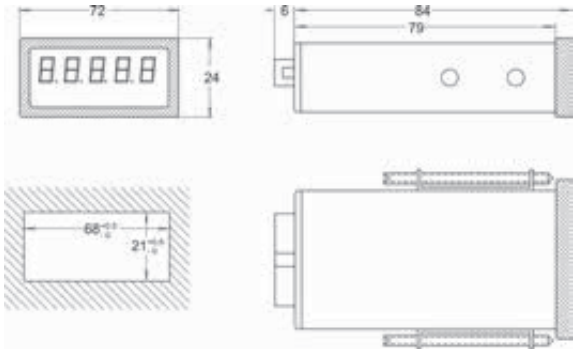
Power supply
Supply voltage : 10..30 V DC
Power consumption : approx. 1.2 VA
Operating temperature : -10..+60 °C
CE-conformity : EN 61326-1:2013

Display : 5-digit
LED 10 mm or 14.2 mm
Color : red or green
Decimals : single selection

Inputs
Control : parallel or multiplex
Voltage level : low-signal 0..3 V DC;
high-signal 10..30 V DC,
or TTL-level
Input resistance : approx. 20 kΩ
minimal rise time of the
strobe inputs 10 ms

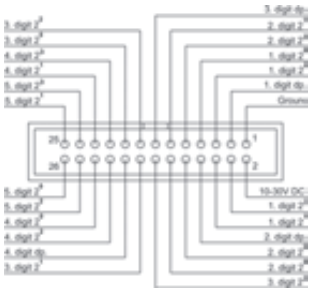
Case : DIN 72x24 mm, mounting depth 85 mm
Type : slide-in case according to
DIN 43700, Noryl SE1 GFN2
panel cut-out 68x21 mm
Weight : approx. 60 g
Connection : terminal strip 16 pole,
Protection class : IP54 or IP65
terminals IP20 acc. to BGV A3

Dimensions

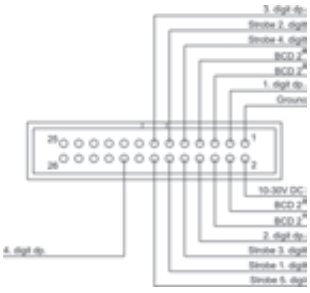


Connection diagram

Input parallel



Input multiplex



Ordering code

BCD 1. [ ] - 2. [ ] - 3. [ ] - 4. [ ] - 5. [ ]

1.	**Model**	
	7224	
2.	**Display**	
	1	LED red 10 mm
	2	LED green 10 mm
	3	LED red 14.2 mm
	4	LED green 14.2 mm
3.	**Supply voltage**	
	5	10..30 V DC
	7	5 V DC
4.	**Input**	
	1	0..3 V DC low; 10..30 V DC high, parallel
	2	5 V TTL-level, parallel
	3	0..3 V DC low; 10..30 V DC high, multiplex
	4	5 V TTL-level, multiplex
5.	**Protection class**	
	1	IP54
	2	IP65
	Accessories connection cable with terminal strip and pigtails	
	AK26K-AE-3	26x0.25 mm² length 3 m
	AK26K-AE-10	26x0.25 mm² length 10 m
	AK26K-AE-20	26x0.25 mm² length 20 m

Bargraph indicator BA9624N

- **Universal design for 0/4..20 mA, 0..10 V DC**
- **Red LED display (optional green)**
- **Vertical and horizontal mounting**
- **All ranges selectable via terminal**
- **Display area selectable via potentiometer**

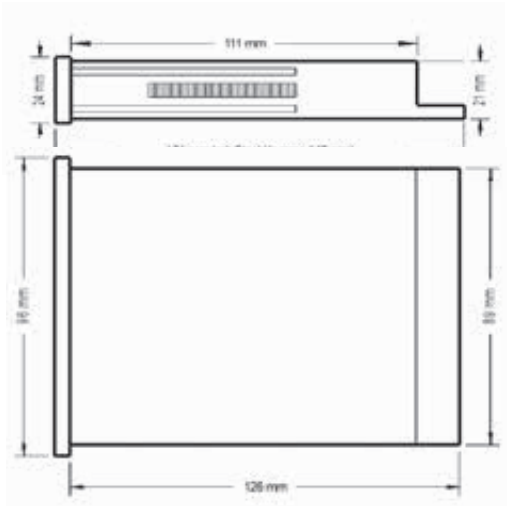
Features

Bargraph indicators of the BA series are especially suited to display constantly changing readings. Due to the compact housing they can be easily integrated into control panels and graphs.
The BA9624N design is particularly suitable for processing unit signals 0/4-20 mA and 0 to 10 V DC. The adaptation to the respective input signal results from the terminal. The indicator's zero point and full-scale value can be adjusted via separate potentiometer.

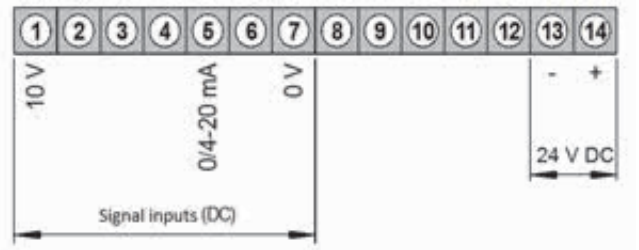
Technical data

Power supply		
Power voltage	:	24 V DC ± 10 %
Current consumption	:	ca. 2.0 VA
Operating temperature	:	0..+60 °C
CE-compliance	:	EN 61326-1:2013; EN 61010-1:2010
Measuring input		
Current input	:	0/4 ..20 mA
Voltage input	:	0..10 V DC
Input resistance	:	Ri at: 10 V = 124 kΩ, 20 mA = 100 Ω
Accuracy		
Resolution	:	30 digits
Basic accuracy	:	+/- 1 Digit
Temperature coefficient	:	100 ppm/K
Indicator		
Scope	:	30 segments
Colour	:	red, optional green
Housing	:	DIN 96 x 24 mm installation depth 134 mm, (T=148 mm incl. terminals)
Design	:	PC/ABS-Blend, black colour, UL94V-0 control panel cut-out 89 x 21 mm
Attachment	:	Snap-in screw to 50 mm, wall thickness
Weight	:	300 g
Connection	:	Rear connection terminals, max 2.5 mm², protection class IP00
Protection class	:	Front IP54 or IP65

Dimensions



Terminal assignment



Ordering code

BA [1.] - [2.] - [3.] - [4.] - [5.] - [6.] - [7.]

1.	**Model**	
	9624N	30 segments
2.	**Mounting**	
	1	vertical
	2	horizontal
3.	**Bargraph colour**	
	1	red
	2	green
4.	**Power supply**	
	5	24 V DC with galvanic isolation
5.	**Input signal**	
	0	universal design
6.	**Measuring range scale 0..100 %**	
	10	universal design
7.	**Protection class**	
	1	IP54
	2	IP65

Bargraph Indicator BA9624B

- **Multipurpose inputs for 0/4..20 mA and 0..10 V DC**
- **Bargraph with 30 segments red, yellow or green programmable**
- **Horizontal or vertical mounting**
- **Integrated integrated 3-digit display red, free adjustable in the range -99..999 Digit**
- **Increasing or decreasing trend indication**
- **Bargraph or dot operation**
- **Display time 0.01..10 s programmable**

Characteristics

Multi-color Bargraph Displays can be used for monitoring analog trend indication. The small cases are suitable for installation in control units and panel boards.
The BA9624B includes a 3-digit display for alarm values and programming functions. The multipurpose input is designed for industry standard signals 0/4..20 mA and 0..10 V DC. 4 front buttons makes the programming for the application possible.

Technical data

Power supply

Supply voltage	:	85..265 V AC, 50/60 Hz; 10..30 V AC/DC
Power consumption	:	approx. 5 VA
Operating temp.	:	0..50 °C
CE-conformity	:	EN 61326-1:2013; EN 61010-1:2010

Input

Current	:	0/4..20 mA, Ri 100 Ω
Voltage	:	0..10 V DC, Ri 200 kΩ

Indicator

Bargraph	:	30 segments LED tricolor
Display	:	3-digits, 8 mm red ; -99..999 Digit
Display time	:	programmable from 0.01..10 s
Overflow	:	flashing upper or lower bargraph segments
Accuracy	:	± 0.2 %; 1 segment (bargraph); ±1 digit (display)

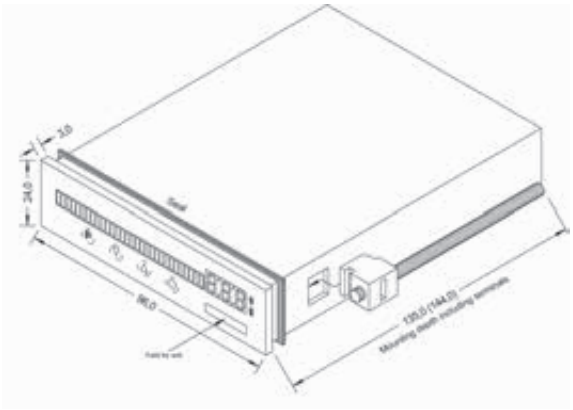
Output

2 Relay	:	250 V AC / 2 A oder 30 V DC / 2 A DC

Case

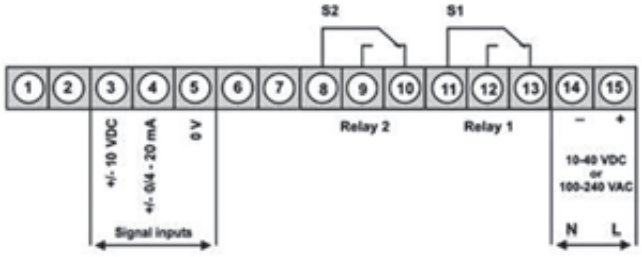
Type	:	slide-in case according to DIN 43700, Polycarbonate / frame ABS panel cut-out 92x22 mm
Installation	:	2 clips, up to 50 mm wall thickness
Weight	:	0.29 kg
Protection class	:	front IP65, terminals IP00
Connection	:	screw terminals, with pressure plate, max. 2.5 mm² according to BGV A3

Dimensions

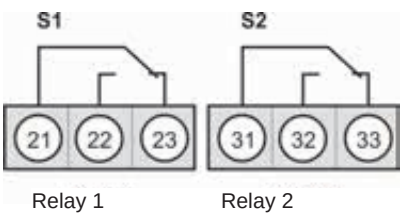


Connection diagrams

Input



Output



Ordering code

BA9624B - 1. - 2. - 3. - 4. - 5.

1.	**Mounting direction**	
	1	vertical
	2	horizontal
2.	**Display color**	
	3	bargraph tricolor red/yellow/green 7-segment display red
3.	**Supply voltage**	
	0	85..265 V AC
	5	10..30 V AC/DC
4.	**Measuring range, scale 0-100 %**	
	10	0/4..20 mA, 0..10 V DC
5.	**Protection class (front)**	
	2	IP65

Universal Display GA 9648

- **Universal input for standard signals, frequency, Pt100/Pt1000 and thermocouples**
- **Self-diagnostics**
- **Integrated electrically isolated transmitter supply**
- **Interface**

Characteristics

The GA 9648 is a microprocessor-controlled displaying device for universal use.

It has a universal input for standard signals (0..20 mA, 4..20 mA, 0..50 mV, 0..1 V, 0..2 V and 0..10 V), resistance thermometers (Pt100 and Pt1000), thermocouples (type J, K, N, S and T) and frequency (TTL and switch contact). Additionally the device provides functions like flow measurement, rotation speed measurement and counter.

The GA 9648 saves the highest and lowest measured value in the min/max value memory.
Furthermore it automatically detects impermissible operating states like display or system error and displays a corresponding error code.

Technical Data

Measuring inputs

Measuring type	Input signal	Measuring range	Note
Voltage signal	0..10 V	0..10 V	Ri ≥ 200 kOhm
	0..2 V	0..2 V	Ri ≥ 10 kOhm
	0..1 V	0..1 V	Ri ≥ 10 kOhm
	0..50 mV	0..50 mV	Ri ≥ 10 kOhm
Current signal	4..20 mA	4..20 mA	Ri = ~125 Ohm
	0..20 mA	0..20 mA	Ri = ~125 Ohm
Resistance	Pt100	-50.0.. +200.0 °C	3-wire connection
		-200.. +850 °C	
	Pt1000	-200.. +850 °C	2-wire connection
Thermocouple	NiCr-Ni type K	-70.0.. +250.0 °C	
		-270.. +1372 °C	
	Pt10Rh-Pt type S	-50.. +1750 °C	
	NiCrSi-NiSi type N	-100.0.. +300.0 °C	
		-270.. +1350 °C	
	Fe-CuNi type J	70.0.. +300.0 °C	
		-170.. +950 °C	
	Cu-CuNi type T	-70.0.. +200.0 °C	
		-270.. +400 °C	
Frequency	TTL signal	0..10 kHz	
	switching contact NPN	0..3 kHz	internal pull-up-resistor is switched on
	switching contact PNP	0..1 kHz	internal pull-down-resistor is switched on
Flow	TTL signal, switching contact NPN, PNP	analog to frequency	
Rotation speed	TTL signal, switching contact NPN, PNP	0..9999 U/min	switchable predistributor (1..1000), pulse frequency: max. 600000 pulses/min.
Rotation speed	TTL signal, switching contact NPN, PNP	0..9999 U/min	switchable predistributor (1..1000), pulse frequency: max. 600000 pulses/min.
	TTL signal, switching contact NPN, PNP	0..9999 U/min	switchable predistributor (1..1000), pulse frequency: max. 10000 pulses/min.

Accuracy

Standard signal : < 0.2 % FS ±1digit
(at 0..50 mV: < 0.3 % FS ±1digit)
Resistance thermometer : < 0.3 % FS ±1digit
Thermocouple : < 0.3 % FS ±1digit
(at type S: < 0.5 % FS ±1digit)
Frequency : < 0.1 % FS ±1digit

Measuring rate

Standard signal : 100 measurements / second
Temperature : 4 measurements / second
Frequency : 100 measurements / second
Power supply : 230 V AC, 50 / 60 Hz
Power consumption : approx. 5 VA
Working temperature : -20..+50 °C

continued on next page

Display

Display	:	LED display
Height	:	13 mm
Display range	:	-1999..+9999 digit initial, final value and decimal point freely selectable
Operation	:	via 4 buttons or via interface
Interface	:	EASYBus interface, electrically isolated
Transmitter supply	:	24 V DC ±5 %, 22 mA, electr. isolated at DC supply: 18 V DC
Electric connection	:	via screw / clamp terminals wire cross section from 0.14..1.5 mm²
Protection class	:	front IP54, with optional sealing IP65

Dimensions

Housing

Size	:	48 x 96 mm (H x W)
Mounting depth	:	115 mm (incl. screw / clamp terminals)
Panel mounting	:	by fixing clamps
Panel cutout	:	43.0 x 90.5 mm [±0.5 mm] (H x W)

Connection diagram

15	EASYBus interface
14	EASYBus interface
13	input: 0..10 V
12	input: 0..1 V, 0..2 V, mA, frequency, Pt100, Pt1000
11	input: 0..50 mV, thermocouple, Pt100
10	input: GND, Pt100, Pt1000
9	transmitter supply (-)
8	transmitter supply (+)
2	power supply
1	power supply

Options

230A	supply voltage: 230 V AC (standard)
012D	supply voltage: 12 V DC (11..14 V)
024D	supply voltage: 24 V DC (22..27 V)
024A	supply voltage: 24 V AC (±5 %)
115A	supply voltage: 115 V AC (±5 %)
AA	analog output 0..20 mA, 4..20 mA (selectable)
AV	analog output 0..10 V

Ordering code

GA9648 - 1. - 2. - 3.

1.	**Supply voltage**	
	230A	230 V AC (standard)
	012D	12 V DC
	024D	24 V DC
	024A	24 V AC
	115A	115 V AC
2.	**Analog output**	
	00	no analog output (standard)
	AA	analog output 0..20 mA, 4..20 mA
	AV	analog output 0..10 V
3.	**Option**	
	00	without option
	IP	sealing to increase protection class to IP65

Special design types (upon request)

SA1 **Selectable scaling**
with input 0..10 V and control input 24 V
The device has a 0..10 V standard signal input and a 24 V control input. By means of the 24 V control input it is possible to switch between two freely programmable scalings.

SA2 **Input ±10 V DC**

SA3 **Set-point controller**
This special design type makes the GA 9648 to a microprocessor-controlled set-point controller for universal use. The output value can be set via button 2 and 3 and then be output as analog signal corresponding to selected analog output type.

Accessories

- **EAK 36**
  Unit stickers (black with white characters), 36 different units, for labeling of display devices

Economy Panelmeter EP9648

- **Multipurpose input for 0/4..20 mA, 0..10 V and Pt100**
- **LED-Display 14,2 mm red, yellow, green or blue or 20.3 mm red**
- **Indicating range and decimal point free programmable**
- **Programmable display time**

Characteristics

The Economy Panelmeter EP9648 is a technical advancement of the DP9648. With universal input conditions and easy programming the Panelmeter receive a powerful instrument for monitoring, measurement and control applications. As highlight the device offers a self acting display brightness. A built-in photo sensor controls the ambient brightness and corrects the display brightness.

Technical data

Power supply

Supply voltage	:	230 / 115 V AC 50/60 Hz ±10 % or 24 V DC ± 20 %
Power consumption	:	3 VA
Working temp.	:	-10..+60 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007

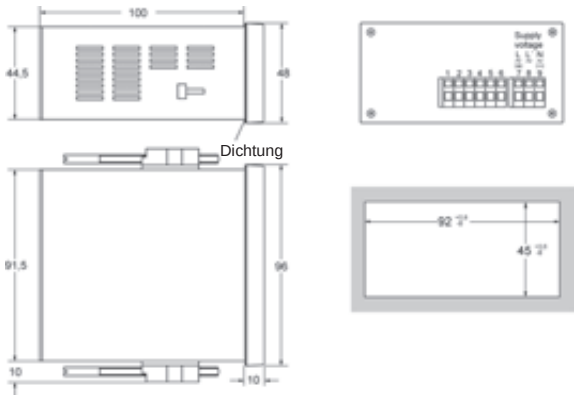
Input

Current	:	0/4..20 mA, Ri 10 Ω, overload max. 3-times
Voltage	:	0..10 V, Ri 100 kΩ, overload max. 3-times
Pt100	:	-100..400 °C sensor current < 1 mA (low self heating)
Accuracy	:	voltage/current ± 0.1 %, ± 1 digit; Pt100 ± 0.2 °C, ± 1 digit
Display	:	LED 14.2 mm yellow, green, blue or 20.3mm red
Indicating range	:	-1999..2000 Digit
Decimal point	:	programmable
Overflow indication	:	"-1999" or " 9999 " , flashing with 2 Hz
Display brightness	:	programmable from 2..100 %, with photo sensor (only display red, optional)

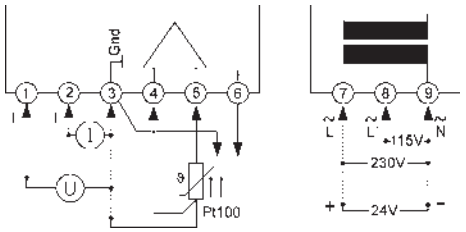
Analog output

Voltage	:	0..10 V DC, linearized, short circuit proof max. 5 mA
Accuracy	:	0.1 %
Case	:	panel case DIN 96x48 mm, material PA6-GF; UL94V-0
Dimensions	:	front 96x48 mm, mounting depth 100mm
Weight	:	max. 390 g
Connection	:	clamp terminals, 0.08..1.5 mm² AWG28..AWG14
Protection class	:	front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

EP9648 - 1. - 2. - 3. - 4. - 5. - 6.

1.	**Display**		
	1	LED red	14.2 mm
	3	LED red	20.3 mm
	4	LED yellow	14.2 mm
	6	LED green	14.2 mm
	8	LED blue	14.2 mm
2.	**Model**		
	15	Industry standard signal	
		0/4..20 mA, 0..10 V DC and Pt100	
3.	**Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	5	24 V DC	±20 %
4.	**Options**		
	00	without option	
	07	self acting display brightness (only display LED red 1 and 3)	
5.	**Unit** appears in the unit field		
6.	**Additional text** above the display (3x90 mm HxW)		

Loop powered Panelmeter SP9648

- **LED-display without separate supply voltage**
- **Free adjustable indicating range**
- **Switch selectable conversion rate 3/s or 0,5/s**

Characteristics

Loop powered Panelmeter SP9648 can be used for indicating and measurement applications in process technology and automation. The small case is suitable for installation in control units and panel boards. The input allows indication of any physical dimension, which are stated in a signal of 4..20mA.

Technical data

Input

Current input	: 4..20 mA
Overload range	: -100..150 mA
Voltage drop	: 2.5..3.4 V, depends on chosen display brightness
Accuracy	: 0.1 % , +/- 1 Digit
Operating temp.	: -10..+60 °C
CE-conformity	: EN 61326-1:2013

Display

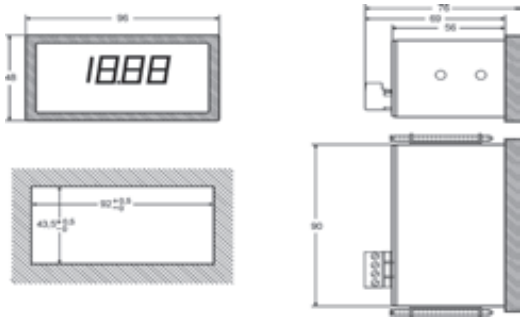
Indicating range	: -1999..+1999
Span	: adjustable 0..4000 Digits
Zero point	: adjustable -100..+25 % of the span
Brightness	: adjustable ≈ 40..100 %
Conversion rate	: 3/s or 0.5/s switchable
Height	: 7.6 mm
Overflow indication	: "-/ for negative and " / " for positive overflow
Color	: red
Case	: DIN96x48 mm mounting depth 69 mm acc. to DIN 43700, material Noryl GFN 2 SE 1 field case polycarbonate RAL 7035

Weight

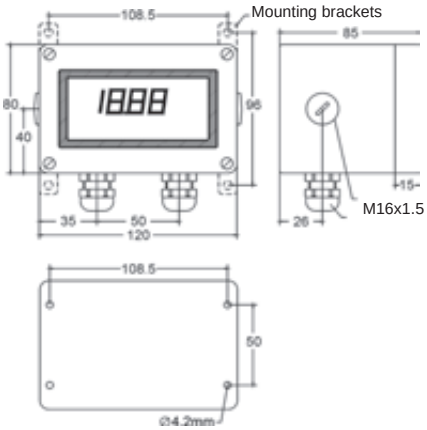
- Panel case	: approx. 170 g
- Field case	: approx. 366 g
Connection	: slide-in terminal strip, max. 1.5 mm², AWG16
Protection class	: front IP54 or IP65 terminals IP20 acc. to BGV A3

Dimensions

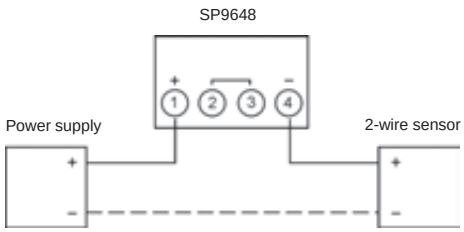
Panel case



Field case



Connection diagram



Ordering code

SP9648 - 1. - 2. - 3. - 4.

1.	**Device type**	
	1	panel case
	2	field case 120x80x85 mm (WxHxD)
2.	**Display characteristic**	
	S	increasing (Standard)
	F	decreasing
3.	**Protection class**	
	1	IP54
	2	IP65
4.	**Unit** (appears on the face plate)	
Accessories		
	10031201	mounting brackets

Standard Signal Panelmeter S9648

- **Measuring input for standard signals 0/4..20 mA or 0..10 V and Potentiometer**
- **Integrated transmitter supply**
- **LED-Display 14.2 mm red, indicating range ±9999(0) Digit**
- **Max. 4 alarm outputs, relay SPDT or transistor**

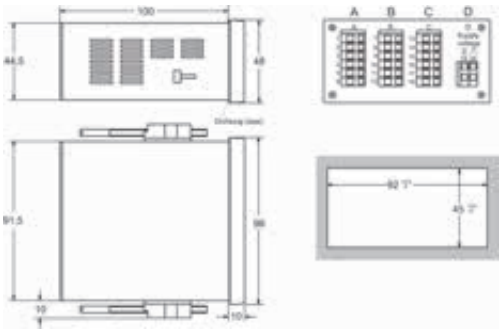
Characteristics

The Standard Signal Panelmeter S9648 has been designed for measuring industry standard signals 0/4..20 mA or 0..10 V DC. The device offers an integrated transmitter supply for direct connection of 2- and 3-wire transmitters for e.g. pressure or temperature. Indicating range and decimal point are free programmable in the range ± 9999(0) digit.

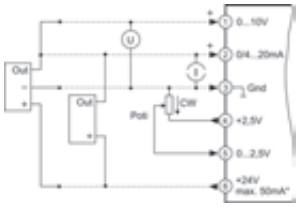
Technical data

Power supply
Supply voltage : 230 V AC ±10 %; 115 V AC ±10 %, 24 V AC ±10 % or 24 V DC ±15 %
Power consumption : max. 3.5 VA, with analog output 5 VA
Operating temp. : -10..+55 °C
CE-conformity : EN 61326-1:2013; EN 60664-1:2007
Input
Current : 0/4..20 mA Ri = 10 Ω
Voltage : 0..10 V Ri = >100 kΩ
Potentiometer : 0..1 kΩ / 100 kΩ
Accuracy : < 0.1 % ± 2 digit
Transmitter supply : U_0 approx. 24 V, Ri ca. 150 Ω, max. 50 mA (max. 25 mA with 4 relays)
Display : LED red, 14.2 mm
Indicating range : ±9999(0) digit with leading zero suppression
Parameter display : LED 2-digit red, 7 mm (parameter and output indicator)
Output
Relay : SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Transistor : max. 35 V AC / DC max. 100 mA, with short circuit protection
Analog : 0/4..20 mA burden ≤ 500 Ω; 0/2..10 V burden > 500 Ω, isolated automatically output changing
- Accuracy : 0.1 %; TK 0.01 %/K
Case : panel case DIN 96x48 mm, material PA6-GF; UL94V-0
Dimensions : front 96x48 mm, mounting depth 100,
Weight : max. 390 g
Connection : clamp terminals, 0.08..1.5 mm² AWG28..AWG14
Protection class : front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

	1.		2.		3.		4.		5.		6.		7.
S9648	-		-		-		-		-		-		

1.	**Terminal strip A**	
	1	input standard signals, 0/4..20 mA, 0..10 V DC and potentiometer, integrated transmitter supply 24 V max. 50 mA*
2.	**Terminal strip B**	
	00	not installed
	2R	2 relay outputs
	2T	2 electronic outputs
	S1**	2. input standard signals, integrated transmitter supply 24 V max. 50 mA*
3.	**Terminal strip C**	
	00	not installed
	2R	2 relay outputs
	2T	2 electronic outputs
	AO	analog output 0/4..20 mA, 0/2..10 V
4.	**Terminal strip D; supply voltage**	
	0	230 V AC ±10 % 50-60Hz
	1	115 V AC ±10 % 50-60Hz
	4	24 V AC ±10 % 50-60Hz
	5	24 V DC ±15 %
5.	**Options**	
	00	without option
	01	min-and max-peak hold
	02	difference-, average-, larger-, smaller value
	08	analog output separate programmable
6.	**Unit** (appears in the unit field)	
7.	**Additional text** placed above the display (3x90 mm HxW)	

Attention!
* Terminal strip A+B together max. 50 mA
** no isolation to terminal strip A, only in connection with option 02

Temperature Panelmeter T9648

- Measuring input for Pt100, Pt1000 or Thermocouple
- LED-Display 14.2 mm red
- Max. 4 alarm outputs relay SPDT or transistor

Characteristics

The Temperature Panelmeter T9648 is suitable for measurement of temperatures in connection with RTD sensors Pt100, Pt1000 and thermocouples Fe-CuNi (J), NiCr-Ni (K), Pt10Rh-Pt (S). Devices for other temperature sensors are available on request . The measuring input is isolated. The measuring range can be limited in the configuration level. It is identical with the range of the analog output.

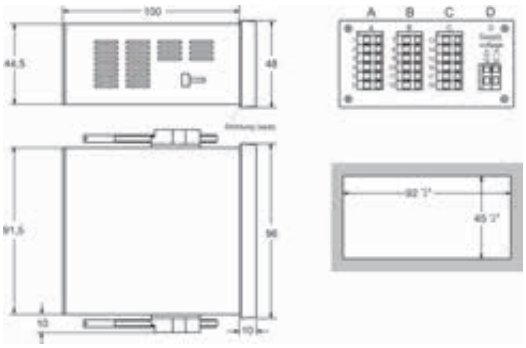
Technical data

Power supply
Supply voltage : 230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %
Power consumption : max. 3.5 VA, with analog output 5 VA
Operating temp. : -10..+55 °C
CE- conformity : EN 61326-1:2013 EN 60664-1:2007

Input
Pt100 : -100..+600 °C
Pt1000 : -50..+200 °C
Accuracy : Pt100 or Pt1000 < 0.1 % ± 2 Digit, max. 100 Ohm line resistance
Thermocouple : Fe-CuNi (J) 0..+800 °C, NiCr-Ni (K) 0..+1200 °C Pt10Rh-Pt (S) 0..+1600 °C built-in cold junction
Accuracy : < 0,1 % ± 2 Digit with compensating line
Display : LED red, 14.2 mm
Indicating range : ±9999(0) Digit
Parameter display : LED 2-digit red, 7 mm (parameter - and output indicator)

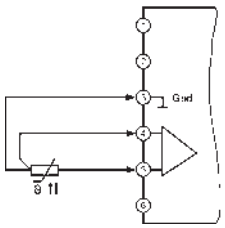
Output
Relay SPDT : < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Transistor : max. 35 V AC/DC, 100 mA, short circuit protected
Analog output : 0/4..20 mA burden ≤ 500 Ω; 0/2..10 V burden > 500 Ω, isolated automatic output changing (burden depending)
- Accuracy : 0.1 %; TK 0.01 %/K
Case : panel case DIN 96x48 mm, material PA6-GF; UL94V-0
Dimensions : front 96x48 mm, mounting depth 100 mm
Weight : max. 390 g
Connection : clamp terminals, 0.08..1.5 mm² AWG28..AWG14
Protection class : front IP65, terminals IP20 acc. to BGV A3

Dimensions

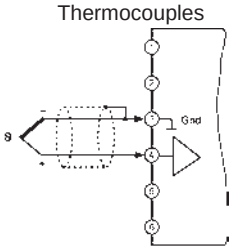


Connection diagram

Pt100/Pt1000



Thermocouples



Order code

T9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Terminal strip A**	
	1	input Pt100
	3	input Pt1000
	5	input thermocouple
2.	**Terminal strip B**	
	00	not installed
	2R	2 relay outputs
	2T	2 electronic outputs
	T1*	2nd input Pt100
	T3*	2nd input Pt1000
3.	**Terminal strip C**	
	00	not installed
	2R	2 relay outputs
	2T	2 electronic outputs
	AO	analog output 0/4..20 mA, 0/2..10 V
4.	**Terminal strip D; supply voltage**	
	0	230 V AC ±10 % 50-60Hz
	1	115 V AC ±10 % 50-60Hz
	4	24 V AC ±10 % 50-60Hz
	5	24 V DC ±15 %
5.	**Options**	
	00	without option
	01	min-and max-peak hold
	02	difference-, average-, larger-, smaller value
	07	display brightness programmable
6.	**Unit** (appears in the unit field)	
7.	**Additional text** placed above the display (3x90 mm HxW)	

*In connection with terminal strip A, only Pt100 or Pt1000; Pt100 and Pt1000 can not be mixed. Not isolated to terminal strip A. Input ranges of Input 1 and 2 have to be the same. Only available with option 02.

DMS Bridge Panelmeter DMS9648

- **Weight-force-pressure-torque with DMS bridges**
- **1- or 2-way action, pressure or traction programmable**
- **Bridge sensitivity programmable**
- **Max. 8 parameter sets programmable**
- **Max. 4 alarm outputs, relay or transistor**

Characteristics

The DMS Bridge Panelmeter DMS9648 is designed for measuring forces, pressure and torques with DMS bridges.
The device offers a programmable bridge supply 5/10 V DC; max. 50 mA output current. Measuring errors due to line resistance can be compensated by using a sense line.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %
Power consumption	:	max. 3.5 VA, with analog output 5 VA
Operating temperature	:	-10..+55 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007

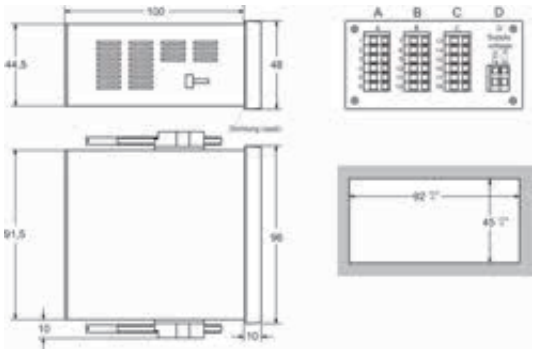
Input

Bridge supply	:	5 V DC or 10 V DC ; programmable; max. 50 mA
Bridge resistance	:	at 5 V min. 100 Ω; at 10 V min. 200 Ω
Bridge sensitivity	:	0.900..6.600 mV/V programmable
Sense line	:	compensated line resistance of max. 10 Ω
Accuracy	:	< 0.1 % ±2 Digit
Display	:	LED red, 14,2 mm
Indicating range	:	±9999(0) Digit
Additional display	:	LED 2 digit red, 7 mm (parameter - and status indicator)

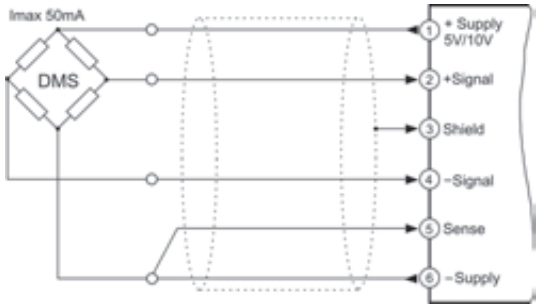
Output

Relay SPDT	:	< 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Transistor	:	max. 35 V AC/DC, 100 mA, with short-circuit-proof
Analog output	:	0/4..20 mA burden ≤ 500 Ω; 0/2..10 V burden > 500 Ω, isolated output changes automatically
- Accuracy	:	0.1 %; TK 0.01 %/K
Case	:	panel mounting DIN 96x48, material PA6-GF; UL94V-0
Dimensions	:	front 96x48 mm, mounting depth 100 mm
Weight	:	max. 390 g
Connection	:	clamp terminals, 0.08..1.5 mm² AWG28..AWG14
	:	front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



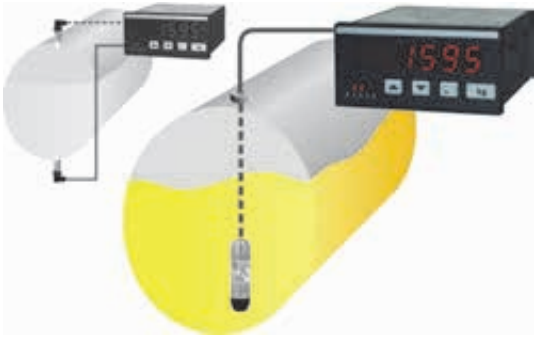
Ordering code

DMS9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Terminal strip A**		
	1	input DMS bridge, 1 parameter set	
	2	input DMS bridge, 8 parameter sets	
2.	**Terminal strip B**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
3.	**Terminal strip C**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
	AO	analog output 0/4..20 mA, 0/2..10 V	
4.	**Terminal strip D; supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Options**		
	00	without option	
	01	min- and max- peak hold	
	07	display brightness programmable	
	08	analog output separately and independent from the indicating range programmable (only DMS9648-1)	
6.	**Unit** (appears in the unit field)		
7.	**Additional text** placed above the display (3x90 mm HxW)		

Connection diagram for terminal strips B-D see page Fehler: Verweis nicht gefunden

Tank Display TA9648



- **Inputs for standard signals 0/4..20 mA or 0/2..10 V**
- **2nd input for pressure transmitter at pressure loaded tanks**
- **Input automatic level correction**
- **6 standard- and custom sized tanks selectable**
- **Max. 4 alarm outputs, relay SPDT or transistor**

Characteristics

The Tank Display TA9648 offers content measurement of tanks with no linear connection between level and content. Measurement will be realized by hydrostatic pressure or distance sensors. The device offers the possibility to connect a level sensor. Reaching a certain level, the displayed value will be corrected automatically to the value according to the position of the installed sensor.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 %; 115 V AC ±10 %, 24 V AC ±10 % or 24 V DC ±15 %
Power consumption	:	max. 3.5 VA, with analog output 5 VA
Operating temp.	:	-10..+55 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007

Input

Current	:	0/4..20 mA; Ri = 10 Ω overload 2-times; 4-times for max. 5 s
Voltage	:	0/2..10 V DC; Ri = 100 kΩ overload max. 100 V
Accuracy	:	< 0.1 % ± 2 Digit
Transmitter supply	:	U_0 appr. 24 V; Ri appr. 150 Ω; max. 50 mA (max. 25 mA, with 4 relays)

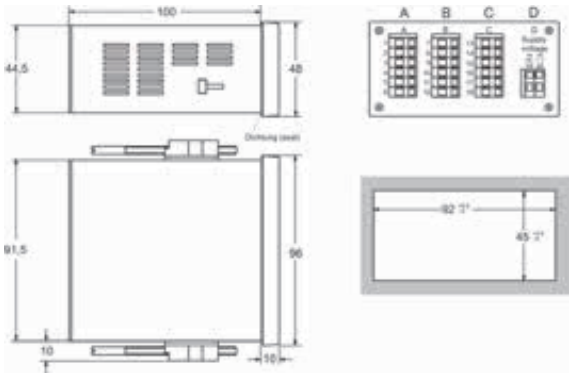
Display

Indicating range	:	999999 Digit with leading zero suppression
Parameter display	:	LED 2 digit red, 7 mm (parameter - and output indicating)

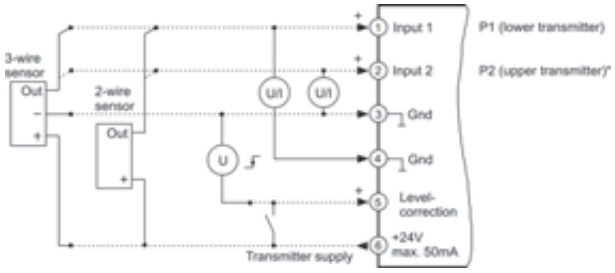
Output

Relay	:	SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Transistor	:	max. 35 V AC/DC max. 100 mA, with short circuit protection
Analog	:	0/4..20 mA burden ≤ 500 Ω; 0/2..10 V burden > 500 Ω, isolated automatic output changing
- Accuracy	:	0.1 %; TK 0.01 %/K
Case	:	panel case DIN 96x48mm, material PA6-GF; UL94V-0
Dimensions	:	front 96x48 mm, mounting depth 100 mm
Weight	:	max. 390 g
Connection	:	clamp terminals, 0.08..1.5 mm² AWG28..AWG14
Protection class	:	front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



* only with pressure loaded tanks

Ordering code

TA9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Terminal strip A**		
	1	2 inputs 0/4..20 mA, 1 input for level correction, Integrated, transmitter supply 24V max. 50 mA	
	2	as 1, but inputs 0/2..10 V	
2.	**Terminal strip B**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
3.	**Terminal strip C**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
	AO	analog output 0/4..20 mA, 0/2..10 V	
4.	**Terminal strip D; supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Options**		
	00	without option	
6.	**Unit** (appears in the unit field)		
7.	**Additional text** placed above the display (3x90 mm HxW)		

Flow Meter DF9648

- **Measuring range programmable ±99999 Digit**
- **Measuring unit programmable**
- **2 totalizators programmable**
- **Pulse output for external evaluation**
- **Max. 4 alarm outputs, relay or electronic**
- **Isolated analog output 0/4..20 mA, 0/2..10 V**

Characteristics

The Flow-Meter DF9648 is used in food technology, chemical and pharmaceutical industry and water technology.
In connection with any type of pulse flow sensor the current flow rate and total flow can be measured, displayed and converted to an analog output signal. The dosage of quantity may be realized by using the alarm outputs. The optional pulse output allows an external summation of the flow quantity.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %
Power consump.	:	max. 3.5 VA, with analog output 5 VA
Operating temp.	:	-10..+55 °C
CE-conformity	:	EN 61326:2013; EN 60664-1:2007

Measuring input

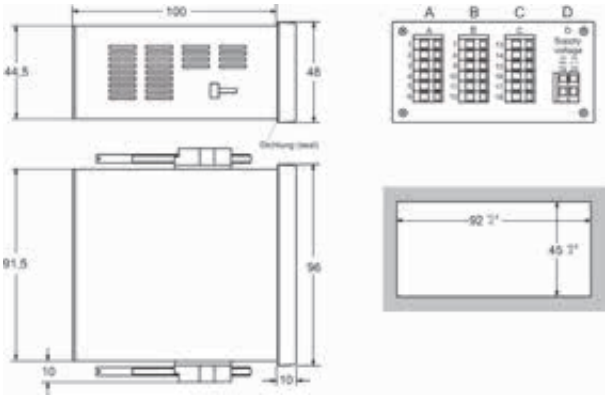
Type	:	sensor with ac-output (coil), Namur-sensor or Hall-sensor (rectangular-signal) programmable alternative external pulses 0/5..24 VDC
- Coil	:	switching threshold programmable ±5..±2000 mV, pull-down resistor 100 kΩ
- NPN sensor	:	low level < 0.9 V, high level > 2.1 V pull-up resistor 20 kΩ
- PNP sensor	:	low level < 0.9 V, high level > 2.1 V pull-down resistor 20 kΩ
- Namur	:	low level< 1.2 mA, high level > 2.1 mA, hysteresis approx. 0.5 mA pull-down resistor 1 kΩ
- Relay	:	pulse width min. 5 ms
Frequency	:	input A or B 0.1 Hz..15 kHz (contact max. 30 Hz) input A and B together 0.1 Hz..8 kHz (contact max. 30 Hz)
Reset-input	:	low level< 0.9 V, high level > 2.1 V, pull-down resistor 20 kΩ pulse width min. 5 ms, reset at rising edge
Accuracy	:	≤ 0.1 % ±1 Digit
Sensor supply	:	8 V DC stabilized (Namur), 24 V DC (coil, NPN, PNP, Push-Pull), Ri approx. 150 Ω, max. 50 mA (25 mA with 4 relay output)

Display : LED red, 14.2 mm
Parameter : LED 2-digit red, 7 mm (parameter - and output indicator)
Display range : flow -99999..99999 Digit, totalizer -99999..0..999999 Digit, with leading zero suppression, max. 3 decimals, daily totalizer not voltage safe, total totalizer voltage safe

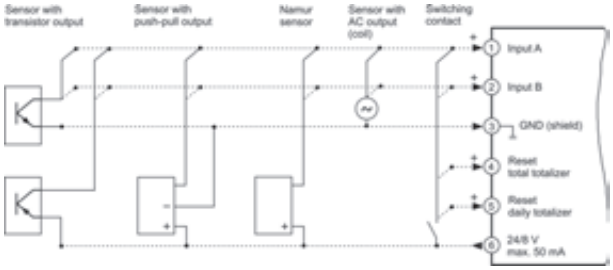
Output

Relay	:	SPDT <250 V AC<250 VA<2 A, <300 V DC<50 W<2 A
Transistor	:	max. 35 V AC/DC / 100 mA, with short circuit protection
Analog	:	0/4..20 mA burden ≤500 Ω; 0/2..10 V load >500 Ω, isolated automatic output changing (burden dependent)
Accuracy	:	0.1 %; TK 0.01 %/K
Pulse output	:	transistor ≤ 5 Hz, relays ≤ 0.1 Hz (max. 500,000 switching cycles) pulse width 100 ms
Case	:	panel case DIN96x48 mm, material PA6-GF; UL94V-0
Dimensions	:	front 96x48 mm, mounting depth 100 mm,
Weight	:	max. 390 g
Connection	:	clamp terminals, 2 mm² single wire, 1.5 mm² flexible wire, AWG14
Protection class	:	front IP65, terminals IP20, acc. to BGV A3

Dimensions



Connection diagram



Ordering code

DF9648 - 1. [ ] - 2. [ ] - 3. [ ] - 4. [ ] - 5. [ ] - 6. [ ] - 7. [ ]

1.	**Terminal strip A**	
	1	Input for sensors with AC-signals (coil), pulse signal (Namur, NPN, PNP, Push-Pull) or switching contact
	2	as 1, but additional input for addition/subtraction
2.	**Terminal strip B**	
	00	not installed
	2R	2 relay outputs
	2T	2 electronic outputs (alarm/pulse output)*
3.	**Terminal strip C**	
	00	not installed
	2R	2 relay outputs
	2T	2 electronic outputs
	AO	analog output
4.	**Terminal strip D supply voltage**	
	0	230 V AC ±10 % 50-60Hz
	1	115 V AC ±10 % 50-60Hz
	4	24 V AC ±10 % 50-60Hz
	5	24 V DC ±15 %
5.	**Options**	
	00	without option
	11	*pulse output (only at terminal strip B)
6.	**Unit**	appears in the unit field
7.	**Additional text** above the display (3x90 mm HxW)	

* Strip B: output A1 = alarm, A2 = pulse output

Connection diagram for terminal strips B-D

Digital Amperemeter A9648

- **Measuring range programmable 0..6/60 A**
- **LED-Display 14.2 mm red, indicating range ±9999(0) Digit**
- **Max. 4 alarm outputs, relay SPDT or electronic**

Characteristics

The Digital Amperemeter A9648 has been designed to measure DC and AC current signals. Five basic models are selectable and possible to measure currents from 0..0.900 mA to 0..60.0A. The measuring range is free programmable. Measuring of bipolar currents are possible. For example -20..+20 mA.
Additional the free programmable display range within ± 9999(0) digit can be assigned to a programmed current measurement range. This can be important, if the measured current is a degree for another physical dimension.

Technical data

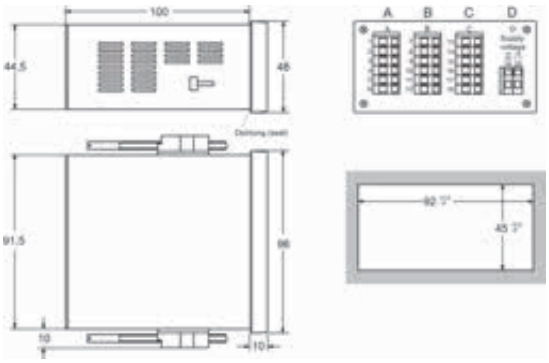
Power supply

Supply voltage	:	230 V AC ±10 %; 115 V AC ±10 %, 24 V AC ±10 % or 24 V DC ±15 %
Power consumption	:	max. 3.5 VA, with analog output 5 VA
Operat. temperature	:	-10..+55 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007
Input	:	model 1-4 = 0..0.9 mA up to 6 A DC/AC_{TRMS} model 5 = 0..4.5 up to 60 A AC_{TRMS}
Input resistant	:	model 1 = 20 Ω, model 2 = 2 Ω, model 3 = 0.2 Ω, model 4 = 0.02 Ω, model 5 = integrated current transformer
Over load	:	2-times; 4-times max. 5 s
Basic accuracy	:	< 0.1 % ± 2 Digit (DC); 0.5 % ± 2 Digit (AC)
Display	:	LED red, 14.2 mm, ±9999(0) Digit
Parameter display	:	LED 2-digit red, 7 mm (parameter and output indicator)

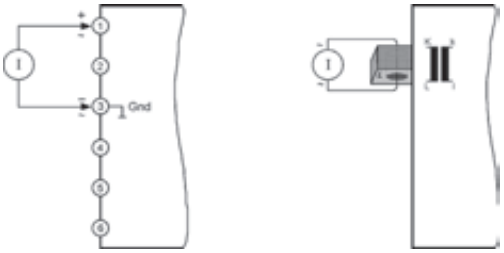
Output

Relay	:	SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Electronic	:	max. 35 V AC/DC max.100 mA, short circuit protected
Analog	:	0/4 ... 20 mA burden ≤ 500 Ω; 0/2 ... 10 V burden > 500 Ω, isolated automatic output changing
- Accuracy	:	0.1 %; TK 0.01 %/K
Case	:	panel case DIN 96x48, material PA6-GF; UL94V-0
Dimensions	:	front 96x48 mm, mounting depth 100, 120 mm (with transformer)
Weight	:	max. 390 g
Connection	:	clamp terminals, 0.08..1.5 mm² AWG28..AWG14
Protection class	:	front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

A9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Terminal strip A**	
	1	0..9.999 mA DC/AC_{TRMS} clamp terminal
	2	0..99.99 mA DC/AC_{TRMS} clamp terminal
	3	0..999.9 mA DC/AC_{TRMS} clamp terminal
	4	0..6.000 A DC/AC_{TRMS} clamp terminal
	5	0..60.00 A AC_{TRMS} winding transformer
2.	**Terminal strip B**	
	00	not installed
	2R	2 relay outputs
	2T	2 electronic outputs
3.	**Terminal strip C**	
	00	not installed
	2R	2 relay outputs
	2T	2 electronic outputs
	AO	analog output
4.	**Terminal strip D; supply voltage**	
	0	230 V AC ±10 % 50-60Hz
	1	115 V AC ±10 % 50-60Hz
	4	24 V AC ±10 % 50-60Hz
	5	24 V DC ±15 %
5.	**Options**	
	00	without option
	01	min- and max-peak hold
	07	display brightness programmable
6.	**Unit** appears in the unit field	
7.	**Additional text** above the display (3x90 mm HxW)	

Digital Voltmeter V9648

- **Measuring and indicating range separate programmable**
- **LED display 14.2 mm red, indicating range ±9999(0) digit**
- **Max. 4 alarm outputs, relay SPDT or transistor**

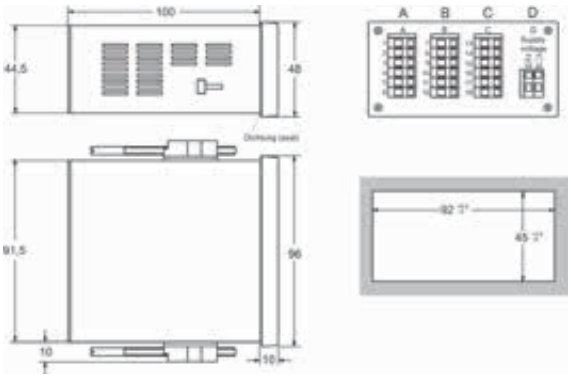
Characteristics

The Digital Voltmeter V9648 has been designed to measure DC and AC (TRMS) voltage signals.
Three basic models all are selectable and makes the possibility to measure voltages from 0..30.00 mV up to 0..999.9 V. Within a model the measurement range is free programmable. Measuring of bipolar voltages is also possible with basic models 1 and 2. For example -5..+5 V; or -10..+10 V in basic model 2. Additional a free programmable display range within ± 9999(0) digit can be assigned to a programmed voltage measurement range.

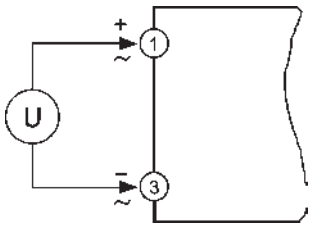
Technical data

Power supply
Supply voltage : 230 V AC ±10 %; 115 V AC ±10 %, 24 V AC ±10 % or 24 V DC ±15 %
Power consumption : max. 3.5 VA, with analog output 5 VA
Operating temp. : -10..+55 °C
CE-conformity : EN 61326-1:2013; EN 60664-1:2007
Input
Input resistance : model 1 = 130 kΩ, model 2 = 1.3 MΩ, model 3 = 2.6 MΩ
Overload : model 1 and 2 = 300 V DC/AC_{TRMS}, model 3 = 1200 V DC/AC_{TRMS}
Accuracy : < 0.1 % ± 2 digit (DC); 0.5 % ± 2 digit (AC) crest-factor < 3 ⇒ max. 2 % error, crest-factor < 5 ⇒ max. 5 % error
Display : LED red, 14.2 mm
Indicating range : ±9999(0) digit
Additional display : LED 2-digit red, 7 mm (parameter - and output indicator)
Output
Relay : SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Transistor : max. 35 V AC/DC, 100 mA, with short circuit protection
Analog output : 0/4..20 mA burden ≤ 500 Ω; 0/2..10 V, burden > 500 Ω, with isolation
-Accuracy : 0.1 %; TK 0.01 %/K
Case : panel case DIN 96x48 mm, material PA6-GF; UL94V-0
Dimensions : front 96x48 mm, mounting depth 100mm
Weight : max. 390 g
Connection : clamp terminals, 0.08..1.5 mm², AWG28..AWG14
Protection class : front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

V9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Terminal strip A**	
	Measuring range programmable:	
	1	0..4000 mV DC/AC $_{TRMS}$
	2	0..250.0 V* DC/AC $_{TRMS}$ * includes e.g. ±5 V, ±10 V
	3	0..999.9 V DC/AC $_{TRMS}$
2.	**Terminal strip B**	
	00	not installed
	2R	2 relay outputs
3.	**Terminal strip C**	
	00	not installed
	2R	2 relay outputs
	2T	2 electronic outputs
	AO	analog output 0/4..20 mA, 0/2..10 V DC
4.	**Terminal strip D; supply voltage**	
	0	230 V AC ±10 % 50-60Hz
	1	115 V AC ±10 % 50-60Hz
	4	24 V AC ±10 % 50-60Hz
	5	24 V DC ±15 %
5.	**Options**	
	00	without option
	01	min- and max-peak hold
	07	display brightness programmable
6.	**Unit** appears in the unit field	
7.	**Additional text** above the display (3x90 mm HxW)	

Connection diagram for terminal strips B-D see page Fehler: Referenz nicht gefunden

Speed Indicator DR9648

- **Pulse inputs for switch contacts, PNP-, Namur-sensors and rotary encoder**
- **Programmable input prescaler**
- **Time base min^{-1}**
- **Integrated transmitter-supply**
- **Max. 4 alarm outputs, electronic or relay SPDT**

Characteristics

The Speed Indicator DR9648 has been designed for field applications in process control and automation. Parameters for operation mode can be programmed. The DR9648 can be used wherever processes based per minute, just as speed should be measured and displayed.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %
Power consumption	:	max. 3.5 VA
Working temp.	:	-20..+55 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007

Input

PNP sensor	:	Ri = 6.3 kΩ level: < 4 V low; > 8.5 V high; hysteresis > 2.5 V; max. 35 V DC
Namur sensor	:	Ri approx. 1 kΩ (< 4 mA) level: < 1 mA low; >2.2 mA high; hysteresis > 0.5 mA; max. 35 V DC
Frequency max.	:	input E1 = 1 Hz..30 Hz, (switch contact) input E2 = 1 Hz..15 kHz, (PNP- or Namur sensor)
Time base	:	min^{-1}
Accuracy	:	≤ 0.003 % ±1 Digit
Min. pulse width	:	electronic 50 µs, contact 5 ms
Hold	:	24 V DC or switch contact
Transmitter supply	:	8 V (Namur), 24 V DC (PNP), Ri approx. 150Ω, max. 50 mA

Display

Indicating range	:	0..99999 digit
Additional display	:	LED 2-digit red, 7 mm (parameter- and switch indicator)

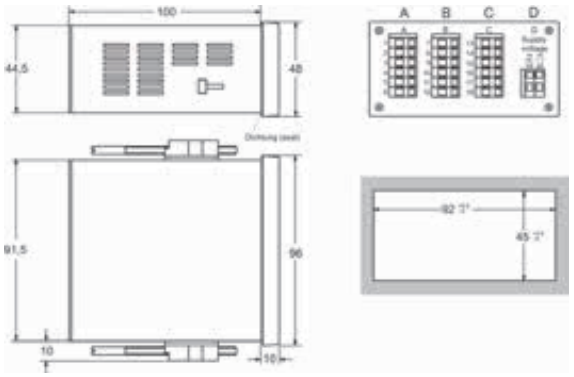
Output

Relay	:	SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Transistor	:	max. 35 V AC/DC, 100mA, short circuit proof

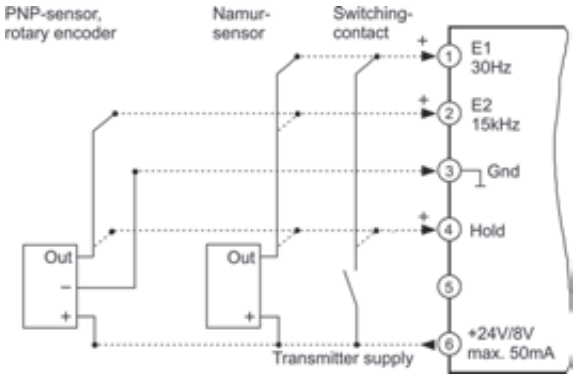
Case

	:	panel case DIN 96x48, material PA6-GF; UL94V-0
Dimensions	:	front 96x48 mm, mounting depth 100mm
Weight	:	max. 390 g
Connection	:	clamp terminals, 0.08..1.5 mm², AWG28..AWG14
Protection class	:	front IP65, terminals IP20, acc. to BGV A3

Dimensions



Connection diagram



Ordering code

DR9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Terminal strip A**		
	1	2 pulse inputs hold input, integrated transmitter supply 24V max. 50 mA	
2.	**Terminal strip B**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
3.	**Terminal strip C**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
4.	**Terminal strip D; Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Options**		
	00	without option	
6.	**Unit** appears in the unit field		
7.	**Additional text** above the display (3x90 mm HxW)		

Productivity Meter PR9648

- **2 digital inputs for summation, difference and ratio measurement**
- **Input prescaler programmable**
- **LED-Display 14.2 mm red, ±99999 Digit**
- **Max. 4 alarm outputs, relay SPDT or transistor**

Characteristics

The Productivity-Meter PR9648 analysis impulse rates, representing a speed, flow, passing time or revolutions per time. The displayed values therefore always refer to a determined time unit and represent productivity. There are extensive functions programmable. Since impulses and unit of a displayed value can take any relation, the device offers extensive conversion possibilities.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %
Power consumption	:	max. 3.5 VA, with analog output 5 VA
Operating temp.	:	-10..+55 °C
CE- conformity	:	EN 61326-1:2013 EN 60664-1:2007

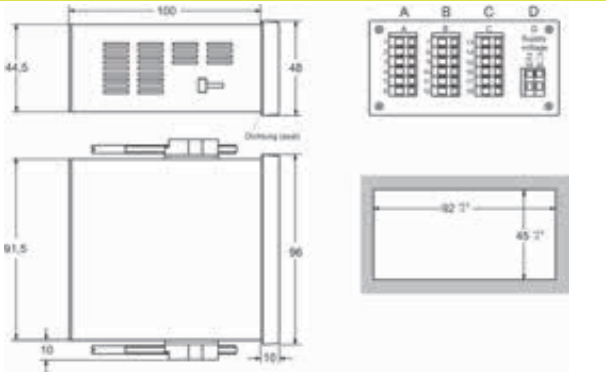
Input

PNP sensor	:	Ri = 6.3 kΩ level: < 4 V low; > 8.5 V high; hysteresis > 2.5 V; max. 35 V DC
Namur sensor	:	Ri approx. 1 kΩ (< 4 mA) level: < 1 mA low; >2.2 mA high; hysteresis > 0.5 mA; max. 35 V DC
Pulse frequency	:	input A or B = 0.1 Hz..15 kHz, A and B together = 0.1 Hz..8 kHz, contact = 0.1 Hz..30 Hz, 2-channel rotary encoder = 0.1 Hz..10 kHz
Min. pulse width	:	electronic 50 µs, contact 5 ms
Time base	:	sec^{-1}, min^{-1}, h^{-1}
Accuracy	:	≤ 0.003 % ± 1 Digit
Hold input	:	24 V DC or contact
Transmitter supply	:	8 V(Namur), 24 V DC(pnp), Ri appr. 150 Ω, max. 50 mA (25 mA with 4 relay outputs)
Display	:	LED red, 14.2 mm, -99999..99999 Digit
Parameter display	:	LED 2-digit red, 7 mm (parameter and output indicator)

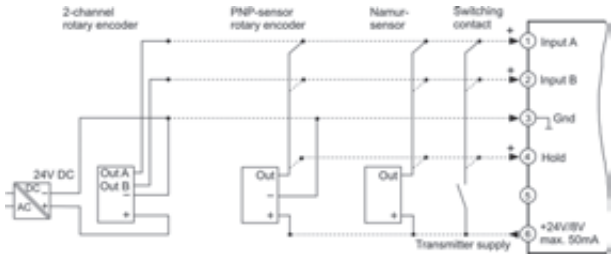
Output

Relay	:	SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Transistor	:	max. 35 V AC/DC, 100 mA, with short circuit protection
Analog output	:	0/4..20 mA burden ≤ 500 Ω; 0/2..10 V, burden > 500 Ω, with isolation
-Accuracy	:	0.1 %; TK 0.01 %/K
Case	:	panel case DIN 96x48 mm, material PA6-GF; UL94V-0
Dimensions	:	front 96x48 mm, mounting depth 100mm
Weight	:	max. 390 g
Connection	:	clamp terminals, 0.08..1.5 mm², AWG28..AWG14
Protection class	:	front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

PR9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Terminal strip A**		
	1	2 configurable impulse inputs, display conversion programmable, hold input, integrated transmitter supply 24V max. 50 mA	
2.	**Terminal strip B**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
3.	**Terminal strip C**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
	AO	analog output 0/4..20 mA, 0/2..10 V DC	
4.	**Terminal strip D; supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Options**		
	00	without option	
	01	min- and max- peak hold	
6.	**Unit** (appears in the unit field)		
7.	**Additional text** placed above the display (3x90 mm HxW)		

Standard Counter SZ9648

- **1 input for contact (debounced) max. 30 Hz**
- **1 input for electronic max. 15 kHz**
- **Auto reset or external reset**
- **LED-Display 14.2 mm red, indicating range 0..999999 Digit**
- **Max. 4 alarm outputs, relay SPDT or transistor**

Characteristics

The Standard Counter SZ9648 is available as totalizing counter or preselect counter. It operates in up-counting function. The device offers separate counting inputs for proximity switch, light barriers, other electronic signals and for mechanical contacts.

Technical data

Power supply
Supply voltage : 230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %
Power consumption : max. 3.5 VA
Operating temp. : -10..+55 °C Standard
CE conformity : EN 61326-1:2013; EN 60664-1:2007

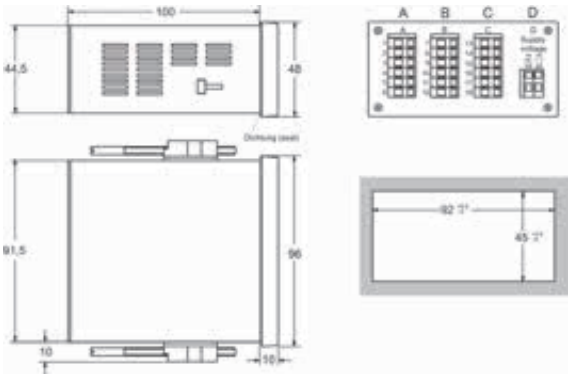
Input
PNP sensor : Ri = 6,3 kΩ
level: < 4 V low; > 8.5 V high;
hysteresis > 2.5 V; max. 35 V DC
Namur sensor : Ri approx. 1 kΩ (< 4 mA)
level: < 1 mA low; > 2.2 mA high;
hysteresis > 0.5 mA; max. 35 V DC
Counting frequency : input A = 30 Hz max., debounced for contact
input B = 15 kHz, electronic
Counting loss : 100 µs at reset;
20 ms changing of preselect value
Min. pulse width : electronic pulse 50 µs, switch contact 5 ms
External reset : min. pulse width ≥ 10 ms
Transmitter supply : 8 V DC (Namur), 24 V DC (PNP), Ri approx. 150 Ω, max. 50 mA (25 mA with 4 relay outputs)

Display : LED red, 14.2 mm
Indicating range : 0..999999 Digit with leading zero suppression
Additional display : LED 2-digit red, 7 mm (parameter - and output indicator)

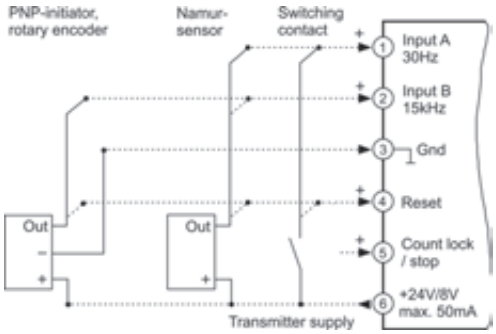
Output
Relay : SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Transistor : max. 35 V AC / DC, 100mA, short circuit proof

Case : panel case DIN 96x48, material PA6-GF; UL94V-0
Dimensions : front 96x48 mm, mounting depth 100mm
Weight : max. 390 g
Connection : clamp terminals, 0.08..1.5 mm², AWG28..AWG14
Protection class : front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

SZ9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Terminal strip A**		
	1	2 count inputs 30 Hz and 15 kHz, 2 additional control inputs, integrated transmitter supply 24V max. 50 mA	
2.	**Terminal strip B**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
3.	**Terminal strip C**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
4.	**Terminal strip D; supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Options**		
	00	without option	
6.	**Unit** (appears in the unit field)		
7.	**Additional text** placed above the display (3x90 mm HxW)		

Connection diagram for terminal strips B-D see page Fehler: Referenz nicht gefunden

Universal Counter UZ9648

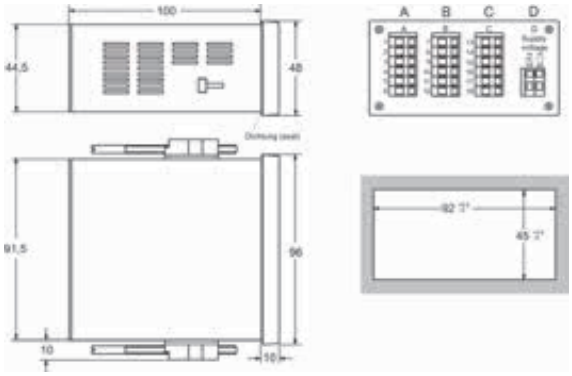
- **Counting, length measurement, metering, positioning**
- **2 digital input channels for summation- and subtraction**
- **Integrated transmitter supply**
- **Max. 4 preselect outputs, relay SPDT or transistor**

The universal counter UZ9648 has been designed for field application in process control and automation. Parameters for operation mode can be programmed. The counter can be used wherever quantity processes should be measured, displayed and monitored.

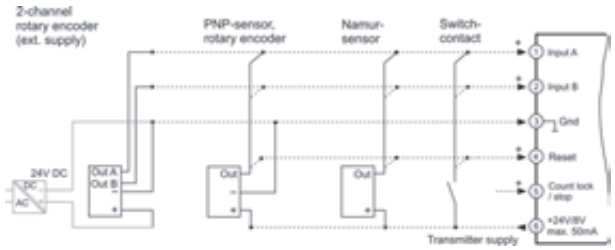
Technical data

Power supply
Supply voltage : 230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %
Power consumption : max. 3.5 VA, 5 VA with analog output
Operating temp. : -10..+55 °C
CE-conformity : EN 61326-1:2013; EN 60664-1:2007
Input
PNP sensor : Ri = 6.3 kΩ
level: < 4 V low; > 8.5 V high;
hysteresis > 2.5 V; max. 35 V DC
Namur sensor : Ri approx. 1 kΩ (< 4 mA)
level: < 1 mA low; >2.2 mA high;
hysteresis > 0.5 mA; max. 35 V DC
Pulse frequency : input A or B = 15kHz,
A and B together = 6 kHz,
contact = 30 Hz debounced,
2-channel rotary encoder = 8 kHz
Counting loss : 100 µs at reset;
20 ms changing of preselect value
Min. pulse width : electronic 50 µs, contact 5 ms
External reset : reset impulse ≥ 10 ms
Transmitter supply : 8 V DC (Namur), 24 V DC (PNP),
Ri approx. 150 Ω, max. 50 mA
(25 mA with 4 relay outputs)
Display : LED red, 14.2 mm
Indicating range : -99999..999999 Digit
Additional display : LED 2-digit red, 7 mm
(parameter - and output indicator)
Output
Relay : SPDT < 250 V AC < 250 VA < 2 A,
< 300 V DC < 50 W < 2 A
Transistor : max. 35 V AC/DC, 100 mA,
with short circuit protection
Analog output : 0/4..20 mA burden ≤ 500 Ω; 0/2..10 V,
burden > 500 Ω, with isolation
-Accuracy : 0.1 %; TK 0.01 %/K
Case : panel case DIN 96x48 mm,
material PA6-GF; UL94V-0
Dimensions : front 96x48 mm, mounting depth 100mm
Weight : max. 390 g
Connection : clamp terminals, 0.08..1.5 mm², AWG28..AWG14
Protection class : front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

UZ9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Terminal strip A**		
	1	2 configurable count inputs, display conversion, wide range of count functions, integrated transmitter supply 24V max. 50 mA	
2.	**Terminal strip B**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
3.	**Terminal strip C**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
	AO	analog output 0/4..20 mA, 0/2..10 V DC	
4.	**Terminal strip D; supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Options**		
	00	without option	
6.	**Unit** (appears in the unit field)		
7.	**Additional text** placed above the display (3x90 mm HxW)		

Conductivity Meter LF9648

Characteristics

The Conductivity Meter LF9648 has been designed for the measurement of conductivity, as a degree of the purity or concentration of a liquid. In connection with 4-electrode-conductivity cells a high accuracy and insensitivity of contamination can be achieved. A further advantage is a broad range of application with only one cell. Only for measurement in ultra-pure water a special 2-electrode conductivity cell must be used.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %
Power consumption	:	max. 3.5 VA, 5 VA with analog output
Operating temp.	:	-10..+55 °C
CE-conformity	:	EN 61326-1:2013 EN 60664-1:2007

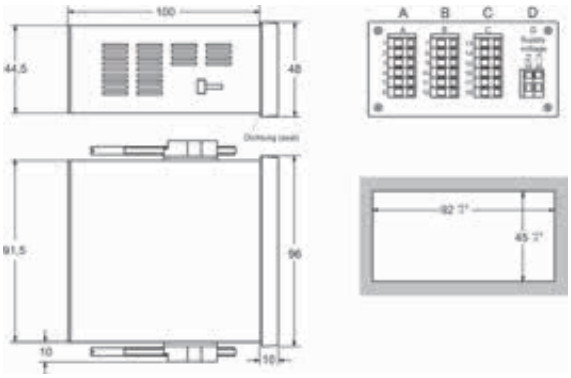
Inputs

MR conductivity	:	0..2.000(0) µS/cm up to 0..2000 / 200(0) mS/cm (at 25 °C)
-Cell constant	:	0.080..9.999
-Accuracy	:	0.5 % of the measuring value, ±2 Digit
-Temperature comp.	:	non linear for ultra pure water and natural water or linear programmable from 0.000..9.999 %/K
MR temperature	:	-50.0..+200.0 °C; Sensor Pt100 or Pt1000
-Accuracy	:	±0.2 °C
Display	:	LED red, 14.2 mm
Indicating range	:	2000(0) Digit with leading zero suppression
Parameter display	:	LED 2-digit red, 7 mm (parameter - and output indicator)

Outputs

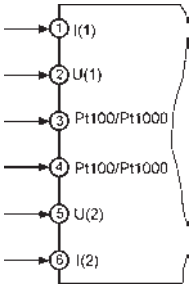
Relay	:	SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Transistor	:	transistor, <35 V AC/DC, max.100 mA, short circuit protected
Analog output		
Active	:	0/4..20 mA burden ≤500 Ω; 0/2..10 V burden >500 Ω, isolated automatic burden changing (burden dependent)
Passive	:	4..20 mA, ext. burden = RA[Ω]≤ (supply - 5 V) ÷ 0.02 A ; supply voltage 5..30 V DC,
Accuracy	:	0.1 %; TK 0.01 %/K
Case	:	panel mounting DIN 96x48 mm, material PA6-GF; UL94V-0
Dimensions	:	front 96x48 mm, mounting depth 100 mm,
Weight	:	max. 390 g
Connection	:	clamp terminals, 0.08..1.5 mm², AWG28..AWG14

Dimensions



Connection diagram

Terminal strip A



Ordering code

LF9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Terminal strip A**		
	1	input for 2- or 4-electrode-cells, temperature compensation via Pt100	
	3	as 1, but temperature compensation via Pt1000	
2.	**Terminal strip B**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
3.	**Terminal strip C**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
	AO	analog output 0/4..20 mA, 0/2..10 V DC	
	2A	2 analog outputs 4..20 mA passive	
4.	**Terminal strip D Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Options**		
	00	without option	
	01	min- and max-peak hold	
	14	measuring/monitoring acc. to USP<645>	
6.	**Unit** appears on the unit field		
7.	**Additional text** above the display (3x90 mm HxW)		

Connection diagram for terminal strip B-D see page Fehler: Verweis nicht gefunden

pH and ORP Panelmeter pH9648

- **LED-Display 14,2 mm red**
- **Measuring range programmable -1..+15 pH / ±1500 mV**
- **Temperature compensation via P100/Pt1000 sensor**
- **Analog output 0/4..20 mA or 0/2..10 V for pH/ORP**
- **Max. 4 alarm outputs relay or transistor**

Characteristics

The pH and ORP Panelmeter pH9648 is suitable for pH and ORP measurement in food technology, chemistry within pharmaceutical and sewage-water technology. The pH9648 operates with all common pH- and ORP electrodes. It is recommended to connect the Impedance-Converter pH40 for cable length > 5 m.

Technical data

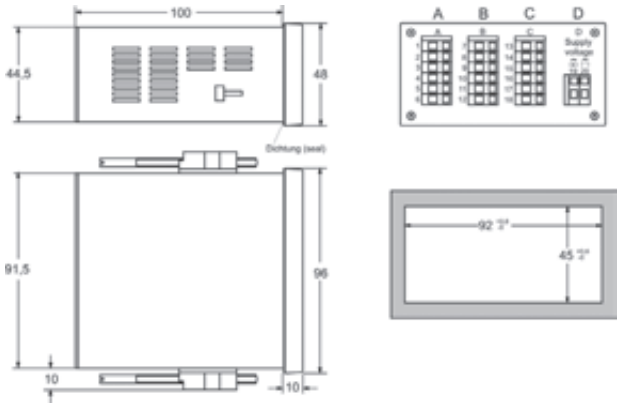
Power supply
Supply voltage : 230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %
Power consumption: max. 3.5 VA, with analog output 5 VA
Operating temperature : -10..+55 °C
CE-conformity : EN 61326-1:2013 EN 60664-1:2007

Input pH/ORP
Measuring range : -1.00..+15.00 pH or -1500..+1500 mV
R_i : > 10^{12} Ω
Input current : < 10^{-12} A
Accuracy : 0.2 % measuring value, ±2 Digit
pH setup : electrode zero point 4.00..10.00 pH slope 40.0..70.0 mV/pH
ORP setup : ± 200 mV
Calibration mode : - **1- or 2-point-calibration**
Buffer selection possible:
-Schott
-WTW
-Ingold (Mettler Toledo)
-Puffer acc. to DIN 19266
-or manual buffer input
- **Data** entering for zero point and slope
- **ORP** offset

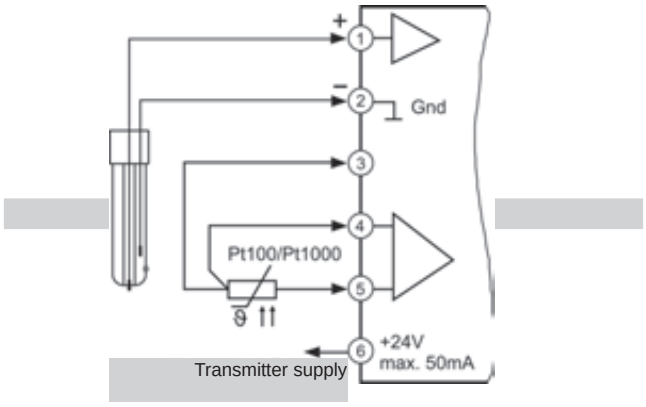
Temperature
Sensor : RTD, Pt100 or Pt1000, (2- or 3-wire connection)
Unit : programmable °C, °F
Measuring range : -40.0..+160.0 °C (-40.0..+320.0 °F)
Accuracy : ± 0.1 %, ±1Digit
Transmitter supply : 24 V DC, R_i approx. 150 Ω, max. 50 mA (25 mA with 4 relay outputs)
Display : LED red, 14.2 mm
Parameter display : LED 2-digit red, 7 mm (Parameter - and output indicator)

Output
Relay SPDT : < 250 V AC < 250 VA < 2 A, < 300 V DC <50 W < 2 A
Transistor : < 35 V AC/DC, max.100 mA, short-circuit-proof
Analog output *active* : 0/4..20 mA burden ≤500 Ω; 0/2..10 V burden > 500 Ω, isolated automatic output changing (burden dependent)
Analog output *passive* : 4..20 mA, ext. burden = RA[Ω]≤ (U_B-5 V) ÷ 0,02 A ; supply voltage 5..30 V DC
Accuracy : 0.1 %
Panel case : DIN 96x48 mm, material PA6-GF; UL94V-0
Dimensions : Front 96x48 mm, mounting depth 100 mm,
Weight : max. 390 g
Connection : clamp terminals, 2.5 mm² single wire, 1.5 mm² flex wire, AWG14
Protection class : Front IP65, terminals IP20, finger save acc. to BGV A3

Dimensions



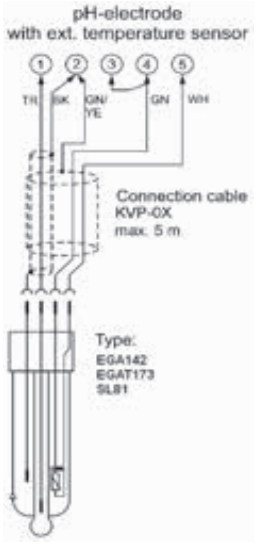
Connection diagram input

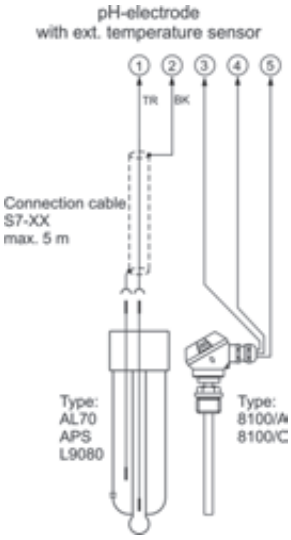


Ordering code

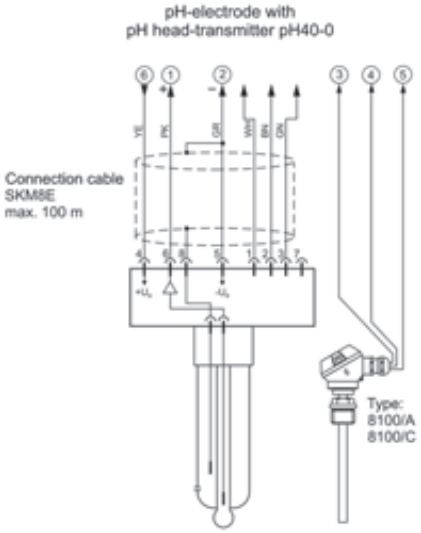
pH9648 - 1. [ ] - 2. [ ] - 3. [ ] - 4. [ ] - 5. [ ] - 6. [ ] - 7. [ ]

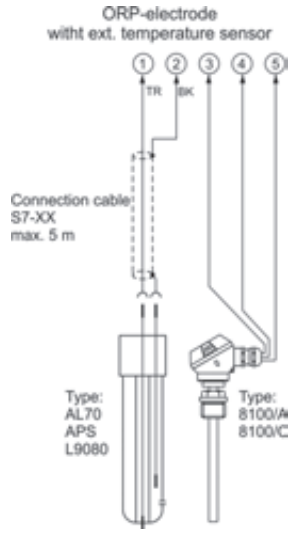
1.	**Terminal strip A**		
	13	input pH / ORP electrode, temperature compensation via Pt100 / Pt1000	
2.	**Terminal strip B**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
3.	**Terminal strip C**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 electronic outputs	
	AO	analog output 0/4..20 mA, 0/2..10 V DC	
	2A	2 analog outputs 4..20 mA passive	
4.	**Terminal strip B supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Options**		
	00	without option	
6.	**Unit** appears in the unit field		
7.	**Additional text** above the display (3x90 mm HxW)		





Connection examples pH9648



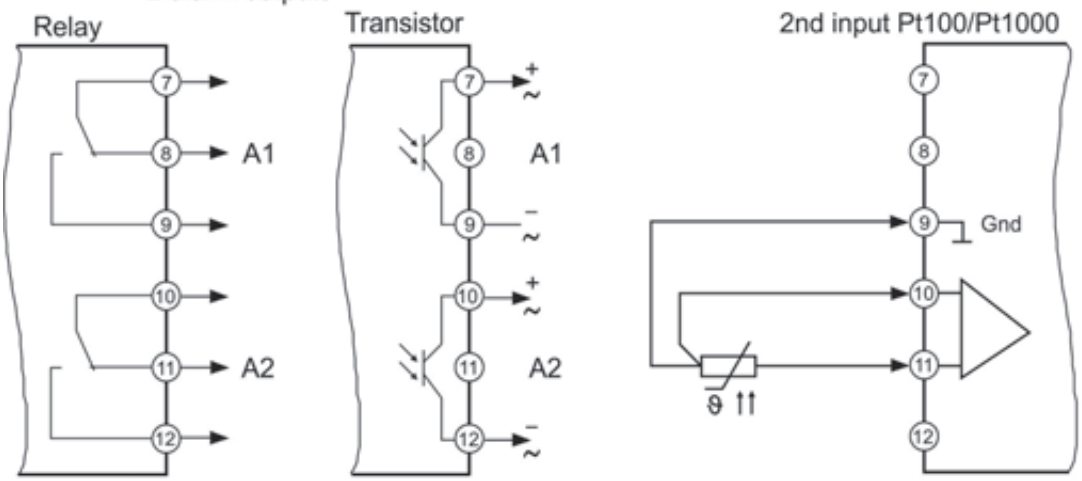


Connection Diagrams X9648, Terminals B-D

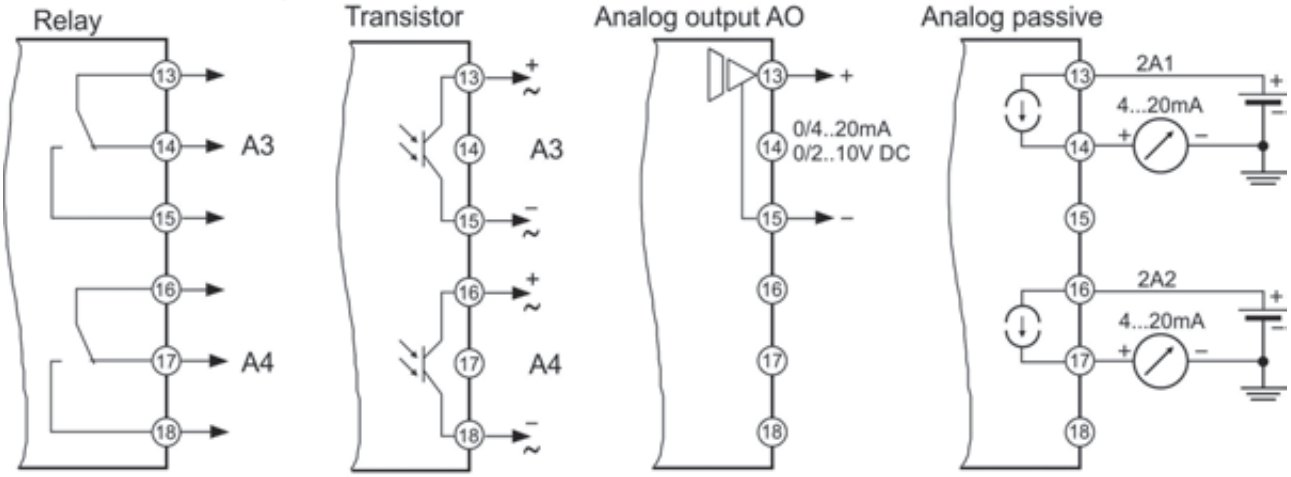
Terminal strips B, C, D

Terminal strip A belongs to each article.

Ternminal strip B (varies with versions)
2 alarm outputs



Terminal strip C (varies with versions)
2 alarm outputs



Terminal strip D supply voltage (varies with version)

Standard Signal Meter S1010

- **Measuring input for standard signals 0/4..20 mA or 0..10 V**
- **LED display 14.2 mm red, indicating range ±9999(0) digit**
- **Max. 2 alarm outputs, relay SPDT**
- **Analog output 0/4..20 mA, 0/2..10 V**
- **Field case with snap-lid, cable glands 2 x M16x1.5**

Characteristics

The Standard Signal Meter S1010 has been designed for measuring industry standard signals 0/4..20 mA or 0..10 V DC. The device offers an integrated transmitter supply for direct connection of 2- and 3-wire transmitters for e.g. pressure or temperature. Indicating range and decimal point are free programmable in the range ± 9999(0) digit.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 %; 115 V AC ±10 %, 24 V AC ±10 % or 24 V DC ±15 %
Power consumption	:	max. 3.5 VA
Operating temp.	:	-20..+55 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007

Input

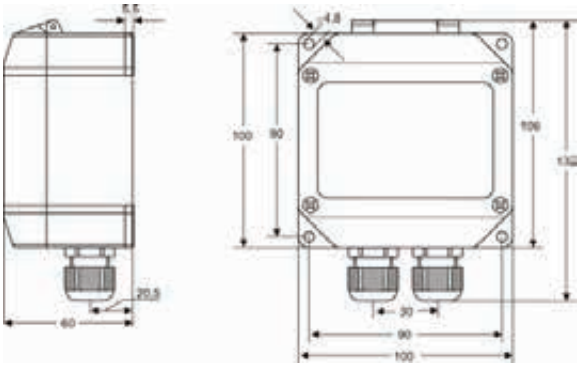
Current	:	0/4..20 mA Ri = 10 Ω
Voltage	:	0..10 V Ri = >100 kΩ
Potentiometer	:	0..1 kΩ / 100 kΩ
Accuracy	:	< 0.1 % ± 2 digit
Transmitter supply	:	U_0 approx. 24 V, Ri ca. 150 Ω, max. 50 mA (max. 25 mA with relay and analog output)
Display	:	LED red, 14.2 mm
Indicating range	:	±9999(0) digit with leading zero suppression
Parameter display	:	LED 2-digit red, 7 mm (parameter and output indicator)

Output

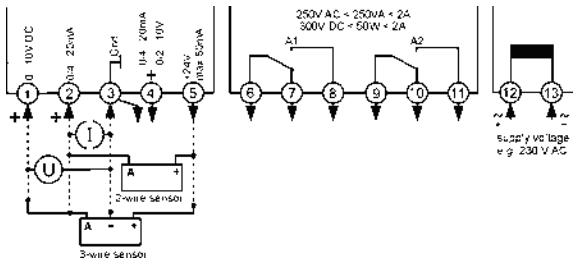
Relay	:	SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Analog	:	0/4..20 mA burden ≤ 500 Ω; 0/2..10 V burden > 500 Ω, without isolation, automatically output changing
- accuracy	:	0.1 %; TK 0.01 %/K

Field case	:	material PA6-GF 15/15
Dimensions	:	100x100x60 mm
Weight	:	max. 350 g
Cable glands	:	2 x M16x1.5
Connection	:	clamp terminals, 0.08..1.5 mm², AWG28..AWG14
Protection class	:	front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

S1010 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Input**		
	1	standard signals 0/4..20 mA, 0..10 V DC, integrated transmitter supply 24V max. 50 mA	
2.	**Alarm output**		
	00	not installed	
	2R	2 relay outputs	
3.	**Analog output**		
	00	not installed	
	AO	analog output 0/4..20 mA, 0/2..10 V DC	
4.	**Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Options**		
	00	without option	
	01	min- and max-peak hold	
	07	display brightness programmable	
	08	analog output free programmable	
	09	1xM20x1,5 multi (2xØ6mm), 1xM20x1,5	
6.	**Unit** (appears in the unit field)		
7.	**Additional text** placed above the display (3x70 mm HxW)		

Tank Display TA1010

- **Inputs for standard signals 0/4..20 mA or 0/2..10 V**
- **2_{nd} input for pressure transmitter at pressure loaded tanks**
- **Input automatic level correction**
- **6 standard- and custom sized tanks selectable**
- **Max. 2 alarm outputs, relay SPDT**
- **Field case with snap lid, cable glands 2 x M16x1.5**

Characteristics

The Tank Display TA1010 offers content measurement of tanks with no linear connection between level and content. Measurement will be realized by hydrostatic pressure or distance sensors. The device offers the possibility to connect a level sensor. Reaching a certain level, the displayed value will be corrected automatically to the value according to the position of the installed sensor.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 %; 115 V AC ±10 %, 24 V AC ±10 % or 24 V DC ±15 %
Power consumption	:	max. 3.5 VA
Operating temp.	:	-20..+55 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007

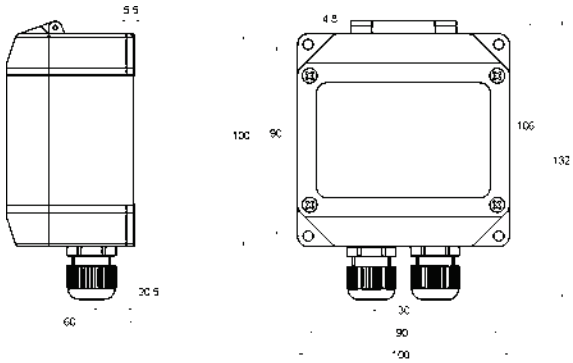
Input

Current	:	0/4..20 mA; Ri = 10 Ω overload 2-times; 4-times for max. 5 s
Voltage	:	0/2..10 V DC; Ri = 100 kΩ overload max. 100 V
Accuracy	:	< 0.15 % ±2 digit
Transmitter supply	:	U_0 approx. 24 V; Ri approx. 150 Ω; max. 50 mA
Display	:	LED red, 14.2 mm
Indicating range	:	999999 Digit, with leading zero suppression
Parameter display	:	LED 2 digit red, 7 mm (parameter - and output indicator)

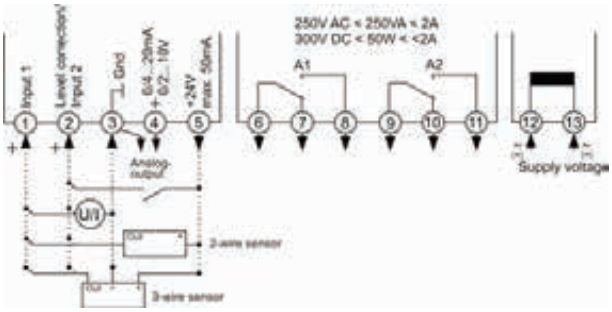
Output

Relay	:	SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Analog	:	0/4..20 mA burden ≤ 500 Ω; 0/2..10 V burden > 500 Ω, **without** isolation, automatic output changing
- Accuracy	:	0.1 %; TK 0.01 %/K
Field case	:	material PA6-GFGFK 15/15
Dimensions	:	100x100x60 mm
Weight	:	max. 450 g
Cable gland	:	2 x M16x1.5
Connection	:	clamp terminals, 0.08..1.5 mm², AWG28..AWG14
Protection class	:	front IP65, terminals IP20, acc. to BGV A3

Dimensions



Connection diagram



Ordering code

TA1010 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Input**		
	01	1 x 0/4..20 mA, 1 x input for level correction	
	11	2 x 0/4..20 mA	
	02	1 x 0/2..10 V, 1 x input for level correction	
	22	2 x 0/2..10 V	
2.	**Alarm output**		
	00	not installed	
	2R	2 relay	
3.	**Analog output**		
	00	not installed	
	AO	analog output 0/4..20 mA, 0/2..10 V DC	
4.	**Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Options**		
	00	without option	
	09	1xM20x1.5 multi (2xØ 6mm), 1xM20x1.5	
6.	**Unit** (appears in the unit field)		
7.	**Additional text** placed above the display (3x70 mm HxW)		

Temperature-Meter T1010

- **Measuring input Pt100 -100.0..+600.0 °C**
  Pt1000 -50.0..+200.0 °C
- **LED-Display 14.2 mm red, indicating range ±9999(0) Digit**
- **Max. 2 alarm outputs, relay SPDT**
- **Analog output 0/4..20 mA, 0/2..10 V**
- **Field case with snap lid, 2 x M16x1.5**

Characteristics

The Temperature-Meter T1010 is suitable for measurement of temperatures in connection with RTD sensors Pt100, Pt1000. Devices for other temperature sensors are available on request. The measuring input is isolated. The measuring range can be limited in the configuration level. This is identical with the range of the analog output.

Technical data

Power supply
Supply voltage : 230 V AC ±10 %; 115 V AC ±10 %, 24 V AC ±10 % or 24 V DC ±15 %
Power consumption : max. 3.5 VA
Operating temp. : -20..+55 °C
CE-conformity : EN 61326-1:2013 EN 60664-1:2007

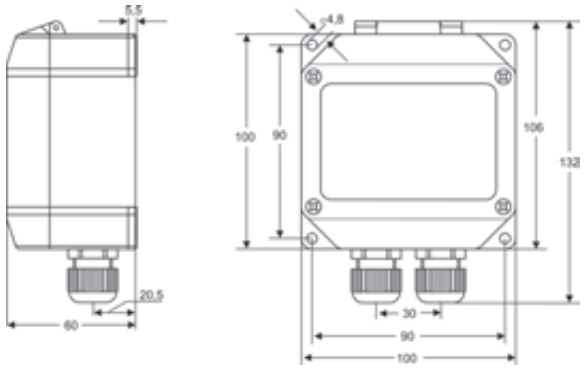
Input
Pt100; Pt1000 : -100..+600 °C ; -50..+200 °C
Accuracy : Pt100 or Pt1000 < 0.1% ±2 Digit, max. 100 Ω line resistance

Display : LED red, 14.2 mm
Indicating range : ±9999(0) digit, with leading zero suppression
Additional display : LED 2-digit red, 7 mm (Parameter - and output indicator)

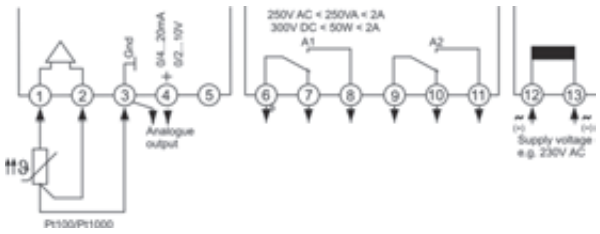
Output
Relay : SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Analog : 0/4..20 mA burden ≤ 500 Ω; 0/2..10 V burden > 500 Ω, **no** isolation, automatic output changing (burden dependent)
- Accuracy : 0.1 %; TK 0.01 %/K

Field case : Material PA6-GF/GFK 15/15
Dimensions : 100x100x60 mm
Weight : max. 450 g
Cable gland : 2 x M16x1.5
Connection : clamp terminals, 0.08..1.5 mm², AWG28..AWG14
Protection class : front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

T1010 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Input**		
	1	Pt100	-100.0..+600.0°C
	3	Pt1000	-50.0..+200.0°C
2.	**Alarm output**		
	00	not installed	
	2R	2 relay SPDT	
3.	**Analog output**		
	00	not installed	
	AO	analog output 0/4..20 mA, 0/2..10 V DC	
4.	**Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Options**		
	00	without option	
	01	min-max-value hold	
	07	display brightness programmable	
	09	1xM20x1.5 multi (2xØ 6 mm), 1xM20x1.5	
6.	**Unit** (appears in the unit field)		
7.	**Additional text** above the display (3x70 mm HxW)		

Speed Indicator DR1010

- **Pulse inputs for switch contacts, PNP-, Namur-sensors and rotary encoder**
- **Programmable input prescaler**
- **Time base min $^{-1}$**
- **Integrated transmitter-supply**
- **Max. 2 alarm outputs, relay SPDT**
- **Field case with snap-lid, 2 x M16x1.5**

Characteristics

The Speed Indicator DR1010 has been designed for field applications in process control and automation. Parameters for operation mode can be programmed. The DR1010 can be used wherever processes based per minute, just as speed should be measured and displayed.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %
Power consumption	:	max. 3.5 VA
Operating temp.	:	-20..+55 °C
CE- conformity	:	EN 61326-1:2013; EN 60664-1:2007

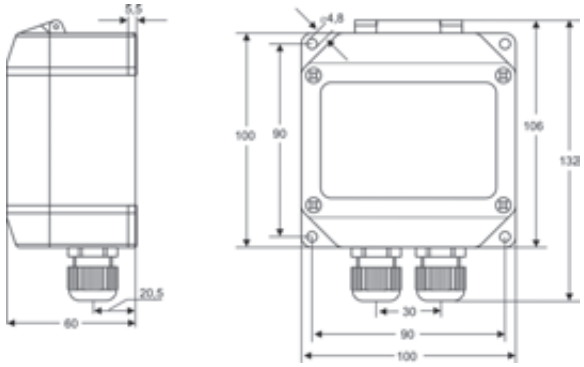
Input

PNP sensor	:	Ri = 6.3 kΩ
- level	:	< 4 V low; > 8.5 V high;
- hysteresis	:	> 2.5 V; max. 35 V DC
Namur sensor	:	Ri approx. 1 kΩ (< 4 mA)
- level	:	< 1 mA low; >2.2 mA high;
- hysteresis	:	> 0.5 mA; max. 35 V DC
Frequency max.	:	input E1 = 1 Hz..30 Hz, (switch contact) input E2 = 1 Hz..15 kHz, (PNP- or Namur sensor)
Time base	:	min^{-1}
Accuracy	:	≤ 0.003 % ±1 Digit
Min. pulse width	:	electronic 50 µs, contact 5 ms
Hold	:	24 V DC or switch contact
Transmitter supply	:	8 V (Namur), 24 V DC (PNP), Ri appr. 150Ω, max. 50 mA
Display	:	LED red, 14.2 mm
Indicating range	:	0..99999 digit
Additional display	:	LED 2-digit red, 7 mm (parameter- and switch indicator)

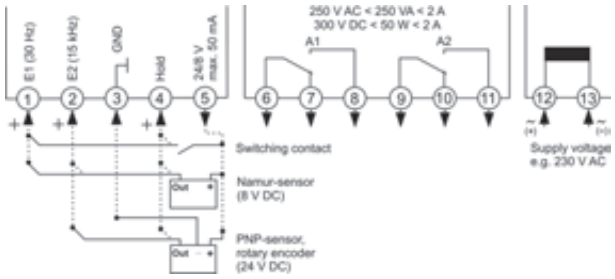
Output

Relay	:	SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Field case	:	material PA6-GF 15/15
Dimensions	:	100x100x60 mm
Weight	:	max. 450 g
Cable glands	:	2 x M16x1.5
Connection	:	clamp terminals, 0.08..1.5 mm², AWG28..AWG14
Protection class	:	front IP65, terminals IP20, acc. to BGV A3

Dimensions



Connection diagram



Ordering code

DR1010 - 1. [ ] - 2. [ ] - 3. [ ] - 4. [ ] - 5. [ ] - 6. [ ]

1.	**Input**		
	1	2 pulse inputs, hold input, integrated transmitter supply 24V max. 50 mA	
2.	**Alarm output**		
	00	not installed	
	2R	2 relay outputs	
3.	**Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
4.	**Options**		
	00	without option	
	09	1 x M20x1.5 multi (2 x Ø6 mm), 1 x M20x1.5	
5.	**Unit** (appears in the unit field)		
6.	**Additional text** placed above the display (3x70 mm HxW)		

Productivity Meter PR1010

- **2 digital inputs for summation, difference, ratio measurement**
- **Input prescaler programmable**
- **LED-Display 14.2 mm red, ±99999 Digit**
- **Max. 2 alarm outputs, relay SPDT**
- **Field case with snap-lid, 2 x M16x1.5**

Characteristic

The Productivity-Meter PR1010 analysis impulse rates, representing a speed, flow, passing time or revolutions per time. The displayed values therefore always refer to a determined time unit and represent productivity. There are extensive functions programmable. Since impulses and unit of a displayed value can take any relation, the device offers extensive conversion possibilities.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %
Power consumption	:	max. 3.5 VA
Operating temp.	:	-20..+55 °C
CE- conformity	:	EN 61326-1:2013; EN 60664-1:2007

Input

PNP sensor	:	Ri = 6.3 kΩ level: < 4 V low; > 8,5 V high; hysteresis > 2.5 V; max. 35 V DC
Namur sensor	:	Ri approx. 1 kΩ (< 4 mA) level: < 1 mA low; >2.2 mA high; hysteresis > 0.5 mA; max. 35 V DC
Pulse frequency	:	input A or B = 0.1 Hz..15 kHz, A and B together = 0.1 Hz..8 kHz, contact = 0.1 Hz..30 Hz, 2-channel encoder = 0.1 Hz..10 kHz
Min. pulse width	:	electronic 50 µs, contact 5 ms
Time base	:	sec^{-1}, min^{-1}, h^{-1}
Accuracy	:	≤ 0.003 % ± 1 Digit
Transmitter supply	:	8 V (Namur), 24 V DC, Ri approx. 150 Ω, max. 50 mA

Display

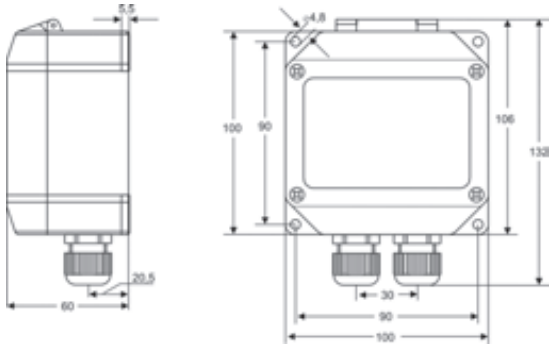
Indicating range	:	-99999..99999 Digit
Parameter display	:	LED 2-digit red, 7 mm (parameter and output indicator)

Output

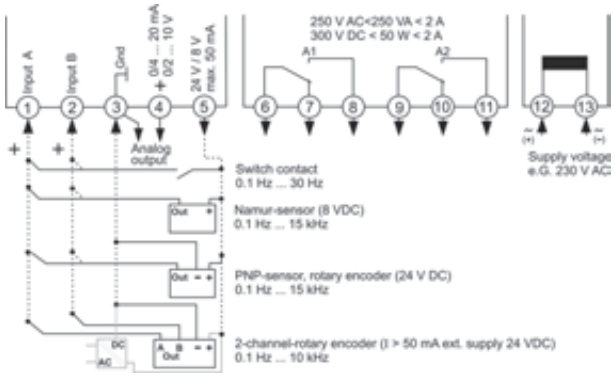
Relay	:	SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Analog output	:	0/4..20 mA burden ≤ 500 Ω; 0/2..10 V, burden > 500 Ω, **without** isolation
-Accuracy	:	0.1 %; TK 0.01 %/K

Field case	:	material PA6-GF 15/15
Dimensions	:	100x100x60 mm
Weight	:	max. 450 g
Cable gland	:	2 x M16x1.5
Connection	:	clamp terminals, 0.08..1.5 mm², AWG28..AWG14
Protection class	:	front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

PR1010 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Input**		
	1	2 configurable pulse inputs, display conversion programmable, integrated transmitter supply 24V 50 mA	
2.	**Alarm output**		
	00	not installed	
	2R	2 relay outputs	
3.	**Analog output**		
	00	not installed	
	AO	analog output 0/4..20 mA, 0/2..10 V DC	
4.	**Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Options**		
	00	without option	
	09	1 x M20x1.5 multi (2 x Ø6 mm), 1 x M20x1.5	
6.	**Unit** (appears in the unit field)		
7.	**Additional text** placed above the display (3x70 mm HxW)		

Universal Counter UZ1010

- **Counting, length measurement, metering, positioning**
- **2 digital input channels for summation- and subtraction**
- **Integrated transmitter-supply**
- **Max. 2 preselect outputs, relay SPDT**
- **Field case with snap lid, cable glands 2xM16x1.5**

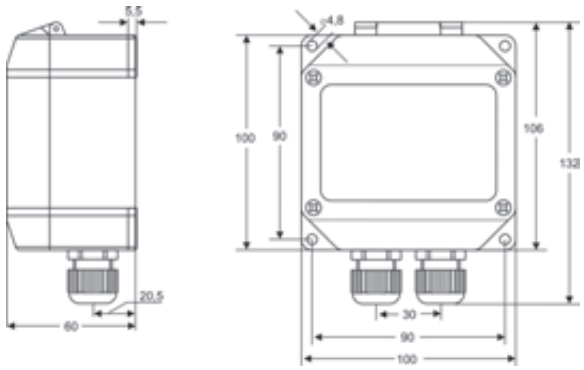
Characteristics

The universal counter UZ1010 has been designed for field application in process control and automation. Parameters for operation mode can be programmed. The counter can be used wherever quantity processes should be measured, displayed and monitored.

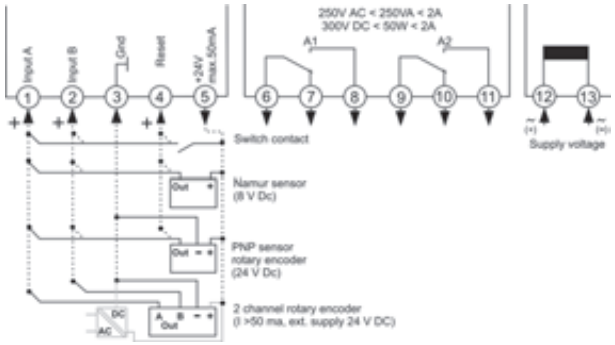
Technical data

Power supply
Supply voltage : 230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %
Power consumption : max. 3.5 VA
Operating temp. : -20..+55 °C
CE- conformity : EN 61326-1:2013; EN 60664-1:2007
Input
PNP sensor : Ri = 6.3 kΩ
level: < 4 V low; > 8.5 V high;
hysteresis > 2.5 V; max. 35 V DC
Namur sensor : Ri approx. 1 kΩ (< 4 mA)
level: < 1 mA low; > 2.2 mA high;
hysteresis > 0.5 mA; max. 35 V DC
Counting frequency : input A or B = 15 kHz
A and B together = 6 kHz,
debounced for contact= 30 Hz
Counting loss : 100 µs at reset;
20 ms changing of preselect value
Min. pulse width : electronic pulse 50 µs, switch contact 5 ms
External reset : min. pulse width ≥ 10 ms
Transmitter-supply : 8 V DC (Namur), 24 V DC (PNP),
Ri approx. 150 Ω, max. 50 mA
Display : LED red, 14.2 mm
Indicating range : -99999..999999 digit
Additional display : LED 2-digit red, 7 mm
(parameter- and output indicator)
Output
Relay : SPDT < 250 V AC < 250 VA < 2 A,
< 300 V DC < 50 W < 2 A
Field case : material PA6-GF 15/15
Dimensions : 100x100x60 mm
Weight : max. 450 g
Cable glands : 2 x M16x1.5
Connection : clamp terminals, 0.08..1.5 mm², AWG28..AWG14
Protection class : front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

UZ1010 - 1. - 2. - 3. - 4. - 5. - 6.

1.	**Input**		
	1	2 configurable count inputs, wide range of count functions, display conversion, reset input, integrated transmitter supply 24V max. 50 mA	
2.	**Alarm output**		
	00	not installed	
	2R	2 relay outputs	
3.	**Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
4.	**Options**		
	00	without options	
	09	1xM20x1.5 multi (2xØ6 mm), 1xM20x1.5	
5.	**Unit** (appears in the unit field)		
6.	**Additional text** placed above the display (3x70 mm HxW)		

Conductivity Meter LF1010

Characteristics

The Conductivity-Meter LF1010 has been designed for the measurement of conductivity, as a degree of the purity or concentration of a liquid. In connection with 4-electrode-conductivity cells a high accuracy and insensitivity of contamination can be achieved. A further advantage is a broad range of application with only one cell. Only for measurement in ultra-pure water a special 2-electrode conductivity cell must be used.

Technical data

Power supply

Supply voltage	: 230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %	
Power consumption	: max. 3.5 VA	
Operating temp.	: -20..+55 °C	
CE-conformity	: EN 61326-1:2013 EN 60664-1:2007	

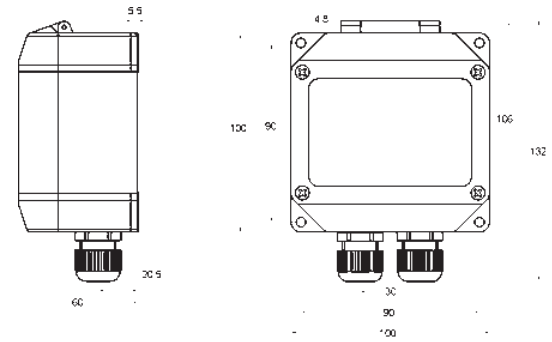
Inputs

MR conductivity	: 0..2.000(0) µS/cm up to 0..2000 / 200(0) mS/cm (at 25 °C)	
-Cell constant	: 0.080..9.999	
-Accuracy	: 0.5 % of the measuring value, ±2 Digit	
-Temperature comp.	: non linear for ultra pure water and natural water or linear programmable from 0.000..9.999 %/K	
MR temperature	: -50.0..200.0 °C; Sensor Pt100 or Pt1000	
-Accuracy	: ±0.2 °C	
Display	: LED red, 14.2 mm	
Indicating range	: 2000(0) Digit with leading zero suppression	
Parameter display	: LED 2-digit red, 7 mm (Parameter - and output indicator)	

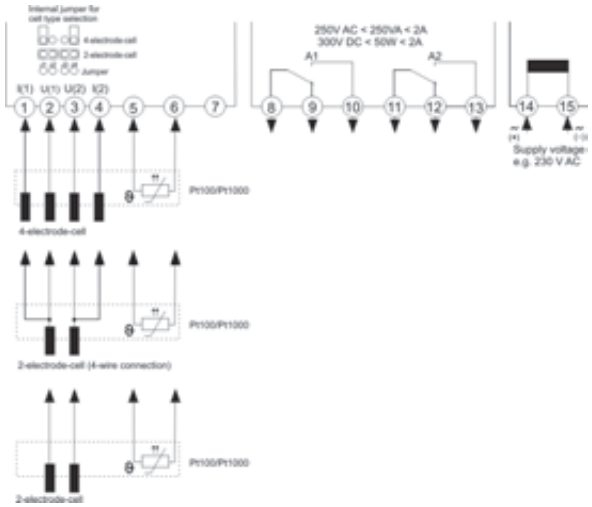
Outputs

Relay	: SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A	
Field case	: Material PA6-GF15/15, keypad polyester	
Dimensions	: 100x100x60 mm	
Weight	: max. 450 g	
Connection	: clamp terminals	
	single wire	*flexi wire*
Terminals 1-4	0.75 mm², AWG18	0.5 mm², AWG 20
Terminals 5-15	2.5 mm², AWG13	1.5 mm², AWG 15
Protection class	: IP65, terminals IP20 acc. to BGV A3	

Dimensions



Connection diagram



Ordering code

LF1010 - 1. - 2. - 3. - 4. - 5. - 6.

1.	**Input**		
	1	input for 2- or 4-electrode-cells, temperature compensation via Pt100	
	3	as 1, but temperature compensation via Pt1000	
2.	**Alarm output**		
	00	not installed	
	2R	2 relay	
3.	**Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
4.	**Options**		
	00	without option	
	01	min- and max-peak hold	
	09	1xM20x1.5 Multi (2xØ6 mm), 1xM20x1.5	
	14	measuring and monitoring of ultra-pure water acc. to USP<645>	
5.	**Unit** appears on the unit field		
6.	**Additional text** above the display (3x70 mm HxW)		

Plug-In Display GIA 0420 VO(T)

Characteristics

The GIA 0420 VO is a microprocessor-controlled displaying device for 4..20 mA standard signals.

Any transmitter (with 4..20 mA output) can be connected to the device. The range adjustment of the GIA 0420 to the transmitter is done by entering the initial and final value and the decimal point position. No additional auxiliaries are needed for this adjustment, but the three buttons accessible after removal of the cover. The device is mounted by easy plug-in of the special adapter (elbow-type plug according to EN 175301-803/A)

The GIA 0420 VO doesn't need a separate auxiliary supply but is directly supplied by the measuring current. It has an integrated self-diagnostic which checks the device that it works correctly. This self-diagnostic together with the transmitter's check for “sensor break” and “sensor short circuit” and range exceeding or falling below ensures an optimum of operational reliability.

Technical data

Measuring input

Input signal	:	4..20 mA (2-wire)
Accuracy	:	± 0.2 % FS ±1 digit
Measuring rate	:	5 measurements / seconds
Filter	:	adjustable
Voltage load	:	approx. 2 V at option S2: approx. 3 V at option ex: approx. 3.5 V
Power supply	:	self-supplying: devices is supplied directly from measuring current
Working temperature	:	0..50 °C

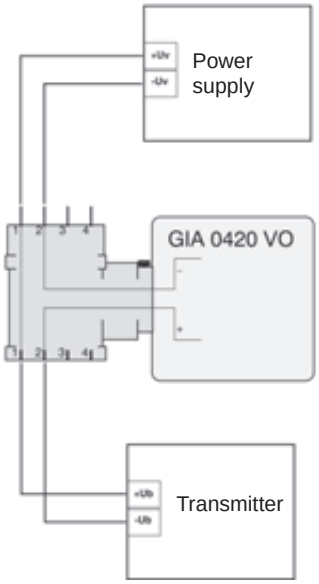
Display

Display	:	LCD display
Height	:	10 mm
Display range	:	-1999..+9999 digit
Decimal point	:	any position
Scaling	:	freely scalable via 3 buttons (accessible after cover has been removed)
Connection	:	special plug design for elbow-type plug (EN 175301-803/A) for easy plug-in
Housing	:	ABS, front screen made of polycarbonate
Protection class	:	front IP65

Dimensions

Housing : 48.5 x 48.5 x 35.5 mm (L x W x D)
without elbow-type plug

Connection diagram



Design types

VO	**With elbow-type plug** special adapter design for elbow-type plug (EN 175301-803/A) for easy plug-in (standard, as per description)
WK	**With cable connection** electric connection via 2 m long connection cable with loose ends for connection to any standard signal source 4..20 mA

Ordering code

	1.		2.		3.
GIA0420		-		-	

1.	**Design type**	
	VO	elbow-type plug (standard)
	WK	cable connection
2.	**Buttons**	
	0	without buttons at front, buttons for scaling are accessible after top cover has been removed
	T	with buttons, 3 operating buttons freely accessible
3.	**Option**	
	00	without option
	S1	display with 1 electrically isolated switching output; delivered incl. 1 m connection cable (just in combination with option “ex”)
	S2	display with 2 electrically isolated switching outputs; delivered incl. 1 m connection cable (not in combination with option “ex”)
	ex	with ex-protection for explosive areas (available: end of 2nd quarter 2011)

Other design types (input signal: 0..10 V) upon request.

Power-Meter Integra 1530

- **Measuring and indicating of all mains parameter of 3- and 4-wire systems**
- **Mains line voltage from 100 up to 485 V AC**
- **Current and voltage transmitter programmable**
- **Measuring range programmable**

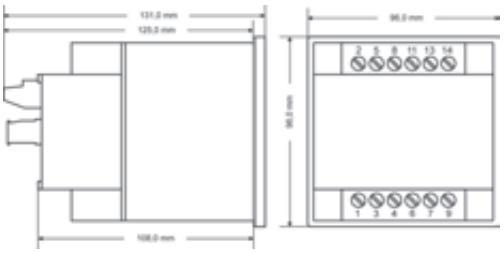
Characteristics

The Integra will measure and communicate many electrical parameters, including THD values. Integra 1530 combines a basic accuracy of 0.2 % with fast response, a range of output options, and a large clear LED display. The display provides a wide viewing angle without parallax issues and fast response at low ambient temperatures. 52 electrical and mains power parameter could be configured and displayed. Additional an serial interface RS485 with protocol Modbus™ and JCNII is deliverable. The Integra 1530 detects the protocol automatically.

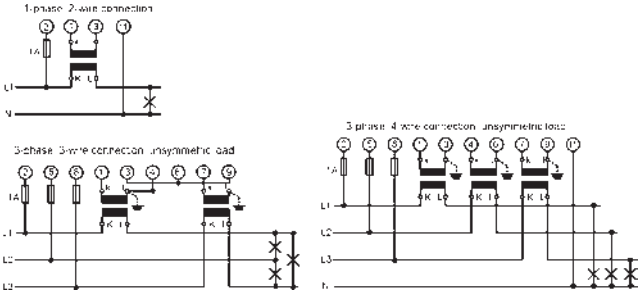
Technical data

Power supply		
Supply voltage	:	100..250 V AC or 12..48 V DC
Frequency	:	45..66 Hz
Power consumption	:	6 VA
Operating temperature	:	0..55 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007
Measuring capabilities		
Voltage	:	80..120 % of the nominal value
Current	:	5..120 % of the nominal value
Frequency	:	45..66 Hz
Active power [W]	:	5..120 % of nominal
Reactive power [VAR]	:	5..120 % of nominal
Apparent power [VA]	:	5..120 % of nominal
Power factor	:	lagging 0.8..1..0.8 leading
Harmonic distortion	:	up to the 31st harmonic wave 0..40 %
Basic accuracy	:	0.2 %
Display	:	3 x 11 mm LED red, 4-digit
Outputs		
Relay	:	2 relay SPDT
Impulse	:	relay SPST, NO
Analog	:	0/4..20 mA, or -1..0..1 mA
Serial interface	:	RS485 2400, 4800, 9600, 19200 Baud Protocol MODBUS
Case	:	DIN 96x96 mm, Polycarbonate
Connection	:	screw clamp (load) and slide-in terminals max. 3mm²
Protection class	:	front IP54

Dimensions



Connection diagram



Ordering code

1530 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1.	**Mains**	
	1	1-phase; L1-N
	3	3-phase; L1-L2-L3, asymmetric load
	4	3-phase; L1-L2-L3-N, asymmetric load
2.	**Measuring voltage**	
	1	L1-N; 1-phase, 57..139 V AC
	2	L1-N; 1-phase, 140..277 V AC
	3	L1-L2; 3-phase, 100..240 V AC
	4	L1-L2; 3-phase, 241..480 V AC
3.	**Measuring current**	
	1	1 A AC
	5	5 A AC
4.	**Supply voltage**	
	0	100..250 V AC
	5	12..48 V DC
5.	**Relay output** (relay 1 and 2)	
	0	without
	1	1 impulse output 1/kWh
	2	2 impulse outputs
6.	**Analog output**	
	00	without
	01	0/4..20 mA
	03	-1..0..1 mA
	11	2 outputs as 01
	33	2 outputs as 03
7.	**Serial interface**	
	0	without
	1	RS485 Modbus
	2	Lonworks
	3	Profibus
8.	**Options**	
	00	without option

Graphic display series migra SC/MC

- **LED-dot matrix**
- **Character size 30..100 mm**
- **Single colour red (SC), multi colour red, yellow, green (MC)**
- **Up to 320 characters, depending on character hight**
- **Interface RS485, Profibus, AS-Interface or Ethernet**
- **Protection class IP54 or IP65**

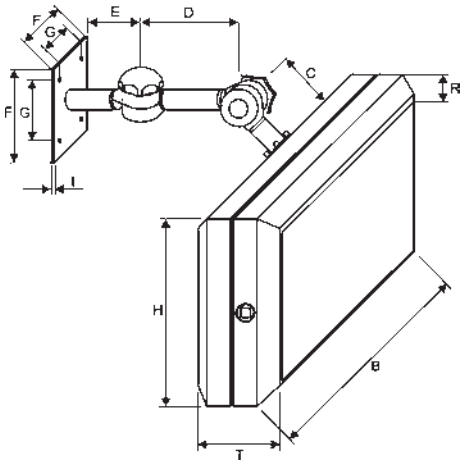
Characteristics

The migra SC/MC graphics and text compatible large size LED display can be used universally for display of production data or as an information board.
The modular design allows cost-effective models of various sizes with different character heights and number of digits.
Thanks to the high resolution LED dot matrix display, characters as well as graphics are crystal clear.
Especially important information can be colour-highlighted with the multicolour model (MC).

Technical data

Power supply		
Supply voltage	:	230 V AC 50 Hz, 24 V DC ±20 %
Power consumption	:	30 W max. depends to the character size
Operating temp.	:	0..50 °C
Input		
Digital	:	pulse counter, A/D-converter
Interface	:	Profibus, AS-Interface, Serial RS485, Ethernet, Modbus
Display	:	LED dot matrix; 64x16 Pixel per module, 30, 40, 55 mm at 3 mm pixel diameter, 50, 75, 100 mm at 5 mm pixel diameter
SC	:	single color red
MC	:	multi color red, yellow, green ASCII full graphic character set
Angel of radiation	:	±75°
Field case	:	material aluminum, powder coated, RAL 7016
Dimensions	:	see table
Protection class	:	IP54 or IP65

Dimensions



	[mm]
C	60
D	110
E	74
F	100
G	70
I	7
R	21
T	87

Dimensions H and B

Number of modules/pixel height [mm]

3 mm								
	1 module		2 modules		3 modules		4 modules	
	H	B	H	B	H	B	H	B
1 module	202	368	202	620	202	920	202	1150
2 modules	238	368	238	620	238	920	238	1150
3 modules	280	368	280	620	280	920	280	1150
4 modules	338	368	338	620	338	920	338	1150
5 mm								
	1 module		2 modules		3 modules		4 modules	
	H	B	H	B	H	B	H	B
1 module	202	620	202	1080	202	1559	202	2047
2 modules	238	620	238	1080	238	1559	238	2047
3 modules	448	620	448	1080	448	1559	448	2047
4 modules	571	620	571	1080	571	1559	571	2047

Ordering code next page

Ordering code

	1.	2.	3.	4.	5.	6.	7.	8.
migra -		-	-	-	-	-		

1.	**Display 1 basic module**		
	SC-3	3 mm single color red (indoor mounting)	
	MC-3	3 mm multi color red/yellow/green (indoor mounting)	
	SC-5	5 mm single color red (indoor mounting)	
	MC-5	5 mm multi color red/yellow/green (indoor mounting)	
2.	**Extended module (1 module = 64x16 Pixel)**		
	n		
3.	**Mounting position (f.e. 1x4 = 1 line with 4 modules)**		
	For each 4x4 module 1 basic module is necessary		
4.	**Input**		
	0	pulse counter	
	1	A/D converter 4-steps	
	3	serial RS 485	
	4	Profibus DP, include cable plug	
	5	Ethernet TCP/IP	
	6	AS-Interface	
	B	radio controlled clock DCF77	
	D	Modbus RTU	
	E	WLAN	
5.	**Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
6.	**Protection class**		
	0	IP54	
	1	IP65	
7.	**Mounting**		
	1	multi hinge*	
	2	mounting angle *	
	3	suspension eyes for chains	
8.	**Options**		
	00	without	
	03	heating with controller	
	06	sensor for display brightness (only SC-5, MC-5)	

* 2 multi hinge/mounting angle are necessary for more than 2 modules in line
* 3 multi hinge/mounting angle are necessary for more than 3 modules in line

Large size display series migan

- **LED-7 Segment**
- **Character height 60..150 mm**
- **Max. 6/8 digit at digital and interface, 4 digit at analog input**
- **Analog inputs 0/4..20 mA, 0..10 V**
- **Digital pulse counter up to 15 kHz, Profibus, AS-Interface or Ethernet**
- **Protection class IP54 or IP65**

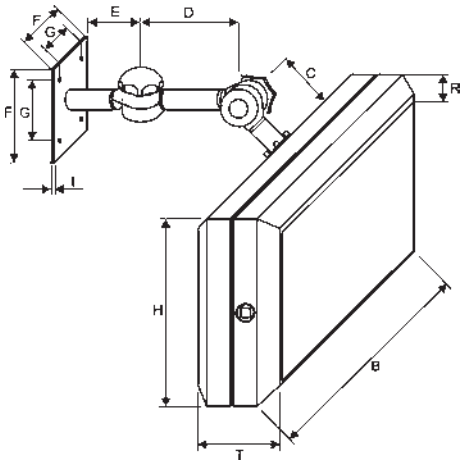
Characteristics

The large size numeric display can be used universally as a process display unit or as an information board. The modular design allows for cost-effective models of various size, and with different character heights and number of digits. Thus integration into existing equipment or systems is easy and simple. The display can be controlled with different inputs.
For example: field bus systems , A-D converter, pulse converter....
Custom devices with different digits even units are possible.

Technical data

Power supply
Supply voltage : 230 V AC ±10 %; 110 V AC ±10 %; or 24 V DC ±20 %
Power consumption : max. 16 W per digit, it depends on the number and size of the digits.
Operating temp. : 0..50 °C
Input
Analogue : 0/4..20 mA, 0..10 V
Digital : pulse counter
Interface : Profibus, AS-interface or Ethernet
Count frequency : max. 15 kHz,
Display : LED red; 60, 100, and 150 mm height
Indicating range : max. 6 / 8 digit with digital- and interface input,
4 digit with analog input
Field case : material Aluminum, powder coated RAL 7016
Dimensions : see table
Protection class : IP54 or IP65

Dimensions



	[mm]
C	60
D	110
E	74
F	100
G	70
I	7
R	21
T	87

Dimensions H and B

Number of digits / character height

	60mm		100mm		150mm	
	B	H	B	H	B	H
2 digits	305	202	305	202	368	238
3 digits	305	202	440	202	440	238
4 digits	305	202	440	202	620	238
5 digits	440	202	620	202	720	238
6 digits	440	202	620	202	820	238
7 digits	440	202	720	202	920	238
8 digits	620	202	820	202	1080	238

Ordering code next page

Ordering code

migan - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1.	**Character size [mm]**		
	1	60	
	2	100	
	3	150	
	4	200	
	5	250	
2.	**Number of digits**		
	n		
3.	**Input**		
	0	pulse counter	
	1	A/D converter 4-times	
	4	Profibus DP, incl. cable plug	
	5	Ethernet TCP/IP	
	6	AS-Interface	
	7	BCD parallel	
	8	BCD multiplex	
	9	Pt100 2-, 3-wire	
	A	incremental input	
	B	radio controlled clock DCF77	
	C	Profinet IO	
	D	Modbus RTU	
4.	**Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Protection class**		
	0	IP54	
	1	IP65	
6.	**Mounting**		
	1	multi hinge*	
	2	mounting angle *	
	3	suspension eyes for chains	
	4	multi hinge with hinge extension	
	5	mounting frame	
7.	**Additional text on the face plate** (please state in clear text)**		
8.	**Options**		
	00	without	
	03	heating with controller	
	04	colon for clock display	
	05	custom display color	

* for more than 7 digits 100/150mm character heights 2 multi hinge or mounting angles are necessary.
** each unit character the case size changes with 1 digit.

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GHMGROUP
Specialists by Competence.

Product information

Controller

Characteristics

System

- 2-point-controller
- 3-point-controller
- 3-point-step-controller
- Difference-controller
- Continuous-controller
- Setpoint adjuster

Output

- Relay-switching contact
- Bistable 0/12V DC
- Alarm outputs
- Continuous outputs

Case

- Panel case
- DIN 48x24 mm
- DIN 48x48 mm
- DIN 96x48 mm
- DIN 96x96 mm

Applications

- **Extruder machines**
- **Heating control systems**
- **Facility engineering**
- **Wide range of instrumentation**

Function

The controllers are ideally adapted for most of the controlling tasks due to their multifunction inputs and due to their compact construction design can be quickly retrofitted.
The setpoint devices adapt themselves automatically to the measurement task at the output defined by the collar.
The industrial standard casing provide for the trouble-free replacement of the controllers.

Benefits

- Geringe Lagerhaltung durch multifunktionale Eingänge
- Weites Funktionsspektrum der Regelfunktionen
- Kompakte Bauweise
- Normgehäuse

Device overview

Device	Function	Input	Output	Mounting	Page
GIA20EB	2-point-controller, 3-point-controller, 2-point-controller with min-/max-alarm function	RTD (Pt100, Pt1000), Thermocouple, standard signals, frequency	2 Transistor (Low-side, High-side, Push-pull)	Panel case DIN 48X24mm	76
GIR230	2-point-controller, 3-point-controller, 2-point-controller with min-/max-alarm function	RTD (Pt100, Pt1000), Thermocouple, NTC, standard signals, frequency	2 relay SPST, 1 transistor NPN	Panel case DIN 48X24mm	78
GIR230DIF	Difference-controller, 2-point-controller, 3-point-controller, 2-point-controller with min-/max-alarm function	RTD (Pt1000), Thermocouple, NTC, standard signals	2 relay SPST, 1 transistor NPN	Panel case DIN 48x24 mm	81
GIR300	2-point-controller, 3-point-controller, 2-point-controller with min-/max-alarm function	RTD (Pt100, Pt1000), Thermocouple, NTC, standard signals, frequency	2 potential free relay switching outputs Relay 1: normally closed Relay 2: normally open	Panel case DIN 72x36 mm	83
GIR360	Universal display and regulating unit	Digital signal 0..5 V (0..28 V)	2 potential free relay switching outputs Relay 1: normally closed Relay 2: normally open	Panel case DIN 72x36 mm	85
EC9648	Difference-controller, 2-point-controller, 3-point-controller, 2-point-controller with min-/max-alarm function	RTD (Pt100), Thermocouple, standard signals frequency	Relay SPDT, transistor, bistable 0/6 V DC, analog output	Panel case DIN 96x48 mm	87
R1140	2-point-controller, 3-point-controller, 3-point-step-controller continuous-controller	RTD (Pt100), Thermocouple, standard signals	Relay, bistable 0/18 V DC, continuous 0/4..20 mA	Panel case DIN 96x96 mm	90
R1300	2-point-controller, 3-point-controller, 3-point-step-controller, continuous controller	RTD (Pt100), Thermocouple, standard signals	Relay SPDT, bistable 0/18 V DC, continuous 0/4..20 mA, 0/2..10 V DC	Panel case DIN 96x96 mm	92
TTM-004W TTM-005W TTM-009W	2-point-controller, 3-point-controller, continuous controller	RTD (Pt100), Thermocouple, standard signals	Relay SPST, bistable 0/12 V DC, continuous 4..20 mA	Panel case DIN 48x48 mm DIN 48x96 mm DIN 96x96 mm	93
GRA	2-point-controller or min-/max-alarm function	4..20 mA, 2-wire or 0..10 V, 3-wire	1 transistor OC	Plug-on case Field mounting	94
SG4824	Setpoint adjuster	-	0/4..20 mA, 0/2..10 V DC	Panel case DIN 48x24 mm	96
SG9648	Setpoint adjuster	Control inputs for setpoint ramp	0/4..20 mA, 0/2..10 V DC	Panel case DIN 96x48 mm	97
SG1010	Setpoint adjuster	Control inputs for setpoint ramp	0/4..20 mA, 0/2..10 V DC	Field case 100x100x60 mm	98

Mistakes reserved, technical specifications subject to change without notice.

Universal Measuring and Controlling Device GIA 20 EB

- **Universal inputs for standard signals, frequency, Pt100 / Pt1000 and thermocouples**
- **2 integrated switching outputs**
- **Self-monitoring and diagnostic system**
- **Interface**

Characteristics

The GIA 20 EB is a microprocessor-controlled displaying, monitoring and controlling device for universal use.
It has a universal input for standard signals (0..20 mA, 4..20 mA, 0..50 mV, 0..1 V, 0..2 V and 0..10 V), resistance thermometers (Pt100 and Pt1000), thermocouples (type J, K, N, S and T) and frequency (TTL and switch contact). Additionally it provides functions like rotation speed measurement or counter.
The GIA 20 EB is equipped with switching outputs. The output functions can be configured as 2-point controller, min/max alarm, 3-point controller, 2-point controller with min/max alarm, etc. The relay state is indicated by 2 additional LEDs below the 7-segment display.
The device identifies impermissible operating states like display or system errors and displays a corresponding error code.

Technical data

Measuring inputs

Design type	Input signal	Measuring range	Note
Voltage signal	0..10 V	0..10 V	Ri ≥ 300 kOhm
	0..2 V	0..2 V	Ri ≥ 10 kOhm
	0..1 V	0..1 V	Ri ≥ 10 kOhm
	0..50 mV	0..50 mV	Ri ≥ 10 kOhm
Current signal	4..20 mA	4..20 mA	Ri = ~ 125 Ohm
	0..20 mA	0..20 mA	Ri = ~ 125 Ohm
Resistance	Pt100	-50.0.. +200.0 °C	3-wire connection
	Pt100	-200.. +850 °C	
	Pt1000	-200.. +850 °C	2-wire connection
Thermocouple	NiCr-Ni type K	-270.0.. +1350 °C	
	Pt10Rh-Pt type S	-50.. +1750 °C	
	NiCrSi-NiSi type N	-270.. +1300 °C	
	Fe-CuNi type J	-170.. +950 °C	
	Cu-CuNi type T	-270.. +400 °C	
Frequency	TTL signal	0..10 kHz	
	Switching contact NPN	0..3 kHz	internal pull-up-resistor is switched on
	Switching contact PNP	0..1 kHz	internal pull-down-resistor is switched on
Rotation speed	TTL signal switching contact NPN, PNP	0..9999 U/min	switchable predistributor (1..1000), pulse frequency: max. 600000 pulses/min.
Up / down counter	TTL signal switching contact NPN, PNP	0..9999 U/min	switchable predistributor (1..1000), pulse frequency: max. 10000 pulses/min.

Switching outputs : 2 switch. outputs, not electrically isolated
Switching behavior : selectable: low-side, high-side or push-pull
Connection data : low-side: 28 V / 1 A
high-side: Uv / 200 mA

Output functions

Description	Function	
	Output 1	Output 2
2-point controller	digital 2-point controller	---
3-point controller	digital 2-point controller	digital 2-point controller
2-point controller with min/max alarm	digital 2-point controller	min/max alarm
Min/max alarm, together	---	min/max alarm
Min/max alarm, individual	max alarm	min alarm

Accuracy
Standard signal : < 0.2 % FS ±1digit
(for 0..50 mV: < 0.3 % FS ±1digit)
Resistance thermometer : < 0.5 % FS ±1digit
Thermocouple : < 0.3 % FS ±1digit
(for type S: < 0.5 % FS ±1digit)
Frequency : < 0.2 % FS ±1digit

continued on next page

Measuring rate

Standard signal	:	100 measurements / second
Temperature	:	4 measurements / second
Frequency	:	100 measurements / second
Power supply	:	9..28 V DC
Power consumption	:	max. 30 mA (without switching output)
Working temperature	:	-20..+50 °C

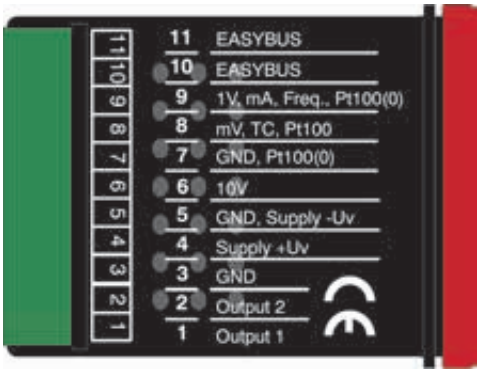
Display

Display	:	red LED display
Height	:	10 mm
Display range	:	-1999..+9999 digit initial / final value and decimal point freely adjustable
Electric connection	:	via screw / clamp terminals: 2-pole for interface and 9-pole for remaining connections wire cross section from 0.14..1.5 mm²
Protection class	:	front IP54

Dimensions

Housing	:	glass fibre reinforced Noryl front panel: polycarbonate
Size	:	24 x 48 mm (H x W)
Mounting depth	:	approx. 65 mm (incl. screw / clamp terminals)
Panel mounting	:	by VA fixing clamps
Allowed panel thickness	:	from 1..10 mm
Panel cutout	:	21.7 x 45.0 mm [±0.5 mm] (H x W)

Connection diagram



Supply voltages

028	Supply voltage: 9..28 V DC (Standard)
G12	Design type with electrically isolated supply: 11..14 V
G24	Design type with electrically isolated supply: 22..27 V

Ordering code

GIA20EB - [1.] - [2.]

1.	**Supply voltage**	
	028	9..28 V DC (standard)
	G12	electrically isolated supply: 11..14 V
	G24	electrically isolated supply: 22..27 V
2.	**Option**	
	00	without option

Special design types (upon request)

SA1 **Tare and hold function**
(only for 4..20 mA input)
If the external switch gets closed the display is set to 0 (tare function).
As long as the switch stays closed the display is updated.
Once the switch is opened the display is frozen (hold function).

SA2 **Max value display**
(only for 4..20 mA input)
The currently measured value is displayed if the external switch is closed.
The highest measured value is displayed if the external switch is opened.

SA3 **Frequency input for 10..100 mV**
The device provides a frequency input with connection possibility for:
frequency (10..100 mV signals)

SA4 **Measuring input 0..30V**
The original measuring input 0..10 V is changed to a measuring input for 0..30 V signals. All adjustments for this input have to be done at the menu point 0..10 V.

SA5 **Delayed measured value displaying**
This special design type can be used to suppress short-term perturbations of signal normally changing very slowly.
This special design type influences only standard signal measurements.

Accessories

- **FS3T**
  Front panel with 3 operating buttons:
  for comfortable configuration, if switching points have to be consistently adjusted, for calling the min and max values, etc.
- **GNR 10**
  Power supply and relay module for supplying a GIA 20 EB (input: 230VAC, power supply for device and transmitter, 2 relay outputs)

Displaying and Controlling Device GIR 230 ...

- **Choose between 5 input types**
- **2 relay outputs and 1 NPN switching output**
- **Self-monitoring and diagnostic system**

Characteristics

The GIR 230 … is a microprocessor-controlled displaying, monitoring and controlling device for universal use.

The device is available with several input types (each device has one of them): standard signals (0..20 mA, 4..20 mA, 0..10 mA), resistance thermometer (Pt100 and Pt1000), thermocouples (type J, K, N, S and T) and NTC. The GIR 230 … provides switching outputs. The output functions can be configured as 2-point controller, min/max alarm, 3-point controller, 2-point controller with min/max alarm, etc. The relay state is indicated by 2 additional LEDs below the 7-segment display.
The GIR 230 … identifies impermissible operating states like display or system errors and displays a corresponding error code.

Technical data

Measuring inputs

Design type	Input signal	Measuring range	Note
NS	0..10 V	0..10 V	
	4..20 mA	4..20 mA	
	0..20 mA	0..20 mA	
Pt	Pt100	-50.0.. +200.0 °C	3-wire connection
	Pt100	-200.. +850 °C	
	Pt1000	-200.. +850 °C	2-wire connection
TC	NiCr-Ni type K	-270,0.. +1350 °C	
	Pt10Rh-Pt type S	-50.. +1750 °C	
	NiCrSi-NiSi type N	-270.. +1300 °C	
	Fe-CuNi type J	-170.. +950 °C	
	Cu-CuNi type T	-270.. +400 °C	
	standard signal 0..50 mV	0..50 mV	
FR	frequency	TTL signal	0..10 kHz	Ri = ~ 50 kOhm
		Switching contact NPN	0..1 kHz	internal pull-up-resistor is switched on
		Switching contact PNP	0..1 kHz	internal pull-down-resistor is switched on
	rotation speed	TTL signal switching contact NPN, PNP	0..9999 U/min	switchable predistributor (1..1000), pulse frequency: max. 600000 pulses/min.
	counter	TTL signal switching contact NPN, PNP	0..9999 U/min	switchable predistributor (1..1000), pulse frequency: max. 10000 pulses/min.
NTC		NTC 10K	-40.0.. +120.0 °C	10k, 2-wire

Switching outputs

Design type	Outputs	Switching functions
NS	2x relay outputs 230V switching, (normally-open) 1x NPN output, ground switching (open collector)	2-point 3-point 2-point with alarm 3-point with alarm min/max alarm
Pt		
TC		
FR		
NTC	1x relay outputs 230V switching, (normally-open) 1x NPN output, ground switching (open collector)	2-point 2-point with alarm min/max alarm

Accuracy

NS	: < 0.2 % FS ±1digit
Pt	: < 0.5 % FS ±1digit
TC	: < 0.3 % FS ±1digit (0..50 mV)
	: < 0.3 % FS ±1digit (thermocouples)
	: < 0.5 % FS ±1digit (type S)
FR	: < 0.2 % FS ±1digit
NTC	: < 0.5 % FS ±1digit

Measuring rate

NS	: 100 measurements / second
Pt	: 4 measurements / second
TC	: 4 measurements / second
FR	: 4 measurements / second
NTC	: 4 measurements / second

continued on next page

Product information Controller

GREISINGER
Member of GHM GROUP

Power supply	:	230 V, 50/60 Hz
Power consumption	:	2 VA
Working temperature	:	-20..+50 °C

Display

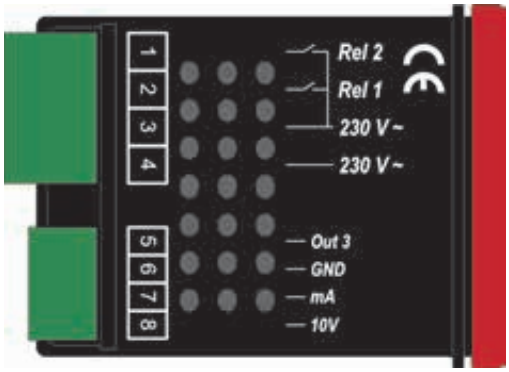
Display	:	red LED display
Height	:	10 mm
Display range	:	-1999..+9999 digit initial / final value and decimal point freely adjustable
Operation	:	via 3 buttons
Electric connection	:	via screw / clamp terminals: 2-pole for interface and 9-pole for remaining connections wire cross section from 0.14..1.5 mm²
Protection class	:	front IP54

Dimensions

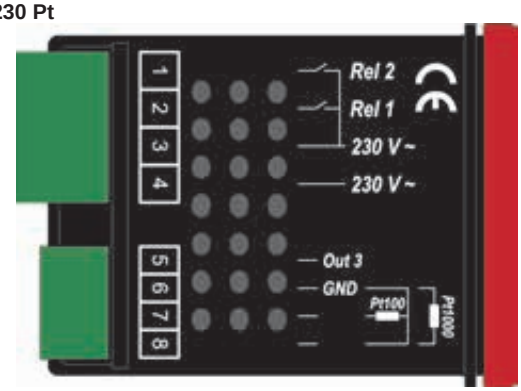
Housing	:	glass fibre reinforced Noryl front panel: polycarbonate buttons: ABS
Size	:	24 x 48 mm (H x W)
Mounting depth	:	approx. 65 mm (incl. screw / clamp terminals)
Panel mounting	:	by VA fixing clamps
Allowed panel thickness	:	from 1..10 mm
Panel cutout	:	21.7 x 45.0 mm [±0.5 mm] (H x W)

Connection diagram

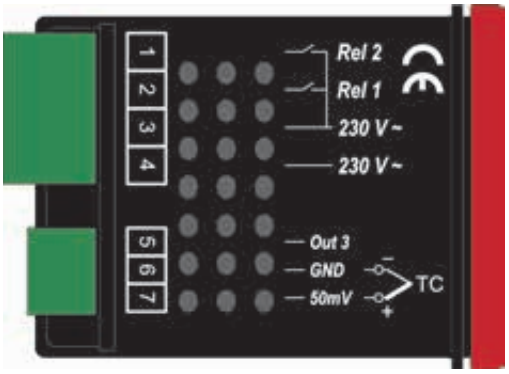
GIR 230 NS



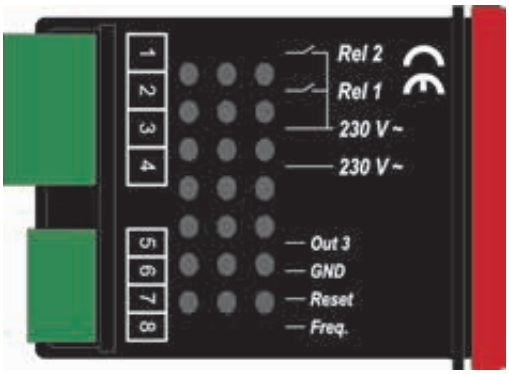
GIR 230 Pt



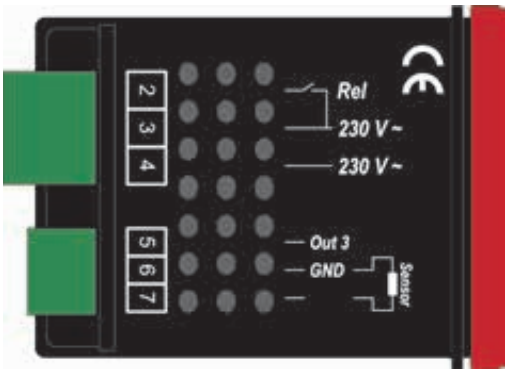
GIR 230 TC



GIR 230 FR



GIR 230 NTC



Design types

NS	Standard signal input controller with measuring input for standard signals (4..20 mA, 0..20 mA, 0..10 V)
Pt	Resistance input controller with measuring input for Pt100 and Pt1000
TC	Thermocouple input (J, K, N, S and T) controller with measuring input for thermocouples and 0..50 V
FR	Frequency input controller with measuring input for frequency
NTC	Controller with measuring input for NTC (only 1 relay output)

continued on next page

Ordering code

	1.
GIR230	

1.	Design type	
	NS	standard signal
	Pt	resistance signal
	TC	thermocouple signal
	FR	frequency signal
	NT	NTC

Special design types (upon request)

SA1 **Supply voltage: 12..24 V DC**
2 relay outputs, +Uv switching
1 NPN output, ground switching

SA2 **Supply voltage: 12..24 V AC**
2 relay outputs, supply voltage switching
1 NPN output, ground switching

SA3 **Supply voltage: 12..24 V DC**
with electric isolation
2 relay outputs, +Uv switching
1 NPN output, ground switching

Differential Controller GIR 230 … / DIF

- **Choose between 3 input types**
- **Temperature difference sensor 1 – sensor 2**
- **Self-monitoring and diagnostic system**

Characteristics

The GIR 230 … / DIF is a microprocessor-controlled displaying, monitoring and regulating device for universal use.
The device has 2 inputs for standard signals, Pt1000 or NTC. The difference between both inputs (sensor 1 – sensor 2) is displayed and used for all regulating uses. The GIR 230 … / DIF provides switching outputs. The output functions can be configured as 2-point controller, min/max alarm, 3-point controller, 2-point controller with min/max alarm, etc. The relay state is indicated by 2 additional LEDs below the 7-segment display.
The GIR 230 … identifies impermissible operating states like display or system errors and displays a corresponding error code.

Technical data

Measuring inputs

Design type	Input signal	Measuring range	Note
NS	0..10 V	0..10 V	
	420 mA	4..20 mA	
	0..20 mA	0..20 mA	
Pt1000	Pt1000	-200.. +850 °C	2-wire connection
NTC	NTC, 10K	-40.0.. +120.0 °C	2-wire

Switching outputs

Design type	Outputs	Switching functions
NS	2x relay outputs 230V switching, (normally-open) 1x NPN output, ground switching (open collector)	2-point 3-point 2-point with alarm 3-point with alarm min/max alarm
Pt1000		
NTC		

Accuracy

NS	:	< 0.2 % FS ±1digit
Pt1000	:	< 0.5 % FS ±1digit
NTC	:	< 0.5 % FS ±1digit

Measuring rate

NS	:	100 measurements / second
Pt1000	:	4 measurements / second
NTC	:	4 measurements / second

Power supply	:	230 V, 50/60 Hz
Power consumption	:	2 VA
Working temperature	:	-20..+50 °C

Display

Display	:	red LED display
Height	:	10 mm
Display range	:	-1999..+9999 digit initial / final value and decimal point freely adjustable

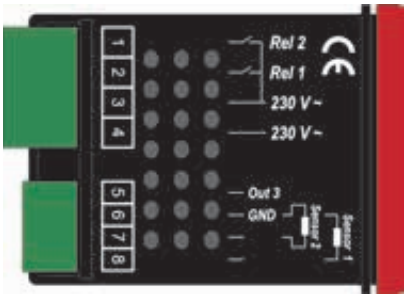
Operation	:	via 3 buttons
Electric connection	:	via screw / clamp terminals: 2-pole for interface and 9-pole for remaining connections wire cross section from 0.14..1.5 mm^2
Protection class	:	front IP54

Dimensions

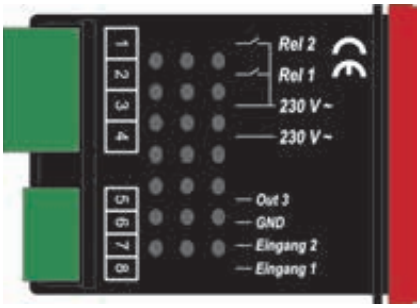
Housing	:	glass fibre reinforced Noryl front panel: polycarbonate buttons: ABS
Size	:	24 x 48 mm (H x W)
Mounting depth	:	approx. 65 mm (incl. screw / clamp terminals)
Panel mounting	:	by VA fixing clamps
Allowed panel thickness	:	from 1..10 mm
Panel cutout	:	21.7 x 45.0 mm [±0.5 mm] (H x W)

Connection diagram

GIR 230 Pt1000 / DIF and **GIR 230 NTC / DIF**



GIR 230 NS / DIF - …



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Design types

NS	Standard signal input differential controller with 2 inputs for standard signal (4..20 mA, 0..20 mA, 0..10 V)
Pt	Resistance input differential controller with 2 inputs for Pt1000
NT	Differential controller with 2 inputs for NTC

Ordering code

1. 2.

GIR230 ☐ **/ DIF** - ☐

1.	**Design type**	
	NS	standard signal input
	Pt	resistance input
	NT	NTC input
2.	**Measuring input ONLY at type NS** (GIR 230 NS / DIF ...)	
	420A	input signal: 4..20 mA
	020A	input signal: 0..20 mA
	010V	input signal: 0..10 V

Universal meter and frequency device GIR 300

- **Universal inputs for standard signals, frequency, Pt100, Pt1000 and thermocouples**
- **2 integrated switching outputs (galvanically isolated)**
- **Quick regulating and monitoring behaviour**
- **72x36 design**
- **Easy operation - high precision - affordable price**

Characteristics

The GIR 300 is a universal microprocessor-controlled display, monitoring and regulating device.

The device has a universal input with connections for:
- Standard signals (0-20 mA, 4-20 mA, 0-50 mV, 0-1 V, 0-2 V and 0-10 V),
- Resistance temperature sensors (Pt 100 and Pt 1000),
- Thermocouples (type K, J, N, T and S)
- Frequency (TTL and switching contact)

It also offers functions such as speed measurement, metering, etc. There are also two switching outputs that can be configured together as a 2-point regulator, 3-point regulator, 2-point regulator with min/max alarm or separately for min/max alarm. The status of the switching contacts is indicated with 2 LEDs. LED 1 displays the status of the contact of Relay 1 and LED 2 displays the status of the contact of Relay 2.
(LED ON = contact is closed).

The device also has an EASYBus interface as standard equipment. The EASYbus interface has an interface converter that enables communication with a superordinate computer and makes the device a full-featured EASYBus module.

The GIR 300 is delivered tested and fully calibrated.

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Technical data

Measurement input	:	Universal input for
Standard signals	:	4-20 mA, 4-20 mA, 0-1 V, 0-2 V, 0-10 V and 0-50 mV
Resistance thermometer	:	Pt100 (3-wire), Pt1000 (2-wire)
Thermocouples	:	Types J, K, N, S, T
Frequency, speed	:	TTL signal, switching contact
Incrementer / decrementer	:	TTL signal, switching contact
Serial interface		
Measurement rates	:	approx. 100 measurements / s (with standard signal) or approx. 4 measurements / s (for temperature and frequency)
Measuring and display ranges, resolution:		
Temperature	:	(Display unit can be switched from °C to °F) Pt100 : -200..+850 °C or -50.0..+200.0 °C; Pt1000 : -200..+850 °C; Type J : -170..+950 °C; Type K : -270..+1350 °C; Type N : -270..+1300 °C; Type S : -50..+1750 °C; Type T : -270..+400 °C
Standard signals	:	-1999.. 9999 digit, start, end value and DP freely variable
Recommended range	:	≤ 2000 digit
Frequency	:	0.000 Hz.. 10 kHz, display freely scalable
Speed	:	0.000 rpm..9999 rpm, activatable prescaler: 1-1000
Incrementer / decrementer	:	Meter count retained even with power failure 0.. 9999 (10 million with prescaler), pulse frequency: ≤ 10 kHz, activatable prescaler: 1-1000
Serial interface	:	Display and regulation for values received via the interface
Accuracy:		(at nominal temperature = 25 °C)
Standard signals	:	< 0.2 % FS ±1 digit (at 0-50 mV: < 0.3 % FS ±1 digit)
Resistance thermometer:		< 0.5 % FS ±1 digit
Thermocouples	:	< 0.3 % FS ±1 digit (with Type S: < 0.5 % FS ±1 digit)
Comparison position accuracy	:	± 1 °C
Frequency, speed, meter	:	< 0.1 % FS ±1 digit
Outputs	:	2 potential free relay switching outputs Relay 1 : Normally open (NO) Relay 2 : Normally closed'
Switching functions	:	2-point, 3-point, 2-point with alarm, min/max alarm at 1 output, min/max alarm at 2 outputs
Switching points, switching hysteresis	:	freely selectable
Reaction time	:	≤ 20 ms with standard signal ≤ 0.5 s with temperature and frequency
Display	:	approx. 13 mm high, 4-digit red LED display
Interface	:	serial interface, galvanically isolated, EASYBus compatible
Miscellaneous	:	constant self-diagnosis, digital filter function, measuring range limiting
Voltage supply	:	9.. 28 V DC (standard)
Optional	:	G24 : 22-27 V DC, galvanically isolated
Current consumption	:	max. 70 mA
Nominal temperature	:	25 °C
Working temperature	:	-20..+50 °C
Relative humidity	:	0..80 % relative humidity (non-condensing)
Storage temperature	:	-30..+70 °C
Electrical connection	:	via screw/plug-in terminal Conductor cross-section of 0.14..1.5 mm²
Scope of delivery	:	Device, operating manual

continued on next page

Dimensions

Housing	:	
Dimensions	:	36 x 72 mm (front frame dimensions)
Installation depth	:	approx. 75 mm (including screw/plug-in terminals)
Panel fastening	:	with retaining clamps
Possible panel thickness	:	
Panel cutout	:	32.0+0.5 x 68.5+0.5 mm (H x W)

Connection diagram

Ordering code

1.

GIR300 - ☐

1.	**Voltage supply**	
	028	9-28 V DC
	G24	22..27 V DC galv. isolated

Universal display and regulating unit GIR 360

- **2 integrated switching outputs (galvanically isolated)**
- **Quick regulating and monitoring behaviour**
- **72x36 design**
- **Serial EASYBus interface**

Characteristics

The GIR 360 is a universal microprocessor-controlled display, monitoring and regulating device.

The device has 3 inputs and is used for frequency measurement, meter function, speed measurement, etc.
There are also two switching outputs that can be configured together as a 2-point regulator, 3-point regulator, 2-point regulator with min/max alarm or separately for min/max alarm.

The status of the switching contacts is indicated with 2 LEDs. LED 1 displays the status of the contact of Relay 1 and LED 2 displays the status of the contact of Relay 2.
(LED ON = contact is closed).

The device also has an EASYBus interface as standard equipment. The EASYbus interface has an interface converter that enables communication with a superordinate computer and makes the device a full-featured EASYBus module.

Technical data

Measurement input	:	
Input 1	:	Frequency, speed, metering input A
Input voltage	:	0..5 V (0..28 V with pre-resistance)
Input level	:	Low < 0.5 V; High > 2.2 V
NPN	:	PullUp resistance 7 kOhm against 3.3 V
PNP	:	PullDown resistance 7 kOhm against GND
Min. pulse width	:	50 us
Input 2	:	Metering input B, gate, direction
Input voltage	:	0..5 V (0..28 V with pre-resistance)
Input level	:	Low < 0.5 V; High > 2.2 V
NPN	:	PullUp resistance 7 kOhm against 3.3 V
PNP	:	PullDown resistance 7 kOhm against GND
Min. pulse width	:	50 us
Input 3	:	Reset input
Input level	:	Low < 1 V; High > 8 V
Min. pulse width	:	50 ms

Measuring and metering ranges:

Frequency	:	0..10 kHz
Speed	:	max. 10000 rpm, activatable prescaler: 1..1000
Meter	:	-2,147,483,647.. 2,147,483,647
Display range		
Frequency / speed	:	-1999..9999, variable decimal point
Meter	:	-1999999..999999, variable decimal point
Functions	:	Frequency measurement, Speed measurement, Incrementer, decrementer, Incrementer / decrementer with directional input, Totaliser A+B, Differential counter A-B, Phase discriminator
Outputs	:	2 potential-free relay switching outputs Relay 1: Normally open (NO) Relay 2: Normally closed (NC)
Switching functions	:	2-point, 3-point, 2-point with alarm, min/max alarm at 1 output, min/max alarm at 2 outputs
Switching points, switching hysteresis	:	freely selectable
Display	:	approx. 10 mm high, 6-digit red LED display
Interface	:	serial interface, galvanically isolated, EASYBus compatible
Miscellaneous	:	constant self-diagnosis, digital filter function, measuring range limiting
Voltage supply	:	9..28 V DC (standard)
Optional	:	G24: 22-27 V DC, galvanically isolated
Current consumption	:	max. 70 mA
Nominal temperature	:	25 °C
Working temperature	:	-20..+50 °C
Relative humidity	:	0..80 % relative humidity (non-condensing)
Storage temperature	:	-30..+70 °C
Electrical connection	:	via screw/plug-in terminal Conductor cross-section of 0.14..1.5 mm².
Scope of delivery	:	Device, operating manual

continued on next page

Dimensions

Housing	:	
Dimensions	:	36 x 72 mm (front frame dimensions)
Installation depth	:	approx. 75 mm (including screw/plug-in terminals)
Panel fastening	:	with retaining clamps
Possible panel thickness	:	
Panel cutout	:	32.0+0.5 x 68.5$^{+0.5}$ mm (H x W)

Connection diagram

1 EASYBus interface
2 EASYBus interface
3 Reset input (meter)
4 Input 2 (meter)
5 Input 1 (frequency, speed, meter)
6 Input: GND
7 Supply voltage GND
8 Supply voltage +Uv
9 Output 2: Relay, NC
10 Output 2: Relay, input
11 Output 1: Relay, input
12 Output 1; relay, NO

Connection specifications

	Intermediate connection	Operating values	Limit values
Supply voltage	7 and 8	9..28 V	0..30 V
Output 1: Relay: Normally open (NO)	11 and 12		253 V AC 5A ohmic load
Output 2: Relay: Normally closed (NC)	9 and 10		253 V AC 5A ohmic load
Input 1	4 and 6	0..3.3 V	-1..10 V I<10 mA
Input 2	5 and 6	0..3.3 V	-1..10 V I<10 mA
Reset input	3 and 6	0..10 V	-1..20 V
EASYBus interface	1 and 2	12..36 V	-1..42 V

Ordering code

1.
GIR360 - ☐

1.	**Voltage supply**	
	028	9-28 V DC
	G24	22..27 V DC galv. isolated

Universal Displaying and Controlling Device EC9648

- **On/off control mode**
- **Universal input for standard signals, frequency, Pt100/Pt1000 and thermocouples**
- **Switching outputs variably configurable**

Characteristics

The EC9648 is a microprocessor-controlled displaying, monitoring and controlling device for universal use.

It has a universal input for standard signals (0..20 mA, 4..20 mA, 0..50 mV, 0..1 V, 0..2 V and 0..10 V), resistance thermometers (Pt100 and Pt1000), thermocouples (type J, K, N, S and T) and frequency (TTL and switch contact). Additionally the device provides functions like flow measurement, rotation speed measurement and counter.
The EC9648 has switching outputs which can be configured as 2-point controller, min/max alarm, 3-point controller, 2-point controller with min/max alarm, etc. The state of the switching outputs (relays) is indicated by LED “1” and “2”.

The EC 9648 saves the highest and lowest measured value in the min/max value memory.
Furthermore it automatically detects impermissible operating states like display or system error and displays a corresponding error code.

Technical data

Measuring inputs

Accuracy

Standard signal	: < 0.2 % FS ±1digit (at 0..50 mV: < 0.3 % FS ±1digit)
Resistance thermometer	: < 0.3 % FS ±1digit
Thermocouple	: < 0.3 % FS ±1digit (at type S: < 0.5 % FS ±1digit)
Frequency	: < 0.1 % FS ±1digit

Measuring type	Input signal	Measuring range	Note
Voltage signal	0..10 V	0..10 V	Ri ≥ 200 kOhm
	0..2 V	0..2 V	Ri ≥ 10 kOhm
	0..1 V	0..1 V	Ri ≥ 10 kOhm
	0..50 mV	0..50 mV	Ri ≥ 10 kOhm
Current signal	4..20 mA	4..20 mA	Ri = ~125 Ohm
	0..20 mA	0..20 mA	Ri = ~125 Ohm
Resistance	Pt100	-50.0.. +200.0 °C	3-wire connection
		-200.. +850 °C	
	Pt1000	-200.. +850 °C	2-wire connection
Thermocouple	NiCr-Ni type K	-70.0.. +250.0 °C	
		-270.. +1372 °C	
	Pt10Rh-Pt type S	-50.. +1750 °C	
	NiCrSi-NiSi type N	-100.0.. +300.0 °C	
		-270.. +1350 °C	
	Fe-CuNi type J	70.0.. +300.0 °C	
		-170.. +950 °C	
	Cu-CuNi type T	-70.0.. +200.0 °C	
		-270.. +400 °C	
Frequency, flow	TTL signal	0..10 kHz	
	switching contact NPN	0..3 kHz	internal pull-up-resistor is switched on
	switching contact PNP	0..1 kHz	internal pull-down-resistor is switched on
Rotation speed	TTL signal, switching contact NPN, PNP	0..9999 U/min	switchable predistributor (1..1000), pulse frequency: max. 600000 pulses/min.
Up / down counter	TTL signal, switching contact NPN, PNP	0..9999 U/min	switchable predistributor (1..1000), pulse frequency: max. 10000 pulses/min.
	reset input		reset: R < 1 kOhm opening: R > 100 kOhm

Output functions

Description	Functions	
	Output 1	Output 2
2-point controller	2-point controller	---
3-point controller	2-point controller	2-point controller
2-point controller with min/max alarm	2-point controller	min/max alarm
min/max alarm, together	---	min/max alarm
min/max alarm, individual	max alarm	min alarm

continued on next page

Measuring rate

Standard signal	:	100 measurements / second
Temperature	:	4 measurements / second
Frequency	:	100 measurements / second
Power supply	:	230 V AC, 50 / 60 Hz
Power consumption	:	approx. 5 VA
Working temperature	:	-20..+50 °C

Display

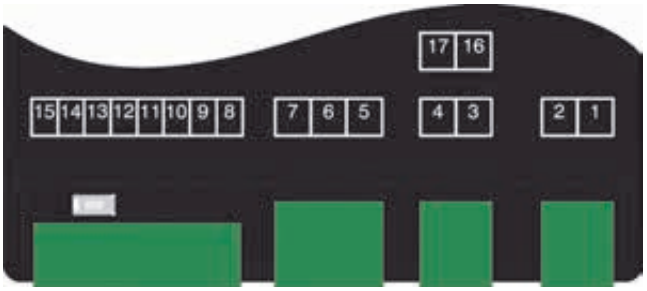
Display	:	LED display
Height	:	13 mm
Display range	:	-1999..+9999 digit initial, final value and decimal point freely selectable
Operation	:	via 4 buttons or via interface
Interface	:	EASYBus interface, electrically isolated
Transmitter supply	:	24 V DC ±5 %, 22 mA, electr. isolated at DC supply: 18 V DC
Electric connection	:	via screw / clamp terminals wire cross section from 0.14..1.5 mm^2
Protection class	:	front IP54, with optional sealing IP65

Dimensions

Housing

Size	:	48 x 96 mm (H x W)
Mounting depth	:	approx. 115 mm (incl. screw / clamp terminals)
Panel mounting	:	by fixing clamps
Panel cutout	:	43.0 x 90.5 mm [±0.5 mm] (H x W)

Connection diagram



17	output 3: analog output -
16	output 3: analog output +
15	EASYBus interface
14	EASYBus interface
13	input: 0..10 V
12	input: 0..1 V, 0..2 V, mA, frequency, Pt100, Pt1000
11	input: 0..50 mV, thermocouple, Pt100
10	input: GND, Pt100, Pt1000, thermocouple
9	transmitter supply (-)
8	transmitter supply (+)
7	output 2: relay, normally-close
6	output 2: relay, normally-open
5	output 2: relay, input
4	output 1: relay, normally-open or analog output (+)
3	output 1: relay, input or analog output (-)
2	power supply 230 V AC
1	power supply 230 V AC

Design types / options

230A	supply voltage: 230 V AC (standard)
012D	supply voltage: 12 V DC (11..14 V)
024D	supply voltage: 24 V DC (22..27 V)
024A	supply voltage: 24 V AC (±5 %)
115A	supply voltage: 115 V AC (±5 %)
R1	output 1 = potential-free relay switching output (normally-open, 5 A / 250 V AC)
H1	output 1 = control output for external semiconductor relay (15 mA / 6 V DC)
R2	output 2 = potential-free relay switching output (switch-over contact, 10 A / 250 V AC)
H2	output 2 = control output for external semiconductor relay (15 mA / 6 V DC)
R3	additional output 3 = potential-free relay switching contact (change-over, 1 A / 40 V AC or 30 V DC)
H3	additional output 3 = control output for external semiconductor relay (5 mA / 14 V DC)
N3	additional output 3 = electrically isolated NPN switching contact (max. 1 A / 30 V DC)
AA1	output 1 = freely scalable analog output 0(4)..20 mA, no additional 3rd output possible
AV1	output 1 = freely scalable analog output 0..10 V, no additional 3rd output possible
AA3	output 3 = freely scalable analog output 0(4)..20 mA
AV3	output 3 = freely scalable analog output 0..10 V
NS/DIF	**2-channel differential controller** The EC 9648 NS/DIF ... is a displaying, monitoring and regulating device for difference measurements. The measuring inputs are designed for following standard signals: (2x) 4..20 mA, (2x) 0..20 mA or (2x) 0..10 V Please state your desired input signal at order transaction.
SW	**Set-point controller** This design type uses the 0..10 V standard signal input as set-point input.

continued on next page

Ordering code

EC9648 - 1. [ ] - 2. [ ] - 3. [ ] - 4. [ ] - 5. [ ]

1.	**Supply voltage**	
	230A	230 V AC (standard)
	012D	12 V DC
	024D	24 V DC
	024A	24 V AC
	115A	115 V AC
2.	**Output 1**	
	R1	output 1 = relay switching output, normally-open contact (standard)
	H1	output 1 = control output for semiconductor relay
	AA1	output 1 = analog output 0(4)..20 mA (no 3rd output possible)
	AV1	output 1 = analog output 0..10 V (no 3rd output possible)
3.	**Output 2**	
	R2	output 2 = relay switching output, change-over contact (standard)
	H2	output 2 = control output for semiconductor relay
4.	**Output 3**	
	00	no 3rd output (standard)
	R3	output 3 = relay switching output, change-over
	H3	output 3 = control output for semiconductor relay
	N3	output 3 = NPN switching output
	AA3	output 3 = analog output 0(4)..20 mA
	AV3	output 3 = analog output 0..10 V
5.	**Option**	
	00	without option
	NS/DIF	differential controller (please state meas. input)
		420 4..20 mA
		020 0..20 mA
		010 0..10 V
	SW	set-point controller
	IP	sealing to increase protection class to IP65

Accessories

- **EAK 36**
  Unit stickers (black with white characters), 36 different units, for labeling of display devices

Temperature Controller R1140

Characteristics

- **2-point, 3-point-, 3-point-stepping- or continuous-controller**
- **Input for Pt100 (RTD), Thermocouple and standard signal 0/4...20 mA.**
- **Control method PID with auto-tuning**
- **2. set value, start-up function, set value ramp**
- **Control output relay, electronic output 0/18V or continuous output 0/4..20 mA**

Technical data

Power supply

Supply voltage	: 230 V AC ± 10 %, 24 V DC ± 25 %
Power consumption	: < 3.5 VA
Operating temp.	: 0..50 °C
Strorage temp.	: -30..70°C
CE-conformity	: EMC acc. to.2014/30/EU; EN61326-1; safety requirements acc. to EN61010-1

Input

RTD	: Pt100, 2- or 3-wire
-Monitoring	: break of sensor/short circuit
-Accuracy	: ≤ 0.2 %
Thermocouple	: L, J, K, S
-Monitoring	: break of sensor, internal cold junction, reverse polarity protection
-Accuracy	: ≤ 0.25 %
Current	: 0/4..20 mA, burden max. 10 Ω
-Accuracy	: ≤ 0.2 %

Output

Electronic	: 0/18 V DC bistable, max. 10 mA
Relay	: controller <250 V AC <250 VA <3 A alarm <250 V AC <250 VA <3 A
Continuous	: 0/4..20 mA, burden max. 500 Ω; usabale as control output or for retransmission of prcocess value

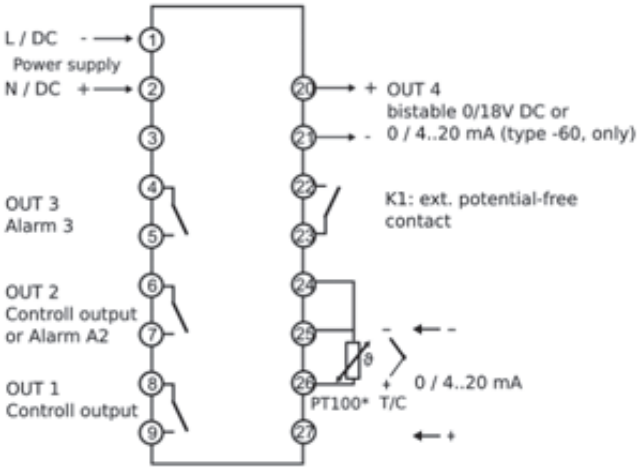
Display

Process value	: LED 4-digit red 10 mm
Setpoint value	: LED 4-digit red 7.6 mm
Decimal point	: programmable
Operating indication	: LED yellow

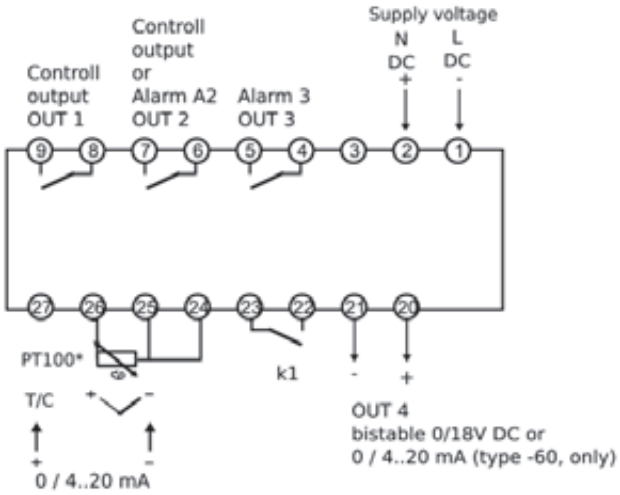
Housing

Dimesions R1140	: panel mounting DIN 48 x 96 mm, mounting depth 122 mm
Panel cut-out	: 45 +0.6 mm x 92+0.8 mm
Dimesions R1180	: panel mounting DIN 96 x 48 mm, mounting depth 122 mm
Panel cut-out	: 92+0.8 mm x 45 +0.6 mm
Material	: Noryl; UL94V-1
Weight	: approx. 420 g
Connection	: Screw terminals. Insulation class C.
Protection class	: front IP50, terminals IP20, acc. to BGV A3

2-, 3-point and continuous-controller



Connection diagram R1140, 48 x 96 housing



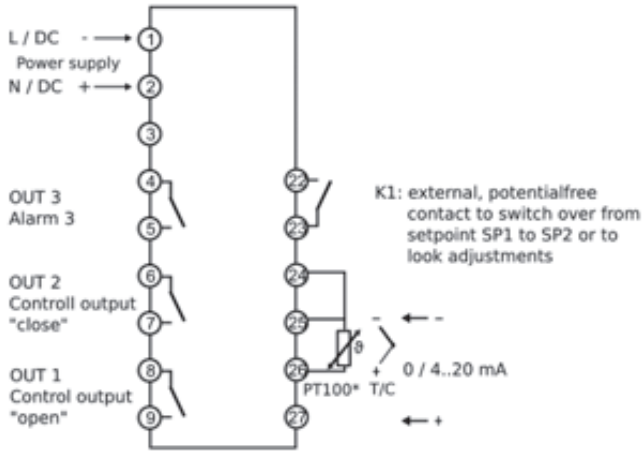
Connection diagram R1180, 96 x 48 housing

Ordering code

1.		2.		3.		4.
R	**-**		**-00-**	**MA1**	**-**	

1.	**Housing**	
	1140	48 x 96 mm
	1180	96 x 48 mm
2.	**Output**	
	10	2-point-, 3-point-controller
	60	2-point-, 3-point-, and continuous- controller
3.	**Interface**	
	MA1	without interface
4.	**Supply voltage**	
	1	230 V AC ± 10 %
	5	24 V DC ± 25 %

3-point-stepping-controller



Connection diagram R1140 3-point-stepping-controller

Ordering code

1.	2.		3.	4.
R1140	**-** **14**	**-00-**	**MA1**	**-**

1.	**Housing**	
	1140	48 x 96 mm
2.	**Output**	
	14	3-point-stepping-controller
3.	**Interface**	
	MA1	With interface
4.	**Supply voltage**	
	1	230 V AC ± 10 %
	5	24 V DC ± 25 %

Temperature Controller R1300

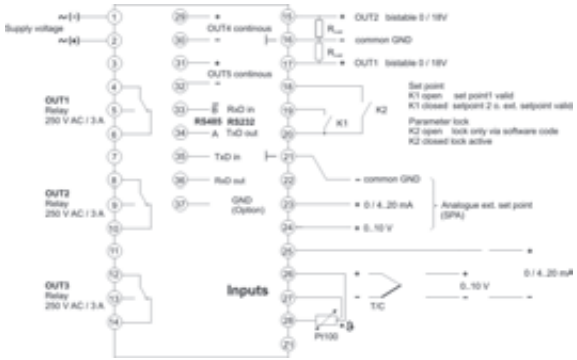
Characteristics

- **2-point, 3-point-, 3-point-step and continuous-controller**
- **Input for Pt100 (RTD), Thermocouple and standard signals**
- **Measuring ranges programmable**
- **Control method PID with auto-tuning**
- **2. set value, start-up function, set value ramp**
- **Control output relay, electronic output 0/18V or continuous output 0/4..20 mA ; 0/2..10 V, burden dependent**
- **RS485-interface**
- **Analog set value input 0/4..20 mA; 0..10 V**
- **Alarm output relay SPDT**
- **True value analog output 0/4..20 mA, 0/2..10 V, burden dependent**

Technical data

Power supply
Supply voltage : 230 V AC ± 10 %, 24 V DC ± 20 %
Power consumption : < 4 W
Operating temp. : 0..50 °C
CE-conformity : EN 61326-1:2013; EN 61010-1:2011
Input
RTD : Pt100, 2- or 3-wire
: sensor break/short circuit
-Accuracy : ≤ 0.2 %
Thermocouple : L, J, K, S
sensor break, internal cold junction
-Accuracy : ≤ 0.25 %
Current : 0/4..20 mA
Voltage : 0..10 V
-Accuracy : ≤ 0.2 %
Output
Electronic : 0/18 V DC bistable, max. 10 mA
Relay : controller <250 V AC <250 VA <3 A
alarm <250 V AC <250 VA <3 A
Continuous : 0/4..20 mA, burden max. 500 Ω
0/2..10 V, load >1 kΩ
Display
True value : LED 4-digit, red 10 mm
Set value : LED 4-digit, red 10 mm
Decimal point : programmable
Operating indication : LED green
Case : panel mounting DIN 96x96 mm,
material Noryl; UL94V-1
Dimensions : front 96x96 mm, mounting depth 122 mm
Panel cut-out : 92 +0.5 mm x 92 +0.5 mm
Weight : approx. 450 g
Connection : slide-in terminals,
Protection class : front IP54, terminals IP20, acc. to BGV A3

Connection diagram



Ordering code

R1300 - 3 - 1. ☐ - 2. ☐

1.	**Interface**	
	MA1	without interface
	MA2	with interface RS485
2.	**Supply voltage**	
	1	230 V AC ± 10 %
	5	24 V DC ± 20 %
	Output variations	
	OUT1	control: relay, bistable 0/18 V DC
	OUT2	control/alarm: relay, bistable 0/18 V DC
	OUT3	alarm relay
	OUT4	continuous: set value, true value output 0/4..20 mA , 0/2..10 V*
	OUT5	continuous: set value, true value output 0/4..20 mA, 0/2..10 V*

* burden dependent

Temperature Controller TTM-00xW Series

Characteristics

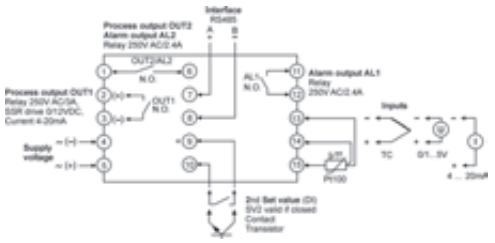
- **2-, 3-point- or continuous controller**
- **Measuring input for Pt100, thermocouple or voltage / current**
- **Measuring range programmable**
- **Control performance PID with auto-tuning**
- **Process output relay, electronic output 0/12 V or continuous 4..20 mA**
- **Alarm output relay, alarm function configurable**

Technical data

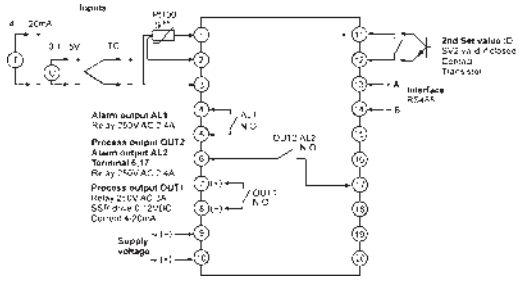
Power supply
Supply voltage : 100..240 V AC, -15%, +10% or
24 V AC/DC, +-10; 50/60 Hz
Power consumption : < 10 VA at 240 V AC
CE-conformity : EN 61326-1:2013; EN 61010-1:2010
Certification : UL3121-1 (UL/CUL)
Measuring input
Pt100 : Pt100/JPt100 range -199(.9)..500(.0) °C
2- or 3-wire connection
Thermocouple
Type J : Fe-CuNi -200..+850/-199.9..+850.0 °C
Type K : NiCr-Ni -200..+1372/-199.9..+990.0 °C
Type N : NiCrSi-NiSi -200..+1300/-199.9..+990.0 °C
Type R : PtRh-Pt87/13 0..1700°C
Type S : PtRh-Pt90/10 0..1700°C
Type T : Cu-CuNi -200..+400/-199.9..+400.0 °C
Type B : Pt30Rh/Pt6Rh 0..1800 °C
break of sensor, built-in cold junction
Voltage : 0/1..5 V DC -1999..+9999 Digit
Current : 4..20 mA -1999..+9999 Digit
Sensor correction : programmable
Accuracy : ± 0.3 % +1 digit of the measuring range
Sampling rate : 0.25 s
Output
Electronic : 0/12 V DC bistable, max. 20 mA, > 600 Ω
Relay : process output <250 V AC <250 VA <3 A
alarm output <250 V AC <250 VA <2.4 A
Continuous : 4..20 mA, burden max. 600 Ω
Interface
Phyiscally : RS485
Protocol : Toho / MODBUS (RTU, ASCII)
Baud rates : 1200, 2400, 4800, 9600, 19200 bps
Display
Process value : LED 4-digit white 10 or 14 mm
Set value : LED 4-digit green 8 mm
Decimal point : programmable
Status indicator : LED red or green
Case
Dimensions HxWxD
TTM-004W : 48x48x77 mm DIN48x48
TTM-005W : 48x96x76.5 mm DIN48x96
TTM-009W : 96x96x77 mm DIN96x96
Protection class : front IP65
Terminals : screw terminals max 2.5 mm²

Connection diagram

TTM-004W



TTM-005 / 009W



Ordering code

TTM - 1. - 2. - 3. - 4. - 5. - 6.

1.	**Model**	
	004W	DIN 48x48
	005W	DIN 48x96
	009W	DIN 96x96
2.	**Input**	
	0	thermocouple; Pt100, JPt100
	2	current, voltage
3.	**Process output OUT1**	
	R	relay SPST
	P	electronic bistable 0/12 V DC for SSR relay
	I	continuous, current 4..20 mA
4.	**Options**	
	AB	AL1 relay SPST (standard) OUT2 / AL2 relay SPST (3-point-controller)
5.	**Interface**	
	0	without interface
	ME	serial interface RS485, 2. set value SV2
6.	**Supply voltage**	
	0	100..240 V AC
	5	24 V AC/DC

Plug-In Controller / Display GRA ... VO

- **Self-supplying plug-in display / controller**
- **Extreme fast controlling and monitoring**
- **Programmable switching outputs**

Characteristic

The GRA 0420 VO and GRA 010 VO are microprocessor-controlled displaying, monitoring and controlling devices for universal use.

The devices have an input for standard signal 4..20 mA (GRA 0420 VO) or 0..10 V (GRA 010 VO). The connection is done by simply plug-in a special plug design for elbow-type plug according to EN 175301-803/A to a transmitter.
They provide a switching output (NPN output) that can be configured as 2-point controller or min/max alarm. The output state is indicated by an additional LED below the left side of the 7-segment display.

The GRA ... identifies impermissible operating states like display or system errors and displays a corresponding error code.

Technical data

Measuring inputs

	GRA 0420 VO	GRA 010 VO
Input signal	4..20 mA (2-wire)	0..10 V (3-wire)
Voltage load	< 5.5 V	---
Input resistance	---	30 Ohm
Power supply	self-supplying	12..28 V / < 10 mA

Switching outputs

	GRA 0420 VO	GRA 010 VO
Switching outputs	1x electrically isolated open-collector switching output test voltage: 50V	1x open-collector switching output, “supply +” switching

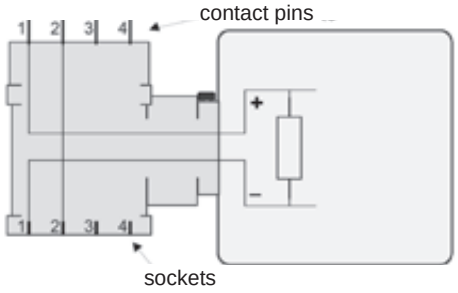
Display

Display	:	red LED display
Height	:	7 mm
Display range	:	-1999..+9999 digit initial / final value and decimal point freely adjustable
Accuracy	:	< 0.2 % FS ±1digit
Measuring rate	:	50 measurements / second
Operation	:	via 3 buttons
Working temperature	:	-25..+50 °C
Electric connection	:	special plug design for elbow-type plug (EN 175301-803/A) for easy plug-in
Protection class	:	front IP65

Dimensions

Housing	:	ABS; front screen: polycarbonate; membrane keypad
Size	:	48.5 x 48.5 x 35.5 mm (L x W x D) without elbow-type plug 50.5 x 90 x 39.5 mm (L x W x D) with elbow-type plug

Connection diagram



GRA 0420 VO
Contact pin 2 is directly connected to the socket. The GRA 0420 VO is between contact pin 1 (+) and socket 1 (-). Contact pins 3 and 4 are used for the switching output.

GRA 010 VO
Contact pins 1, 3 and 4 are directly connected to the corresponding sockets. The GRA 010 VO is connected to contact 1 (signal +), contact 3 (supply +) and contact 4 (GND / signal -). The contact pin 2 is used for the switching output (“supply +”-switching).

Design types

GRA 0420 VO	**Self-supplying plug-in controller / display** special adapter design for elbow-type plug (EN 175301-803/A) for easy plug-in, output: 4..20 mA, with 1 electrically isolated switching output
GRA 010 VO	**Plug-in controller / display** special adapter design for elbow-type plug (EN 175301-803/A) for easy plug-in, output: 0..10 V, with 1 “+Ub”-switching output

continued on next page

GRA 0420 WK	**Controller / display with cable connection** approx. 2m long connection cable with loose ends for connecting to any standard signal source and for switching output; housing with mounting holes, can be directly mounted to any surface; output 4..20 mA; with 1 electrically isolated switching output
GRA 010 WK	**Controller / display** **with cable connection** approx. 2m long connection cable with loose ends for connecting to any standard signal source and for switching output; housing with mounting holes, can be directly mounted to any surface; output: 0..10 V; with 1 “+Ub”-switching output

Options

S2	2 electrically isolated switching outputs, outputs with increased switching power, connection via separate M8 socket
OT	Cover without buttons e.g. if the adjustment of the device should not be directly accessible for the user

Ordering code

	1.		2.		3.
GRA		-		-	

1.	**Input signal type**	
	0420	4..20 mA (standard)
	010	0..10 V
2.	**Connection type**	
	VO	elbow-type plug (standard)
	WK	cable connection
3.	**Option** (combination of multiple options upon request)	
	00	without option
	S2	2 electrically isolated switching outputs
	OT	cover without buttons

Set Point Adjuster SG4824

- **Output 0/4..20 mA, 0/2..10 V DC internal selectable set point adjustable via front side poti**
- **Display 3-digit, 7,6 mm red or green**
- **Supply voltage 24V DC (10.8..30 V), isolated**

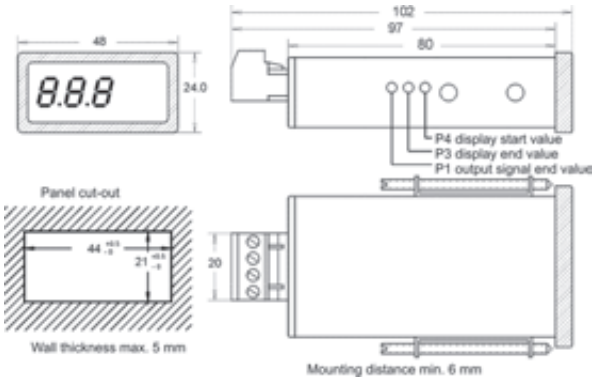
Characteristics

SG4824 is a set point adjuster for monitoring and control applications in process technology and automation.
The small case is suitable for installation in control units and panel boards. The universal conception of the multipurpose output allows simulation and digital indication of any physical dimensions, which are stated as a signal of 0..20 mA, 4..20 mA, 0..10 V or 2..10 V DC. The corresponding display can be adjusted in the range from -99..+999 digit.

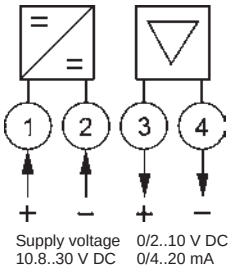
Technical data

Power supply		
Supply voltage	:	10.8..30 V DC
Power consumption	:	< 2 VA
Operating temperature	:	-10..+50 °C
CE-conformity	:	EN 61326-1:2013
Output		
Voltage	:	0/2..10 V burden ≥ 2 kΩ (I ≤ 5 mA)
Current	:	0/4..20 mA burden ≤ 500 Ω (U ≤ 10 V)
Accuracy	:	< 0.2 % ± 1 digit
Display	:	LED red or green 7.6 mm
Indicating range	:	-99..+999 Digit
Conversion rate	:	4/s
Decimal point	:	switch selectable
Overflow indication	:	"- - -" for negative overflow "E E E" for positive overflow
Case	:	slide-in case acc. to DIN 43700 material Noryl GFN 2 SE 1
Weight	:	approx. 100 g
Electrical connection	:	plug-in screw terminals, max. 1.5 mm²
Protection class	:	front IP50 adjustment screw type, IP54 adjustment knob type, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

SG4824 - 1. - 2. - 3. - 4.

1.	**Display**	
	1	3-digit LED red 7.6 mm
	2	3-digit LED green 7.6 mm
2.	**Model**	
	1	standard device
	2	custom device (on request)
3.	**Set point controlling**	
	1	screw driver
	2	rotary knob
4.	**Unit** (appears on the face plate)	

Set Point Adjuster SG9648

- **Output 0/4..20 mA, 0/2..10 V DC**
- **Set point adjustment with front buttons or external signals**
- **Indicating range and decimal point programmable**
- **Set point output isolated**

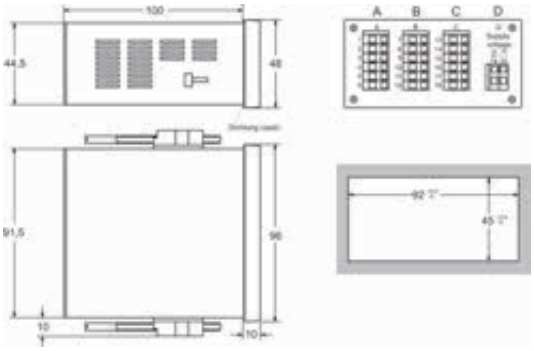
Characteristics

The Set point adjuster SG9648 has been designed for generating adjustable set point value signals 0/4..20mA and 0/2..10V DC. Any display value can be assigned to the respective output signal. The operator can work with real values. The adjustment speed is programmable.

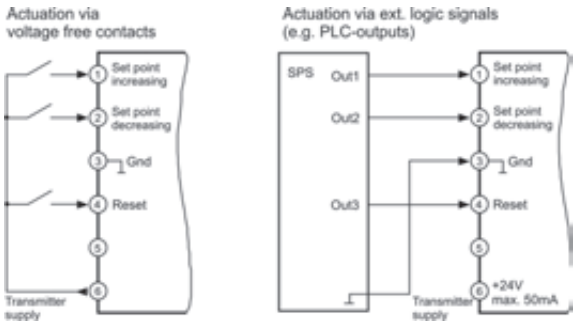
Technical data

Power supply
Supply voltage : 230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %
Power consumption : 5 VA
Operating temperature : -20..+55 °C
CE-conformity : EN 61326-1:2013; EN 60664-1:2007
Input
Control : 0/24 V DC Ri 6.3 kΩ < 4 V low, >8.5 V high, hysteresis >2.5 V, max. 35 VDC
Transmitter supply : 24 V DC (pnp), Ri approx. 150 Ω, max.50 mA
Display : LED red, 14.2 mm
Indicating range : ± 9999(0) Digit
Additional display : LED 2-digit red, 7 mm (Parameter - and status indicator)
Output
Relay SPDT : < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Transistor : max. 35V AC/DC, max. 100mA, short-circuit-proof
Analog output : 0/4..20 mA burden ≤ 500 Ω; 0/2..10 V burden > 500 Ω, isolated output changes burden dependent
- Accuracy : 0.1 %; TK 0.01 %/K
Case : panel case DIN 96x48 mm, material PA6-GF; UL94V-0
Dimensions : front 96x48 mm, mounting depth 100 mm,
Weight : max. 390 g
Electrical connection: clamp terminals, 0.08..1.5 mm² AWG28..AWG14
Protection class : front IP65, terminals IP20, acc. to BGV A3

Dimensions



Connection diagram



Ordering code

	1.	2.	3.	4.	5.	6.	7.
SG9648 -		-		-		-		-		-		-	

1.	**Terminal strip A**		
	0	not installed, set point adjustment via front buttons, adjustment speed dynamically, (Power-on)-reset to the last stored value or programmed reset value	
	1	as 0, but additional 2 control inputs for ext. adjustment, ext. reset to a programmed reset value adjustment speed dynamically	
2.	**Terminals strip B**		
	00	not installed	
	2R	2 relay outputs	
	2T	2 transistor outputs	
3.	**Terminal strip C** (standard)		
	AO	analog output 0/4..20 mA, 0/2..10 V	
4.	**Terminal strip D** supply voltage		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Options**		
	00	without option	
6.	**Unit** appears on the front panel		
7.	**Additional text** above the display (3x90 mm HxW)		

Set Point Adjuster SG1010

- **Output 0/4..20 mA, 0/2..10 V DC**
- **Set point adjustment with front buttons or external signals**
- **Indicating range and decimal point programmable**
- **Set point output isolated**

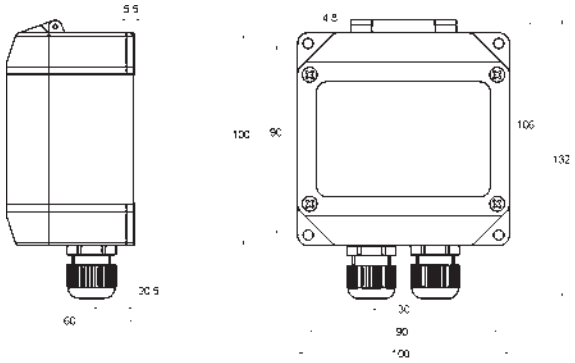
Characteristics

The Set point adjuster SG1010 has been designed for generating adjustable set point value signals 0/4..20mA and 0/2..10V DC. Any display value can be assigned to the respective output signal. The operator can work with real values. The adjustment speed is programmable.

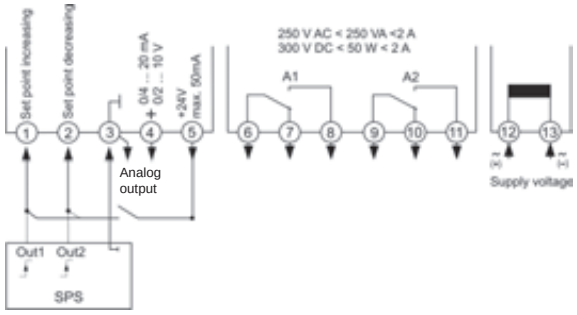
Technical data

Power supply
Supply voltage : 230 V AC ±10 %; 115 V AC ±10 %; 24 V AC ±10 % or 24 V DC ±15 %
Power consumption : 5 VA
Operating temperature : -20..+55 °C
CE-conformity : EN 61326-1:2013; EN 60664-1:2007
Input
Control : 0/24 V DC Ri 6.3 kΩ < 4 V low, > 8.5 V high, hysteresis >2.5 V, max. 35 VDC
Transmitter supply : 24 V DC (pnp), Ri approx. 150 Ω, max. 50 mA
Display : LED red, 14.2 mm
Indicating range : ±9999(0) Digit with leading zero suppression
Additional display : LED 2 digit red, 7 mm (Parameter - and status indicator)
Output
Relay SPDT : < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Analog output : 0/4..20 mA burden ≤500 Ω; 0/2..10 V burden >500 Ω, **not** isolated output changes burden dependent
- Accuracy : 0.1 %; TK 0.01 %/K
Field case : material PA6-GF 15/15
Dimensions : 100x100x60 mm
Weight : max. 350 g
Electrical connection : clamp terminals, 2.5 mm² single wire, 1.5 mm² flexi wire, AWG14
Protection class : IP65, terminals IP20, BGV A3

Dimensions



Connection diagram



Ordering code

SG1010 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1.	**Set point adjustment**		
	0	Set point adjustment via front buttons, adjustment speed dynamically	
	1	as 0, but additional control inputs, adjustment speed dynamically or linear programmable	
2.	**Alarm output**		
	00	not installed	
	2R	2 relay outputs	
3.	**Analog output** (standard)		
	AO	analog output 0/4..20 mA, 0/2..10 V	
4.	**Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
5.	**Options**		
	00	without option	
	09	1xM20x1.5 multi (2xØ6 mm), 1xM20x1.5	
6.	**Unit** appears on the lid		
7.	**Additional text** above the display (3x70mm HxW)		

Transmitters / Signal conditioning

www.ghm-group.de

GHMGROUP
Specialists by Competence.

Product information

Transmitter / Signal Conditioning

PROFIBUS

Modbus RTU

Characteristics

System
- Direct connection of sensors
- Converting of Industry Standard Signals

Measuring input
- Voltage
- Current
- Power
- Frequency
- Resistance

Applications

- **Industry Instrumentation**
- **Process Instrumentation**
- **Mechanical Engineering and Construction**
- **Ex-Applications**
- **Interface Profibus DP**

Function
According to the basic standard DIN 1319 a measuring transducer is measuring equipment which transforms an input value corresponding to a fixed relation in an output value. This output value which is given in the form of industrial standard signals, can be further processed in the standard way by display devices or programmable logic controllers (PLC).

Advantages
- Direct connection of sensors
- Galvanic separation of the input signal to the output
- No ground loops
- Signal adaptation to downstream devices
- Compact construction design
- DIN rail mo

General

Measuring inputs
- 0/4..20 mA
- 0/2..10 V DC
- Voltage AC/DC
- Current AC/DC
- Resistance / Potentiometer

Outputs
- Analogue output active 0/4..20 mA
- Analogue output active 0/2..10 V DC
- Impulse output 0/18 V DC
- Relay output SPDT
- Transistor output PNP

Measuring mode – Connection types
- 2-wire
- 3-wire
- Plug-in terminals
- Screw terminals

Specials
- Without supply
- Field bus Profibus DP
- Custom devices on request
- Integrated display
- Device for rail vehicles (FT500)

Device Overview

Device	Voltage	Current	Power	Frequence	Standard Signal 0/4..20mA; 0/2..10 V	Temperature	DMS	Resistance	Profibus-PA	Page
CT500P		•								106
CT500		•								107
CVT500	•	•								108
VT500	•									109
WM500			•							110
MU125						•				112
MU500L						•				114
MU500						•				115
MU500-Ex						•				116
TC500						•				117
AF500					•					118
FT500*				•						119
RT500								•		120
DMS50							•		•	121
DMS50Ex							•		•	123
UT125					•	•		•		125
PMT50-1					•				•	127
PMT50Ex-1					•				•	129
PMT50-2/-3						•		•	•	131
PMT50Ex-2/-3						•		•	•	133

* Available for rail vehicles.
Mistakes reserved, technical specifications subject to change without notice.

AC Current Transmitter CT500P

- **1- and 2-channel device**
- **Measuring ranges 0..1 A / 0..5 A AC**
- **Arithmetic average value measurement RMS calibrated**
- **Frequency range 45..400 Hz**
- **Loop voltage 14..30 V DC**

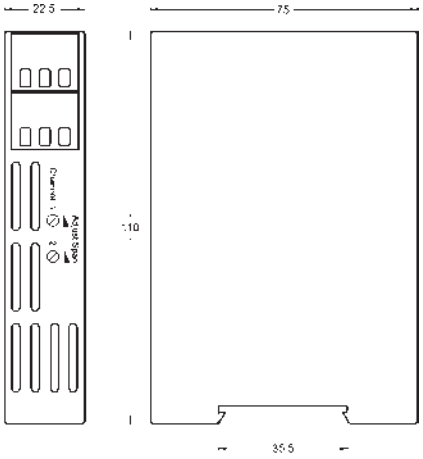
Characteristics

The transmitter converts AC current from 0..1 A or 0..5 A to the proportional standard signal 4..20 mA.
The CT500P operates like an 2-wire transmitter, which is supplied from the measuring device (e.g. SPS input circuit board).

Technical data

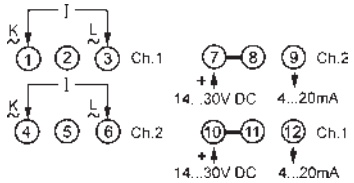
Power supply		
Loop voltage	:	14..30 V DC
Operating temperature	:	-10..+60 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007
Input	:	1- or 2-channels
Current	:	0..1 A or 0..5 A AC, overload max. 10 A
R_i	:	< 20 mΩ
Frequency	:	45..400 Hz fundamental wave, $16^{2/3}$ Hz on request
End value	:	adjustable ± 5 %
Output		
Current	:	4..20 mA, burden $R_{max.} = (U_B - 14\ V) \div 20\ mA$
Rise time (T_{90})	:	≤ 1 s
Accuracy	:	≤ 0.2 %
Case	:	Polycarbonate, UL94V-0 TS 35 acc. to DIN EN 60715:2001-09
Weight	:	approx. 200 g
Connection	:	screw terminals, max. 2.5 mm²
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

Dimensions



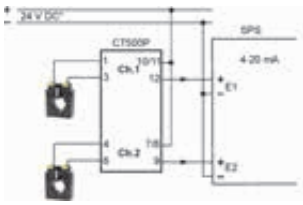
DIN rail mounting TS35

Connection diagrams

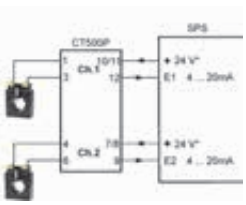


Circuit examples

passive PLC-input



active PLC-input



Ordering code

CT500P - 1. - 2. - 3.

1.	**Number of channels**	
	1	
	2	
2.	**Input direct connection / via transformer**	
	1	1 A
	5	5 A
3.	**Options**	
	00	without option
	Accessories	
	KA-500	terminal cover for measuring voltages > 400V AC

AC Current Transmitter CT500

- **12 measuring ranges selectable 0..6 A / 0..60 A AC**
- **Average function selectable**
- **Frequency range 40..2000 Hz**

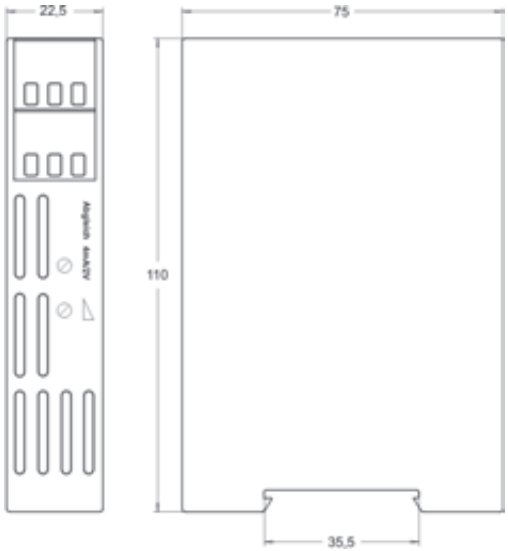
Characteristics

AC current transmitter CT500 converts true r.m.s. current measuring values of all types of waveform into industry standard signals for process control systems.
For example, the load current of an frequency converter can be detected and converted.

Technical data

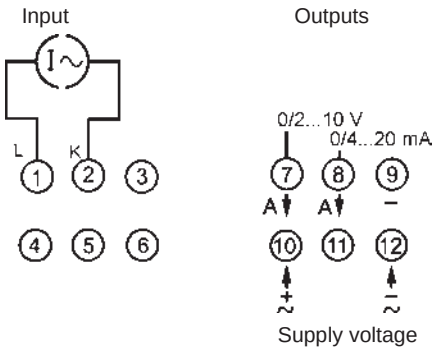
Power supply	
Supply voltage	: 85..265 V AC or 10..30 V AC/DC
Frequency	: 40..400 Hz
Power consumption	: < 3 VA
Operating temperature	: -10..+60 °C
CE-conformity	: EN 61326-1:2013; EN 60664-1:2007
Input	
Current	
Terminals	: 0..1 / 2 / 3 / 4 / 5 / 6 A AC, over load max. 9 A
Bushing connection	: 0..10 / 20 / 30 / 40 / 50 / 60 A, over load max. 90 A, cable diameter max. 8 mm
Ri	: < 20 mΩ
Frequency	: 40..2000 Hz fundamental wave, $16^{2}/_{3}$ Hz on request
Start value	: adjustable ± 5 %
End value	: adjustable ± 35 %
Output	
Current	: 0/4..20 mA, selectable, burden ≤ 1 kΩ
Voltage	: 0/2..10 V DC, selectable, load max. 15 mA, short circuit proof (parallel with the voltage output max. 5 mA)
Rise time (T_{90})	: ≤ 150 ms
Accuracy	: ≤ 0.5 %; single adjustment ≤ 0.2 %
Case	: Polycarbonate, UL94V-0 TS 35 acc. to DIN EN 60715:2001-09
Weight	: approx. 200 g
Connection	: terminals, max. 2.5 mm²
Protection class	: case IP30, terminals IP20, acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagrams



Ordering code

CT500 - 1. [ ] **-** 2. [ ]

1.	**Measuring ranges**	
	30	0..1 / 2 / 3 / 4 / 5 / 6 and 0..10 / 20 / 30 / 40 / 50 / 60 A AC
		custom range on request
2.	**Supply voltage**	
	0	85..265 V AC
	5	10..30 V DC
	Accessories	
	KA-VT	terminal cover for measuring voltages >400 V AC

Current and Voltage Transmitter CVT500

- **Measuring input for DC- and sinusoidal AC-signals**
- **Arithmetic average value measurement RMS calibrated**
- **Frequency range 40..200 Hz**

Characteristics

Transmitter CVT 500 convert current or voltage signals to proportional industry standard signal 0/4..20 mA, 0/2..10 V DC. Direct measurement of currents up to 5 A and voltages up to 400 V are possible.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 % or 24 V DC ±15 %
Frequency AC	:	47..63 Hz
Power consumption	:	< 3 VA
Operating temperature	:	-10..+50 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007

Inputs

Accuracy	:	≤ 0.5 % (≤ 0.2 % single adjustment)
Frequency	:	40..200 Hz (other ranges on request)

Standard measuring ranges

Current	:	0..1 A and 0..5 A sinusoidal or DC
Ri	:	20 mΩ (5 A-input) or 100 mΩ (1 A-input)
Overload	:	2-times, 4-times max. 5 s
Voltage	:	0..125 V and 0..250 V AC or DC
Ri	:	600 kΩ (125 V-) or 1,2 MΩ (250 V-input)
Overload	:	max. 500 V AC/DC

Custom measuring ranges

Voltage	:	end value in range 0.1..400 V AC/DC
Ri	:	4.8 kΩ/V
Overload	:	5-times U_N, max. 500 V AC/DC
Current	:	end value in range 0.001..5 A AC/DC
Ri	:	100 mΩ ÷ (custom range [A])
Overload	:	2-times, 4-times max. 5 s
End value	:	adjustable ± 5 %

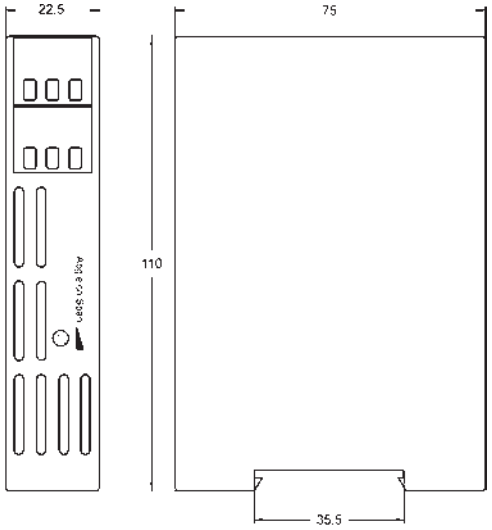
Output

Output changing

Voltage/current	:	link between terminal 8 and 9
Current output	:	0/4..20 mA selectable, burden ≤ 500 Ω
Rise time (T_{90})	:	< 650 ms
Burden error	:	< 0.1 % (R_L = <200 Ω), < 0.2 % (R_L = <500 Ω)
Voltage	:	0/2..10 V selectable, load max. 10 mA

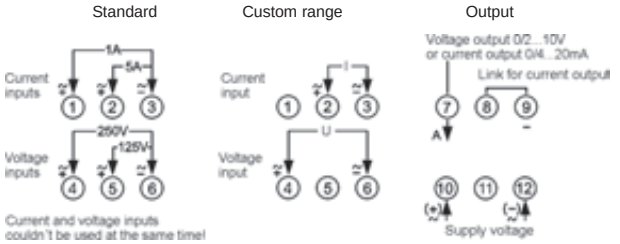
Case	:	Polycarbonate, UL94V-0 TS 35 acc. to DIN EN 60715:2001-09
Weight	:	approx. 200 g
Connection	:	screw terminals, max. 2.5 mm²
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagram



Ordering code

CVT500 - 1. [ ] - 2. [ ] - 3. [ ]

1.	**Current ranges**	
	0	not installed (custom measuring range voltage)
	1 / 5	standard device 0..1 A and 0..5 A AC / DC
2.	**Voltage ranges**	
	0	not installed (custom measuring range current)
	125 / 250	standard device 0..125 V and 0..250 V AC/DC
3.	**Supply voltage**	
	0	230 V AC ± 10 %
	5	24 V DC ± 15 %

AC Voltage Transmitter VT500

- **6 measuring ranges selectable 0..600 V AC**
- **Average function selectable**
- **Frequency range 40..2000 Hz**

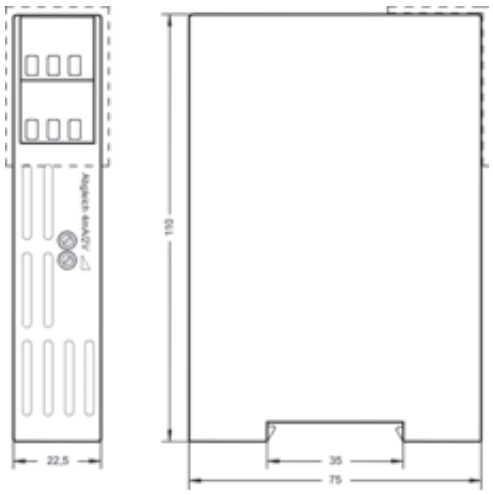
Characteristics

Voltage transmitter VT500 converts true r.m.s. voltage measuring values of all types of waveforms into industry standard signals for process control systems. For example, the load voltage of an frequency converter can be detected and converted.

Technical data

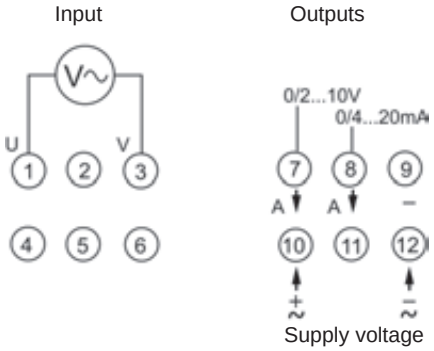
Power supply		
Supply voltage	:	85..265 V AC or 10..30 V AC/DC
Frequency	:	40..400 Hz
Power consumption	:	<3 VA
Operating temperature	:	-10..+60 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007
Input		
Voltage AC	:	0..100 / 200 / 300 / 400 / 500 / 600 V AC, overload max. 1200 V max. 5 s
R_i	:	720 kΩ
Frequency	:	40..2000 Hz fundamental wave, $16^{2}/_{3}$ Hz on request
Start value	:	adjustable ± 5 %
End value	:	adjustable ± 35 %
Output		
Current	:	0/4..20 mA, selectable, burden ≤ 1 kΩ
Voltage	:	0/2..10 V DC, selectable, load max. 15 mA, short-circuit-proof (parallel with the voltage output max. 5 mA)
Rise time (T_{90})	:	≤ 150 ms
Accuracy	:	≤ 0.5 %; single adjustment ≤ 0.2 %
Case	:	Polycarbonate, UL94V-0 TS 35 acc. to DIN EN 60715:2001-09
Weight	:	approx. 200 g
Connection	:	screw terminals, max. 2.5 mm²
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagram



Ordering code

VT500 - 1. **-** 2.

1.	**Measuring ranges**	
	30	0..100 / 200 / 300 / 400 / 500 / 600 V AC
		custom range on request
2.	**Supply voltage**	
	0	85..265 V AC
	5	10..30 V DC
	Accessories	
	KA-VT	terminal cover for measuring voltages > 400 V AC

Active Power Transmitter WM500

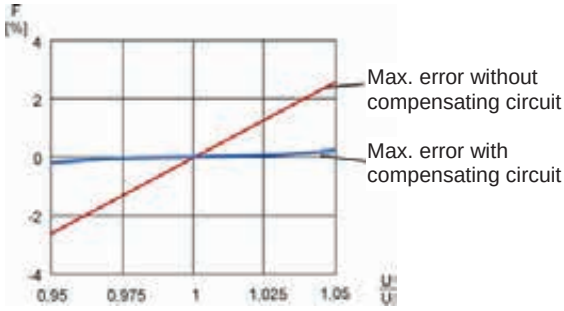
- **For 1- and 3-phase power systems with symmetric load**
- **Current measuring range 1 A or 5 A**
- **Power-factor (cos φ) selectable 0.72 or 1**
- **Frequency range 45..400 Hz**

Characteristics

Active-power transmitter WM500 converts active-power of symmetric 1-3 phase power supply systems into proportional industry standard signals. Devices without compensating circuits can be used to measure active-power of phase-angle controlled equipments or electric motor drives controlled by frequency inverters. Devices with integrated compensating circuits (only for sinusoidal voltage) compensate errors which depends on different deviation from line voltages to nominal voltages. Both types work with any curve shape variations of the measuring current.

Error compensation

The results of the error compensation



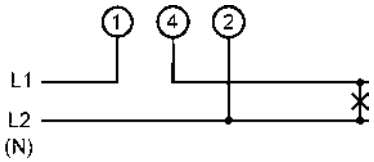
Deviation from line voltage to nominal voltage

In practice an additional error up to 3 % can occur when 3-phase line voltages are not symmetrical. The WM500 with built-in compensating circuit* eliminates this error nearly completely.

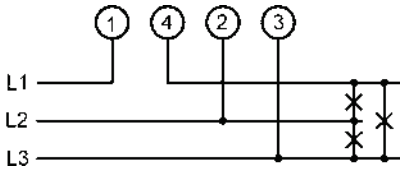
*Note: The device with compensating circuit must be connected to the measuring voltage at any time of operation!

Connection diagrams

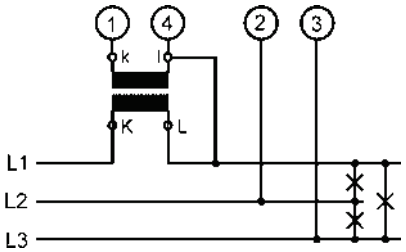
Direct access 1-phase



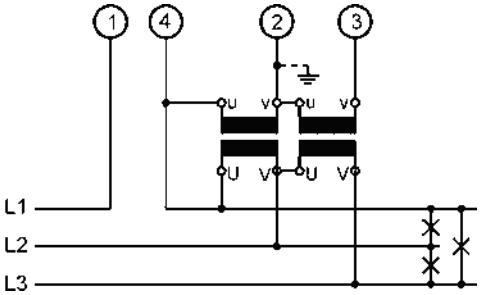
Direct access 3-phase



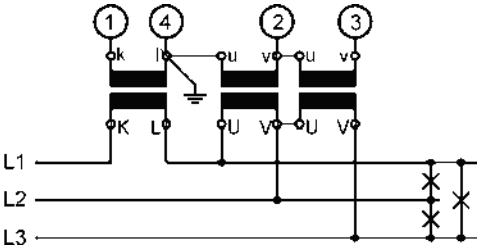
Current transformer connection



Voltage transformer connection



Current and voltage transformer connection



Technical data

Power supply

Supply voltage	:	230 V AC ± 10 % or 24 V DC ± 15 %
Frequency	:	47..63 Hz
Power consumption	:	< 3 VA
Operating temperature	:	-10..+50 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007

Inputs

Current	:	0..1 A: R_i = 82 mΩ, over load 2-times, 4-times for max. 5 s 0..5 A: R_i = 10 mΩ, over load 2-times, 4-times for max. 5 s,
Frequency range	:	45..400 Hz, Crest-factor: 3
Curve shape	:	insignificant
Voltage	:	0..440 V, R_i = 3.4 kΩ/V, over load max. 700 V
Frequency range	:	45..400 Hz
Curve shape	:	insignificant, without compensating circuit
Curve shape	:	sinusoidal, with compensating circuit
End value	:	adjustable -30..5 %

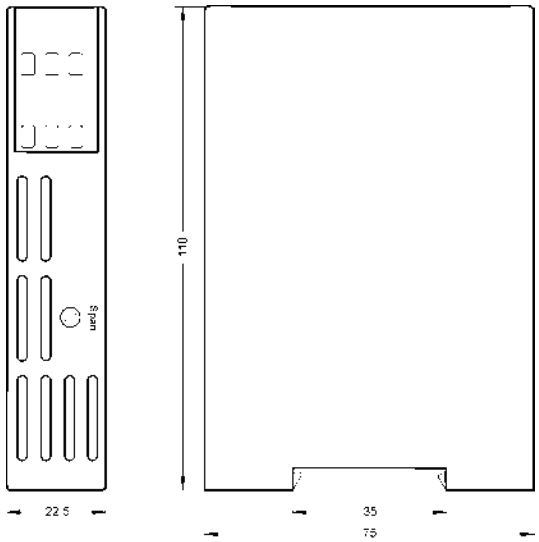
Outputs

Programmable output

Voltage → current	:	link between terminal 8 and 9
Current	:	0/4..20 mA selectable, burden ≤ 500 Ω
Burden error	:	< 0.1 % (R_L = 0 ... 200 Ω), < 0.2 % (R_L = 0 ... 500 Ω)
Voltage	:	0/2 ..10 V selectable, load max. 10 mA
Adjustment	:	P = U x I x √ 3 x cosφ = 20 mA (10 V)* * cosφ=1
Accuracy	:	< 0.2 %
Rise time (T_{90})	:	< 500 ms

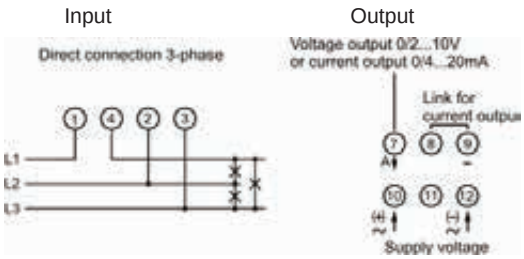
Case	:	Polycarbonate, UL94V-0 TS 35 acc. to DIN EN 60715:2001-09
Weight	:	approx. 200 g
Connection	:	screw terminals, max. 2.5 mm²
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagram



Ordering code

WM500 - 1. - 2. - 3. - 4. - 5.

1.	**Power supply system**	
	1	1-phase
	3	3-phase
2.	**Measuring voltage**	
	100	100 V AC
	110	110 V AC
	230	230V AC
	400	400 V AC
	440	440 V AC
3.	**Measuring current**	
	1	1 A AC
	5	5 A AC
4.	**Model**	
	1	without compensating circuit
	2	with compensating circuit
5.	**Supply voltage**	
	0	230 V AC ±10 %
	5	24 V DC ±15 %

Note!
Please quote the active-power measurement range and transformation ratio of the current transformer.

Temperature Measuring Transducer MU125

- **Universal input for Pt100, Pt1000, thermocouple, NTC and resistance measurement value**
- **Configuration via front DIP switches**
- **Analog actual value output 4 .. 20mA**
- **Zero point and limit value can be adjusted via trim potentiometers on the front**
- **With Pt100 and Pt1000 sensors, monitoring of sensor break and short-circuit**
- **Wide-range mains adapter or 24 V DC**
- **Optional supply via carrier rail bus**
- **Removable coded screw terminals or optional push-in terminals**
- **Housing width 12.5 mm**
- **Carrier rail mounting TS35 EN60715**

Characteristics

Devices of the MU125 series convert a temperature measurement value or resistance measurement value from various sensors to a current signal of 4..20mA.
The universal configurability of the measuring inputs reduces the stock requirement for various applications.
The housing width of only 12.5 mm enables space-saving installation in the switch cabinet.

Measurement inputs

Switchable via DIP switch:

	Measuring range	Basic precision	Temperature deviation *)
Pt100	-50.. 50°C	0.4%	0.01%/K
	0.. 50°C	0.6%	0.02%/K
	0..100°C	0.4%	0.02%/K
	0..150°C	0.4%	0.01%/K
	0..200°C	0.3%	0.01%/K
	0..250°C	0.3%	0.01%/K
	0..300°C	0.2%	0.005%/K
	0..500°C	0.2%	0.005%/K
Pt1000	-50.. 50°C	0.4%	0.01%/K
	-30.. 70°C	0.4%	0.01%/K
	-20.. 40°C	0.4%	0.01%/K
	0.. 50°C	0.6%	0.02%/K
	0..100°C	0.4%	0.02%/K
	0..150°C	0.4%	0.01%/K
	0..200°C	0.3%	0.01%/K
	0..250°C	0.3%	0.005%/K
FeCuNi	0..250°C	1.0%	0.04%/K
	0..500°C	0.5%	0.03%/K
NiCrNi	-50..250°C	0.7%	0.05%/K
	0..500°C	0.5%	0.04%/K
	0..750°C	0.4%	0.03%/K
	0..1000°C	0.3%	0.02%/K
	0..1250°C	0.3%	0.02%/K
PtRhPt	0..1500°C	1.0%	0.04%/K
NTC R_{25}=10kΩ $B_{25/85}$=3977K	0..100°C	1.0%	0.01%/K
NTC R_{25}=10kΩ $B_{25/85}$=3977K	-20.. 50°C	1.5%	0.01%/K
NTC R_{25}=2kΩ $B_{25/85}$=3528K	0.. 100°C	1.0%	0.01%/K
Resistance linear**)	0.. 2kΩ	0.3%	0.005%/K
	0.. 5kΩ	0.5%	0.01%/K
	0..10kΩ	0.3%	0.005%/K

*) Measurement deviation depending on the environmental temperature in the switch cabinet (-10..+60°C)

**) Adjusting zero point and limit value via the integrated trim potentiometers makes it possible to also connect KTY sensors for these measuring ranges. The linearisation must then be accomplished with the help of a parallel resistor.

(Special measurement ranges available on request)

Technical data

Wide-range power supply
Supply voltage : 20..125VDC and
20..250VAC (47..63Hz), max.1.5W

24V power supply
Supply voltage : 24V DC +/-15%, max. 1.5W

Combined data
Rated voltage : 253V AC
Test voltage : 3kV AC between
supply // input = output
Working temperature : -10..60°C
Storage temperature : -20..80°C
Humidity : 10..90% (no condensation)

Measurement inputs
Pt100 : linearised,
measuring current approx. 1.6mA
Pt1000 : linearised,
measuring current approx. 130µA
In the event of a sensor break or short circuit, the analog output drops to 0mA.
The operation LED blinks red
Thermocouple : linearised with comparison position compensation
(optionally without internal compensation)
NTC : linearised for $B_{25/85}$=3977K or 3528K
Max. load 200µW (averaged)
Linear resistance : Mb. 0..2kΩ: approx. 1.4mA
Mbs. 0..5kΩ, 0..10kΩ: approx. 300µA
Zero point setting : +/-40% of the factory measuring range (= end value – start value)
via 12-turn trim potentiometer
End value reduction : -50% based on the factory end value
via 12-turn trim potentiometer
Note: The measuring accuracy drops proportionally with the narrowing of the measuring range
Potentiometer setting limits : Limitation of the aforementioned adjustment ranges

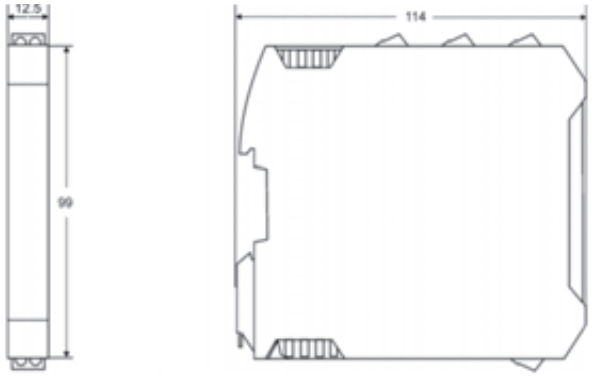
Pt100	-50..500°C	(..600°C)
Pt1000	-50..250°C	(..300°C)
FeCuNi	-100..500°C	(..800°C)
NiCrNi	-150..1250°C	
PtRhPt	0..1500°C	(..1600°C)
NTC (10kΩ)	-20..100°C	(..150°C)
NTC (2kΩ)	-40..100°C	(-50°C..150°C)
R linear	0..10kΩ	

(values in parentheses apply for optional, customer-specific special measuring ranges that are configured at the factory)

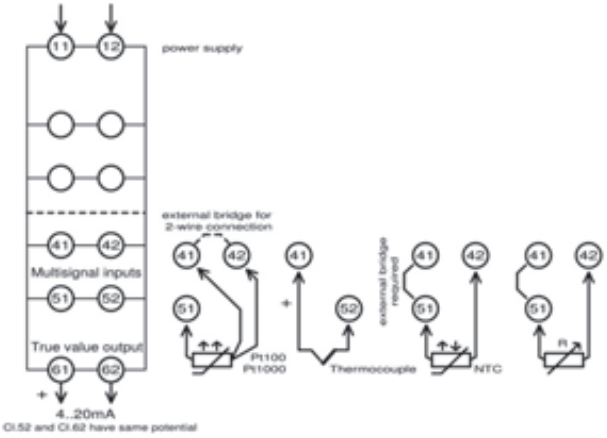
Analog output : 4..20mA, max. burden 400Ω,
no galvanic isolation
from the input signal
(max. burden error of 0.2% at 400Ohm)
Dimensions (WxDxH): 12.5 x 114 x 108mm
Material : PA6.6, light grey,
Flammability class V0 (UL94)
Weight : 120g
Protection rating : IP20
Screw terminals : 0.2..2.5 mm², AWG 24..14,
removable, coded
Push-in terminals (spring-type terminals) : 0.5..1.5 mm², AWG 25..16,
Double connection (12A between the connections), removable, coded
Power Rail : 8A over the entire bus system
(power supply via removable terminals 0.2..2.5 mm², AWG 24..14)

A service mode for the trim potentiometers on the front offers the following possibilities:
1) A check of whether potentiometers are positioned at the calibrated factory settings
2) The pre-adjustment of a new output characteristic curve only with connection of a current measuring device.
(a temperature calibrator is not necessary)
3) Specification of a constant value at the current output, e.g. in order to test the reaction of connected devices.
(Limited range from 5.6..20mA)

Dimensions



Connection diagram



Ordering code

MU 1. [ ] - 2. [ ]

1.	Device version	
	125L	Supply voltage 24V DC +/- 15%
	125LP	Supply voltage:24V DC +/-15% with carrier rail bus connection *)
	125M	Wide-range mains adapter 20..125VDC / 20..253V AC
4.	**Options**	
	00	No options
	01	Push-in terminals (plug-in)

*) see separate Power-Rail information sheet

Temperature Transmitter MU500L

Characteristics

Temperature transmitter MU500L accept field signals of Pt100 or Pt1000 RTD sensors to the input which is filtered, isolated and converted into industry standard signals for process control systems. Special circuit design makes it possible, to produce any useful measurement ranges.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 %; 24 V DC ±20 %
Frequency AC	:	47..63 Hz
Power consumption	:	<1.5 VA
Operating temperature	:	-10..+60 °C
CE- conformity	:	EN 61326-1:2013, EN 60664-1:2007
Explosion protection	:	Approval: TÜV 03 ATEX 2283
Marking	:	II (1) G [Ex ia] IIC bzw. II (1) D [Ex iaD]

Measuring input *

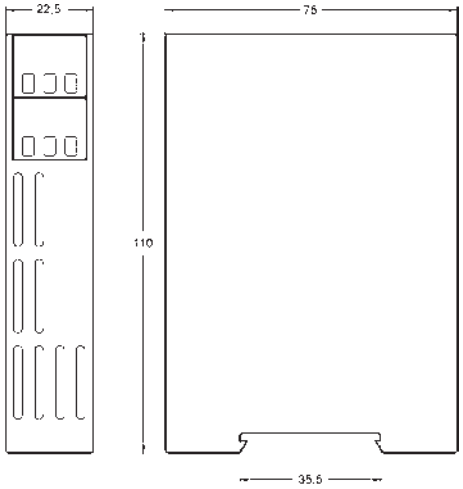
Start value Pt100	:	in the range -100 °C.. +100 °C
Span Pt100	:	in the range 50..600 °C
Start value Pt1000	:	in the range -50 °C..+50 °C
Span Pt1000	:	in the range 10..200 °C
Sensor current	:	ca. 0.6 mA (no self heating)
Line resistance	:	max. 10 Ω, automatic compensation at 3-wire connection
Start value adjustment	:	approx. ±10 °C
4mA /2V adjustment	:	approx. ±1 mA or ±0.5 V
Span	:	approx. ±10 %
Broken line	:	output shows max. value
short circuit	:	output shows min. value

Outputs

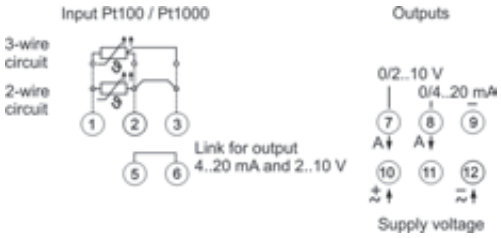
Current	:	0/4..20 mA, max. 500 Ω
Voltage	:	0/2..10 V, max. 10 mA, simultaneously to the current output max. 1 mA
Accuracy	:	≤ 0.2 %
Temperature error	:	≤ 0.01 %/K
Case	:	Polycarbonate, UL94V-0 T35 acc. to DIN EN 60715
Weight	:	approx. 140g
Connection	:	screw terminals with pressure plate, max. 2.5 mm²
Protection class	:	case IP30, terminals IP20, BGVA3

*Minimal and maximal range for start value and span of the measuring range.

Dimensions



Connection diagram



Ordering code

MU500L - 1. - 2. - 3.

1.	**Device type**	
	51	Pt100
	53	Pt1000
2.	**Supply voltage**	
	0	230 V AC ±10 %
	5	24 V DC ±15 %
3.	**Measuring range**	
	Please state in clear text e. g.: -50..+100 °C	

Universal Transmitter MU500

Characteristics

Temperature transmitter MU500 accept field signals of Pt100 or Pt1000 RTD sensors to the input which is filtered, isolated and converted into industry standard signals for process control systems. The multipurpose design of inputs and outputs, also the wide range of the supply voltage reduces the number of types. The small case allows space-saving mounting.

Technical data

Power supply

Supply voltage	:	85..265 V AC/110..125 V DC or 10..30 V AC/10..42 V DC
Frequency AC	:	40..400 Hz
Power consumption	:	max. 2.2 W , max. 3.3 VA
Operating temperature	:	-10..+60 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007

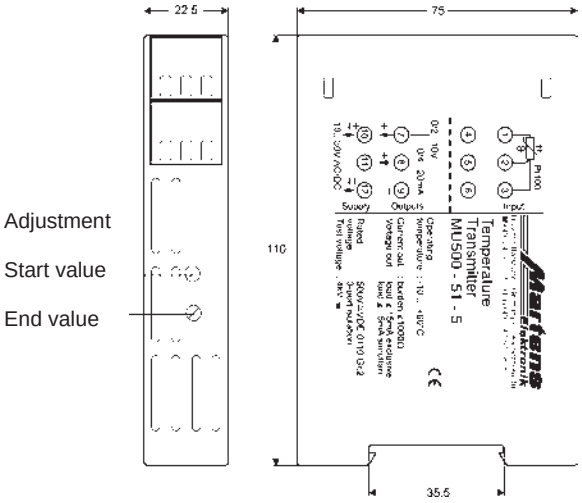
Input

RTD Pt100	:	13 ranges, switch selectable
- Sensor current	:	Pt100 approx. 1 mA
RTD Pt1000	:	16 ranges, switch selectable
- Sensor current		Pt1000 approx. 0.25 mA
Line resistance	:	max. 100 Ω
Accuracy	:	≤ 0.2 %
Zero adjust	:	Pt100 approx. ± 8 Ω (≙ 20 °C)
		Pt1000 approx. ± 8 Ω (≙ 2 °C)
End value	:	adjustable approx. +/-20 %
Sensor error;		
- broken or shorted line:		output rises to max. output value

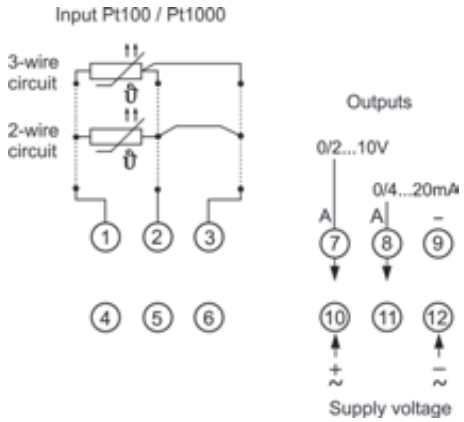
Outputs

Current	:	0/4..20 mA switch selectable burden ≤ 1 kΩ
Voltage	:	0/2..10 V switch selectable load max. 15 mA , short-circuit-proof (simultaneously to the current output max. 5 mA)
Case	:	Polycarbonate, UL94V-0 TS 35 acc. to DIN EN 60715:2001-09
Weight	:	approx. 200 g
Protection class	:	case IP30, terminals IP20, BGV A3
Electrical connection	:	screw terminals with pressure plate, max. 2.5 mm²

Dimensions



Connection diagram



Ordering code

MU500 - 1. - 2.

1.	**Device type**	
	51	Pt100, 13 measuring ranges
	53	Pt1000, 16 measuring ranges
2.	**Supply voltage**	
	0	85..265 V AC
	5	10..30 V AC/DC

Universal Transmitter MU500Ex

Characteristics

Temperature transmitters series MU500-Ex offer an intrinsically safe input and convert RTD sensor signals (Pt100 or Pt1000) into industry standard signals. The device includes a full 3-port isolation.

Technical data

Power supply

Supply voltage	:	85..253 V AC/110..125 V DC 10..30 V AC/DC
Frequency AC	:	40..400 Hz
Power consumption	:	< 3.3 VA
Operating temperature	:	-10..+60 °C
CE-conformity	:	ATEX-Richtlinie 2014/34/EU
Standards	:	EN 60079-0:2006, EN 60079-11:2007 EN 61241-0:2006, EN 61241-11:2006
EMC-directive / standard	:	2014/30/EU / EN 61326-1:2013

Explosion protection

		U_0	I_0	P_0	C_0	L_0
Approval	:	TÜV 03 ATEX 2283,				
Marking	:	II (1) G [Ex ia Ga] IIC or II (1) D [Ex ia Da] IIIC				
MU500Ex- … -51	:	1.3 V	<3mA	<3mW	29µF	100mH
MU500Ex- … -53	:	4.9 V	<3mA	<3mW	2.2µF	100mH
Ci, Li	:	5 nF, ca. 0 mH				

The intrinsically safe circuit is galvanically separated from the non-intrinsically safe circuits up to a peak crest value of the voltage of 375 V.

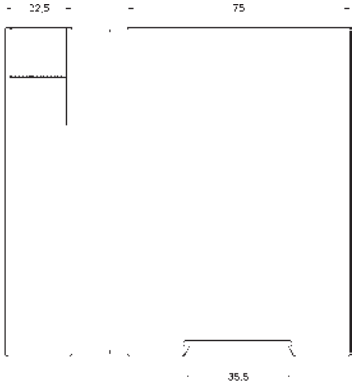
Measuring input

Sensor current	:	Pt100 approx 1 mA, Pt1000 approx. 0.25 mA
Line resistance	:	max. 100 Ω, automatic compensation with 3-wire connection
Zero adjust	:	Pt100 approx. ± 8 Ω, (≙ 20 °C) Pt1000 approx. ± 8 Ω (≙ 2 °C)
End value	:	approx. +/-20 % adjustable
Sensor error	:	output rises to max. output (voltage output >12V DC current output > 25 mA)

Outputs

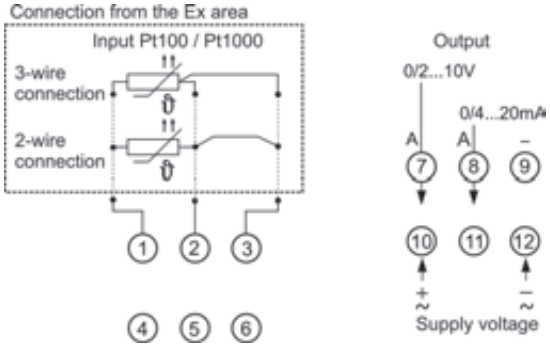
Current	:	0/4..20 mA DC switch selectable, burden ≤ 1 kΩ
Voltage	:	0/2..10 V DC switch selectable, load max. 15 mA , short-circuit-proof (simultaneously with current output 5 mA)
Rated voltage	:	253 V AC or 125 V DC (Um) acc. to EN 60079-0
Accuracy	:	≤ 0.2 %
Case	:	Polycarbonate UL94V-0 TS 35
Weight	:	approx. 200 g
Protection class	:	case IP30, terminals IP20 (BGV A3)
Connection	:	screw terminals with pressure plate max. 2.5 mm²
Mounting	:	installation in dry, clean and well monitored areas

Dimensions



Adjustment
Start value
End value

Connection diagram



Ordering code

MU500Ex - 1. - 2. - 3.

1.	**Device type**	
	51	Pt100, 13 measuring ranges
	53	Pt1000, 16 measuring ranges
2.	**Supply voltage**	
	0	85..253 V AC/110..125 V DC
	5	10..30 V AC/DC
3.	**Options**	
	00	without option

Thermocouple Transmitter TC500

Characteristics

Thermocouple Transmitter TC500 converts thermovoltages into standard industry signals 0/4..20 mA or 0/2..10 V DC. The measuring range is programmable via rotary switches at the side.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 % or 24 V DC ±15 %
Frequency AC	:	47..63 Hz
Power consumption	:	< 3.5 VA
Operating temperature	:	-10..+60 °C
CE-conformity	:	EN55022, EN60555-2 IEC61000-4-4/5/11/13

Input

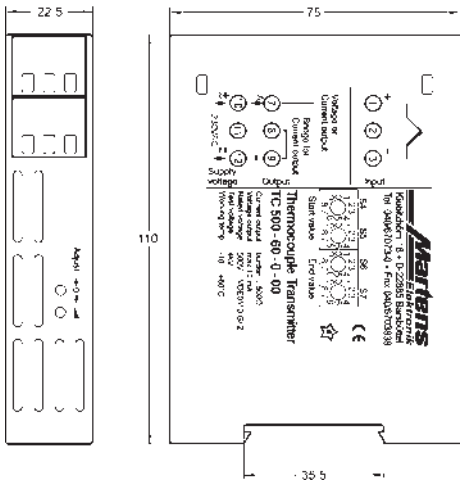
Thermocouple

Type J	:	Fe-CuNi, in range -100..+800 °C
Type K	:	NiCr-Ni, in range -150..+1200 °C
Type S	:	Pt10Rh-Pt, in range 0..+1600 °C

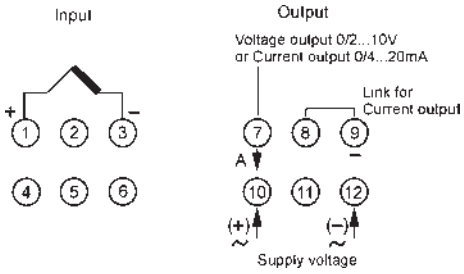
Output

Current	:	0..20 mA, 4..20 mA switch selectable, burden ≤ 500 Ω
Voltage	:	0..10 V, 2..10 V switch selectable, load max. 10 mA , short-circuit-proof
Start value	:	adjustable approx. ± 5 %
End value	:	adjustable approx. ± 5 %
Broken line	:	outputs takes the end value +1 %, overflow indication
Short-circuit	:	no indication (output takes terminal temperature)
Accuracy	:	≤ 0.15 %, 1 °C
Temperature coefficient	:	≤ 0.01 %/K
Case	:	Polycarbonate, UL94 V-0 TS35 acc. to DIN EN 60715:2001-09
Weight	:	approx. 200 g
Connection	:	screw terminals with pressure plate max. 2.5 mm²
Protection class	:	case IP30 terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

	1.	2.	3.
TC500	-	-	-

1.	**Input**	
	60	Thermocouple J, K, S programmable, output 0/4..20 mA or 0/2..10 V DC
2.	**Supply voltage**	
	0	230 V AC ± 10 %
	5	24V DC ± 15 %
3.	**Options**	
	00	without option

Analog Frequency Transmitter AF500

- **Output frequency from 0..0.01Hz/20 kHz programmable**
- **Inputs for 0/4..20 mA, 0/2..10 V DC**
- **Teach-in programming for analog start- and end value**
- **Outputs transistor and relay SPDT**
- **Power- and programming indicator via 2-color LED**

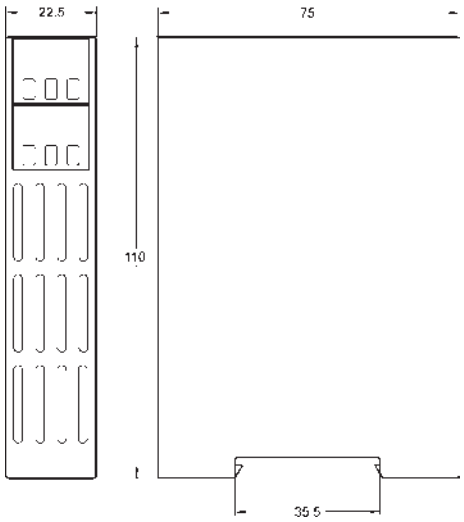
Characteristics

Analog frequency transmitter AF500 converts standard industry signals 0/4..20 mA or 0/2..10 V DC into a proportional frequency. The output frequency is programmable with rotary switches at the case side.

Technical data

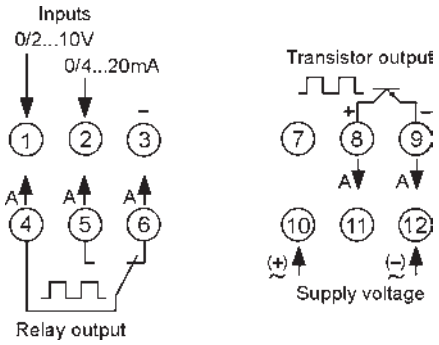
Power supply		
Supply voltage	:	230 V AC ±10 % or 24 V DC ±15 %
Frequency	:	47..63 Hz
Power consumption	:	< 3 VA
Operating temperature	:	-10..+60 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007
Input		
Current	:	0/4..20 mA, switch selectable
- Ri	:	51 Ω
Voltage	:	0/2..10 V DC, switch selectable
- Ri	:	20 kΩ
Start value	:	via software programmable 0..25 %
End value	:	via software programmable -15..+10 %
Output		
Transistor	:	max. 30 V DC, load max. 30 mA
- Frequency range	:	0..0.01 Hz , 0..20 kHz duty cycle 0.5
Relay SPDT	:	250 V AC < 250 VA < 2 A, 100 V DC < 50 W < 1 A
- Frequency range	:	0..0.01 Hz, 0..9.9 Hz, duty cycle 0.5
Accuracy	:	0.1 % of the end value
Case	:	Polycarbonate, UL94V-0 TS 35 acc. to DIN EN 60715:2001-09
Weight	:	approx. 140 g
Connection	:	screw terminal, max. 2.5 mm²
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagrams



Ordering code

AF500 - 1. - 2. - 3.

1.	**Measuring range**	
	10	0/4..20 mA, 0/2..10 V DC output frequency from 0..0.01 up to 20 kHz
2.	**Supply voltage**	
	0	230 V AC ±10 %
	5	24 V DC ±15 %
3.	**Options**	
	00	without option

Frequency Analog Transmitter FT500

- **Frequency ranges from 0..0.01Hz/20 kHz programmable**
- **start- and end value of the measuring range programmable**
- **Multipurpose inputs for 24 V sensors, switching contacts and Namur actors**
- **Integrated transmitter supply**

Characteristics

Frequency transmitter FT 500 are used to convert an impulse frequency range into industry standard signals. The transmitter accepts impulses from proximity switch, contact switch, light barriers and Namur proximity switches. Start- and end value will be programmed with 5 rotary switches. Increasing or decreasing output characteristic is therefore programmable.

Technical data

Power supply

Supply voltage	:	85..265 V AC or 10..30 V AC / DC
Frequency	:	47..63 Hz
Power consumption	:	< 4 VA
Operating temperature	:	-10..+60 °C
CE- conformity	:	EN 61326-1:2013; EN 60664-1:2007

Input

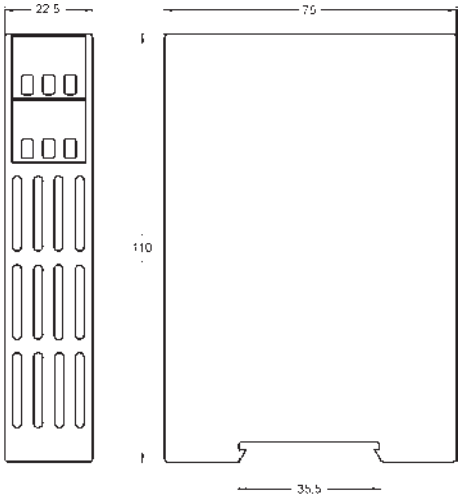
Frequency range	:	0..0.01 Hz/20 kHz
Pulse cycle	:	min. 20 µs (electronic) and min. 5 ms (contacts)
Start value	:	programmable 0..25 %
End value	:	programmable -15..+ 5 %
Impulse input (Terminals 2, 3)	:	low- signal -30 V..+3 V, high- signal +10 V..+35 V
Ri	:	> 10 kΩ
Transmitter supply (Terminal 1)	:	approx. 20 V DC, 25 mA short circuit current
Namur input (Terminals 4, 5)	:	acc. to DIN 19234, Namur
Ri	:	approx. 1 kΩ

Output

Current	:	0/4..20 mA selectable, burden ≤ 1 kΩ
Voltage	:	0/2..10 V DC, load max. 10 mA, short-circuit-proof (parallel with current output, 5 mA)
Accuracy	:	0.1 % Measuring end value
Rise time (T_{90})	:	< 130 ms

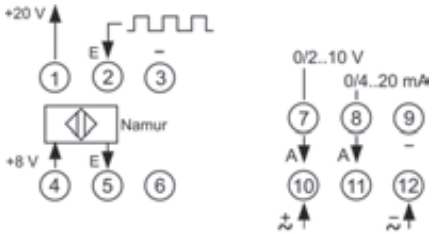
Case	:	Polycarbonate, UL94V-0 TS 35 acc. to DIN EN 60715:2001-09
Weight	:	approx. 140 g
Connection	:	screw terminals, max. 2.5 mm²
Protection class	:	case IP30, terminals IP20, acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagram



Supply voltage

Ordering code

FT500 - 1. - 2. - 3.

1.	**Measuring range**	
	70	0..0.01Hz up to 20 kHz, output 0/4..20 mA and 0/2..10 V DC
2.	**Supply voltage**	
	0	85..265 V AC
	5	10..30 V AC / DC
3.	**Options**	
	00	without option

Resistance Transmitter RT500

- **Measuring range 0..50 Ω up to 100 kΩ**
- **Processor technology with 12 Bit AD/DA-converter**
- **Teach-in programming for start- and end-value**
- **Increase or decrease output characteristic programmable**
- **Operation mode indicated by use of a 2-color LED**

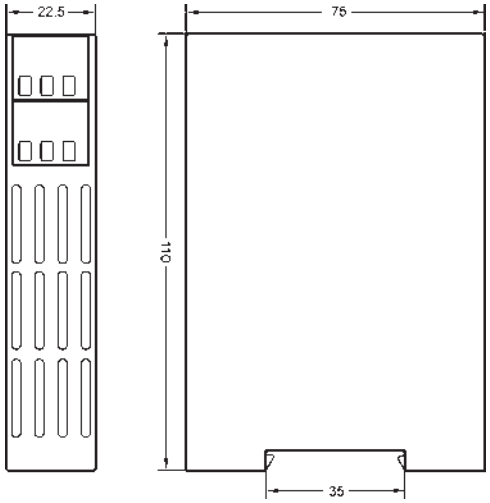
Characteristics

RT500 transmitter converts a resistance- or potentiometer signal into industry standard signals. Initial and final value may be in the range of 0..100 kOhm. Easy programming by means of Teach-in. The measuring range will be selected automatically. The input circuit is designed in 3-wire technology and can provide compensation of the
line resistance. The linear output signal is generated between minimum and maximum input resistance.

Technical data

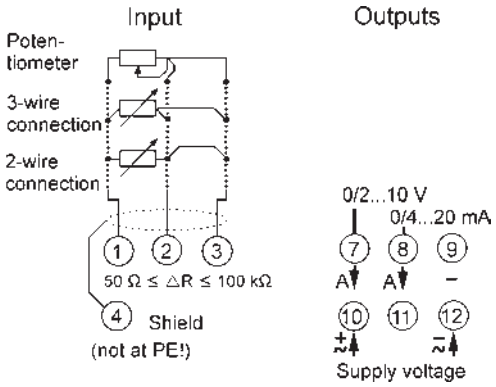
Power supply
Supply voltage : 85..265 V AC or 10..30 V AC/DC
Frequency : 47..63 Hz
Power consumption : < 3 VA
Operating temperature : -10..+50 °C
CE-conformity : EN 61326-1:2013; EN 60664-1:2007
Input
Measuring range : R_{max}: 50 Ω..100 kΩ,
Condition: ΔR ≥ 0.5 R_{max}
characteristic curve increasing or decreasing
Solution : 600..3000 Digit
(depends on measuring range)
Sampling frequency : 250 Hz real-time processing
Line resistance : max. 10 Ω, line compensation in 3-wire-circuits
Outputs
Current : 0/4..20 mA, selectable, burden ≤ 1 kΩ
Voltage : 0/2..10 V, selectable, load max. 15 mA
short-circuit-proof
(parallel with current output max. 5 mA)
Attention! No isolation between in- and output.
Rise time (T_{90}) : < 8 ms
Accuracy : ± 0.2 % of the measuring range
Case : Polycarbonate, UL94V-0
TS 35 acc. to DIN EN 60715:2001-09
Weight : approx. 200 g
Connection : screw terminals, max. 2.5 mm²
Protection class : case IP30,
terminals IP20 acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagram



Ordering code

RT500 - 1. - 2.

1.	**Measuring range**	
	40	R_{max} in range 50 Ω up to 100 kΩ programmable (see examples)
2.	**Supply voltage**	
	0	85..265 V AC
	5	10..30 V AC/DC

Examples:
1.) Range 15..90 Ω
2.) Range 0..1000 Ω
3.) Range 100..200 Ω

Attention!
Minimal span 0.5 x Rmax

Transmitter DMS50

- **Weight – Force – Pressure – Torque with DMS-strain gauges**
- **Bridge sensitivity 0.100..5.000 mV/V**
- **Teach-in function**
- **Tare function**
- **Min- and Max peak storage (not voltage safe)**
- **Integrated bridge supply 2.5 V, 5 V, 10 V max. 120 mA**
- **Bus-interface Modbus / Profibus**

Characteristics

The DMS50 converts the output signal of standard strain gauges (DMS measuring bridges) into a standard signal 0/4..20 mA or 0/2..10 DC. The bridge supply and an external control input for the tare function are integrated.
If several strain gauges are required in an application, these must be connected parallel. The bridge current must not exceed 120 mA in this case. Where appropriate, a SBB1616 measuring amplifier is to be interposed for a feed current up to 200 mA.

Technical data

Power supply

Supply voltage	: 230 V AC ±10 %; 115 V AC ±10 % or 24 V DC ±15 %
Power consumption	: max. 7 VA
Operating temperature	: -10..+55 °C
CE-conformity	: EN 61326-1:2013; EN 60664-1:2007

Input

DMS

Bridge-supply	: 2.5 V/ 5 V/ 10 V DC ; programmable; max. 120 mA
Bridge sensitivity	: 0.100..5.000 mV/V
Sense line	: compensated line resistance of max. 10 Ω
Accuracy	: < 0.025 % ± 2 digit
Tare external	: ext. contact or 24 V DC signal
Display	: graphic LCD-Display 128x64 pixel, backlight white
Indicating range	: ±9999 Digit

Outputs

Relay SPDT, A1-A4	: < 250 V AC < 250 VA < 2 A cos φ ≥ 0.3 < 300 V DC < 40 W < 2 A
Analog output	: 0/4..20 mA burden ≤ 500 Ω; 0/2..10 V burden > 500 Ω, isolated output changes automatically
Accuracy	: 0.2 %; TK 0.01 %/K

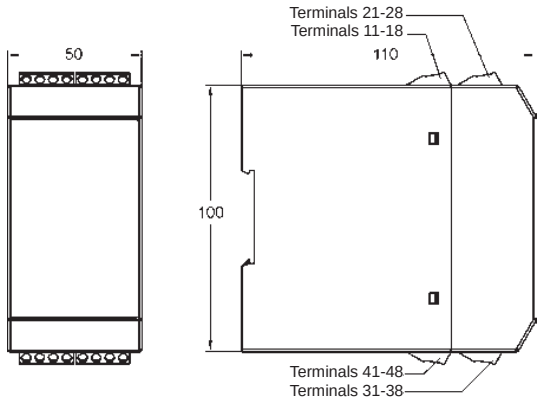
Fault indication at error in the DMS measuring circuit
→ Analog output 0 mA, < 3.6 mA or >21.5 mA, programmable
→ Alarm contact(s) min. or max. programmable

Bus system

Modbus	: RS485, RTU or ASCII max. 38400 Bd
Profibus	: Profibus DP
Connection	: 9 pole D-SUB plug in the front

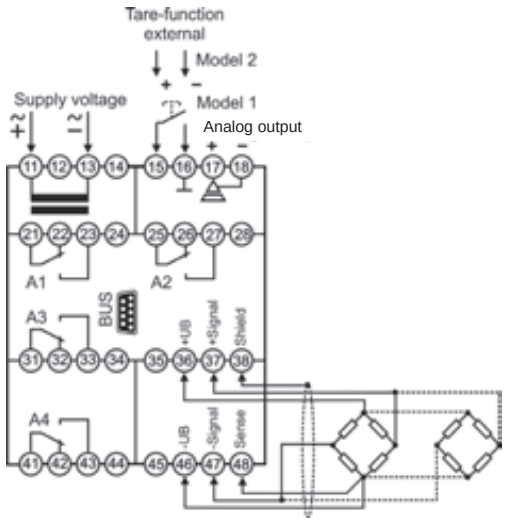
Case	: Polyamide (PA) 6.6, UL94V-0, acc. to DIN EN 60715
Weight	: approx. 450 g
Connection	: screw terminals 0.14..2.5 mm² AWG 26..AWG14
Protection class	: case IP30, terminals IP20 acc. to BGV A3

Dimensions



Continue next page

Connection diagram

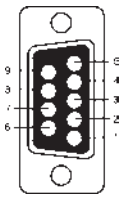


Bridge supply max. 120 mA

Bus connection

Modbus		
PIN	**Signal**	**EIA / TIA-485 name**
5	D1	B / B´
9	D0	A / A´
1	Common	C / C´
Profibus		
3	RxD / TxD-P	
5	DGND	
6	VP / +5V max 10 mA	
8	RxD / TxD-N	

9 pole D-Sub connector in the front



Ordering code

DMS50 - 1. [ ] - 2. [ ] - 3. [ ] - 4. [ ] - 5. [ ] - 6. [ ]

1.	**Model**	
	1	input DMS strain gauge, input ext. tare-function via contact
	2	as 1, but isolated input for external tare function via 24 V DC electronic signal
2.	**Alarm outputs**	
	00	not installed
	2R	2 relay outputs, A1, A2 SPDT
3.	**Alarm outputs/BUS configuration**	
	00	not installed
	2R	2 relay outputs, A3, A4 SPDT
	MB	Modbus RTU/ASCII, RS485
	PB	Profibus DP
4.	**Analog output**	
	AO	0/4..20 mA; 0/2..10 V DC
5.	**Supply voltage**	
	0	230 V AC, ± 10 % 50-60 Hz
	1	115 V AC, ± 10 % 50-60 Hz
	5	24 V DC, ± 15 %
6.	**Options**	
	00	without option

Transmitter DMS50Ex

- **Weight – Force – Pressure – Torque with DMS strain gauges**
- **Bridge sensitivity 0.500..5.000 mV/V**
- **Teach-in function**
- **Tare function**
- **Min- and Max peak storage (not voltage safe)**
- **Integrated bridge supply 2.5 V, 5 V max. 40 mA**
- **Bus-interface Modbus / Profibus**

Characteristics

The DMS50Ex converts the output signal of standard strain gauges (DMS measuring bridges) into a standard signal 0/4..20 mA or 0/2..10 DC. The bridge supply and an external control input for the tare function are integrated.
If several strain gauges are required in an application, these must be connected parallel. The bridge current must not exceed 40 mA in this case.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 %; 115 V AC ±10 % 24 V DC ±15 % Um = 253 V AC or 125 V DC
Power consumption	:	max. 5 VA
Operating temperature	:	-10..+55 °C
CE-conformity	:	ATEX-directive 2014/34/EU
Standards	:	EN 60079-0:2006; EN60079-11:2007 EN 61241-0:2006; EN61241-11:2006
EMC-directive / standard	:	2014/30/EU / EN 61326-1:2013

Explosion protection

Certification	:	Ex II (1) G [Ex ia] IIC/IIB or Ex II (1) D [Ex iaD]
Approval	:	TÜV 08 ATEX 554171

Input

DMS

Bridge supply	:	2.5 V / 5 V DC programmable, max. 40 mA
Bridge sensitivity	:	0.500..5.000 mV/V
Sense line	:	compensated line resistance of max. 10 Ω
Accuracy	:	< 0.025 % ±2 digit
Max. no load voltage U_0	:	14.5 V
Max. short circuit curr. I_0	:	163 mA
Max. power consump. P_0	:	590 mW

Explosion protection		**Ex ia / IIC**	**ia / IIB**
Max. external inductivity	:	100mH	100mH
Max. external capacity	:	25 µF	120 µF
Internal capacity	:	negligible	
Internal inductivity	:	negligible	
Tare-function	:	external contact	
Display	:	graphic LCD-Display 128x64 pixel, with back-light white	
Indicating range	:	±9999 Digit	

Outputs

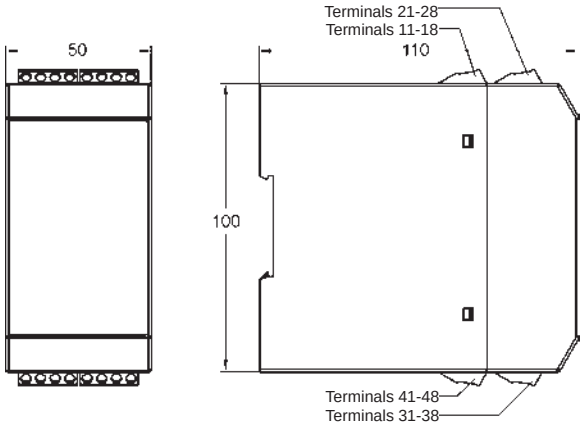
Relay SPDT A1-A2	:	< 250 V AC < 250 VA < 2 A cos φ ≥ 0.3 < 300 V DC < 40 W <2 A
Analog output	:	0/4..20 mA burden ≤ 500 Ω; 0/2..10 V burden > 500 Ω, isolated output changes burden depending
Accuracy	:	0.2 %; TK 0.01 %/K

Fault indication at error in the DMS measuring circuit
→ Analog output 0 mA, < 3.6 mA or >21.5 mA, programmable
→ Alarm contact(s) min. or max. programmable

Bus system

Modbus	:	RS485, RTU or ASCII max. 38400 Bd
Profibus	:	Profibus DP
Connection	:	9 pole D-SUB connector in the front
Case	:	Polyamide (PA) 6.6, UL94V-0, acc. to DIN EN 60715
Weight	:	approx. 450 g
Connection	:	screw terminals 0.14..2.5 mm² AWG 26..AWG14
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

Dimensions



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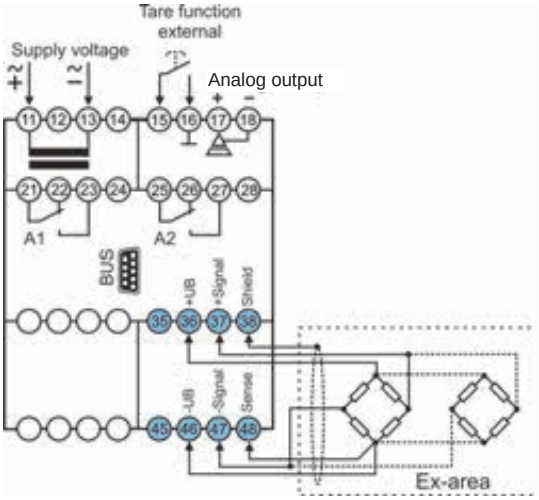
Connection diagram

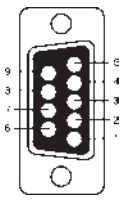


Bridge supply max. 40 mA

Bus connection

Modbus		
PIN	**Signal**	**EIA / TIA-485 name**
5	D1	B / B´
9	D0	A / A´
1	Common	C / C´
Profibus		
3	RxD / TxD-P	
5	DGND	
6	VP / +5V max 10 mA	
8	RxD / TxD-N	

9 pole D-Sub connector
in the front



Ordering code

DMS50Ex - 1. [ ] - 2. [ ] - 3. [ ] - 4. [ ] - 5. [ ] - 6. [ ]

1.	**Model**	
	1	input DMS strain gauge, input external tare-function via contact, voltage free, intrinsically safe ATEX II (1) G [Ex ia] IIC/IIB ATEX II (1) D [Ex iaD]
2.	**Alarm outputs**	
	00	not installed
	2R	2 relay SPDT A1, A2
3.	**BUS configuration**	
	00	not installed
	MB	Modbus RS485 RTU, ASCII
	PB	Profibus DP
4.	**Analog output**	
	AO	0/4..20 mA; 0/2..10 V DC
5.	**Supply voltage**	
	0	230 V AC ±10 % 50-60 Hz
	1	115 V AC ±10 % 50-60 Hz
	5	24 V DC ±15 %
6.	**Options**	
	00	without option

Universal Transmitter UT125

- **Transmitter for electrical signals**
- **Universal input for standard signals, Pt100, thermocouple, potentiometer**
- **Configuration via front-side DIP switch**
- **Analog output 4..20 mA**
- **With Pt100 sensors, monitoring of sensor break and short-circuit**
- **Wide-range power supply or 24 V DC**
- **Housing width 12.5 mm**
- **Removal coded screw terminals**
- **Carrier rail mounting TS35 EN60715**

Characteristics

The UT125 series of universal transmitters are designed for the affordable transformation of standard signals, temperatures and potentiometer statuses into a current signal of 4..20 mA. The universal configurability of the measuring inputs reduces the stock requirement for various applications. The measuring inputs and actual value output are not galvanically isolated. The housing width of only 12.5 mm enables space-saving installation in the switch cabinet.

Measurement inputs

Configuration via DIP switch

Standard signals	:	0/2..10 V and 0/4..20 mA
Potentiometer	:	Rated value 500 Ω..20 kΩ
Pt100	:	-50..50 °C
		0..50 °C
		0..100 °C
		0..150 °C
		0..200 °C
		0..300 °C
		0..500 °C
Thermocouple		
FeCuNI, Type J	:	0..250 °C
		0..500 °C
NiCrNi, Type K	:	0..500 °C
		0..750 °C
		0..1000 °C
PtRhPt, Type S	:	0..1500 °C

(Special measurement ranges available on request)

Technical data

Wide-range power supply

Supply voltage	:	20..125 VDC and 20..250 VAC (47..63 Hz), max. 1.5 W

24V power supply

Supply voltage	:	24 V DC +/-15 %, max. 1.5 W

Combined data

Rated voltage	:	253 V AC
Test voltage	:	3 kV AC between power supply // input = output
Working temperature	:	-10..60 °C
Storage temperature	:	-20..80 °C
Air humidity	:	10..90% (no condensation)

Measurement inputs

Voltage	:	0/2..10 V, Ri approx. 20 kΩ
Current	:	0/4..20 mA, Ri approx. 60 kΩ
Pt100		linearised, measurement current 1.6 mA Recognition of sensor break or short circuit: Actual value drops to approx. 0mA
Thermocouple	:	linearised with comparison point compensation
Resistance	:	Potentiometer (3-wire) Rated value 500 Ω..20 kΩ Intern. reference voltage approx. 1.5 V
Analog output	:	4..20 mA, max. burden 400 Ω, No galvanic isolation from the input signal

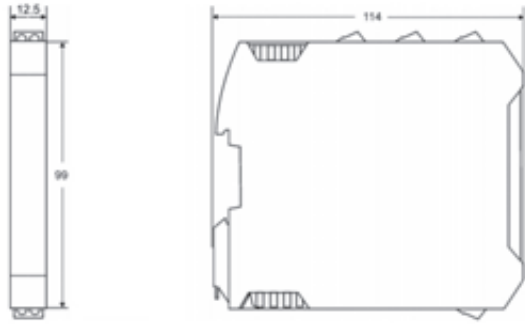
Input signal	Basic precision-actual value output	Temperature deviation *)
0/2..10 V	0.2 %	0.004 %/K
0/4..20 mA	0.2 %	0.004 %/K
Potentiometer	1 %	0.007 %/K
Pt100 -50.. 50 °C	0.5 %	0.03 %/K
Pt100 0.. 50 °C	0.9 %	0.04 %/K
Pt100 0..100 °C	0.5 %	0.03 %/K
Pt100 0..150 °C	0.2 %	0.02 %/K
Pt100 0..200 °C	0.4 %	0.02 %/K
Pt100 0..300 °C	0.3 %	0.01 %/K
Pt100 0..500 °C	0.2 %	0.007 %/K
FeCuNi 0..250 °C	1.0 %	0.04 %/K
FeCuNi 0..500 °C	0.5 %	0.03 %/K
NiCrNi 0..500 °C	0.5 %	0.04 %/K
NiCrNi 0..750 °C	0.4 %	0.03 %/K
NiCrNi 0..1000 °C	0.3 %	0.02 %/K
PtRhPt 0..1500 °C	1.0 %	0.04 %/K

*) Measurement deviation depending on the environmental temperature in the switch cabinet (-10..+60°C)

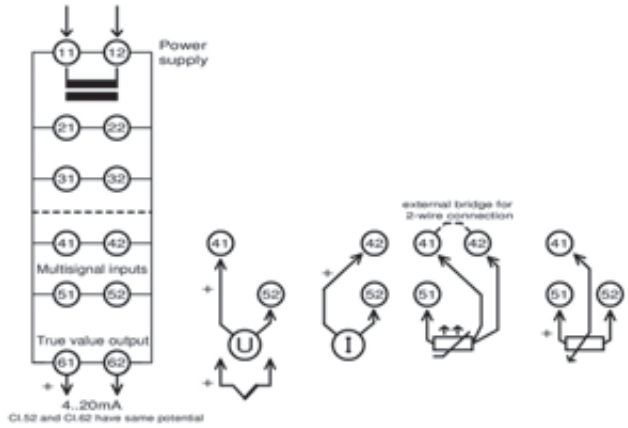
Housing

Dimensions (W x D x H)	:	12.5 x 114 x 108 mm
Material	:	PA6.6, light grey, Flammability class V0 (UL94)
Weight	:	120 g
Protection rating	:	IP20
Screw terminals	:	0.2..2.5 mm², AWG 24..14, removable, coded
Push-in terminals (spring-type terminal)	:	0.5..1.5 mm², AWG 25..16, Double connection (12A between the connections), removable, coded
Power Rail	:	8A over the entire bus system (Supply via removable terminals 0.2..2.5 mm², AWG 24..14)

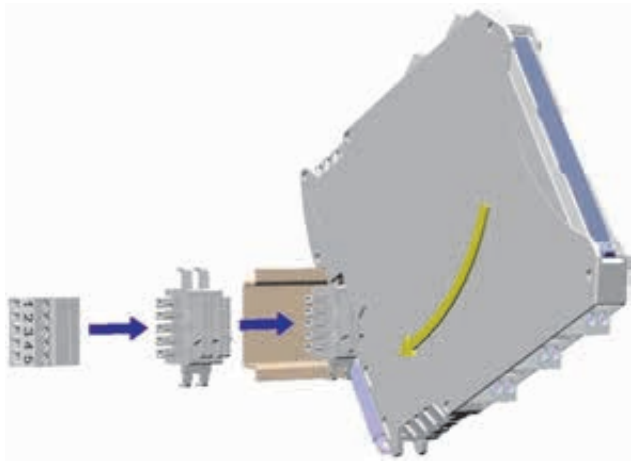
Dimensions



Connection diagram



Power Rail



The power supply of multiple devices can be concentrated in the mounting carrier rail (TS35) of a bus system.

An equivalent version is available for the entire series of GHM power rail devices in 12.5 mm wide housing.

Ordering code

UT 1. - 2.

1.	**Device version**	
	125L	Supply voltage 24 V DC +/- 15 %
	125LP	Supply voltage 24 V DC +/- 15 % with carrier rail bus connection *)
	125M	Wide-range power supply 20..125 V DC / 20..253 V AC
2.	**Options**	
	00	No options
	01	Push-in terminals (plug-in)

*) Supply including matching bus adapter piece; see also separate Power Rail information sheet

Standard Signal Transmitter PMT50-1

PROFIBUS

- **Signal conditioning – Linearisation – Characteristic adjustment**
- **Input for standard signals 0/2..10 V and 0/4..20 mA**
- **Measuring range programmable**
- **Linearisation and characteristic adjustment programmable via 32 bases**
- **Automatic input fault detection**

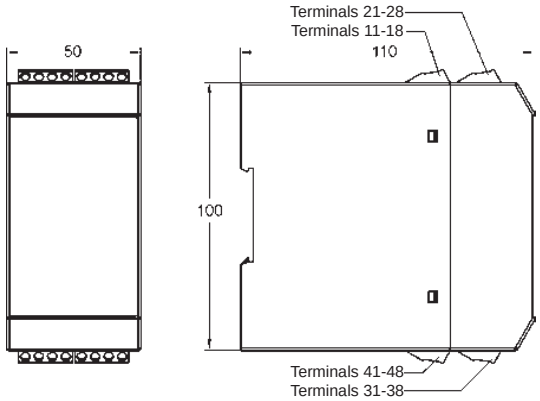
Characteristics

The programmable universal transmitter PMT50 operates with analog input signals. The device convert input signals to analog output 0/4..20 mA; 0/2..10 V DC. Optional a serial interface is available. The device offers a linearisation function for any sensor curves and a simulator function. The integrated transmitter supply 24 V DC max. 30 mA allows the feeding of 2-and 3-wire transmitter. 4 alarm outputs for monitoring and controlling are available.

Technical data

Power supply
Supply voltage : 230 V AC ±10 %
115 V AC ±10 %
24 V DC ±15 %
Power consumption : < 5 VA
Operating temperature : -10..+55 °C
CE – conformity : EN 61326-1:2013; EN 60664-1:2007
Input : 0/2..10 V, 0/4..20 mA
Ri : current 10 Ω
voltage 10 kΩ
Accuracy : < 0.1 %, ±1 Digit
Transmitter supply : 24 V DC max. 30 mA
Fault detection : break of wire (only 4 mA / 2 V)
Outputs
Alarm outputs : relay SPDT
< 250 V AC < 250 VA < 2 A cos φ ≥ 0,3
< 300 V DC < 40 W <2 A
Analog output : 0/4..20 mA burden ≤ 500 Ω,
0/2..10 V burden > 500 Ω, isolated
output burden depending
Fault indication : break of wire in the measuring circuit
→ analog output programmable
0 mA, < 3.6 mA or >21.5 mA
→ alarm relay(s)
min. or max. programmable
Bus system
Modbus : RS485, RTU or ASCII
max. 38400 Baud
Profibus : Profibus DP
Connection : 9pol. D-SUB connector in the front
Display : graphic-LCD-Display, 128 x 64 Pixel,
with white LCD backlight
Case : Polyamide (PA) 6.6 , UL94V-0
acc. to DIN EN 60715, DIN rail TS35
Weight : approx. 450 g
Connection : screw terminals 0.14..2.5 mm²
AWG 26..AWG14
Protection class : case IP30, terminals IP20 acc. to BGV A3

Dimensions



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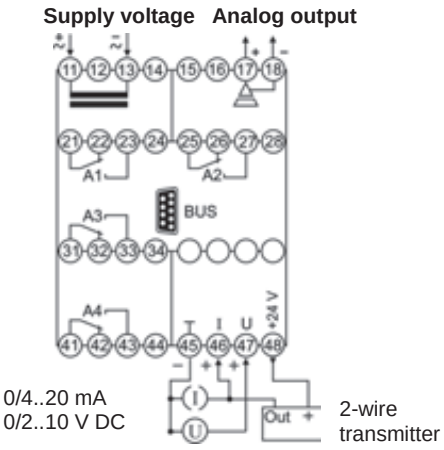
Connection diagram

Model PMT50-1
Standard signals 0/4..20 mA, 0/2..10 V



Ordering code

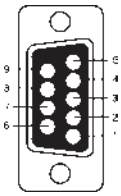
PMT50 - 1. [ ] - 2. [ ] - 3. [ ] - 4. [ ] - 5. [ ] - 6. [ ]

1.	**Model/input**	
	1	standard signals 0/4..20 mA, 0/2..10 V DC
2.	**Analog output**	
	AO	0/4..20 mA, 0/2..10 V DC, isolated
3.	**Alarm outputs**	
	00	not installed
	2R	2 relay outputs, A1, A2 SPDT
4.	**Alarm outputs/BUS configuration**	
	00	not installed
	2R	2 relay outputs, A3, A4 SPDT
	MB	Modbus RTU/ASCII, RS485
	PB	Profibus DP
5.	**Supply voltage**	
	0	230 V AC, ± 10 % 50-60 Hz
	1	115 V AC, ± 10 % 50-60 Hz
	5	24 V DC, ± 15 %
6.	**Options**	
	00	without option

Bus connection

Modbus		
PIN	**Signal**	**EIA/TIA-485 name**
5	D1	B / B´
9	D0	A / A´
1	Common	C / C´
Profibus		
3	RxD / TxD-P	
5	DGND	
6	VP / +5V max. 10 mA	
8	RxD / TxD-N	

9 pole D-Sub connector
in the front



Standard Signal Transmitter PMT50Ex-1

- **Signal conditioning – Linearisation – Characteristic adjustment**
- **Input for standard signals 0/2..10 V and 0/4..20 mA**
- **Measuring range programmable**
- **Linearisation and characteristic adjustment programmable via 32 bases**
- **Automatic input fault detection**

Characteristics

The programmable universal transmitter PMT50Ex operates with analog input signals. The device convert input signals to an analog output 0/4..20 mA; 0/2..10 V DC. Optional a serial interface is available. The device offers a linearisation function for any sensor curves and a simulator function. The integrated transmitter supply 16 V DC max. 20 mA allows the feeding of 2- and 3-wire transmitter. 2 alarm outputs for monitoring and controlling are available.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 % 115 V AC ±10 % 24 V DC ±15 % Um = 253 V AC and 125 V DC (terminals 11, 13)
Power consumption	:	< 5 VA
Operating temperature	:	-10..+55 °C
CE-conformity	:	ATEX-directive 2014/34/EU
Standards	:	EN 60079-0:2006 EN 60079-11:2007 EN 61241-0:2006 EN 61241-11:2006
EMC-directive / standard	:	2014/30/EU / EN 61326-1:2013

Explosion protection

Marking	:	II (1) G [Ex ia] IIC/IIB or II (1) D [Ex iaD]
Approval	:	TÜV 08 ATEX 554329

Input	:	0/2..10 V DC, 0/4..20 mA
Fault detection	:	broken line in the measuring circuit
Ri	:	current 10 Ω voltage 10 kΩ (terminals 45, 46, 47)
Accuracy	:	< 0.1 %, ±1 Digit
Max. U_0 no load	:	18.9 V
Max. I_0 short circuit	:	92.5 mA
Max. output power P_0	:	580 mW
Resistance	:	272 Ω
Characteristic curve	:	trapezoidal
Internal inductivity	:	4 µH
Internal capacity	:	1.2 nF
Transmitter supply	:	16 V DC, max. 20 mA (terminals 48)

Explosion protection		**Ex ia/IIC**	**or**	**ia/IIC**	**ia/IIB**
Max. external inductivity	:	2,3 mH		0,1 mH	5 mH
Max. external capacity	:	0,12 µF		0,22 µF	0,76 µF
Max. values U_i	:	30 V			
I_i	:	52 mA			
P_i	:	980 mW			

Outputs

Alarm outputs	:	relay SPDT < 250 V AC < 250 VA < 2 A cos φ ≥ 0,3 < 300 V DC < 40 W <2 A (terminals 21, 22, 23; 25, 26, 27)
Analog output	:	0/4..20 mA burden ≤ 500 Ω 0/2..10 V burden > 500 Ω isolated output changes burden depending
Accuracy	:	0.2 %; TK 0.01 %/K (terminals 17, 18)
Fault indicating	:	break of wire in the measuring circuit → analog output programmable 0 mA, < 3.6 mA or >21.5 mA → alarm relay(s) min. or max. programmable

Bus system

Modbus	:	RS485, RTU or ASCII max. 38400 Baud
Profibus	:	Profibus DP
Connection	:	9pol. D-SUB connector in the front
Display	:	graphic-LCD-Display, 128 x 64 Pixel with white back-light
Case	:	Polyamide (PA) 6.6, UL94V-0
Weight	:	approx. 450 g
Connection	:	screw clamps 0.14..2.5 mm² AWG 26..AWG14
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

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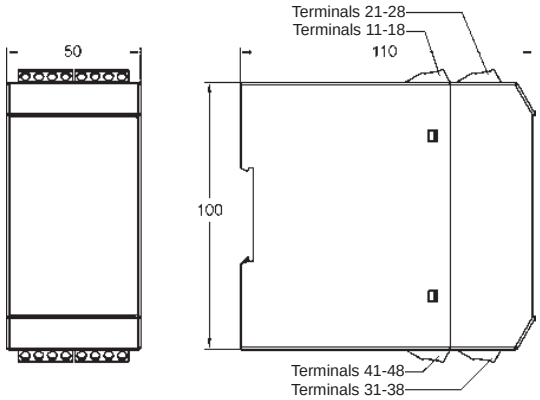
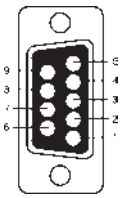
Dimensions



Bus connection

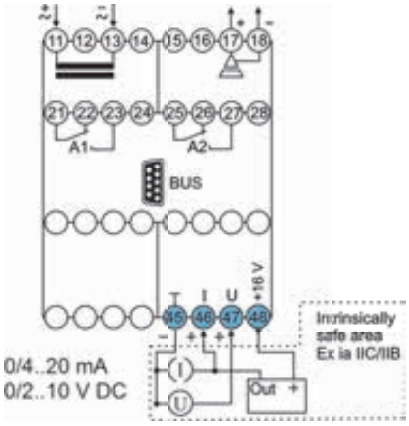
Modbus		
PIN	**Signal**	**EIA / TIA-485 name**
5	D1	B / B´
9	D0	A / A´
1	Common	C / C´
Profibus		
3	RxD / TxD-P	
5	DGND	
6	VP / +5V max 10 mA	
8	RxD / TxD-N	

9 pol. D-Sub connecter in the front



Connection diagram

Supply voltage Analog output



2-wire transmitter

Ordering code

PMT50Ex - 1. - 2. - 3. - 4. - 5. - 6.

1.	**Model/input**	
	1	Standard signals 0/4..20 mA, 0/2..10 V DC
	Intrinsically safe	EX II (1) G [Ex ia] IIC/IIB EX II (1) D [Ex iaD]
2.	**Analog output**	
	AO	0/4..20 mA, 0/2..10 V DC, isolated
3.	**Alarm outputs**	
	00	not installed
	2R	2 relay outputs, A1, A2 SPDT
4.	**BUS configuration**	
	00	not installed
	MB	Modbus RTU/ASCII, RS485
	PB	Profibus DP
5.	**Supply voltage**	
	0	230 V AC, ± 10 % 50-60 Hz
	1	115 V AC, ± 10 % 50-60 Hz
	5	24 V DC, ± 15 %
6.	**Options**	
	00	without option

Temperature Transmitter PMT50-2 /-3

PROFIBUS

- Signal conditioning – linearisation – output characteristic transformation
- Input for resistance and Potentiometer or RTD Pt100/Pt1000 and thermocouples
- Measuring range programmable
- Linearisation or transformation of output characteristic via 32 base-points programmable
- Automatic fault detection in the measuring circuit

Characteristics

The programmable universal transmitter PMT50 operates with analog input signals. The device convert input signals to analog output 0/4..20 mA; 0/2..10 V DC. Optional a serial interface is available. The device offers a linearisation function for any sensor curves and a simulator function. The integrated transmitter supply 24 V DC max. 30 mA allows the feeding of 2-and 3-wire sensors. 4 alarm outputs for monitoring and controlling are available.

Technical data

Power supply

Supply voltage	: 230 V AC ±10 % 115 V AC ±10 % 24 V DC ±15 %
Power consumption	: < 5 VA
Operating temperature	: -10..+55 °C
CE – conformity	: EN 61326-1:2013, EN 60664-1:2007

Inputs

Fault detection	: type -2: (only resistance measurement) broken line; type -3: broken line (Pt100 / Pt1000,TC) and short circuit (only Pt100 / Pt1000)

Device type 2

Input	: resistance 0..100 kΩ, potentiometer min.1 kΩ.. max. 100 kΩ
Accuracy	: < 0.2 %, ±1 Digit

Device type 3

Input	: Pt100 (3-wire) -100.0..+600.0 °C Pt1000 (3-wire) -100.0..+300.0 °C : Thermocouple (TC) type J -100.0..+800.0 °C type K -150..+1200 °C type N -150..+1200 °C type S -50..+1600 °C
Accuracy	: < 0.1 %, ±1 Digit

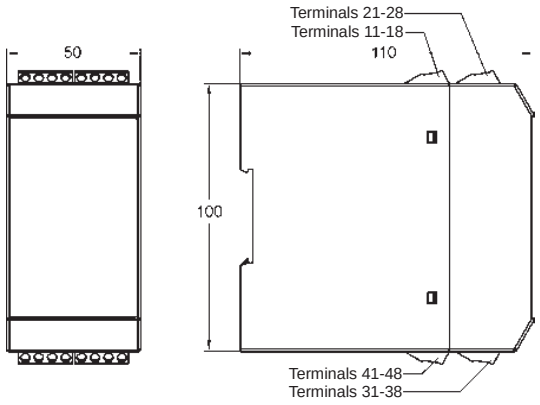
Outputs

Alarm outputs	: relay SPDT < 250 V AC < 250 VA < 2 A cos Phi ≥ 0.3 < 300 V DC < 40 W <2 A
Analog output	: 0/4..20 mA burden ≤ 500 Ω, 0/2..10 V burden > 500 Ω isolated output changes automatically (burden depending)
Fault indication	: for broken line or short circuit detection → analog output (programmable) 0 mA, < 3.6 mA or >21.5 mA → Alarm relays min. or max. programmable

Bus system

Modbus	: RS485, RTU or ASCII max. 38400 Baud
Profibus	: Profibus DP
Connection	: 9 pole D-SUB plug in the front
Display	: Graphic-LCD-Display 128 x 64 Pixel, with white LCD backlit
Case	: Polyamide (PA) 6.6 , UL94V-0 TS35 acc. to DIN EN 60715
Weight	: approx. 450 g
Connection	: screw terminals 0.14..2.5 mm² AWG 26..AWG14
Protection class	: case IP30, terminals IP20 acc. to BGV A3

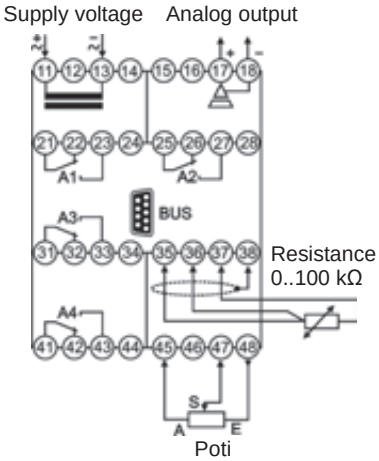
Dimensions



continue next page

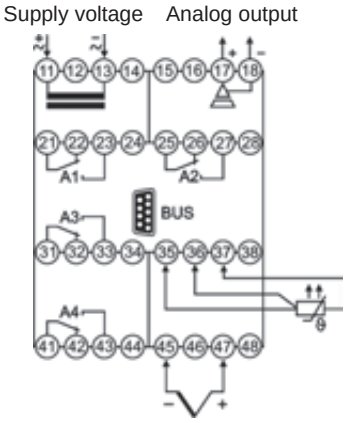
Connection diagrams

Device type PMT50-2
Resistance, Potentiometer



Poti
1kΩ..100 kΩ
sliding current <1 µA

Device type PMT50-3
Pt100, Pt1000, thermocouple



Pt100/Pt1000 3-wire
2-wire (link terminal 35-36)
Thermocouple J, K, N, S

Bus connection

Modbus		
PIN	**Signal**	**EIA/TIA-485 Name**
5	D1	B / B´
9	D0	A / A´
1	Common	C / C´
Profibus		
3	RxD / TxD-P	
5	DGND	
6	VP / +5V max. 10 mA	
8	RxD / TxD-N	

9-pol. D-Sub plug
in the front

Ordering code

PMT50 - 1. - 2. - 3. - 4. - 5. - 6.

1.	**Device type/input**	
	2	Resistance in the range 0..100 kΩ Poti 1 kΩ..100 kΩ
	3	RTD Pt100, 3-wire, -100.0..+600.0 °C RTD Pt1000, 3-wire, -100.0..+300.0 °C Thermocouple J (Fe-CuNi), -100.0..+800.0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), -50..+1600 °C
2.	**Analog output**	
	AO	0/4..20 mA, 0/2..10 V DC isolated
3.	**Alarm outputs**	
	00	not installed
	2R	2 relay outputs, A1, A2 SPDT
4.	**Alarm output/BUS configuration**	
	00	not installed
	2R	2 relay outputs, A3, A4 SPDT
	MB	Modbus RTU/ASCII, RS485
	PB	Profibus DP
5.	**Supply voltage**	
	0	230 V AC, ± 10 % 50-60 Hz
	1	115 V AC, ± 10 % 50-60 Hz
	5	24 V DC, ± 15 %
6.	**Options**	
	00	without option

Temperature Transmitter PMT50Ex-2 /-3

- **Signal conditioning – linearisation – output characteristic transformation**
- **Input for resistance and Potentiometer or RTD Pt100/Pt1000 and thermocouples**
- **Measuring range programmable**
- **Linearisation or transformation of output characteristic via 32 base-points programmable**
- **Automatic input fault detection**

Characteristics

The programmable Temperature Transmitter PMT50 operates with RTD and thermocouple input signals. The device convert the signal to analog output 0/4..20 mA; 0/2..10 V DC. Optional a serial interface is available. The device offers a linearisation function for any sensor curves and a simulator function. The integrated transmitter supply 24 V DC max. 30 mA allows the feeding of 2-and 3-wire sensors. 4 alarm outputs for monitoring and controlling are available.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 % 115 V AC ±10 % 24 V DC ±15 % Um = 253 V AC or 125 V DC (terminals 11 and 13)
Power consumption	:	< 5 VA
Operating temperature	:	-10..+55 °C
CE-conformity	:	ATEX-directive 2014/34/EU
Standards	:	EN 60079-0:2006 EN60079-11:2007 EN 61241-0:2006 EN61241-11:2006
EMC-directive / standard	:	2014/30/EU / EN 61326-1:2013

Explosion protection

Marking	:	II (1) G [Ex ia] IIC/IIB bzw. II (1) D [Ex iaD]
Approval	:	TÜV 08 ATEX 554329

Device type 2

Input	:	resistance 0..20 kΩ (terminals 35, 36, 37, 38)
Fault detection	:	broken line
Accuracy	:	< 0.2 %, ±1 Digit
Max. U_0 no load	:	1.4 V
Max. I_0 short circuit	:	2,5 mA
Max. output power P_0	:	3 mW
Resistance	:	5600 Ω
Characteristic curve	:	trapezoidal
Internal inductivity	:	4 µH
Internal capacity	:	135 nF

Explosion protection		**Ex ia/IIC**	**ia/IIB**
Max. external inductivity	:	100 mH	100 mH
Max. external capacity	:	25 µF	120 µF

Input	:	Potentiometer min. 1 kΩ..max. 100 kΩ (terminals 45, 47, 48)
Accuracy	:	<0.2 %, ±1 Digit
Max. values U_0	:	9.6 V
Max. I_0	:	56 mA
Max. P_0	:	200 mW
Resistance R	:	259 Ω
Characteristic curve	:	trapezoidal
Internal inductivity	:	4 µH
Internal capacity	:	negligible

Explosion protection		**Ex ia/IIC**	**ia/IIB**
Max. external inductivity	:	5 mH	20 mH
Max. external capacity	:	0.48 µF	2 µF

Device type 3

Input	:	Pt100 (3-wire) -100.0..+600.0 °C Pt1000 (3-wire) -100.0..+300.0 °C thermocouple (TC) type J -100.0..+800.0 °C type K -150..+1200 °C type N -150..+1200 °C type S -50..+1600 °C (terminals 35, 36, 37; 45, 47)
Fault detection	:	broken line (Pt100 / Pt1000,TC) or short circuit (only Pt100 / Pt1000)
Accuracy	:	< 0.1 %, ±1 Digit
Max. voltage no load U_0	:	1,4 V
Max. short circuit curr. I_0	:	2.5 mA
Max. output power P_0	:	3 mW
Resistance R	:	5600 Ω
Characteristic curve	:	trapezoidal
Internal inductivity	:	4 µH
Internal capacity	:	135 nF

Explosion protection		**Ex ia/IIC**	**ia/IIB**
Max. external inductivity	:	100 mH	100 mH
Max. external capacity	:	25 µF	120 µF

Outputs

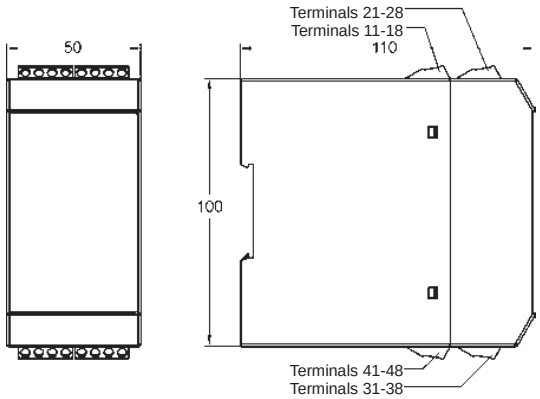
Alarm outputs	:	relay SPDT < 250 V AC < 250 VA < 2 A cos Phi ≥ 0.3 < 300 V DC < 40 W <2 A (terminals 21, 22, 23; 25, 26, 27)
Analog output	:	0/4..20 mA burden ≤ 500 Ω 0/2..10 V burden > 500 Ω, isolated output changes automatically (burden depending)
- Accuracy	:	0.2 %; TK 0.01 % / K (terminals 17, 18)
Fault function	:	for broken line or short circuit detection → analog output (programmable) 0 mA, < 3.6 mA or >21.5 mA → alarm relays min. or max. programmable

Bus system

Modbus	:	RS485, RTU or ASCII max. 38400 Baud
Profibus	:	Profibus DP
Connection	:	9 pole D-SUB plug in the front
Display	:	graphic-LCD-display, 128 x 64 Pixel with white LCD backlit

Case	:	Polyamide (PA) 6.6, UL94V-0 TS35 acc. to DIN EN 60715
Weight	:	approx. 450 g
Connection	:	screw terminals 0.14..2.5 mm² AWG 26..AWG14
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

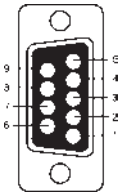
Dimensions



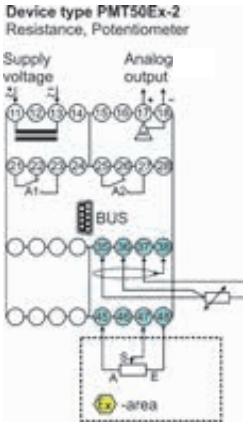
Bus connection

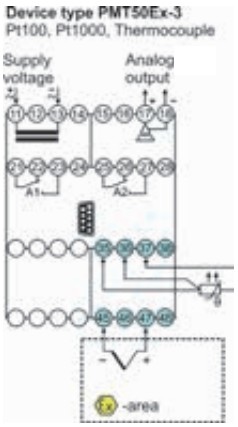
Modbus		
PIN	**Signal**	**EIA / TIA-485 Name**
5	D1	B / B´
9	D0	A / A´
1	Common	C / C´
Profibus		
3	RxD / TxD-P	
5	DGND	
6	VP / +5V max. 10 mA	
8	RxD / TxD-N	

9 pol. D-Sub plug
in the front



Connection diagram





Ordering code

PMT50Ex - [1.] - [2.] - [3.] - [4.] - [5.] - [6.]

1.	**Device type/input**	
	2	Resistance in the range 0..20 kΩ Poti 1 kΩ..100 kΩ
	3	RTD Pt100, 3-wire, -100.0..+600.0 °C RTD Pt1000, 3-wire, -100.0..+300.0 °C Thermocouple J (Fe-CuNi), -100.0..+800.0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), -50..+1600 °C
	Inputs intrinsically safe	EX II (1) G [Ex ia] IIC/IIB EX II (1) D [Ex iaD]
2.	**Analog output**	
	AO	0/4..20 mA, 0/2..10 V DC isolated
3.	**Alarm outputs**	
	00	not installed
	2R	2 relay outputs, A1, A2 SPDT
4.	**BUS configuration**	
	00	not installed
	MB	Modbus RTU/ASCII, RS485
	PB	Profibus DP
5.	**Supply voltage**	
	0	230 V AC, ± 10 % 50-60 Hz
	1	115 V AC, ± 10 % 50-60 Hz
	5	24 V DC, ± 15 %
6.	**Options**	
	00	without option

Isolating converter

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Isolating converter

Produktinformation

Isolating converter

Members of GHM GROUP: GREISINGER | HONSBERG | Martens | IMTRON | DeltaOHM | VAL.CO

Characteristics

System

- 3-port isolation
- Signal conditioning 0..20 mA ➡ 4..20 mA, 0..10 V ➡ 2..10 V
- Decoupling
- Transmitter supply into the Ex-area
- Safety barriers for RTD (Pt100/Pt1000) and 0/4..20 mA

Applications

- **Industry Instrumentation**
- **Process Instrumentation**
- **Oil- and Gas industry**
- **Ex-Applications**
- **SIL-Applications**

Function

Isolating amplifiers are suitable for potential separation or to covert standard signals. The universal design of the inputs and outputs and the wide back-up voltage ranges limit the variety of models to two designs. Furthermore, the transmitter allows for the direct connection of 2 active wire sensors (4..20 mA) and 3 wire sensors. They also guaranteed for a high degree of safety for signals from the Ex-range.
Safety barriers are available as accessories to setup Ex measuring circuits for devices without Ex certification.

Advantages

- Safe 3-port signal isolation
- Transmitter supply for active sensors
- Universal inputs
- Range switchover
- Signal output in the ex range (only TV501Ex)
- Outputs 0/4..20 mA simultaneous 0/2..10 V DC
- 22.5mm standard case for DIN rail mounting TS35

Device overview

Signal	Input				Output			
Device	0/4..20 mA	0/2..10 V	Transmitter supply	Switching contact (Namur)	0/4..20 mA	0/2..10 V	Switching contact	Page
ST125M	●*	●	●		●	●		142
TV125M	●*	●			●	●		142
TV125L	●	●			●			144
ST500	●	●	●		●	●		146
TV500	●	●			●	●		146
ST500Ex	●*	●*	●		●	●		147
TV500Ex	●*	●*			●	●		147
TV500H	●	●			●	●		148
TV500L	●	●			●	●		149
TV500P	●	●			●			150
TW500	●	●			●			151
TV501Ex	●	●			●*	●*		152
TS125/TS225				●*				153
TS500							●	155
TS500Ex				●*			●	156
Accessories Safety Barrier 9001	●*				●			157

* Intrinsically safe

Mistakes reserved, technical specifications subject to change without notice.

Universal Isolating Amplifier TV125M / ST125M

- Standard inputs and outputs with adjustment function
- Safe electrical isolation between input / output / power supply by reinforced insulation in accordance to DIN EN 61010-1
- Functional safety to EN61508 SIL2
- Input intrinsically safe for the connection of sensors in the Ex-zone 0 and 20 possible
- Equipment installation in ex-zone 2
- Wide range power supply for AC and DC supply
- Power rail supply
- Output accuracy < 0.2% of full scale
- Operating display and status messages bi-color LED
- Configuration via front panel dip switches
- Coded Plug-in terminal blocks
- Small design, width 12.5 mm
- Mounting rail TS 35 and EN60715

Characteristics

Isolation amplifiers of series TV/ST125M are suitable for potential separation or to convert the standard signals. The universal design of inputs and outputs, and the internal power supply with wide-range power supply enable a wide spectrum of applications with only one type of device.

Alternatively the power supply can be carried out via a mounting rail bus connector. The pluggable terminal strips allow a simple and time-saving wiring.

The configuration of input and output signals is done by front panel dip switches in a very easy and fast way.

Because of the microprocessor design it´s possible to interpret undershooting or exceedance of the measurement range and reported about by a bi-color status LED on the front panel. In case of an error the output is then set to a defined initial value or ending value.

The initial value and the end value of the measuring range can be adjusted by means of two front-mounted trimmers.
The device version of ST125 additionally provides a transmitter power supply for external 2-, 3- and 4-conductor sensors.

Technical data

Explosion protection

Gas	:	II (1) G [Ex ia Ga] IIC/IIB
Dust	:	II (1) D [Ex ia Da] IIIC
Intrinsically safe + Zone 2:		II 3 G nA nC [ic] IIB T4 Gc *)
Ignition protection type „n“:		II 3 G nA nC IIB T4 Gc X *)

*) Installation in a clean environment in a conductive, earthed housing (switch cabinet) with a minimum protection rating of IP54.

Characteristics intrinsically safe circuits

	All types (Terminals 41, 42)	ST125M(MP)-Ex (Terminals 51, 52)
U0	27,6 V	25,9 V
I0	1,3 mA	92,6 mA
P0	9,6 mW	598 mW
Ui	26 V	-
Ii	113 mA	-
Pi	660 mW	-
	max. inductivity capacity	
Ci	1 nF	1 nF
Li	240 nH	240 nH
	IIB / IIIC	
C0	667 nF	769 nF
L0	200 mH	8 mH
	IIC	
C0	85 nF	99 nF
L0	100 mH	2 mH

External Power

Auxiliary voltage

Wide-range power supply	: 20..125 V DC / 85..253 V AC (47..63Hz)
Power-Rail-supply	: 24 V DC +/- 15 %
Wide-range power supply	: < 4 VA
Power-Rail-supply	: < 2 W
Conformity	: Directive 2014/35/EU
EMC	: Directive 2014/30/EU
Standards	: EN 61010-1: 2010, EN 61326-1: 2013, EN 61326-3-1: 2008,
Rated voltage	: 253 V AC, 125 V DC according to EN 60079-11 300 V AC/DC according to DIN EN 61010-1 with overvoltage Category 2 and Degree of Contamination 2 between all circuits. Safe separation with amplified isolation
Test voltage	: 3kV AC Input/Output/Power supply

Ambient conditions

Working temperature	: -10..60°C
Storage temperature	: -20..80°C
Relatvice air humidity	: 10..90% (no condensation)

Input

Voltage input	: 0..10V oder 2..10 V switchable, Ri = 30 kΩ. overload max. 26 V DC
Current input	: 0..20 mA or 4..20 mA switchable; Ri = 51 Ω, 113mA
Measuring span	: adjustable ± 2 %
Zero point	: adjustable ± 2 %

Output
Voltage output : 0…10 V or 2…10 V switchable, Load > 500 Ω.
Current output : 0..20 mA or 4..20 mA switchable, Load < 600 Ω.
Step response T90 : 40 ms
Standard error : < 0,2 % of the end value
Temperature coefficient : < 0,01 % / K
Transmitter feed
Rated voltage at 20 mA output current : > 15 V DC; terminals 51, 52
> 14 V DC; terminals 51, 41, Ri = 300 Ω

Housing
Material : Polyamid (PA) 6.6, UL94V-0
Weight : 91g
Protection class : Housing IP30, terminals IP20 BGV A3
Colour : light grey
Installation width : 12,5 mm
Dimension (HxT) : 108 x 114 mm
Assembly : Mounting rail assembly TS35 DIN EN 60715

Safety Integrity
Level : Sil 2 (parameters in accordance with EN 61508 and SN 29500) for input types 4..20 mA or 2..10 V and output types 4..20 mA or 2..10 V
Device type : B
HFT : 0
Error signalling : Output 0 V respective 0 mA
Reaction time : Normal function → error: 40 ms, error → normal function: 1s (self resetting)

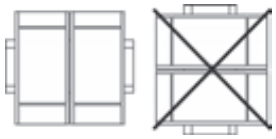
Controls, functional description

Status-LED	Message
Green LED illuminates	Operating voltage connected
Red and green LED illuminates	See manual tab. 7: Status messages
Red LED illuminates	Electronic defect

Configuration:

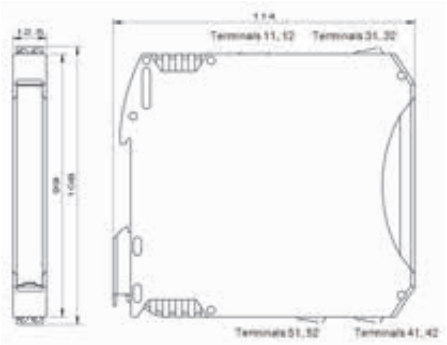
DIP	On	Off
S1	Voltage input	Current input
S2	Voltage output	Current output
S3	Input: S1 = On: 0 … 10 V, S1 = Off: 0 … 20 mA	Input: S1 = On: 2 … 10 V, S1 = Off: 4 … 20 mA
S4	Output: S2 = On: 0 … 10 V, S2 = Off: 0 … 20 mA	Output: S2 = On: 2 … 10 V, S2 = Off: 4 … 20 mA

Mounting

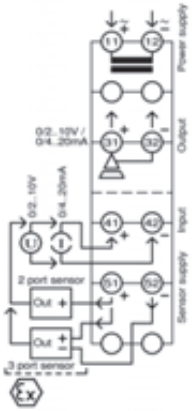


Carrier rail mounting TS35, DIN EN 60715
Mounting of multiple units without distance is only permitted in horizontal orientation.

Mechanical design / dimensions



Connection diagram



Power supply:
85…253 VAC / 20 … 125 VDC
or 24 VDC +/- 15 %

Output:
0/2 … 10V or 0/4…20 mA

Input:
0/2 … 10 V or 0/4…20 mA

Order code

1. 2. 3. 4.
[ ] - [ ] - [ ] - [ ]

1.	**Device version**	
	TV125M	Wide-range mains adapter
	TV125MP	Mounting rail bus connection *), Auxiliary voltage 24 V DC +/- 15 %
	ST125M	Transmitter feed, Wide-range mains adapter
	ST125MP	Transmitter feed, mounting rail bus connection *), Auxiliary voltage 24 V DC +/- 15 %
2.	**Explosion protection**	
	00	No intrinsically safe input and no intrinsically safe transmitter feed. The devices TV125MP and ST125MP may be installed in zone 2 according to ATEX-ignition protection type “n”
	Ex	**In case of installing the devices out of the ex-zone:** Input and transmitter feed are intrinsically safe in accordance to ignition protection type “ia” for zones 0 and 20. **The devices TV125MP and ST125MP** may be installed in zone 2 according to ATEX-ignition protection type „ic“
3.	**Input**	
	10	0/2…10 V / 0/4…20 mA
4.	**Options**	
	00	without option
	01	Push-In terminals (plug-in)

*) see seperate information sheet power rail

Universal Isolating Amplifier TV125L

- **Safe galvanic isolation between input / output / auxiliary voltage with reinforced isolation in accordance with DIN EN 61010-1**
- **Step response T_{90} 40ms**
- **Output deviation < 0.2% of the limit value**
- **Overload protection of the current input with automatically resetting fuse**
- **Operating display and status messages via two-colour LED**
- **Configuration via front DIP switches**
- **Plug-in terminal strips**
- **Narrow installation width of 12.5 mm for carrier rail mounting TS 35**

Characteristics

Isolating amplifiers of the series TV125L are suitable for potential isolation or for conversion of unit signals. The universal layout of the inputs and the output enables a broad range of applications with only one type of device. The plug-in terminal strips enable simple and time-saving wiring. The configuration is also quick and easy with the front DIP switches.

Brief information

The input measuring ranges can be switched between 0..20 mA and 4..20 mA or 0..10 V and 2..10 V with a DIP switch on the front. The input measuring ranges can be switched between 0..20 mA and 4..20 mA or 0..10 V and 2..10 V with a DIP switch on the front.

With the microprocessor-controlled measurement logging, undercutting and exceeding of the measurement range are detected and indicated via a two-colour status LED on the front side. Then the current output is set to a defined starting or final value.

The current input is protected with an automatically resetting fuse (PTC) against static overvoltages up to 32 V AC/DC.

The required auxiliary energy is less than 0.5 VA.

The three circuits: Inputs, outputs, and auxiliary voltage, are galvanically separated with amplified isolation.

Technical data

Auxiliary power

Auxiliary voltage :	18 - 30V DC
Power consumption :	< 0.5 VA
Conformity :	CE; Directive 2004/108/EC
EMC :	DIN EN 61326-1: 2013-07
Standards :	DIN EN 61010-1: 2011-07, DIN EN 61010-2: 2011-07
Rated voltage:	300 V AC/DC in accordance with DIN EN 61010-1 with Overvoltage category 2 and Degree of contamination 2 between all circuits. Safe separation with amplified isolation
Test voltage :	3 kV AC, 50 Hz, 1 min
Input / Output / Auxiliary power	

Environmental conditions

Working temperature :	-10..60°C
Storage temperature :	-20..60°C
Air humidity :	< 95% (no condensation)

Inputs

Voltage input :	Switchable, 0..10V or 2..10 V. Ri = 47 kΩ. Max. overload 32 V AC
Current input :	Switchable, 0..20 mA or 4..20 mA. Ri = 48 Ω + 15 Ω (RiPTC). Max. overload 32 V AC/DC in accordance with DIN EN 61010-2-30

Output

Current output	Switchable, 0..20 mA or 4..20 mA. Load < 150 Ω.
Step response :	40 ms
Standard error :	< 0.2 % of final value
Temperature coefficient :	< 0.01 % / K

Casing

Material :	Polyamide (PA) 6.6 , UL94V-0,
Weight :	91g
Protection rating :	Housing IP30, terminals IP20 BGV A3
Colour :	light grey
Installation width :	12.5 mm
Dimensions (HxD) :	108 x 114 mm
Installation :	Carrier rail mounting TS35 DIN EN 60715

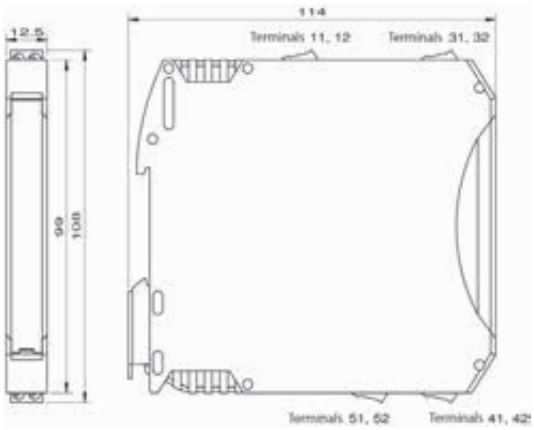
Operation

Status LED	Message
Green LED illuminates	Operating voltage applied
Red and green LED blink alternately with 2 Hz	measuring range undercutting or measuring range exceeding
Red LED illuminates	Failure of the unit, please return to manufacturer!

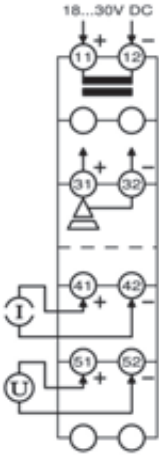
Configuration

S1	S2	Input	Output
Off	Off	4..20 mA, 2..10 V	4..20 mA
Off	On	4..20 mA, 2..10 V	0..20 mA
On	Off	0..20 mA, 0..10 V	4..20 mA
On	On	0..20 mA, 0..10 V	0..20 mA

Dimensions



Connection diagram



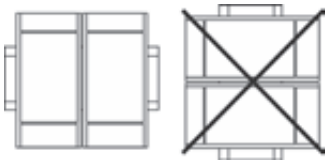
Auxiliary voltage: 18 – 30 V DC

Current output: 0/4 – 20 mA

Current input 0/4 – 20 mA

Voltage input: 0/2 – 10 V

Installation



Carrier rail mounting TS35, DIN EN 60715
The gapless installation of multiple devices
is now permissible with horizontally installed carrier rails.

Ordering code

TV - 1. - 2. - 3. - 4.

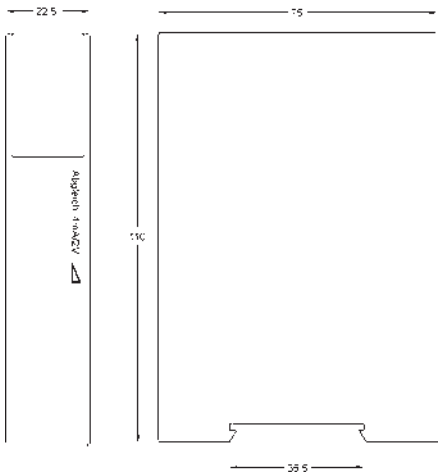
1.	**Device version**	
	125L	Auxiliary voltage 18..30 V DC
	125LP	Auxiliary voltage 18..30 V DC Tragschienenbusanschluss *)
2.	**Metering range**	
	10	Inputs 0/4..20 mA and 0/2..10 V Outputs 0/4..20 mA
3.	**Auxiliary voltage**	
	5	18..30 V DC
4.	**Options**	
	00	without option
	01	Push-in-clamp (plug-in)

*) siehe gesondertes Informationsblatt Power-Rail

Isolating Signal Converter TV500 / ST500

With integr. transmitter supply

Dimensions



DIN rail mounting TS35

Characteristics

TV500 isolating signal converter can be used to isolate and convert field signals 0/4..20 mA or 0/2..10 V DC into industry standard signals for process control systems. The ST500 provides a fully floating isolated transmitter supply.

Technical data

Power supply

Supply voltage	:	100..265 V AC or 10.8..30 V AC/DC
Frequency AC	:	47..63 Hz
Power consumption	:	< 3.5 VA
Operating temperature	:	-10..+60 °C
CE-conformity	:	EN 61326-1:2013 EN 60664-1:2007

Inputs

Current	:	0/4..20 mA selectable, Ri = 25 Ω overload max. 100 mA
Voltage	:	0/2..10 V DC selectable, Ri approx. 40 kΩ, overload max. 100 V
Span and start value 4 mA/2 V	:	adjustable approx. ± 5 %
Transmitter supply (only ST500)	:	approx 24 V DC, Ri approx. 150 Ω, short-circuit current approx. 35 mA

Outputs

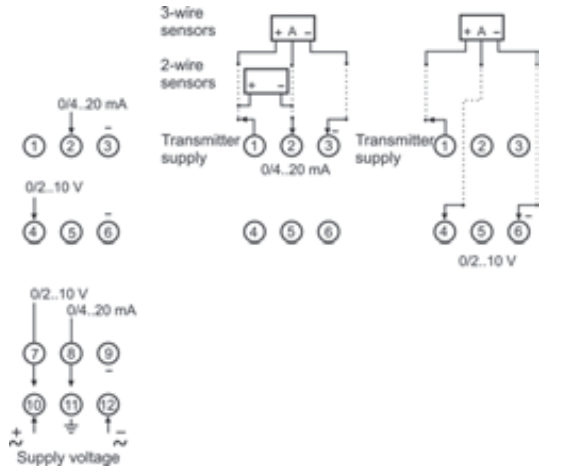
Current	:	0/4..20 mA selectable, burden max. 1 kΩ
Voltage	:	0/2..10 V selectable, load max. 15 mA, short-circuit-proof (parallel with the current output max. 5 mA)
Rise time (T_{90})	:	model 10: < 20 ms, max. frequency 18 Hz model 11: < 100 µs, max. frequency 1 kHz
Accuracy	:	≤ 0.2 % (single range adjustment ≤ 0.1 %)

Case

Design	:	standard case, Makrolon 8020 UL94V-1 acc. to DIN EN 60715
Weight	:	approx. 200 g
Connection	:	screw terminals, max. 2.5 mm²
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

Connection diagram

Signal converter TV500 | **Power feed signal converter ST500**



Ordering code

1. - 2. - 3.

1.	**Model**	
	TV500	signal converter
	ST500	power feed signal converter
2.	**Measuring range**	
	10	inputs 0/4..20 mA and 0/2..10 V
		outputs 0/4..20 mA and 0/2..10 V
	11	as 10, but rise time T_{90} < 100 µS
3.	**Supply voltage**	
	0	100..265 V AC
	5	10.8..30 V AC/DC

Isolating Signal Converter TV500Ex / ST500Ex

With integr. transmitter supply

Characteristics

TV500 isolating signal converter can be used to isolate and convert field signals 0/4..20 mA or 0/2..10 V DC out of the intrinsically area. The ST500 provides a fully floating isolated transmitter supply.

Technical data

Power supply

Supply voltage	:	85..253 V AC/110..125 V DC or 10..30 V AC/DC
Frequency	:	40..400 Hz
Power consumption	:	< 3.5 VA
Operating temperature	:	-10..+55 °C
CE-conformity	:	ATEX-directive 2014/34/EU
Standards	:	EN 60079-0:2006, EN 60079-11:2007 EN 61241-0:2006, EN 61241-11:2006
EMC-directive	:	2014/30/EU
Standards	:	EN 61326-1:2013

Explosion protection

Certification	:	TÜV 97 ATEX 1150, 2. annex
Approval	:	II (1) G [Ex ia Ga] IIC, II (1) D [Ex ia Da] IIIC

Inputs

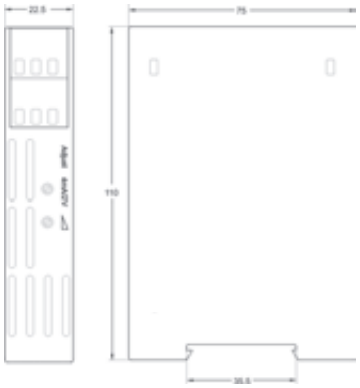
Current	:	0/4..20 mA selectable, R_i 25 Ω overload max. 100 mA
Voltage	:	0/2..10 V DC selectable, R_i 40 kΩ , overload max. 100 V
Span and start value		
4 mA/2 V	:	adjustable approx. ± 20 %
Transmitter supply (only ST500Ex)	:	approx. 20 V DC, Ri approx. 300 Ω, short-circuit current < 27 mA

Outputs

Current	:	0/4..20 mA selectable, burden max. 1 kΩ
Voltage	:	0/2..10 V selectable, load max. 15 mA, short-circuit-proof (parallel with current output max. 5 mA)
Rise time (t_{90})	:	< 100 ms
Accuracy	:	0.25 %
Case	:	standard case polycarbonate 8020 UL94V-1 acc. to DIN EN 60715:2001-09, TS35
Weight	:	approx. 200 g
Connection	:	screw terminals, max. 2.5 mm²
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

Mounting area
Mounting in dry, clean and well monitored areas
For more details see user manual.

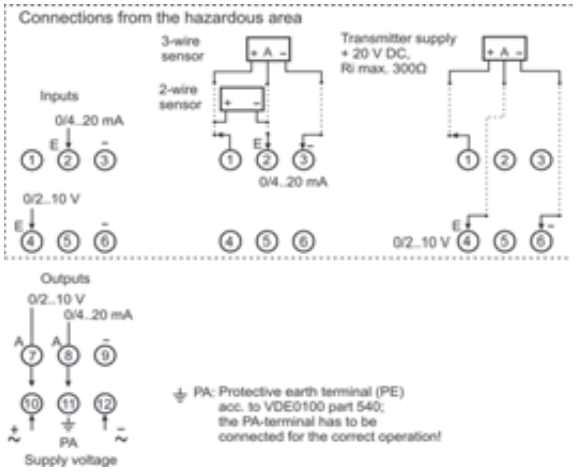
Dimensions



DIN rail mounting TS35

Connection diagram

Signal converter TV500Ex | **Power feed signal converter ST500Ex**



Ordering code

1. - 2. - 3.

1.	**Model**	
	TV500Ex	signal converter
	ST500Ex	power feed signal converter
2.	**Measuring range**	
	10	inputs 0/4..20 mA and 0/2..10V
		outputs 0/4..20 mA and 0/2..10V
3.	**Supply voltage**	
	0	85..253 V AC
	5	10..30 V AC/DC

Isolating Signal Converter TV500H

Characteristics

The TV500H brings the function of an isolating signal converter together with a set point adjuster and offers comparator and hold function. This combination offers therefore the possibility, to simulate a measuring value and the easy way to change the sensor without process interruption.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 % 47..63 Hz or 24 V DC ±15%
Power consumption	:	< 3 VA
Operating temperature	:	-10..+50 °C
CE-conformity	:	EN 61326-1:2013 EN 60664-1:2007

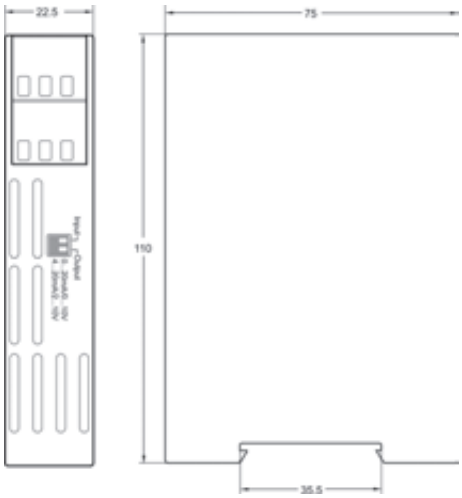
Input

Current	:	0/4..20 mA selectable, R_i = 43 Ω, overload max. 100 mA
Voltage	:	0/2..10 V selectable, R_i = 175 kΩ, overload max. 100 V

Output

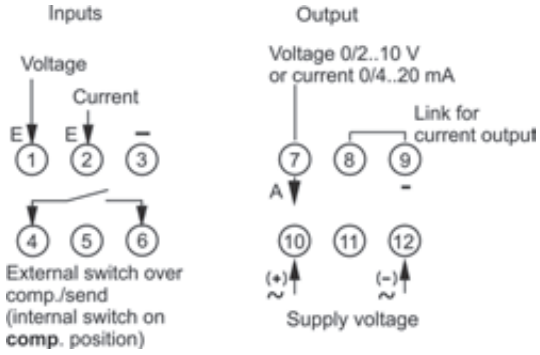
Programmable output		
Voltage → current	:	link between terminal 8 and 9
Current	:	0/4..20 mA selectable, burden < 500 Ω
Voltage	:	0/2..10 V selectable, load max. 10 mA
Accuracy	:	< 0.2 %
Rise time (T_{90})	:	< 40 ms
Case	:	standard polycarbonate 8020 UL94V-1 acc. to DIN EN 60715:2001-09
Weight	:	approx. 200 g
Electrical connection	:	screw terminals, max. 2.5 mm²
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagram



Ordering code

TV500H - 10 - 1.

1.	Supply voltage	
	0	230 V AC ±10 %
	5	24V DC ±15 %

Isolating Signal Converter TV500L

Characteristics

Isolating signal converter TV500L can be used to isolate and convert unipolar or bipolar field signals into industry standard unipolar 0/4..20 mA and 0/2..10 V DC or bipolar signals for process control systems. The output characteristic curve is programmable for increasing or decreasing performance.

Technical data

Power supply

Supply voltage	: 230 V AC ± 10 % or 24 V DC ± 15 %
Frequency AC	: 47..63 Hz
Power consumption	: < 3 VA (at 24 V DC, 80 mA)
Operating temperature	: -10..+50 °C
CE-conformity	: EN 55022, EN 60555, IEC 61000-4-3/4/5/11/13
EMC	: EN 61326-1:2013; EN 60664-1:2007

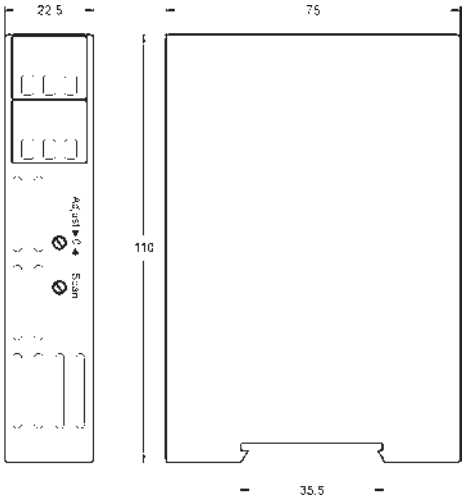
Inputs

Current	: ± 20 mA or 0/4..20 mA selectable, R_i = 43 Ω, overload max. 100 mA
Voltage	: ± 10V or 0/2..10 V selectable, R_i = 40 kΩ, overload max. 100 V
Start value	: adjustable ± 1.5 %
End value	: adjustable ± 1.5 %
Accuracy	: < 0.3 %, (single range adjustment < 0.1 %)

Output

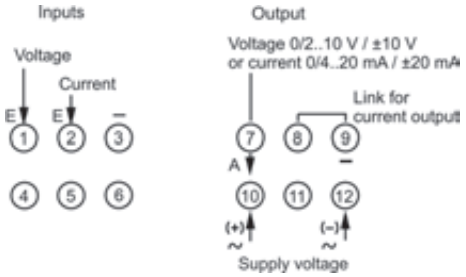
Programmable output	
Voltage → current	: link between terminal 8 and 9
Current	: 0/4..20 mA selectable, burden ≤ 400 Ω; ± 20 mA, burden ≤ 150 Ω
Burden error	: < 0.1 % (R_L = 0..200 Ω), < 0.2 % (R_L = 0..400 Ω)
Voltage	: 0/2..10V selectable, load max. 10 mA; ± 10 V, load max. 5 mA
Rise time (T_{90})	: < 40 ms
Case	: standard case polycarbonate 8020 UL94V-1 acc. to DIN EN 60715:2001-09, TS35
Weight	: approx. 200 g
Electrical connection	: screw terminals, max. 2.5 mm²
Protection class	: case IP30, terminals IP20, acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagram



Ordering code

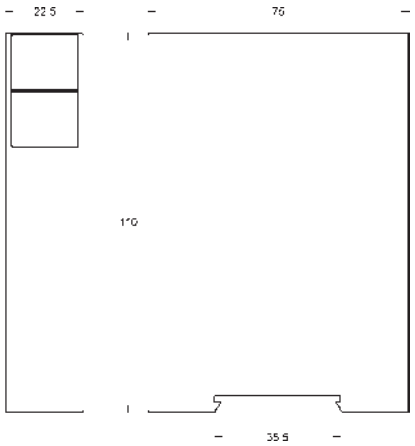
TV500L - 1. 2. 3. - 4.

1.	**Inputs**	
	1	0/4..20 mA and 0/2..10 V DC
	2	± 20 mA and ± 10 V DC
2.	**Outputs**	
	0	0/4..20 mA and 0/2..10 V DC
	1	± 20 mA and ± 10 V DC
3.	**Characteristic curve**	
	0	increasing
	1	decreasing (inverted)*
4.	**Supply voltage**	
	0	230 V AC ± 10 %
	5	24V DC ± 15 %

* please state input- and output signal in clear text

Isolating Signal Converter TV500P

Dimensions



DIN rail mounting TS35

Characteristics

Loop powered signal converter series TV500P are highly compact devices to isolate and adapt standard signals to active inputs of SPC- and DC-systems.
The device is loop powered via the 4-20 mA output.

Technical data

Power supply

Supply voltage	: 14..30 V DC (loop voltage)
Operating temperature	: -10..+50 °C
CE-conformity	: EN 61326-1:2013; EN 60664-1:2007

Inputs

Current	: 0..20, 4..20 mA or ± 20 mA R_i = 43 Ω, overload max. 100 mA
Voltage	: 0..10, 2..10 V or ±10 V R_i = 160 kΩ, overload max. 100 V
End value 20 mA	: adjustable ± 5 %
Accuracy	: < 0.2 %, (single range adjustment < 0.1 %)

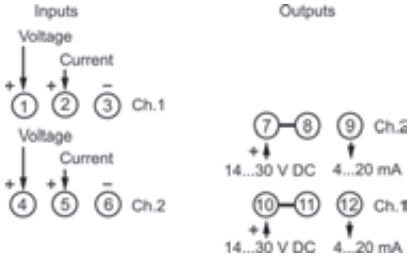
Outputs

Current	: 4..20 mA,
Burden	: $R_{max} = (U_B\text{-}14\ V) \div 20\ mA$
Rise time T_{90}	: < 70 ms

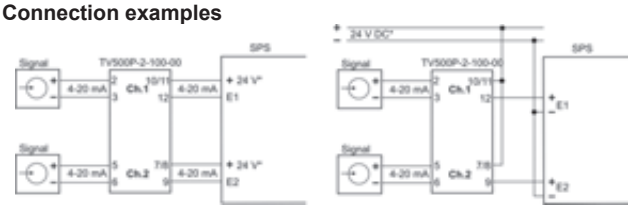
Note!
Output switches to 22 mA, if the input signal fall below -34 % or exceeds +34 % of the input signal.

Case	: standard case polycarbonate 8020 UL94V-1 acc. to DIN EN 60715:2001-09
Weight	: approx. 200 g
Electrical connection	: screw terminals, max. 2.5 mm²
Protection class	: case IP30, terminals IP20, acc. to BGV A3

Connection diagram



Connection examples



Ordering code

TV500P - 1. - 2. 3. 4. - 5.

1.	**No. of channels**	
	1	1 channel
	2	2 channels
2.	**Inputs**	
	0	0..20 mA and 0..10 V DC
	1	4..20 mA and 2..10 V DC
	2	± 20 mA and ± 10 V DC
3.	**Output**	
	0	4..20 mA passive
4.	**Characteristic curve**	
	0	increasing
	1	decreasing (inverted)
5.	**Options**	
	00	without option

Isolating Signal Converter TW500

Loop powered 0(4)..20 mA

Characteristics

Loop powered signal isolator TW 500 are highly compact devices to isolate DC-current signals 0(4)..20 mA without power supply. Up to 3 channels are deliverable in one 22.5 mm DIN rail housing.

Technical data

Input

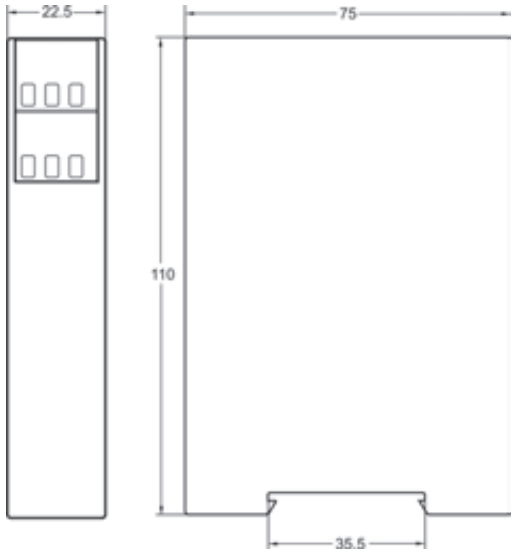
Current	:	0(4)..20 mA DC
Max. current	:	100 mA
Max. voltage	:	27 V DC
Voltage drop	:	< 2.7 V (I ≤ 20 mA)
Test voltage	:	4 kV DC input / output
Rated voltage	:	630 V acc. to VDE 0110 group 2
Operating temperature	:	-20..+60 °C
CE-conformity	:	EN 61326-1:2013 EN 60664-1:2007

Output

Current	:	0(4)..20 mA
Max. current	:	max. input current
Burden	:	< 1200 Ω (I ≤ 20 mA)
Rise time (T_{90})	:	< 30 ms
Accuracy	:	< 0.1 %
Burden error	:	< 0.0008 %/Ω
Temperature coefficient	:	< 0.001 %/°C
Ripple	:	< 0.2 %

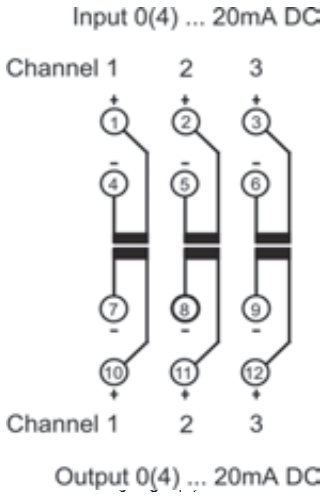
Case	:	standard case polycarbonate 8020 UL94V-1 acc. to DIN EN 60715:2001-09, DIN rail TS35
Weight	:	approx. 140 g
Connection	:	screw terminals, max. 2.5 mm²
Protection class	:	case IP30, terminals IP20, acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagram



Note:
Not used outputs must be shorted by a link.

Ordering code

TW500 - [1.] - 1

1.	Model	
	1	1-channel
	2	2-channels
	3	3-channels

Isolating Signal Converter TV501Ex

Intrinsically safe outputs

Characteristics

Isolating signal converter TV501 can be used to isolate and convert 0/4..20 mA and 0/2..10 V signals to the hazardous area. The universal design of the in- and outputs and the wide range of supply voltage limits the devices into 2 models.

Technical data

Power supply

Supply voltage	: 85..253 V AC / 110..125 V DC or 10..30 V AC/DC
Frequency AC	: 40..400 Hz
Power consumption	: < 3.5 VA
Operating temperature	: -10..+55 °C
CE-conformity	: ATEX-directive 2014/34/EU
Standards	: EN 60079-0:2006, EN 60079-11:2007 EN 60079-25:2004 EN 61241-0:2006, EN 61241-11:2006
EMC-directive	: 2014/30/EU / EN 61326-1:2013

Inputs

Current	: 0/4..20 mA DC, selectable, R_i = 25 Ω, overload max. 100 mA
Voltage	: 0/2..10 V DC, selectable, R_i ca. 40 kΩ, overload max. 100 V
Span	: adjustable approx. ± 5 %
Zero point	: adjustable approx. ± 5 %

Explosion protection

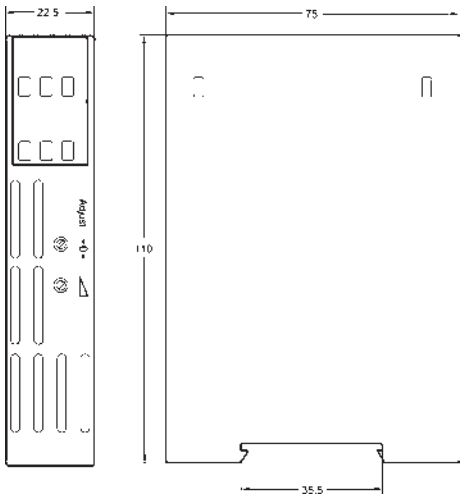
Certification	: TÜV 97 ATEX 1164
Approval	: II (1) G [Ex ia Ga] IIC or II (1) D [Ex ia Da] IIIC

Outputs

Current	: 0/4..20 mA DC, selectable burden ≤ 320 Ω (TV501Ex-..-10) burden ≤ 1 kΩ (TV501Ex-..-20)
Voltage	: 0/2..10 V DC, selectable, max. 15 mA short-circuit-proof, (parallel with voltage output max. 5 mA)
Rise time (T_{90})	: < 20 ms
Accuracy	: ≤ 0.3 %
Case	: standard case polycarbonate 8020 UL94V-1 DIN rail mounting TS35
Weight	: approx. 200 g
Electrical connection	: screw terminals, max. 2.5 mm²
Protection class	: case IP30, terminals IP20 acc. to BGV A3

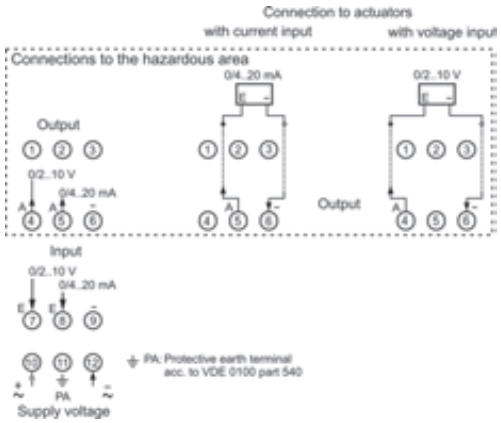
Mounting area
Mounting in dry, clean and well monitored areas
For more details see user manual.

Dimensions



DIN rail mounting TS35

Connection diagram



Ordering code

TV501Ex - 1. - 2. - 3.

1.	**Measuring range**	
	10	inputs 0/4..20 mA and 0/2..10V DC outputs 0/4..20 mA burden 320 Ω, 0/2..10 VDC
	20	inputs 0/4..20 mA and 0/2..10V DC outputs 0/4..20 mA burden 1 kΩ, 0/2..10 VDC
2.	**Supply voltage**	
	0	85..253 V AC
	5	10..30 V AC/DC
3.	**Options**	
	00	without option

Switch amplifier TS125 and TS225

- **1 or 2 channel version**
- **Safe galvanic isolation between input / output / auxiliary voltage**
- **Functional safety up to SIL2 EN61508**
- **Inputs for switching contacts, Namur initiators, or optocouplers**
- **Intrinsically safe inputs for connection of sensors in Ex Zones 0 and 20**
- **Device installation in Ex Zone 2 possible**
- **Galvanic isolation in accordance with the requirements for amplified isolation (EN60664)**
- **Switchable monitoring of the input circuit for wire breaks and short-circuit**
- **Relay outputs as normally open contacts or changeovers (invertible effect)**
- **Wide-range mains adapter or 24 V DC**
- **Configuration via front DIP switches**
- **Plug-in coded terminal strips**
- **Housing width of 12.5 or 22.5mm**
- **Carrier rail mounting TS35 EN60715**
- **Operating display, switching status and error message display via LEDs**

Characteristics

Switch amplifiers of the series TS125 and TW255 are used in switch cabinets for the conversion and isolation of digital switching signals, as well as in explosion-prone areas.

The devices are available in one- or two-channel versions.
Passive sensors, such as switching contacts, Namur initiators, or passive electronic outputs of third-party devices, can be connected to the intrinsically safe inputs.
The TS125 series in 12.5 mm wide carrier rail housing offers relay outputs with output make circuit. The TW225 series in 22.5 mm wide carrier rail housing offers relay outputs with changeover function. The plug-in terminal strips enable simple and time-saving wiring. The configuration is also quick and easy with the front DIP switches.

Technical data

Explosion protection

Gas:	II (1) G [Ex ia Ga] IIC/IIB
Dust:	II (1) D [Ex ia Da] IIIC
Intrinsically safe + Zone	II 3 G nA nC [ic] IIB T4 Gc *)
Protection rating 'n':	II 3 G nA nC IIB T4 Gc X *)

*) Manufacturer's certificate, requires installation in an earthed, conductive housing (minimum protection rating IP54)

Wide-range mains

Auxiliary voltage:	20..125VDC and 20..250VAC, (47..63Hz), max. 1.5W
ATEX thresholds:	U_o= 8.7V; I_o= 19mA; P_o= 42mW L_i = 20µH; C_i =10nF IIB/IIIC: L_o 100µH 1mH 100mH C_o 12.9µF 7.3µF 2.8µF IIC : L_o 100µH 1mH 100mH C_o 2.2µF 1.2µF 0.4µF

24V mains adapter

Auxiliary voltage:	24V DC +/-15%, max. 1.5W
ATEX thresholds:	U_o= 8.7V; I_o= 17mA; P_o= 37mW L_i = 20µH; C_i =10nF IIB/IIIB: L_o 100µH 1mH 100mH C_o 13.9µF 7.3µF 2.9µF IIC/IIIC: L_o 100µH 1mH 100mH C_o 2.2µF 1.3µF 0.4µF

Combined data

Um (according to ATEX):	253V AC / 125V DC
Test voltage :	3kV AC between input/output/auxiliary voltage
Working temperature :	-10..60°C
Storage temperature :	-20..80°C
Air humidity :	10..90% (no condensation)

Measuring inputs (in accordance with EN60947-5-6 Namur)

Open circuit voltage :	approx. 8V
Short circuit voltage :	approx. 8mA
Switching points :	inactive <= 1.2mA, active >= 2.1mA, hyst. < > 0.5mA
Error recognition	
-Wire break :	<0.2mA
-Short circuit :	>7mA

Relay outputs

Switching voltage :	<250V AC <2A <500VA <125V DC <0.2A <25W < 30V DC <2A <60W
Switching frequency :	max. 5Hz
-delay :	max. 30ms

Casing

Dimensions (WxDxH)	TS125: 12.5 x 114 x 108mm TS225: 22.5 x 114 x 108mm
Material :	PA6.6, light grey, Flammability class V0 (UL94)
Weight :	TS125: 120g; TS225: 140g
Protection rating :	IP20
Terminals :	0.2 - 2.5mm², AWG 24 - 14 Removable coded terminals

Functional safety :

SIL2 in accordance with EN61508

(specific data on request)

Operation

- Green Power ON operating display

TS125...-1, TS125...-2, TS225...-1 TS225...-2
Operating elements per channel Ch.1 / Ch.2

- LEDs A1 / A2 : yellow with active relay
  blinks red with error status
  (wire break or short circuit)

- Switch INV : off: active input switches on the assigned relay
  off: active input switches off the assigned relay

(condition as delivered underlined)
Applications with functional safety (SIL2) require switch **INV = off** and **ERR = on** !

TS125...-F, TS225...-F
Single-channel isolating amplifier with additional error relay or parallel relay. Operating elements :

- LED A1 : yellow with active Relay A1
  blinks red with error status
  (wire break or short circuit)

- LED A2 : yellow with active Relay A2
  (if switch ERR-Ch.2 = off)
  blinks red/yellow with active Relay A2 with error status
  blinks red with inactive Relay A2 with error status
  (if switch ERR-Ch.2 = on)

- Switch INV-Ch.1 : off: active input Ch.1 switches on Relay A1
  on: active input Ch.1 switches off Relay A1

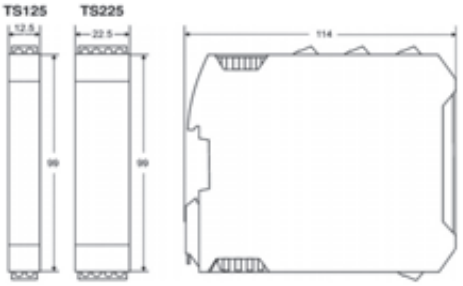
- Switch ERR-Ch.1 : off: Error recognition via Relay A1 inactive
  on: Error recognition active With error status, switches off Relay A1

- Switch INV-Ch.2 : off: active input Ch.1 or alternatively an error status*) switch on Relay A2
  on: active input Ch.1 or alternatively an error status*) switch off Relay A2

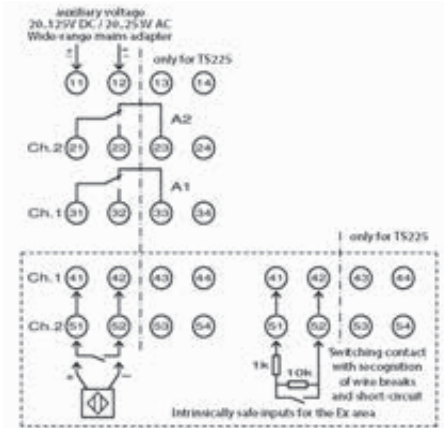
- Switch ERR-Ch.2 off: Error recognition via relay A2 inactive
  (A2 switches parallel to A1)
  *) on: Error recognition active
  (see Switch INV-Ch.2)

(condition as delivered underlined)
Applications with functional safety (SIL2) require switch **INV-Ch.2 = on, ERR-Ch.2 = on !**
INV-Ch.1 = off, INV-Ch.2 = on, ERR-Ch2. = off simulates a changeover contact with Relay A1 / A2

Dimensions



Connection diagram



Ordering code

	1.	2.	3.	4.
TS	-	-	-	-

1.	**Device version**	
	125L	Housing width 12.5mm, Relay NO contacts, Auxiliary voltage 24V DC +/15%
	125LP	Housing width 12.5mm, Relay NO contacts, Auxiliary voltage 24V DC +/-15% with DIN-rail bus connector / Power Rail *)
	125M	Housing width 12.5mm, Relay NO contacts, Wide-range mains adapter 20..125 VDC, 20..250 VAC
	225M	Housing width 22.5mm, Relay changeover contacts, Wide-range mains adapter 20..125 VDC, 20..250 VAC
2.	**Explosion protection**	
	00	Installation of the device TV125L in Zone 2 permitted, in accordance with ATEX ignition protection rating 'n'
	Ex	**With installation of the devices outside the Ex area:** Inputs intrinsically safe in accordance with ATEX ignition protection rating 'ia' for Zones 0 and 20 **The device TS125L** may be installed in Zone 2 in accordance with ATEX ignition protection rating 'ic'.
3.	**Number of channels**	
	1	Single channel
	2	Dual channel
	F	Single channel with additional error relay or parallel relay
4.	**Options**	
	00	without option

*)see separate information sheet Power Rail

Isolating Switching Repeater TS500

Characteristics

Isolating switching repeater TS500 can be used for monitoring and controlling digital signals. The input is suitable for switching contact, proximity switch acc. Namur DIN EN 60947-5-6, or passive electronic outputs of other devices. The output can be delivered as relay SPDT or transistor (voltage free).

Technical data

Power supply

Supply voltage	:	230 V AC ±10 %, 47..63 Hz 24 V ±15 %
Power consumption	:	< 2 W
Operating temperature	:	-10..+55 °C
CE-conformity	:	EN 61326-1:2013; EN 60664-1:2007

Inputs

Namur		(acc. to DIN EN 60947-5-6)
- No load voltage	:	approx. 8 V
- max. current	:	approx. 8 mA
- Switching points	:	inactive ≤ 1.2 mA, active ≥ 2.1 mA, hysteresis approx. 0.5 mA
- Break of wire	:	≤ 0.1 mA
- Short circuit	:	≥ 7.5 mA
Switching contact		

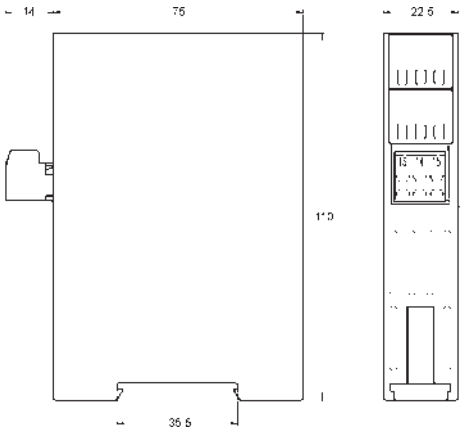
Output

Relay SPDT	:	< 253 V AC < 100 VA < 2 A; < 100 V DC < 50 W < 2 A
- max. frequency	:	5 Hz
- max. delay	:	20 ms (2-channel: 50 ms)
Transistor		max. 35 V DC, max. 50 mA, voltage free (short-circuit-proof)
- voltage drop	:	≤ 3.5 V active (at load 50 mA)
- max. frequency	:	2 kHz

Case

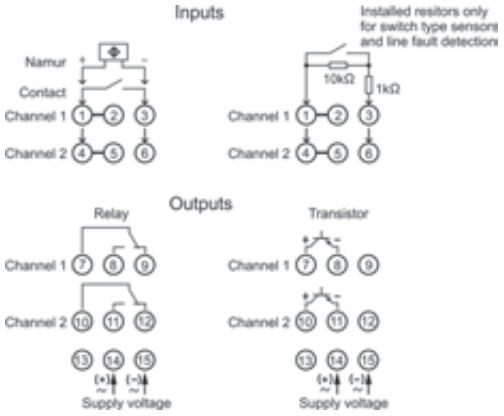
Design	:	standard case, Makrolon 8020 UL94V-1
Weight	:	approx. 200 g
Electrical connection	:	screw terminals, max. 2.5 mm²
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagram



Ordering code

TS500 - 1. - 2. - 3.

1.	**Model**	
	00	Standard
2.	**Output**	
	1R	1-channel relay output
	2R	2-channels relay output
	1T	1-channel transistor output
	2T	2-channels transistor output
3.	**Supply voltage**	
	0	230 V AC ±10 %
	5	24 V DC ±15 %

Note:
The TS500 is also available as Ex-ia.

Isolating Switching Repeater TS500-Ex

Characteristics

Isolating switching repeater TS500-Ex can be used for monitoring and controlling digital signals out of the hazardous area. The intrinsically safe input is suitable for switching contact, proximity switch according to Namur DIN EN 60947-5-6, or passive electronic outputs of other devices. The devices must be installed out of the Ex-area because only the input is intrinsically safe.

Technical data

Explosion protection

Certification	: DMT 99 ATEX E 079
Approval	: ATEX II (1) G [Ex ia] IIC/IIB or (1) D [Ex iaD]

Power supply

Supply voltage	: 230 V AC ±10 %, 47..63 Hz 24 V ±15 %
Power consumption	: < 2 W
Operating temperature	: -10..+55 °C
CE-conformity	: ATEX-directive 2014/34/EU
Standards	: EN 60079-0:2006, EN 60079-11:2007 EN 60079-26:2004, EN 61241-0:2006 EN 61241-11:2006
EMC-directive	: 2014/30/EU / EN 61326-1:2013

Inputs (intrinsically safe)

Namur	(acc. to DIN EN 60947-5-6)
- No load voltage	: approx. 8 V
- max. current	: approx. 8 mA
- Switching points	: inactive ≤ 1.2 mA, active ≥ 2.1 mA, hysteresis approx. 0.5 mA
- Break of wire	: ≤ 0.1 mA
- Short circuit	: ≥ 7.5 mA
Switching contact	

Output

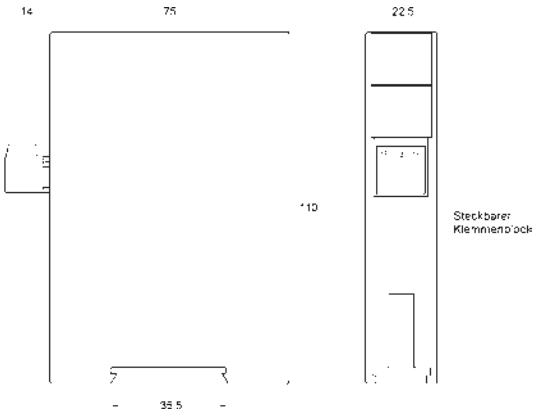
Relay SPDT	: < 253 V AC < 100 VA < 2 A; < 100 V DC < 50 W < 2 A
- max. frequency	: 5 Hz
- max. delay	: 20 ms (2-channel: 50 ms)
Transistor	max. 35 V DC, max. 50 mA, voltage free (short-circuit-proof), safety voltage 253 V AC/125 V DC
- voltage drop	: ≤ 3.5 V active (at load 50 mA)
- max. frequency	: 2 kHz

Case

Design	: standard case, Makrolon 8020 UL94V-1
Weight	: approx. 200 g
Electrical connection	: screw terminals, max. 2.5 mm²
Protection class	: case IP30, terminals IP20 acc. to BGV A3

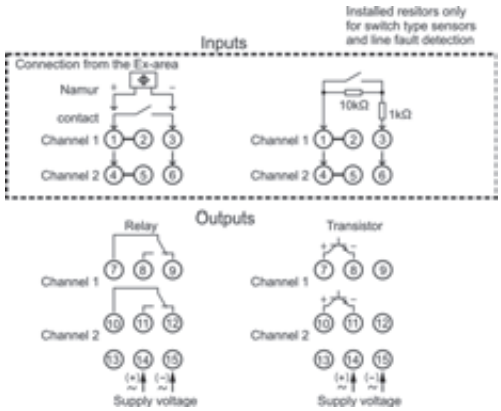
More details see user manual

Dimensions



DIN rail mounting TS35

Connection diagram



Ordering code

TS500-Ex - ia - 1. - 2.

1.	**Output**	
	1R	1-channel relay output
	2R	2-channels relay output
	1T	1-channel transistor output
	2T	2-channels transistor output
2.	**Supply voltage**	
	0	230 V AC ±10 %
	5	24 V DC ±15 %

Safety Barriers Series 9001

Characteristics

Safety barriers of the series 9001 can be used for varied applications in the area of the automation.
They allow the intrinsically safe mode of a HART transmitter, actuator, voltage free contact, temperature sensor, DMS, magnet valves, Display...
The compact size makes an easy and space saving mounting possible.

Technical data

Installation	: valid in zone 2 and Division 2
Mounting	: DIN EN 60715 TS35
Explosion protection	: II 3 (1) G Ex nA [ia Ga] IIC/IIB T4 Gc II (1) D [Ex ia Da] IIIC
Dimensions	: 12.2x104x70 mm (WxHxD)

Model 01
0(4)..20mA

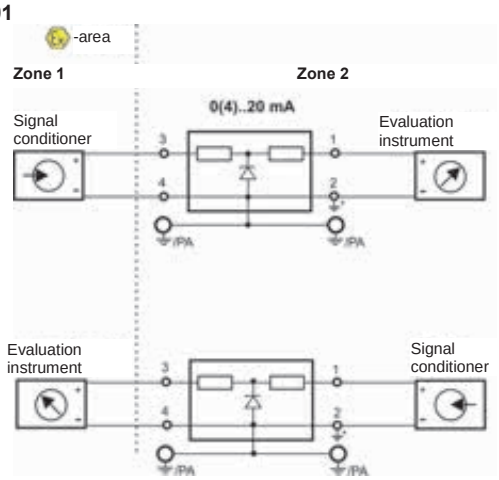
Nominal voltage	: 24 V DC
R_i	: min. 286 Ω max. 319 Ω
I_{max}	: 75 mA
U_0	: 28 V
I_0	: 100 mA
P_0	: 700 mW

Model 02
Pt100/Pt1000

Nominal voltage	: 0,7 V DC
R_i	: min. 39 Ω max. 40 Ω
I_{max}	: 17 mA
U_0	: 1.6 V
I_0	: 50 mA
P_0	: 20 mW

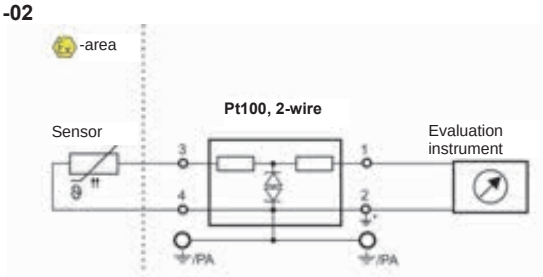
Connection examples

9001-01

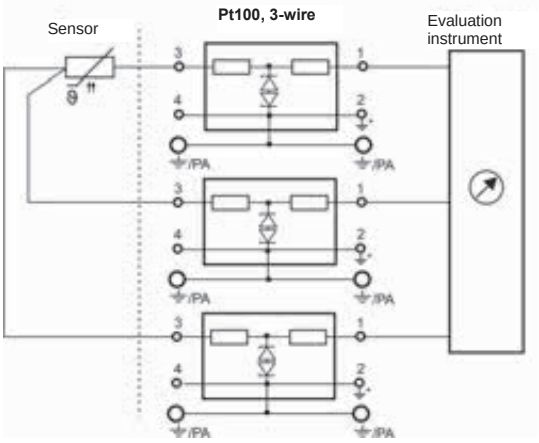


The calculation of the burden for the signal conditioner must be including the line resistant of the safety barrier.

9001-02



The line resistant of the safety barrier must be calibrated at the evaluation instrument.



* only in connection with the isolated mounting of the safety-barrier.

Ordering code

9001 - 1.

1.	Model	
	01	0(4)..20 mA
	02	Pt100 / Pt1000

Safety and monitoring

www.ghm-group.de

GHMGROUP
Specialists by Competence.

Product information

Safety and Monitoring

Safety and monitoring

Characteristics

System
- Current
- voltage
- power
- temperature

Principle
- Vibration, insulation resistance
- safety end switch
- safety-temperature limiting/-monitoring

Evaluation
- Standard-signals
- switching outputs with display

Mounting
- Switch panel case,
- DIN rail mountingTS35

Applications

- **Monitoring of AC Power systems**
- **Temperature limiter acc. to SIL2**
- **Battery guard for solar systems and wind power stations**
- **Insulation guard for health care facility's and railway vehicles**
- **Pressure monitoring, filling height**
- **Live saving in machine controls for cutters, mixing machines etc.**

Device overview

Device	Function	Input	Measuring / indicating range	Page
MR50	Limit switch, 4 alarm outputs, analog output	0/4..20 mA, 0/2..10 V DC	±9999 Digit	164
MR50Ex	Limit switch, 2 alarm outputs, analog output	0/4..20 mA, 0/2..10 V DC	±9999 Digit	165
BW500	Battery guard, 1 alarm output	12, 24, 48, 60 V DC	11..14 V, 22..28 V, 44..56 V, 55..70 V	167
CVG500	Limit switch, 1 alarm output	0..1 A AC/0..5 A AC 0..125 V AC / 0..250 V AC	0..100%	168
GS500	Limit switch, 1 alarm output	0/4..20 mA, 0/2..10 V DC	0..100 %	169
GS1000	Limit switch, 2 alarm output, analog output	0/4..20 mA, 0/2..10 V DC	0..100 %	170
GS1000	Limit switch, 2 alarm output, analog output	Pt100, Thermocouple J, K,S	-50..600 °C, 0..1600 °C	171
GS125	Limit switch, 2 alarm output, analog output	0/4..20 mA, 0/2..10 V DC, Pt100, Thermocouple J, K, S	0..100 %, -50..500 °C, 0..1500 °C	173
TG50	Temperature guard, 4 alarm output, analog output	Pt100, Thermocouple J, K, N, S	-100..600 °C, -100..1600 °C	175
TG50Ex	Temperature guard with Ex, 2 alarm output, analog output	Pt100, Thermocouple J, K, N, S	-100..600 °C, -100..1600 °C	177
TB225	Temperature limiter/guard, 2 alarm output, analog output	0/4..20 mA, 0/2..10 V DC, Pt100, Thermocouple J, K, N, S	0..100 %, -100..600 °C -100..1600 °C	179
STL50	Safety temperature limiter/guard, 1 alarm output	Pt100, Thermocouple J, K, N, S	-100..600 °C -100..1600 °C	181
STL50Ex	Safety temperature limiter/guard, 1 alarm output	Pt100, Thermocouple J, K, N, S	-100..600 °C -100..1600 °C	183
Safety-TL4896	Safety temperature limiter/guard,			185
SD9648	Alarm Display	Analog signal 0/4..20 mA, 0/24 V DC or voltage free contacts	Free text	187
IW1000	Insulation guard	Insulation resistance	1 kΩ..5,5MΩ	188

Mistakes reserved, technical specifications subject to change without notice.

Monitoring Relay MR50

- **Input standard signals 0/4..20 mA, 0/2..10 V DC**
- **Measuring range programmable**
- **Max. 4 alarm outputs**
- **Isolated analog output 0/4..20 mA, 0/2..10 V DC**

Characteristics

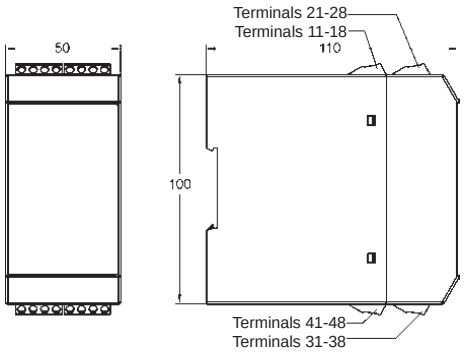
The Monitoring Relay MR50 has inputs for industry standard signals 0/4..20 mA and 0/2..10 V DC. Measuring value and programmed unit are shown in the display. The integrated transmitter supply offers direct connection of loop powered sensors. Simple programming, up to 4 alarm outputs (SPDT) and optional available fully isolated free programmable analog output 0/4..20 mA; 0/2..10 V DC meets the demand for different applications.

Technical data

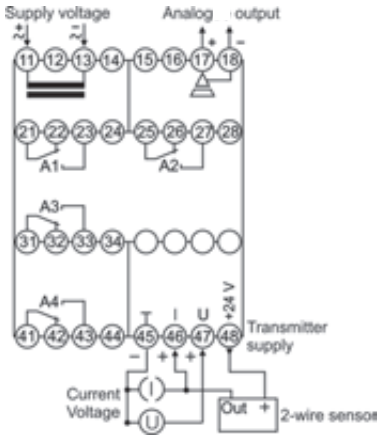
Power supply

Supply voltage	: 230 V AC ±10 %, 115 V AC ±10 %, or 24 V DC ±15 %
Power consumption	: max. 5 VA
Operating temperature	: -10..+55 °C
CE-conformity	: EN 61326-1:2013 EN 60664-1:2007
Input	: 0/4..20 mA; 0/2..10 V DC
Ri	: current 10 Ω, voltage 10 kΩ
Fault detection	: break of wire
Accuracy	: <0,1 %, ±1 Digit
Transmitter supply	: 24 V DC max. 30mA
Outputs	
Relay SPDT	: < 250 V AC < 250 VA < 2 A cosφ ≥ 0.3, < 300 V DC < 40 W <2 A
Analog output	: 0/4..20 mA, burden ≤500 Ω; 0/2..10 V burden >500 Ω, isolated, output changes automatically (burden dependent)
Accuracy	: 0.2 %;TK 0.01 %/K
Fault function at break of wire:	
→ Analog output	: 0 mA, < 3.6 mA or >21.5 mA
→ Alarm contact(s)	: min. or max. programmable
Display	: graphic LCD-display with 128 x 64 Pixel, and white back-light
Case	: Polyamide (PA) 6.6 , UL94V-0 acc. to DIN EN 60715
Weight	: approx. 450 g
Connection	: screw terminals 0.14..2.5 mm² (AWG 26..14)
Protection class	: case IP30, terminals IP20, BGV A3

Dimensions



Connection diagram



Ordering code

MR50 - 1. - 2. - 3. - 4. - 5. - 6.

1.	**Input**	
	1	standard signals 0/4..20 mA, 0/2..10 V DC, transmitter supply 24 V DC, max. 30 mA
2.	**Alarm output A1, A2**	
	2R	2 relays SPDT
3.	**Alarm output A3, A4**	
	00	not installed
	2R	2 relays SPDT
4.	**Analog output**	
	00	not installed
	AO	0/4..20 mA, 0/2..10 V DC
5.	**Supply voltage**	
	0	230 V AC, ± 10 % 50-60 Hz
	1	115 V AC, ± 10 % 50-60 Hz
	5	24 V DC, ± 15 %
6.	**Options**	
	00	without option

Monitoring Relay MR50Ex

- **Input standard signals 0/4..20 mA, 0/2..10 V DC**
- **Measuring range programmable**
- **Max. 2 alarm outputs**
- **Isolated analog output 0/4..20 mA, 0/2..10 V DC**

Characteristics

The Monitoring Relay MR50Ex has inputs for industry standard signals 0/4..20 mA and 0/2..10 V DC. Measuring value and the programmed unit are shown in the display. The integrated transmitter supply offers direct connection of loop powered sensors. Simple programming, up to 2 alarm outputs (SPDT) and an optional available fully isolated free programmable analog output 0/4..20mA; 0/2..10 V DC meets the demand for different applications.

Technical data

Power supply

Supply voltage	: 230 V AC ±10 %, 115 V AC ±10 %, 24 V DC ±15 % U_m=253 V AC or 125 V DC (terminals 11 and 13)
Power consumption	: max. 5 VA
Operating temperature	: -10..+55 °C
CE-conformity	: ATEX-directive 2014/34/EU
Standards	: EN 60079-0:2006 EN 60079-11:2007 EN 61241-0:2006 EN 61241-11:2006,
EMC-directive / standard	: 2014/30/EU / EN 61326-1:2013

Inputs

Explosion protection	: Ex II (1) G [Ex ia] IIC/IIB or II (1) D [Ex iaD]
Approval	: TÜV 08 ATEX 554329
Input	: 0/4..20 mA; 0/2..10 V DC
Ri	: current 10 Ω, voltage 10 kΩ
Fault detection	: break of wire in the measuring circuit (terminals 45, 46 and 47)
Accuracy	: < 0.1 %, ±1 Digit
Temperature coefficient	: 0.01 %/K

Safety data

Max. no load voltage U_0	: 18.9 V
Max. short circuit curr. I_0	: 92.5 mA
Max. output power P_0	: 580 mW
Resistance R	: 272 Ω
Characteristics	: trapezoidal
Internal inductivity	: 4 µH
Internal capacity	: 1.2 nF
Transmitter supply	: approx. 16 V DC max. 20 mA (terminal 48)

Explosion protection	**Ex ia/IIC or ia/IIC**		**ia/IIB**
Max. ext. inductivity	: 2.3 mH	0.1 mH	5 mH
Max. ext. capacity	: 0.12 µF	0.22 µF	0.76 µF

At connecting of externally supplied active intrinsically safe circuits the rules for the interconnection of intrinsically safe circuits have to be observed.

Max. values	U_i	: 30 V
	I_i	: 52 mA
	P_i	: 980 mW

Outputs

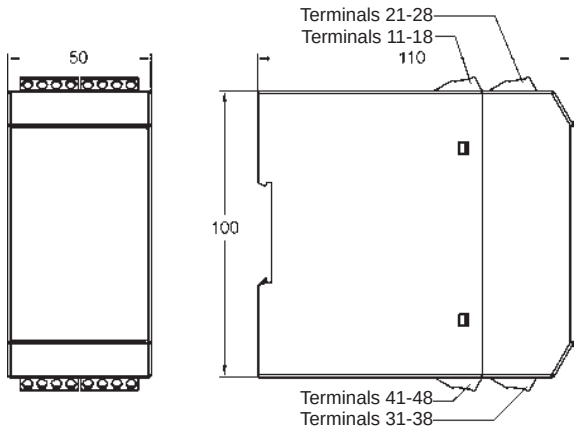
Relay SPDT	: < 250 V AC < 250 VA < 2 A cos φ ≥ 0.3, < 300 V DC < 40 W <2 A (terminals 21, 22, 23; 25, 26, 27)
Analog output	: 0/4..20 mA, burden ≤500 Ω; 0/2..10 V burden >500 Ω, isolated, output changes automatically (burden dependent)
Accuracy	: 0.2 %;TK 0.01 %/K

for connection at electrical equipments with supply voltage of max. 230V (terminals 17 and 18)

Fault function	: break of wire in the measuring circuit: → analog output 0 mA, < 3.6 mA or >21.5 mA → alarm contact(s) min. or max. programmable
Display	: Graphic-LCD-Display, 128 x 64 Pixel, with white back-light
Case	: Polyamide (PA) 6.6 , UL94V-0 acc. to DIN EN 60715
Weight	: approx. 450 g
Connection	: screw terminals 0.14..2.5 mm² (AWG 26..14)
Protection class	: case IP30, terminals IP20, BGV A3

Continue next page

Dimensions

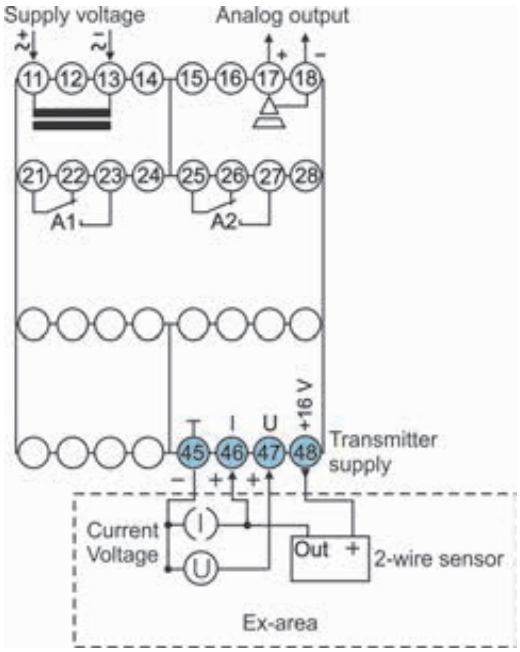


Ordering code

MR50Ex - 1. [ ] - 2. [ ] - 3. [ ] - 4. [ ] - 5. [ ] - 6. [ ]

1.	**Input**	
	1	standard signals 0/4..20 mA, 0/2..10 V DC, transmitter supply approx. 16 V DC, max. 20 mA, inputs intrinsically safe
2.	**Alarm output A1, A2**	
	2R	2 relay SPDT
3.	**Alarm output A3, A4**	
	00	not available
4.	**Analog output**	
	00	not installed
	AO	0/4..20 mA, 0/2..10 V DC
5.	**Supply voltage**	
	0	230 V AC, ± 10 % 50-60 Hz
	1	115 V AC, ± 10 % 50-60 Hz
	5	24 V DC, ± 15 %
6.	**Options**	
	00	without option

Connection diagram



Battery Voltage Guard BW500

- **Monitoring of battery voltages 12 V, 24 V, 48 V or 60 V**
- **Alarm function under-voltage / over-voltage selectable**
- **Time delay adjustable**
- **Measuring voltage and supply voltage are identical**

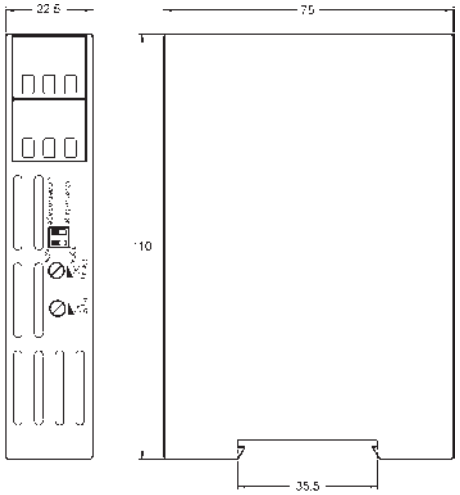
Characteristics

The BW500 is designed for monitoring of battery voltages. Under-voltage or over-voltage can be selected.
Under-voltage:
The relay switches off, if the voltage falls under the limit value and if the delay time ran off.
If the voltage exceeds the limit value + hysteresis, the relay will be activated.
Over-voltage:
The relay switches on, if the voltage exceeds the limit value and if the delay time ran off.
If the voltage falls under the limit value - hysteresis, the relay will be deactivated.

Technical data

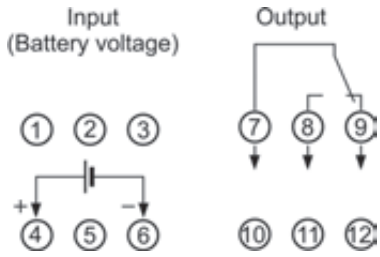
Power supply
Battery voltage : 12 V, 24 V, 48 V or 60 V DC, -30..+40 %
Current consump. : 14 mA (24 mA at 12 V type)
with activated relay
Operating temp. : -10..+60 °C
CE- conformity : EN 61326-1:2013
EN 60664-1:2007
Vibration,- shock- and impact testings
Measuring input/measuring range
12 V : 11..14 V
24 V : 22..28 V
48 V : 44..56 V
60 V : 55..70 V
Scale error : ≤2 %
Output
Relay SPDT : 250 VAC < 250 VA < 2 A; 300 V= < 50 W < 2 A
Alarm function : under-voltage/over-voltage selectable
Hysteresis : 2..16 % adjustable
(related to the nominal battery voltage)
Time delay : in 2-steps switch selectable
1..60 s or 5..300 s adjustable
Case : standard case polycarbonate 8020 UL 94 V-1
acc. to DIN EN 60715:2001-09, DIN rail TS35
Weight : approx. 100 g
Connection : screw terminals, max. 2.5 mm²
Protection class : case IP30, terminal IP20, acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagram



Ordering code

BW500 - 1. - 2. - 3.

1.	**No. of inputs**	
	1	
2.	**Battery voltage / measuring scale**	
	12V	11..14 V
	24V	22..28 V
	48V	44..56 V
	60V	55..70 V
3.	**Options**	
	00	without option

Current and Voltage Monitoring Relay CVG500

- **Arithmetic average value measuring RMS calibrated (AC) or DC**
- **Contact function min/max selectable**
- **Hysteresis and time delay adjustable**

Characteristics

CVG500 monitoring relays can be used for monitoring current or voltage levels. The standard model is designed for input 0...1/5 A and 0...125/250 V AC/DC. Models with inputs in range of 0...1 mA/ 5 A AC/DC or 0...50 mV/400 V AC/DC are available.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 % or 24 V DC -30/+40 %
Frequency AC	:	47..63 Hz
Power cons.	:	< 3 VA
Operating temp.	:	-10..+50 °C (-25 °C..+70 °C on request)
CE-conformity	:	EN 61326-1:2013 EN 60664-1:2007

Inputs

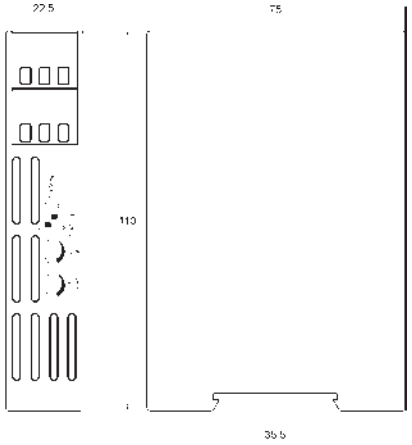
Scale error	:	≤ 2 %
Frequency AC	:	40..200 Hz (other ranges on request)
Standard ranges		
Current	:	0..1 A and 0..5 A AC (sinusoidal) or DC
Ri	:	20 mΩ (5 A input) or 100 mΩ (1 A input)
Over-load	:	2-times, 4-times for max. 5 seconds
Voltage	:	0..125 V and 0..250 V sinusoidal or DC
Ri	:	600 KΩ (125 V input) or 1.2 MΩ (250 V input)
Over-load	:	max. 300 V AC/DC
Custom ranges		
Voltage	:	end value in the range 0.05..400 VAC/DC
Ri	:	4.8 kΩ/V
Over-load	:	5-times nominal voltage, max. 500 V AC / DC
Current	:	end value in the range 0.001..5 A AC/DC
Ri	:	= 100 mΩ ÷ (measuring range [A])
Over-load	:	2-times, 4-times for max. 5 seconds

Output

Relay SPDT	:	250 VAC < 250 VA < 2 A; 100 V= < 50 W < 1 A
Switching function	:	min. / max. selectable
Hysteresis	:	1..25 %
Time delay	:	0.1..8 seconds

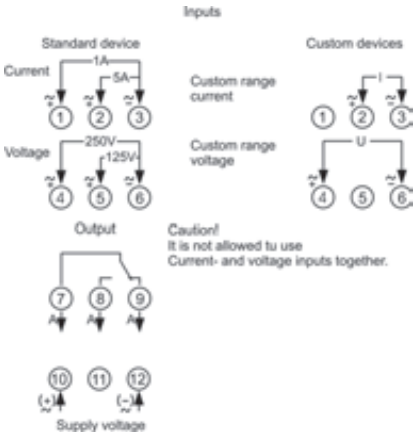
Case	:	standard case polycarbonate 8020 UL 94 V-1 acc. to DIN EN 60715:2001-09, DIN rail TS35
Weight	:	approx. 200 g
Protection class	:	case IP30, terminals IP20, (BGV A3)
Connection	:	screw terminals, max. 2.5 mm²

Dimensions



DIN rail mounting TS35

Connection diagram



Ordering code

CVG500 - 1. - 2. - 3.

1.	**Current measuring ranges**	
	0	not installed (at custom range voltage)
	1/5	standard range 0..1 A and 0..5 A AC/DC
		custom range state in clear text
2.	**Voltage measuring ranges**	
	0	not installed (at custom range current)
	125/250	standard range 0..125 V and 0..250 V AC/DC
		custom range state in clear text
3.	**Supply voltage**	
	0	230 V AC ±10 %
	5	24 V DC -30..40 %

Monitoring Relay GS500

- **Input 0/4..20 mA, 0/2..10 V DC**
- **Contact function min/max selectable**
- **Hysteresis and switching delay adjustable**

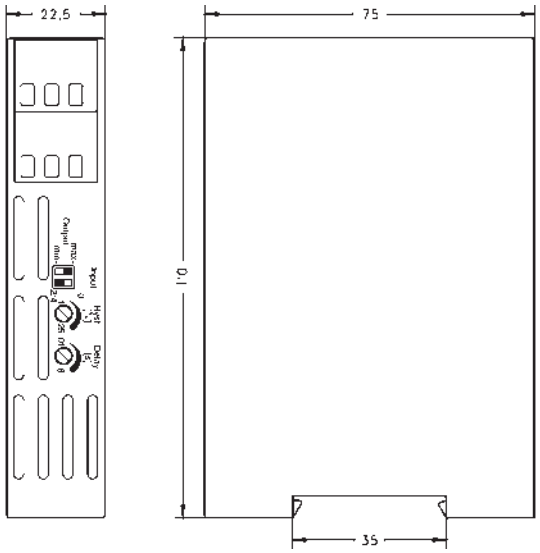
Characteristics

The GS500 can be used for monitoring physical processes presented as industry standard signal. Limit value can be set from 0..100%. The adjustable switching delay prevents that short signal peaks does not activate the alarm.
By an adjustable switching hysteresis a frequently switching can be suppressed with small signal variations.

Technical data

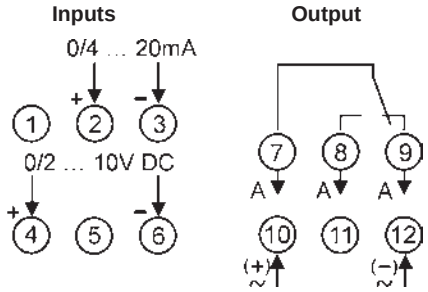
Power supply		
Supply voltage	:	230 V AC ±10 % or 24 V DC -30/+40 %
Frequency AC	:	47..63 Hz
Power consumption	:	<3 VA
Operating temperature	:	-10..+50 °C (-25..+70 °C special device)
CE-conformity	:	EN 61326-1:2013 EN 60664-1:2007
Inputs		
Scale error	:	≤ 2 %
Repeatability	:	≤ 0.1 %
Current		
Range	:	0/4..20 mA selectable
Input resistance	:	125 Ω
Over-load	:	2-times, 4-times for max. 5 seconds
Voltage		
Range	:	0/2..10 V DC selectable
Input resistance	:	40 kΩ
Over-load	:	max. 100 V DC
Outputs		
Relay SPDT	:	250 V AC < 250 V A < 2 A; 100 V DC < 50 W < 1 A
Switching function	:	min./max. selectable
Hysteresis	:	1..25 %
Time delay	:	0.1..8 seconds
Case	:	standard case polycarbonate 8020 UL 94 V-1 acc. to DIN EN 60715:2001-09, DIN rail TS35
Weight	:	approx. 200 g
Connection	:	screw terminals, max. 2.5 mm²
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagram



Supply voltage

Caution:
It is not permissible to use current and voltage inputs at the same time!

Ordering code

GS500 - 1. - 2.

1.	**Measuring range**		
	10	Standard device 0/4..20 mA, 0/2..10 V DC	
2.	**Supply voltage**		
	0	230 V AC	±10 %
	5	24 V DC	-30..40 %

Safety and monitoring

Monitoring Relay GS1000

- **1 or 2 adjustable limit values min/max selectable**
- **Measuring inputs for standard signals and Potentiometer**
- **True value output 0..10 V, 0..20 mA or 4..20 mA**

Characteristics

GS1000 limit value relays can be used for monitoring in process and automation systems. The multipurpose input allows controlling of all physical dimensions which can be converted to standard signal 0/4..20 mA, 0/2..10 V DC. An optional transmitter supply for 2-wire-transmitters (4...20 mA) will offer additional fields of application..

Technical data

Power supply

Supply voltage	:	Uc ± 10 %
Frequency	:	47..63 Hz
Power consumption	:	4 VA
Operating temperature	:	-10..+60 °C
CE-conformity	:	EN 61326-1:2013 EN 60664-1:2007

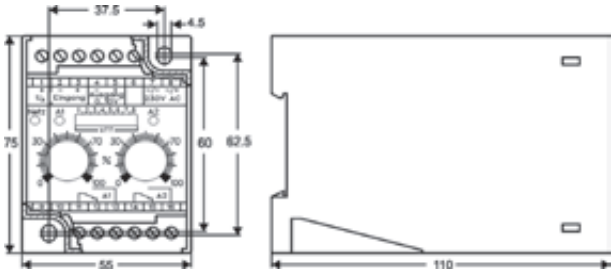
Input

Voltage	:	Ri 4 kΩ/V, over-load max. 3-times
Current	:	Ri 125 Ω, over-load max. 100 mA
Potentiometer	:	reference voltage U_A = 2.5 V DC load max. 5 mA for potentiometer 1 kΩ..100 kΩ
Transmitter supply	:	2-wire sensor $U_A \approx$ 15 V DC
Switching hysteresis	:	approx. 1 %
Scale accuracy	:	2 %
Repeatability	:	0.2 %

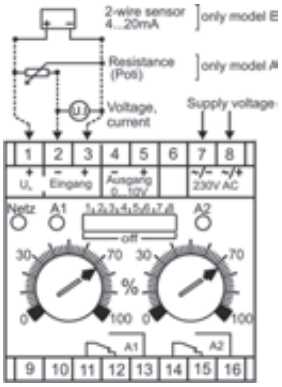
Output

Relay	:	250 V AC < 250 VA < 2 A 100 V DC < 50 W < 1 A
Voltage	:	0..10 V DC, max. 10 mA
Current (optional)	:	0..20 mA or 4..20 mA, burden max. 500 Ω
Accuracy	:	0.3 %
Case	:	Polycarbonate 8020 UL94V-1
Weight	:	approx. 400 g
Connection	:	screw terminals with pressure plate max. 4mm²
Protection class	:	case IP40, terminals IP20, acc. to BGV A3

Dimensions



Connection diagram



Ordering code

GS1000 - [1.] - [2.] - [3.] - [4.]

1.	**Limit outputs (relay SPDT)**	
	1	1 limit contact max. 250 V AC/2 A
	2	2 limit contacts max. 250 V AC/2 A
2.	**True value output**	
	1	0..10 V (max. 10 mA) standard
	2	0..20 mA burden max. 500 Ω
	3	4..20 mA burden max. 500 Ω
3.	**Supply voltage**	
	0	230 V ±10 % 50-60Hz
	1	115 V ±10 % 50-60Hz
	5	20..28 V DC isolated
4.	**Input**	
	10	multipurpose device A input signal via DIP-switch configurable: 0..20 mA / 4..20 mA 0..2.5 V / 0..5 V / 0..10 V and Potentiometer
	20	multipurpose device B * transmitter supply approx. 15 V DC for 2 wire sensors 4..20 mA input signal via DIP-switch configurable: 0..20 mA / 4..20 mA 0..2.5 V / 0..5 V / 0..10 V

Temperature Limit Value Relay GS1000

Characteristics

The monitoring device GS1000 can be used for monitoring of temperatures in process and automation systems.

Technical data

Power supply

Supply voltage	:	Uc ± 10 %
Frequency	:	47..63 Hz
Power consumption	:	4 VA
Operating temperature	:	-10..+60 °C
CE - conformity	:	EN 61326-1:2013; EN 60664-1:2007

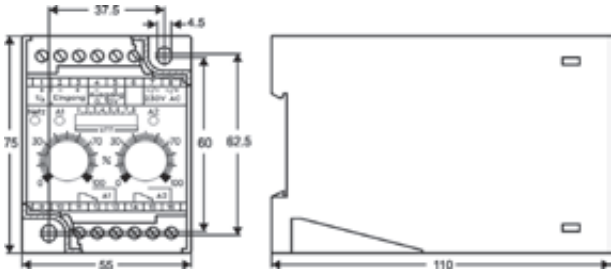
Input

RTD Pt100	:	sensor current 1 mA
Thermocouple	:	Ri > 1 MΩ
Switching hysteresis	:	approx. 1 %
Scale accuracy	:	2 %
Repeatability	:	0.2 %
Accuracy	:	RTD Pt100 0.7 % Thermocouple 0.3 % non linearized
Temperature coefficient - Pt100 / Thermocouple	:	0.035 %/K

Outputs

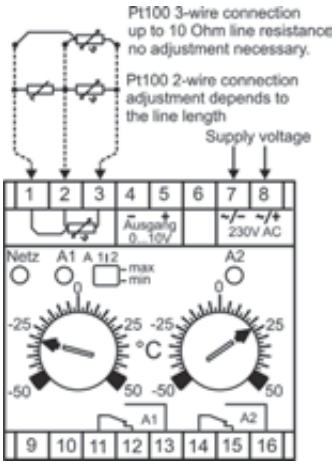
Limit relay	:	250 V AC < 250 VA < 2 A 100 V DC < 50 W < 1 A
True value - Voltage	:	0..10 V DC, max, 10 mA
- Current (optional)	:	0..20 mA or 4..20 mA, burden max. 500 Ω
Case	:	Polycarbonate UL94V-0 acc. to DIN EN 60715:2001-09
Weight	:	approx. 400 g
Electrical connection	:	Screw terminals with pressure plate, max. 4 mm²
Protection class	:	case IP40, terminals IP20 BGV A3

Dimensions

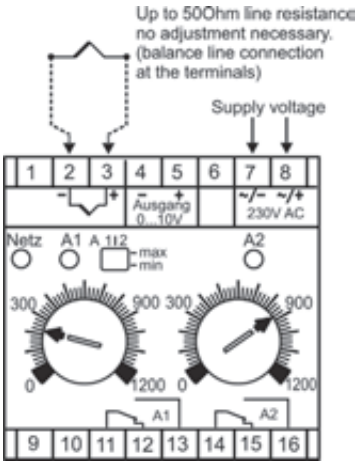


Connection diagrams

Pt100 scale °C



Thermocouple scale °C



Continue next page

Ordering code

GS1000 - 1. - 2. - 3. - 4.

1.	**Limit contact (SPDT)**	
	1	1 contact max. 250 V AC/2 A
	2	2 contacts max. 250 V AC/2 A
2.	**True value output**	
	1	0..10 V (max. 10 mA) standard
	2	0..20 mA burden max. 500Ω
	3	4..20 mA burden max. 500Ω
3.	**Supply voltage**	
	0	230 V ±10 % 50-60Hz
	1	115 V ±10 % 50-60Hz
	4	24 V ±10 % 50-60Hz
	5	20..28 V DC isolated
4.	**Measuring input /scale**	
	51	Pt100, -50..+50 °C
	52	Pt100, 0..50 °C
	53	Pt100, 0..100 °C
	535	Pt100, 0..150 °C
	54	Pt100, 0..200 °C
	55	Pt100, 0..300 °C
	56	Pt100, 0..400 °C
	57	Pt100, 0..600 °C
	61	Fe-CuNi (J), 0..300 °C
	62	Fe-CuNi (J), 0..450 °C
	63	Fe-CuNi (J), 0..600 °C
	71	NiCr-Ni (K), 0..600 °C
	72	NiCr-Ni (K), 0..900 °C
	73	NiCr-Ni (K), 0..1200 °C
	81	PtRh-Pt (S), 0..1200 °C
	82	PtRh-Pt (S), 0..1600 °C

Limit value switch GS125

Colour change of the scale lighting depending on the switch status

- **Universal input for unit signals,**
- **Pt100, thermocouple, potentiometer, switchable via front-side DIP switch**
- **1 or 2 relay outputs**
- **Universal relay connection**
- **Adjustable min/max contact function**
- **Actual value output 4 .. 20mA**
- **2-colour illuminated scales for limit value adjustment, colour depends on switch status**
- **With Pt100 sensors, monitoring of sensor break and short-circuit**
- **Wide-range mains adapter or 24 V DC**
- **Functional safety up to SIL2**
- **Housing width 12.5 mm**
- **Removal coded terminals**
- **Carrier rail mounting TS35 EN60715**
- **Safe galvanic isolation between input / output / auxiliary voltage**

Technical data

Limit value switches of the series GS125 are used in switch cabinets for process monitoring or for simple process regulation.

Both temperatures and derived variables such as voltage, current and resistance are used as control signals. In the process, 1 or 2 limit values can be monitored.

The universal configurability of the measuring inputs reduces the stock requirement for various applications.

The housing width of only 12.5mm enables space-saving installation in the switch cabinet. The scales for the limit value setting, illuminated red or green depending on the switch status, also enable operating in dark environments.

For assignment of the measuring unit to the scale labelling, 24 transparent adhesive labels are supplied. They can be glued between the adjusting wheels on the front panel.

Measurement inputs

Switchable via DIP switch

Unit signals	:	0/2..10 V 0/4..20 mA
Potentiometer	:	500 Ω..20 kΩ
Pt100	:	-50..50°C 0..50°C 0..100°C 0..150°C 0..200°C 0..300°C 0..500°C
Thermocouple		
FeCuNI, Type J	:	0..250°C 0..500°C
NiCrNi, Type K	:	0..500°C 0..750°C 0..1000°C
PtRhPt, Type S	:	0..1500°C

(Special measurement ranges available on request)

Technical data

Wide-range power supply

Voltage	:	20..125 V DC and 20..250 V AC, (47 - 63Hz), max. 1.5W

24 V power supply

Voltage	:	24 V DC +/-15%, max. 1.5W

Combined data

Rated voltage	:	253 V AC
Test voltage	:	3kV AC between input/relay output/auxiliary voltage
Operating temperature	:	-10..60 °C
Storage temperature	:	-20..80 °C
Air humidity	:	10..90 % (non-condensing)

Measurement inputs

Voltage	:	0/2..10 V, Ri approx. 20 kΩ
Current	:	0/4..20 mA, Ri approx. 60 Ω
Pt100	:	linearised, measurement current approx. 1.6 mA Relays become inactive if there is a sensor break or short-circuit
Thermocouple	:	linearised with comparison position compensation
Resistance	:	(3-wire), nominal value 500 Ω..20 kΩ Internal reference voltage approx. 1.5 V

Relay outputs

Switching voltage	:	< 250 V AC <2 A <500 VA < 125 V DC <0.2 A <25 W < 30 V DC <2 A <60 W
Switching frequency	:	max. 5 Hz
Switching hysteresis	:	approx. 1%
Functional safety	:	SIL2 in accordance with EN61508 (specific data available on request)
Setpoint setting	:	Scale precision: 2 %
Actual value output	:	4..20 mA, resistance max. 120 Ω, No galvanic isolation from the input signal

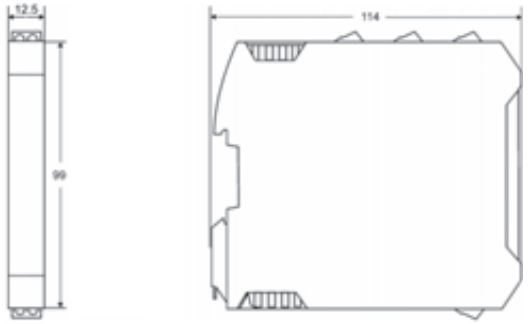
Input signal	Basic precision-actual value output	Temperature deviation *)
0/2..10V	0.2%	0.004%/K
0/4..20mA	0.2%	0.004%/K
Potentiometer	1%	0.007%/K
Pt100 -50.. 50°C	0.5%	0.03%/K
Pt100 0.. 50°C	0.9%	0.04%/K
Pt100 0..100°C	0.5%	0.03%/K
Pt100 0..150°C	0.2%	0.02%/K
Pt100 0..200°C	0.4%	0.02%/K
Pt100 0..300°C	0.3%	0.01%/K
Pt100 0..500°C	0.2%	0.007%/K
FeCuNi 0..250°C	1.0%	0.04%/K
FeCuNi 0..500°C	0.5%	0.03%/K
NiCrNi 0..500°C	0.5%	0.04%/K
NiCrNi 0..750°C	0.4%	0.03%/K
NiCrNi 0..1000°C	0.3%	0.02%/K
PtRhPt 0..1500°C	1.0%	0.04%/K

*) Measurement deviation depending on the environmental temperature in the switch cabinet (-10..+60°C)

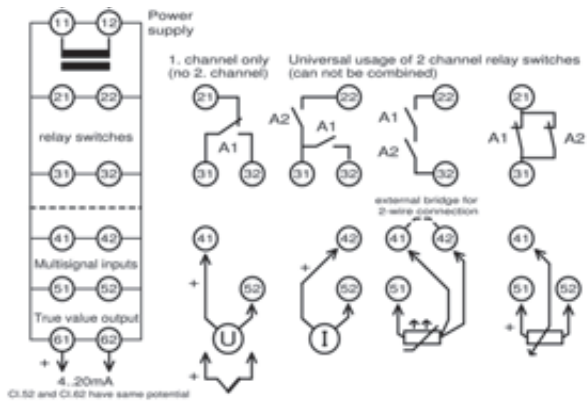
Housing

Dimensions (WxDxH) : 12.5 x 115 x 108 mm
Material : PA6.6, light grey, Flammability class V0 (UL94)
Weight : 120 g
Protection class : IP20
Screw terminals : 0,2..2,5 mm², AWG 24..14,
Push-In-Terminals : 0,5..1,5 mm², AWG 25..16, coded terminals

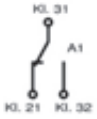
Dimensions



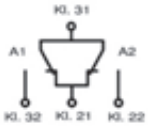
Connection diagram



Limit value contacts

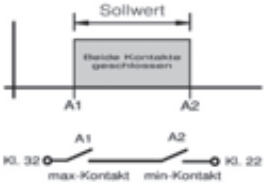


1 relay output

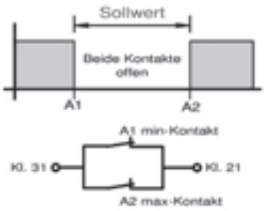


2 relay outputs in universal connection enable the following applications:

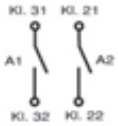
Two independent n.o. contacts



Window range monitoring - normally open / n.o.



Window range monitoring - normally closed / n.c.



Version with 2 potential-free n.o. contacts

Ordering code

GS 1. - 2. - 3. - 4.

1.	**Device version**	
	125L	Power supply 24V DC +/15%
	125LP	Power supply:24V DC +/-15% with carrier rail bus connection *)
	125M	Wide-range power supply 20..125 V DC / 20..253V AC
2.	**Limit value contacts**	
	1	1 relay (changeover contact)
	2	2 relays (universal connection)
	3	2 relays (potential-free n.o. contacts)
3.	**Actual value output**	
	0	not provided
	1	Output 4..20 mA
4.	**Options**	
	00	No options
	01	Push-in terminals (plug-in)

*) Delivery incl. bus adapter see also separate information sheet Power-Rail

Temperature Guard TG50

Characteristics

The Temperature-Guard TG50 has inputs for temperature probes RTD (Pt100/Pt1000) and thermocouple J, K, N and S. Simple programming, up to 4 alarm outputs (SPDT) and an available fully isolated free programmable analog output 0/4..20 mA; 0/2..10 V DC offers a lot of solutions for temperature monitoring. Peak value indication for minimum and maximum measured temperature are stored in the background and can be read out from the display at any time.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 % 115 V AC ±10 % 24 V DC ±15 %
	:	< 5 VA
Operating temperature	:	-10..+55 °C
CE-conformity	:	EN 61326-1:2013 EN 60664-1:2007

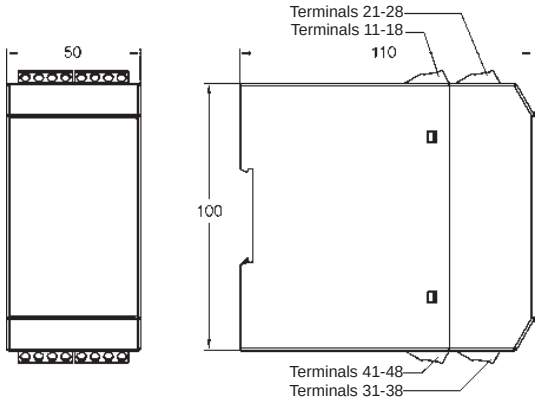
Input

Fault function	:	break of wire (RTD Pt100/1000, Thermocouple) and short-circuit (only Pt100/1000)
RTD	:	Pt100 (3-wire) -100.0..+600.0 °C Pt1000 (3-wire) -100.0..+300.0 °C
	:	Thermocouple (TC) type J -100.0..+800.0 °C type K -150..+1200 °C type N -150..+1200 °C type S -50..+1600 °C cold junction compensation integrated
Accuracy	:	<0.1 %, ±1 Digit
Display	:	Graphic LCD-Display, 128 x 64 Pixel, with white back-lite

Output

Alarm A1-A4	:	relay SPDT < 250 V AC < 250 VA < 2 A cos Phi ≥ 0.3 < 300 V DC < 40 W <2 A
Analog	:	0/4..20 mA burden ≤500 Ω 0/2..10 V burden >500 Ω isolated, automatic output changing (burden dependent)
- Accuracy	:	0.2 %;TK 0.01 %/K
Fault indication	:	for broken line or short circuit detection → analog output (programmable) 0 mA, < 3.6 mA or >21.5 mA → Alarm relays min. or max. function programmable
Case	:	Polyamide (PA) 6.6 , UL94V-0 TS35 acc. to DIN EN 60715:2001-09
Weight	:	approx. 450 g
Connection	:	screw terminals 0.14..2.5 mm² AWG 26..AWG14
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

Dimensions



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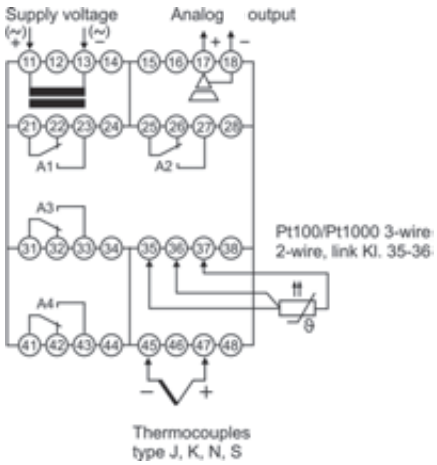
Connection diagram



Ordering code

	1.	2.	3.	4.	5.	6.
TG50	-	-	-	-	-	-

1. Device type/input

3	RTD Pt100, 3-wire, -100.0..+600.0 °C RTD Pt1000, 3-wire, -100.0..+300.0 °C Thermocouple J (Fe-CuNi), -100.0..+800.0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), -50..+1600 °C

2. Alarm output A1, A2

2R	2 relay SPDT

3. Alarm output A3, A4

00	not installed
2R	2 relay SPDT

4. Analog output

00	not installed
AO	0/4..20 mA, 0/2..10 V DC, isolated

5. Supply voltage

0	230 V AC, ± 10 % 50-60 Hz
1	115 V AC, ± 10 % 50-60 Hz
5	24 V DC, ± 15 %

6. Options

00	without option

Temperature Guard TG50Ex

Characteristics

The Temperature Guard TG50Ex offers intrinsically safe inputs for direct connection of temperature probes RTD (Pt100,Pt1000) and thermocouples type J, K, N or S, which are installed in the explosion endangered area.
Simple programming, 2 alarm outputs (SPDT) and an optional available fully free programmable isolated analog output 0/4..20 mA; 0/2..10 V DC offers a lot of solutions for temperature monitoring. The peak value indication for minimum and maximum measured temperature are stored in the background and can be read out from the display at any time.

Technical data

Power supply

Supply voltage	:	230 V AC ±10 % 115 V AC ±10 % 24 V DC ±15 % Um = 253 V AC or 125 V DC (terminals 11 and 13)
Power consumption	:	max. 5 VA
Operating temperature	:	-10..+55 °C
CE-conformity	:	ATEX-directive 2014/34/EU EN 60079-0:2006 EN 60079-11:2007 EN 61241-0:2006 EN 61241-11-0:2006
EMC-directive / standard	:	2014/30/EU / EN 61326-1:2013

Inputs

Explosions protection	:	II (1) G [Ex ia] IIC/IIB or II (1) D [Ex iaD]
Approval	:	TÜV 08 ATEX 554329
Fault detection	:	broken line (Pt100/1000 and thermo-couple) and short circuit (only Pt100/1000)
Input RTD	:	Pt100 (3-wire) -100.0..+600.0 °C Pt1000 (3-wire) -100.0..+300.0 °C (terminals 35, 36, 37)
Input TC	:	Thermocouple type J -100.0..+800.0 °C type K -150..+1200 °C type N -150..+1200 °C type S -50..+1600 °C cold junction compensation integrated (terminals 45 and 47)
Accuracy	:	<0.1 %, ±1 Digit
Temperature coefficient	:	0.01 %/K

Safety data

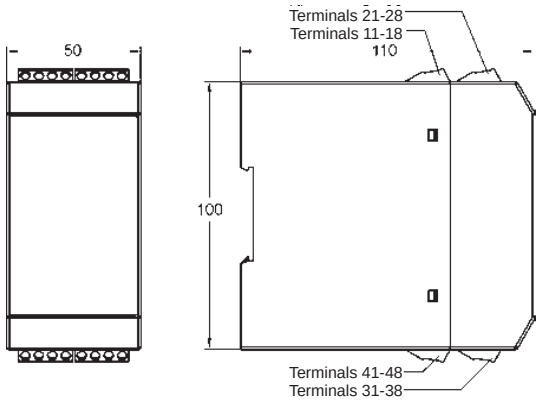
Max. voltage no load U_0	:	1,4 V	
Max. short circuit curr. I_0	:	2.5 mA	
Max. output power P_0	:	3 mW	
Resistance R	:	5600 Ω	
Characteristic curve	:	trapezoidal	
Internal inductivity	:	4 µH	
Internal capacity	:	135 nF	
Explosion protection		**Ex ia/IIC**	**ia/IIB**
Max. external inductivity	:	100 mH	100 mH
Max. external capacity	:	25 µF	120 µF

Outputs

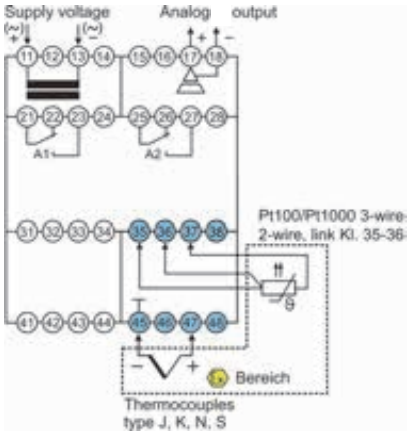
Alarm outputs	:	relay SPDT < 250 V AC < 250 VA < 2 A cos Phi ≥ 0.3 < 300 V DC < 40 W <2 A (terminals 21, 22, 23; 25, 26, 27)
Analog output	:	0/4..20 mA burden ≤ 500 Ω 0/2..10 V burden > 500 Ω, isolated output changes automatically (burden depending)
- Accuracy	:	0.2 %; TK 0.01 % / K (terminals 17 and 18)
Fault function	:	for broken line or short circuit detection → analog output (programmable) 0 mA, < 3.6 mA or >21.5 mA → alarm relays min. or max. function programmable
Display	:	graphic-LCD-display, 128 x 64 Pixel with white LCD backlit
Case	:	Polyamide (PA) 6.6, UL94V-0 TS35 acc. to DIN EN 60715
Weight	:	approx. 450 g
Connection	:	screw terminals 0.14..2.5 mm² AWG 26..AWG14
Protection class	:	case IP30, terminals IP20 acc. to BGV A3

Continue next page

Dimensions



Connection diagram



Ordering code

TG50Ex - 1. - 2. - 3. - 4. - 5. - 6.

1.	**Device type/input**	
	3	RTD Pt100, 3-wire, -100.0..+600.0 °C RTD Pt1000, 3-wire, -100.0..+300.0 °C Thermocouple J (Fe-CuNi), -100.0..+800.0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), -50..+1600 °C
	Inputs intrinsically safe	EX II (1) G [Ex ia] IIC/IIB EX II (1) D [Ex iaD]
2.	**Alarm outputs A1, A2**	
	2R	2 relay SPDT
3.	**Alarm outputs A3, A4**	
	00	not available
4.	**Analog output**	
	00	not installed
	AO	0/4..20 mA, 0/2..10 V DC, isolated
5.	**Supply voltage**	
	0	230 V AC, ± 10 % 50-60 Hz
	1	115 V AC, ± 10 % 50-60 Hz
	5	24 V DC, ± 15 %
6.	**Options**	
	00	without option

Thermal Limiter TB225

(in accordance with DIN EN 14597)

- **Can be used as a temperature limiter and monitor**
- **Certified in accordance with DIN EN 14597**
- **adapted for all sensors according to DIN EN14597**
- **Pt100 inputs, dual thermocouple, input signals**
- **2 changeover relays**
- **Configuration via backlit graphic display**
- **'White / Red' display colour change in the case of an alarm**
- **Safe galvanic isolation between input / output / auxiliary voltage**
- **Automatic recognition of the output signal**
- **Wide-range mains adapter**
- **Carrier rail mounting TS 35**

Characteristics

The temperature limiter TB225 is used for applications where thermal processes must be monitored and the system must be switched to a safe operating state in the case of a fault. The device has universal inputs for the connection of dual thermocouples,Pt100 sensors, and input signals (0/4..20mA or 0/2..10V). The safety function is provided by means of the main relay with configurable threshold. An additional relay with an independently adjustable threshold is provided for additional signalling. The TB225 also offers an analog output which can be freely defined within the measuring range of the temperature input. The resetting of the device in the operating mode as a temperature limiter can take place via the buttons on the front, the integrated graphic display, or using an external switch or external voltage. The TB225 has safe 3-way electrical isolation between input, output, and auxiliary voltage.

Brief information

The connected temperature signal is evaluated and monitored. If the permissible threshold is reached or an error occurs within the permissible temperature range, the TB225 switches off immediately. The additional relay output of the TB225 enables the function of a preliminary alarm with an independent threshold. TB225 is adapted for the use with all sensors according to EN14597.
The following operating modes are possible through configuration:

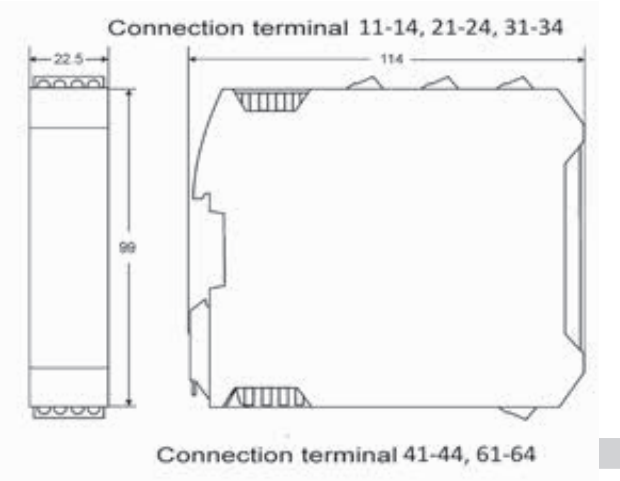
Temperature limiter:
Maximum or minimum monitoring with catch, manual resetting after fault elimination via the front keys or an external switch / voltage signal.
Operating methods in accordance with EN14597: 02/2015: Type 2B, 2H, 2V

Temperature monitor:
Maximum or minimum monitoring without catch, automatic resetting on return to the permissible range.
Operating methods in accordance with EN 14597: 02/2015: Type 2B

Technical data

Auxiliary power		
Auxiliary voltage	:	18 – 230 V AC/DC
Power consumption	:	< 5 VA
Rated voltage	:	250V AC in accordance with EN 60730-1: 10/2012, between input / relay output / auxiliary voltage, Degree of contamination 2, Overvoltage category III Rated surge voltage 4kV
CE Conformity	:	EN 14597 02/2015 EN 61326: 07/2013
Environmental conditions		
Operating temperature	:	-10..+55 °C
storage temperature	:	-20..+60 °C
Relative air humidity	:	< 95 %
Condensation	:	not permitted
Approvals		**Title**
DIN EN 14597: 02/2015	:	Temperature control devices and temperature limiters for heat generating systems
Input		
Pt100	:	-100.0..600.0°C
Accuracy	:	0,2%, ±1 Digit
Temperature coefficient	:	0,01%/K
Thermocouple	:	Type J:Fe-CuNi-100..800°C Type K: NiCr-Ni -150..1200°C Type N:NiCrSi-NiSi -150..1200°C Type S:Pt10RH-PT 0..1600°C Reference junction compensation integrated
Accuracy:	:	<0.3 %, ±1 digit
Temperature coefficient	:	0.01 %/K
Analog input	:	0/2..10 V DC, 0/4..20 mA 0..10 V und 0..20 mA not allowed for temperature limiter
Accuracy	:	0,2%, ±1 Digit
Temperature coefficient	:	0,01%/K
Display	:	graphic LC display with 32 x 90 pixel, with white/red background lighting
Outputs		
Switching outputs	:	2 x relay
Changeover relay	:	< 250 V AC < 500 VA < 2 A ohmic load < 30 V DC < 60W < 2 A ohmic load Internal main relay secured with 2A fuse! Fuse is not interchangeable!
Analog output	:	0/4..20 mA load ≤ 500 Ω 0/2..10 V DC load > 500 Ω electrically isolated. Output switches automatically (load-dependent)
Housing	:	polyamide (PA) 6.6 , UL94V-0, TS35 in accordance with DIN EN 60715
Weight	:	approximately 180 g
Connection	:	screw terminals 0.14..2.5 mm² with wire protection 0.14 - 2.5 mm² (AWG 26 - 14)
Protection rating	:	IP20, BGV A3

Dimensions

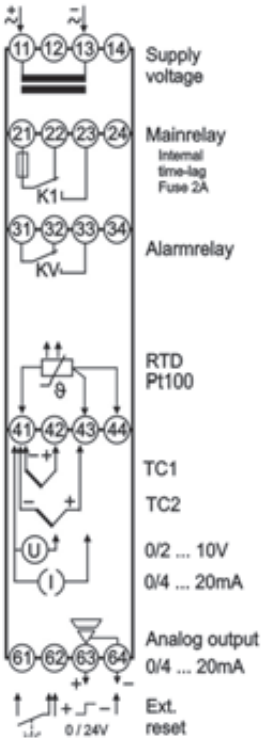


Ordering code

TB225 - 1. - 2. - 3. - 4.

1.	**Version/input**	
	0	Universal input
2.	**Output**	
	0	2 relay / 1 analog output 0/4..20 mA
3.	**Auxiliary voltage**	
	0	18 – 230 V AC/DC
4.	**Options**	
	00	without option
	01	Push-in terminal block

Connection diagram



Safety Temperaturee Limiter STL50

(acc. to DIN EN 14597, SIL 2)

- **Useable as Temperature Limiter/-Guard and Exhaust gas Temperature Limiter**
- **Certified according to DIN EN 14597 SIL2**
- **Inputs RTD Pt100 or double-thermocouple**
- **Limit value and switching hysteresis programmable**
- **Basic accuracy < 0.5%, ± 2 digit**
- **Reaction time ≤ 0.5 s**
- **1 Relay for safety-relevant temperature limit, forcibly guided**
- **1 Relay for pre-alarm**
- **Analogue output 0/4... 20mA; 0/2... 10 VDC**
- **Memory function for error message**
- **Operator lock (password protection)**
- **Contact input for external reset**
- **24 V DC signal for external alarm message**

Characteristics

The STL50 safety temperature limiter is used where ever thermal processes must be monitored and the system must be transferred into a safe operational state in case of fault. If the permissible temperature limit value is reached, or if a fault occurs within the permissible temperature range on the monitoring equipment (sensor open, sensor short-circuit, failure of a component part in the device, fault in the software, failure or inadmissible value of the supply voltage etc.), the STL50 switches off without delay.
The alarm contact is activated, the LED ALARM on the front panel and the back-lighting of the display light up, and the error cause is indicated as plain text on the display. In addition, there is a 24 V DC signal present on the terminals 16-17 for an external alarm signal. Alternatively, the device can be reset using an external contact. In addition, the STL50 optionally has an programmable analog output with up or downscaling function, as well as a precontact.

Description

Programming
The device is programmable via front side buttons in connection with the graphic display.
Operating modes
The device can be used as:
STB ➔ Maximum- or minimum-monitoring with hold. Reset possible after omission of the fault with the external or internal button.
ASTB ➔ as before, but monitoring the exhaust gas temperature
STW ➔ Maximum- or minimum-monitoring without hold. Automatic reset after leaving the dangerous range
Switching hysteresis always acts in the direction of safe range.
The last fault is stored as plain text and can be called up in the working level and deleted.

Temperature sensor
When using the device according to DIN EN 14597, temperature sensors which are approved according to DIN EN 14597 must be used!

Technical data

Power supply

Supply voltage	:	230 V AC ±10 % 115 V AC ±10 % 24 V DC ±15 %
Power consumption	:	< 4 VA
CE-conformity	:	EN 61326-1: 2013 EN 61326-2-2: 2013

Ambient conditions

Operating temperature	:	-10..+55 °C
Storage temperature	:	-30..+60 °C
Relative humidity	:	< 95 %
Condensation	:	not permitted
Vibrations	:	operation only in vibration less ambient

Approvals		**Title**
EN 14597:2012	:	Temperature control devices and temperature limiters for heatgenerating systems
EN 61508:2011 SIL2	:	Functional security safety-related electrical/electronic/programmable electronic systems

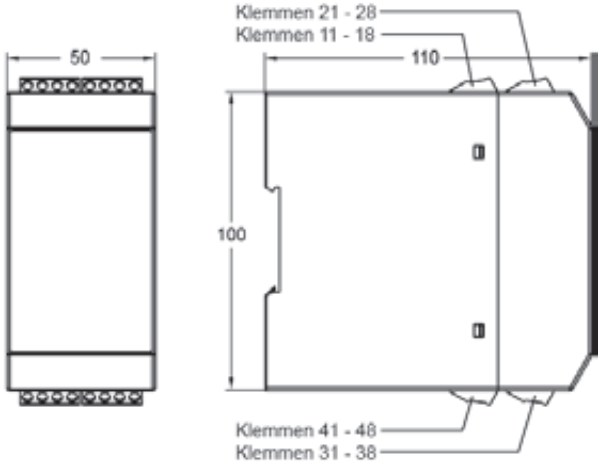
Input

Pt100	:	in the range -100,0..+600,0 °C 3-wire, max. line resistance 4 Ω each line sensor current <1 mA (non self heating)
Thermocouple		
Typ J	:	Fe-CuNi , -100,0..+800,0 °C
Typ K	:	NiCr-Ni,-150..+1200 °C
Typ N	:	NiCrSi-NiSi, -150..+1200 °C
Typ S	:	Pt10Rh-Pt, 0..+1600 °C cold junction compensation integrated
Accuracy	:	<0,5 %, ±2 Digit
Temperature coefficient	:	0,01 %/K
Display	:	graphic-LCD-display 28 x 64 Pixel, with white LCD-backlight

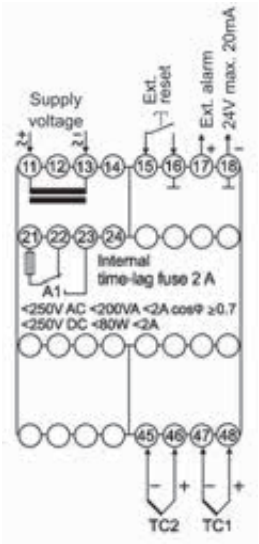
Outputs

Main relays	:	SPDT <250 V AC <200 VA <2 A cosn ≥0,7; <250 VDC <80 W <2 A, forcibly guided, internal fuse 2 A (slow-blow)
Pre-alarm relays	:	SPDT <250 V AC <500 VA < 2 A ohmic load; <30 VDC <60 W <2 A,
Analogue output	:	0/4 … 20mA burden ≤500Ω; 0/2 … 10V burden > 500Ω, galvanically isolated Output automatically changing (burdendependend)
Accuracy (analogue output)	:	0,4 %; TK: 0,01% /K
Case	:	Polyamide (PA) 6.6 , UL94V-0, TS35 according to DIN EN 60715
Weight	:	approx. 450 g
Connection	:	screw terminals 0,14..2,5 mm² (AWG 26 .. 14)
Protection class	:	IP20, DIN EN 60529, BGV A3

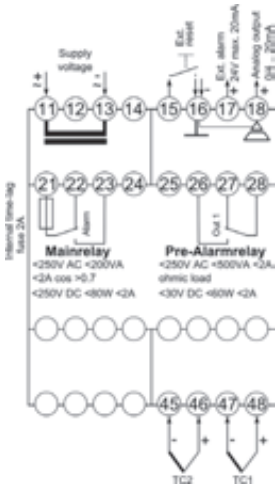
Dimensions



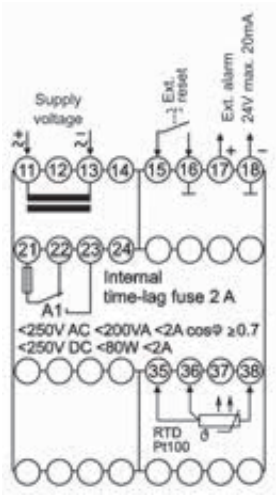
Connection diagrams



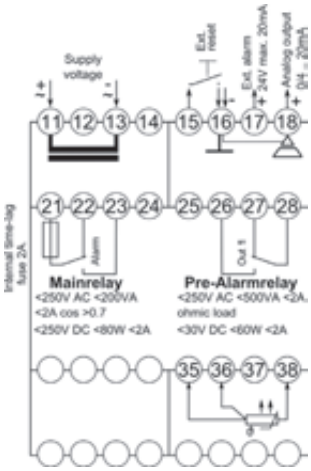
Thermocouple 1R



Thermocouple 2RAO



Pt100-1R



Pt100-2RAO

Accessories:

Temperature sensor

- When using STL50 as safety limiter -or guard- according to EN14597, safety temperature sensors acc. To 14597 have to be used: See our products TR296/293, TC296/293
- Temperature sensor for SIL applications:
  Temperature sensors without transducers are passive elements and not SIL-classified.
  All sensors of our portfolio can be used. PFD characteristics for resistance elements or thermocouples are to be found in the standard tables. Alternatively manufacturer declarations of evaluation electronics and sensors to the SIL level can be created on request.

Ordering code

STL50 - 1. - 2. - 3. - 4.

1.	**Device type/input**	
	1	Pt100, 3-wire, -100,0..+600,0 °C
	5	Thermocouple J (Fe-CuNi), -100,0..+800,0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), 0..1600 °C
2.	**Output**	
	1R	1 alarm output,relay SPDT
	2RAO	2 relay SPDT + analogue output
3.	**Supply voltage**	
	0	230 V AC, ± 10 % 50-60 Hz
	1	115 V AC, ± 10 % 50-60 Hz
	4	24 V AC, ±15 % 50-60 Hz
	5	24 V DC, ± 15 %
4.	**Options**	
	00	Without option

Safety Temperature Limiter STL50Ex
(acc. to DIN EN 14597, SIL 2)

- **Useable as Temperature Limiter/-Guard and Exhaust gas Temperature Limiter**
- **Certified according to DIN EN 14597 SIL2**
- **Intrinsically safe input for use with temperature sensors in 0/20; 1/21; 2/22**
- **Inputs RTD Pt100 or double-thermocouple**
- **Limit value and switching hysteresis programmable**
- **Basic accuracy < 0.5%, ± 2 digit**
- **Reaction time ≤ 0.5 s**
- **1 Relay for safety-relevant temperature limit, forcibly guided**
- **1 Relay for pre-alarm**
- **Analogue output 0,4..20mA; 0/2..10 VDC**
- **Memory function for error message**
- **Operator lock (password protection)**
- **Contact input for external reset**
- **24 V DC signal for external alarm messag**

Characteristics

The STL50Ex safety temperature limiter is used where ever thermal processes must be monitored and the system must be transferred into a safe operational state in case of fault. If the permissible temperature limit value is reached, or if a fault occurs within the permissible temperature range on the monitoring equipment (sensor open, sensor short-circuit, failure of a component part in the device, fault in the software, failure or inadmissible value of the supply voltage etc.), the STL50Ex switches off without delay. The alarm contact is activated, the LED ALARM on the front panel and the back-lighting of the display light up, and the error cause is indicated as plain text on the display. In addition, there is a 24 V DC signal present on the terminals 16-17 for an external alarm signal. Alternatively, the device can be reset using an external contact. In addition, the STL50Ex optionally has an programmable analog output with up or downscaling function, as well as a precontact.

Description

Programming
The device is programmable via front side buttons in connection with the graphic display.

Operating modes
The device can be used as:
STB ➔ Maximum- or minimum-monitoring with hold. Reset possible after omission of the fault with the external or internal button.
ASTB ➔ as before, but monitoring the exhaust gas temperature
STW ➔ Maximum- or minimum-monitoring without hold. Automatic reset after leaving the dangerous range.

Switching hysteresis always acts in the direction of safe range.
The last fault is stored as plain text and can be called up in the working level and deleted.

Temperature sensor
When using the device according to DIN EN 14597, temperature sensors which are approved according to DIN EN 14597 must be used!

Technical data

Power supply			
Supply voltage	:	230 V AC ±10 % 115 V AC ±10 % 24 V DC ±15 %	
Power consumption	:	< 4 VA	
CE-conformity	:	EN 61326-1: 2013 EN 61326-2-2: 2013	
Ambient conditions			
Operating temperature	:	-10..+55 °C	
Storage temperature	:	-30..+60 °C	
Relative humidity	:	< 95 %	
Condensation	:	not permitted, operation only in vibration less ambient	
Approvals		**Title**	
EN 14597:2005	:	temperature control devices and temperature limiters for heat-generating systems	
EN 61508:2001 SIL2	:	Functional security safety-related electrical/electronic/programmable electronic systems	
Input			
Explosion protection	:	II (1) G [Ex ia] IIC/IIB or II (1) D [Ex ia Da] IIIC	
Approval	:	TÜV 07 ATEX 554295	
Pt100	:	-100.0..+600.0 °C, 3-wire, 3-wire, max. line resistance 4 Ω each line, sensor current<1 mA (non self heating)	
Data in case of an error			
Max. voltage no load U_0	:	1.4 V	
Max. short circuit current I_0	:	6 mA	
Max. power loss P_0	:	7 mW	
Min. internal resistor R	:	1.6 kΩ (curve trapezoidal)	
Explosion protection		**Ex ia/IIC**	**ia/IIB**
Max. external inductivity	:	100mH	20mH
Max. external capacity	:	110µF	28 µF
Internal capacity	:	negligible	
Internal inductivity	:	negligible	
Thermocouple			
Type J	:	Fe-CuNi, -100.0..+800.0°C	
Type K	:	NiCr-Ni, -150..+1200 °C	
Type N	:	NiCrSi-NiSi, -150..+1200°C	
Type S	:	Pt10Rh-Pt, 0..1600 °C cold junction compensation integrated	
Data in case of an error			
Max. voltage no load U_0	:	0.7 V	
Max. short circuit current I_0	:	2 mA	
Max. power loss P_0	:	1.5 mW	
Min. internal resistor R	:	5 kΩ (curve trapezoidal)	
Explosion protection		**Ex ia/IIC**	**ia/IIB**
Max. external inductivity	:	100mH	50mH
Max. external capacity	:	240µF	54 µF
Internal capacity	:	negligible	
Internal inductivity	:	negligible	
Accuracy	:	<0.5 %, ±2 Digit	
Temperature coefficient	:	0.01 %/K	
Display	:	graphic LCD-display 28 x 64 Pixel, with white LCD-backlight	

Continue next page >

Output

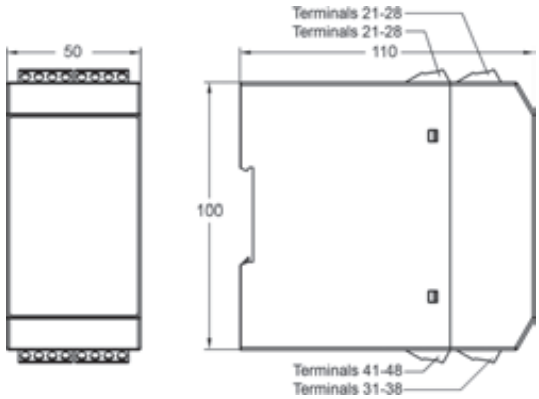
Relay	:	SPDT <250 V AC <200 VA <2 A cos Phi ≥0.7 <250 VDC <80 W <2 A, internal fused 2 A (slow-blow)
Pre-alarm relays	:	SPDT <250 V AC <500 VA <2 A ohmic load;<30 VDC <60 W <2 A,
Analogue output	:	0/4 … 20mA burden ≤500Ω; 0/2..10V burden > 500Ω, galvanically isolated Output automatically changing (burdendependend)
Accuracy (analogue output)	:	0,04 %; TK: 0,01% /K
Case	:	Polyamide (PA) 6.6 , UL94V-0, TS35 acc. to DIN EN 60715
Weight	:	approx. 450 g
Connection	:	screw terminals 0.14..2.5 mm² (AWG 26 .. 14)
Protection class	:	IP20, DIN EN 60529, BGV A3

Ordering code

STL50Ex - 1. - 2. - 3. - 4.

1.	**Device type/input**	
	1	Pt100, 3-wire, -100.0..+600.0 °C
	5	Thermocouple J (Fe-CuNi), -100.0..+800.0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), 0..1600 °C
2.	**Output**	
	1R	1 alarm output relay
	2RAO	2 relay outputs + analog output
3.	**Supply voltage**	
	0	230 V AC, ± 10 % 50-60 Hz
	1	115 V AC, ± 10 % 50-60 Hz
	5	24 V DC, ± 15 %
4.	**Options**	
	00	without option

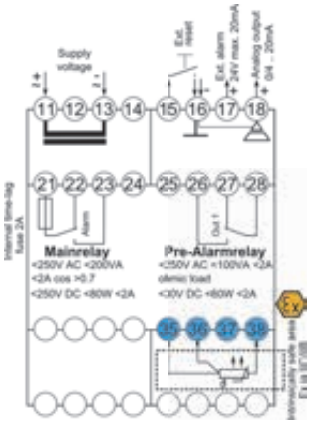
Dimensions



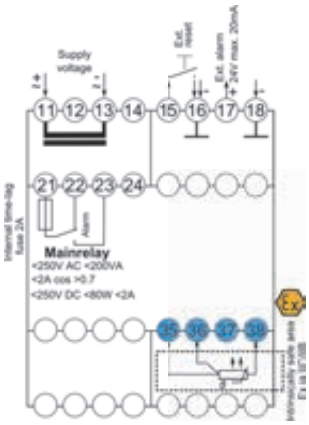
Connection diagrams

Pt100

with pre-alarm / analog

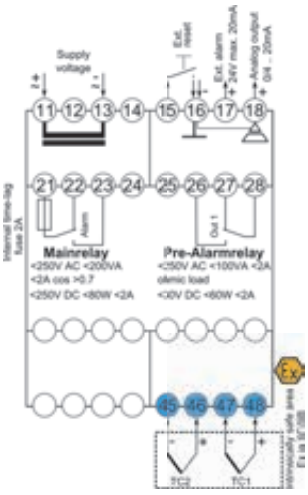


without pre-alarm / analog

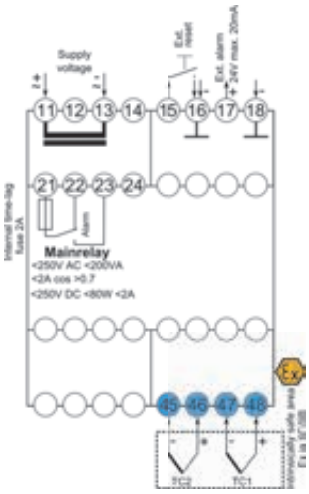


Thermo

with pre-alarm / analog



without pre-alarm / analog



Accessories

Temperature sensor

- When using STL50Ex as safety limiter -or guardaccording to EN14597, safety temperature sensors acc. To 14597 have to be used: See our products TR296/293, TC296/293

- Temperature sensor for SIL applications: Temperature sensors without transducers are passive elements and not SIL-classified. All sensors of our portfolio can be used.
PFD characteristics for resistance elements or thermocouples are to be found in the standard tables. Alternatively manufacturer declarations of evaluation electronics and sensors to the SIL level can be created on request.

Safety Temperature Limiter Safety-TL4896

(acc. to DIN EN 14597, SIL 2)

- **Useable as Temperature Limiter/-Guard and Exhaust gas Temperature Limiter**
- **Certified according to DIN EN 14597 SIL2**
- **Inputs RTD Pt100 or double-thermocouple**
- **Limit value and switching hysteresis programmable**
- **Basic accuracy < 0.5%, ± 2 digit**
- **Reaction time ≤ 0.5 s**
- **1 Relay for safety-relevant temperature limit, forcibly guided**
- **1 Relay for pre-alarm**
- **Analogue output 0/4... 20mA; 0/2... 10 VDC**
- **Memory function for error message**
- **Operator lock (password protection)**
- **Contact input for external reset**
- **24 V DC signal for external alarm message**

Characteristics

The STL4896 safety temperature limiter is used where ever thermal processes must be monitored and the system must be transferred into a safe operational state in case of fault. If the permissible temperature limit value is reached, or if a fault occurs within the permissible temperature range on the monitoring equipment (sensor open, sensor short-circuit, failure of a component part in the device, fault in the software, failure or inadmissible value of the supply voltage etc.), the STL4896 switches off without delay.
The alarm contact is activated, the LED ALARM on the front panel and the back-lighting of the display light up, and the error cause is indicated as plain text on the display. In addition, there is a 24 V DC signal present on the terminals 16-17 for an external alarm signal. Alternatively, the device can be reset using an external contact. In addition, the STL4896 has an programmable analog output with up or downscaling function, as well as a precontact.

Description

Programming
The device is programmable via front side buttons in connection with the graphic display.

Operating modes
The device can be used as:

STB Maximum- or minimum-monitoring with hold. Reset possible after omission of the fault with the external or internal button.
ASTB as before, but monitoring the exhaust gas temperature
STW Maximum- or minimum-monitoring without hold. Automatic reset after leaving the dangerous range

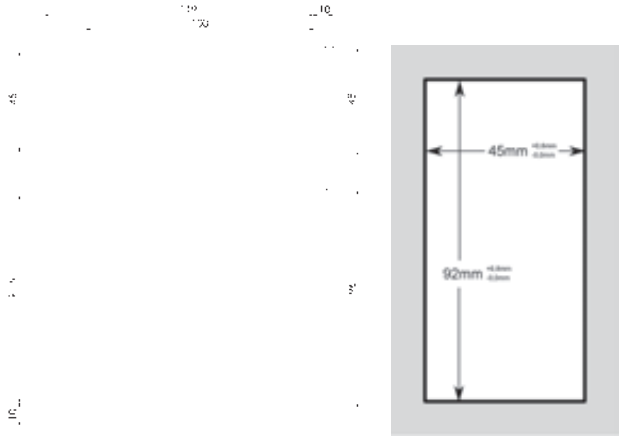
Switching hysteresis always acts in the direction of safe range. The last fault is stored as plain text and can be called up in the working level and deleted.

Temperature sensor:
When using the device according to DIN EN 14597, temperature sensors which are approved according to DIN EN 14597 must be used!

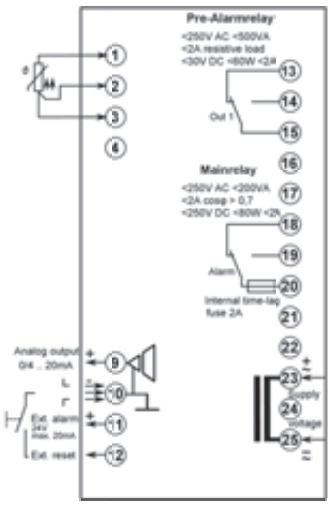
Technical data

Power supply		
Supply voltage	:	230 V AC ±10 % 115 V AC ±10 % 24 V DC ±15 %
Power consumption	:	< 4 VA
CE-conformity	:	EN 61326-1: 2013 EN 61326-2-2: 2013
Ambient conditions		
Operating temperature	:	-10..+55 °C
Storage temperature	:	-30..+60 °C
Relative humidity	:	< 95 %
Condensation	:	not permitted
Vobrations	:	operation only in vibration less ambient
Approvals		**Title**
EN 14597:2012	:	temperature control devices and temperature limiters for heat-generating systems
EN 61508:2011 SIL2	:	functional security safety-related electrical/electronic/programmable electronic systems
Input		
Pt100	:	in the range -100,0..+600,0 °C 3-wire, max. line resistance 4 Ω each line sensor current <1 mA (non self heating)
Thermocouple		
Typ J	:	Fe-CuNi -100,0..+800,0 °C
Typ K	:	NiCr-Ni -150..+1200 °C
Typ N	:	NiCrSi-NiSi -150..+1200 °C
Typ S	:	Pt10Rh-Pt 0..+1600 °C cold junktion compensation integration
Accuracy	:	<0,5 %, ±2 Digit
Temperature coefficient	:	0,01 %/K
Display	:	graphic-LCD-display mit 128 x 64 Pixel, with white LCD-backlight
Outputs		
Main relays	:	SPDT <250 V AC <200 VA <2 A cos Phi ≥0,7 <250 VDC <80 W <2 A, forcibly guided, internal fuse 2 A (slow-blow)
Pre-alarm relays	:	SPDT <250 V AC <500 VA <2 A ohmic load; <30 VDC <60 W <2 A
Analogue output	:	0/4…20mA burden ≤ 500Ω; 0/2…10V burden > 500Ω, galvanically isolated, output automatically changing (burden dependend)
Accuracy (Analogue output)	:	0,4%; TK: 0,01%/K
Case	:	Polyamide (PA) 6.6 , UL94V-0,
Weight	:	approx. 450 g
Connection	:	Spring terminals 0,2..2,5 mm² (AWG 24 .. 12)
Protection class	:	Front IP65, DIN EN 60529, BGV A3

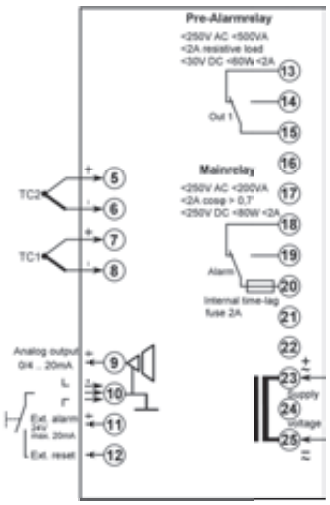
Dimensions



Wiring



Pt100 type



Thermocouple type

Accessories:

Temperatur sensor

- When using Safety-TL4896 as safety limiter -or guard- according to EN14597, safety temperature sensors acc. To 14597 have to be used: See our products TR296/293, TC296/293
- Temperature sensor for SIL applications:
  Temperature sensors without transducers are passive elements and not SIL-classified.
  All sensors of our portfolio can be used. PFD characteristics for resistance elements or thermocouples are to be found in the standard tables. Alternatively manufacturer declarations of evaluation electronics and sensors to the SIL level can be created on request.

Ordering code

STL4896 - 1. - 2. - 3. - 4.

1.	**Device type/Input**	
	1	Pt100, 3-wire, -100,0..+600,0 °C
	5	Thremocouple J (Fe-CuNi), -100,0..+800,0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), 0..1600 °C
2.	**Output**	
	2RAO	2 relay output and analogue output
3.	**Supply voltage**	
	0	230 V AC, ± 10 % 50-60 Hz
	1	115 V AC, ± 10 % 50-60 Hz
	4	24 V AC, ±15 % 50-60 Hz
	5	24 V DC, ± 15 %
4.	**Options**	
	00	without option

Alarm-Display SD9648

Characteristics

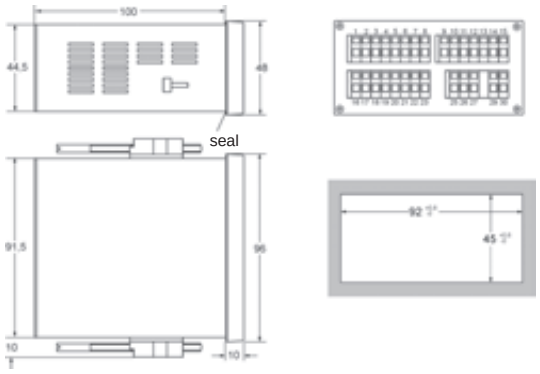
The Alarm-Display SD9648 will be used for indicating and evaluations of alarm signals as well as analog measured values. Activation with voltage free contacts, 0/24 V signals or 0/4..20 mA for monitoring of analog measuring values.

Technical data

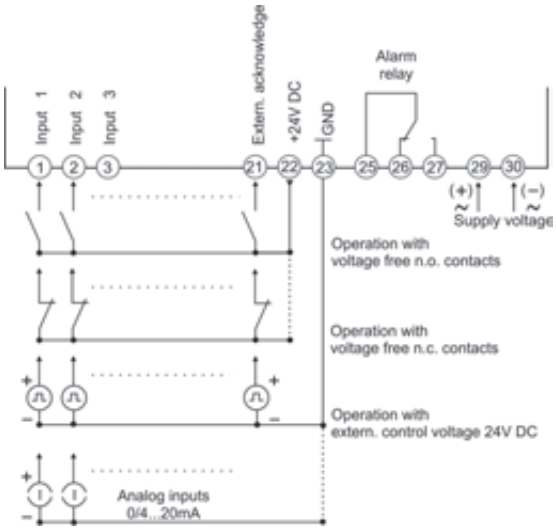
Power supply
Supply voltage : 230 V AC ±10 %, 115 V AC ±10 %, 24 V AC ±10 %, 24 V DC ±15 %
Frequency AC : 50 / 60 Hz
Power consumption : max. 3.5 VA
Operating temperature : 0..50 °C
CE- conformity : EN 61326-1:2013 EN 60664-1:2007

Inputs
Digital : 0 / 24 V DC, Ri = 10 kΩ, switching threshold low < 4 V, high >11 V max. 35 V
Impulse/pause : min. 10 ms
Analog : 0 / 4..20 mA, Ri = 100 Ω voltage drop max. 2.2 V at 20 mA over-load limit approx. 23 mA (max. voltage 35 V). With powerless device the inputs became a high resistance
Accuracy : 0.1 %, ± 1 Digit
Transmitter supply : Uo = 24 V, Ri 150 Ω, max. 50 mA
Display : LCD-dot matrix display white / blue, character height 6.5 mm, with back-lite 2 lines 16 characters each
Display interval : 0.5 s (refresh time)
Output
Relay SPDT : < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A
Case : panel case DIN 96x48, Material PA6-GF; UL94V-0
Dimensions : front 96x48 mm, mounting depth 100mm
Weight : max. 390 g
Connection : clamp terminals, 0.08..1.5 mm², AWG28..AWG14
Protection class : front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

SD9648 - 1. [ ] - 2. [ ] - 3. [ ] - 4. [ ] - 5. [ ]

1.	**Inputs**		
	1	20 digital inputs	
	2	12 digital + 8 analog inputs	
2.	**Real time clock**		
	0	without clock	
	1	with clock	
3.	**Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	±15 %
4.	**Options**		
	00	without option	
5.	**Additional text** above the display (3x90mm HxW)		

Insulation Guard IW1000

- **Time optimized pulse measuring method**
- **2 alarm outputs relay, 1 analogue output**
- **Automatic and manual self test**
- **Acoustic alarm in case of malfunction**
- **Devices for railway vehicles and healthcare facilities available**

Characteristics

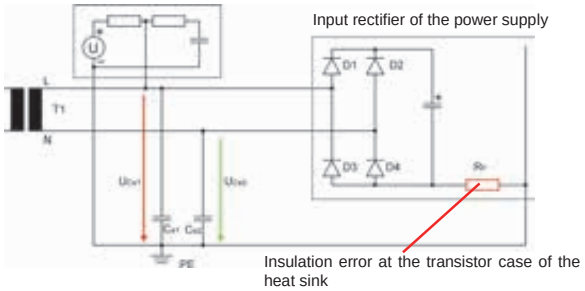
The isolation-guard IW1000 will be used for insulation-monitoring in machines and systems with ungrounded voltage systems. The universal design allows the monitoring of all AC - and DC -Systems.

Common informations

In well-insulated IT-systems (new installations) with a lot of connected devices a high leakage capacity may occur due grounded input filters, cable capacities etc. Common insulation guards, working with pulse measuring mode, are running with fixed pulse widths. For well operation, they must be adapted manually to the actual leakage capacity of the system. There are also insulation guards available, working with self adapting pulse width. However these devices need a long measuring time because the result will be at least available, when loading voltage will find its maximum (no more change in load voltage). With the time optimized measuring method of the IW1000, insulation resistance and leakage capacity will be calculated after 2-time constants. Therefor the reaction time of the IW1000 is very short. By applications of modern signal processing-algorithms in the software and over sampling-mode in connection with high signal-dissolution of the AD-converter, the IW1000 runs with high stability and reliable measurement.

Comparison of the DC-measuring procedure with the time optimized pulse measuring procedure of the IW1000

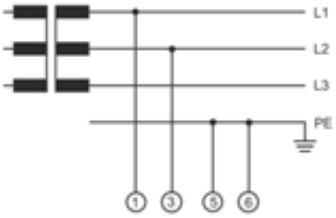
Simple circuit of an insulation guard with the DC-measurement method



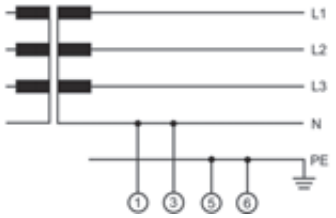
DC-components of the leakage currents could be appear without insulation error in case of an asymmetric load during positive and negatives half-waves. For example: Power controlled devices which are operating in phase-angle control or as zero-crossing switch (SSR- relays). Even frequency converters produce high DC-leakage currents. With time optimized pulse measuring method of the IW1000, DC-voltage-shares at the leakage capacities measured during positive and negative voltage pulses will be eliminated automatically by calculation. Therefor the measuring method is qualified for AC-AC/DC and true DC-systems.

Connection examples

3-phase (AC) without neutral wire



3-phase (AC) with neutral wire



Characteristic curve 1, measuring time

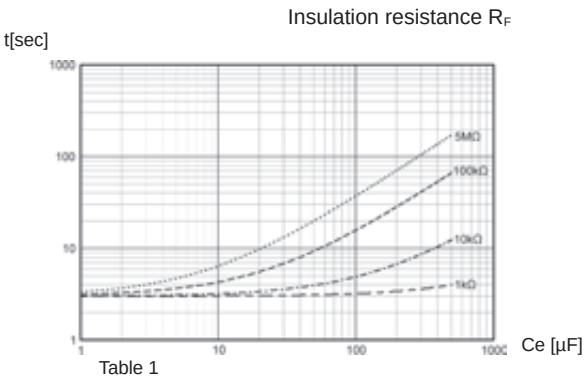


Table 1

Technical data

Power supply

Supply voltage	: 230 V AC, 115 V AC, 24 V AC ±10 %; 16.8..33.6 V DC, 10.8..15.6 V DC
Power consumption	: max. 4 VA
Operating temp.	: -10..+55 °C;
Option 01	: -25..+70 °C
Relative humidity	: 75 % for annual mean in accordance with DIN EN50155, 95 % for 30 days all year continuously, seldom or low humidity doesn't lead to malfunctions or cancellations.
CE-conformity	: EN 60664-1, EN 61326-2-4, EN 50121-3-2, EN 60068-2-1/2/6/27
add. for Option 01	: EN 50155 in following points: EN 61373, EN 60068-2-27
Fire safety	: Fulfilment of fire safety requirements for railway vehicles acc. to the basic standard NFF16-101 paticulary (IEC) EN 60695-2-12 (Glow-wire testing temperature 850 °C) and NFF16-102 particulary 6.2; 6.4; 6.5

Input

U_{nom}	: 0..690 V AC/DC; ab UN >400 V operation only with cover clamp permitted	
Frequency range	: 16 $_{2/3}$..400 Hz	
Measurement	**(standard)**	**(health care)**
U_{meas} max.	: ± 40 V	± 20 V
I_{meas} max.	: ± 220 µA	± 110 µA
Ri DC	: 180 kΩ (2 x 360 kΩ parallel)	
Impedance Zi	: 180 kΩ (2 x 360 kΩ parallel) at 50 Hz	

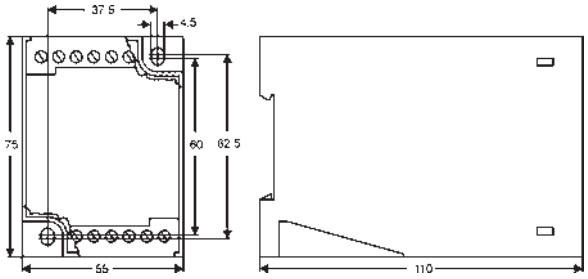
Operating values

AL1/AL2	: 1 kΩ..5 MΩ x 1,1 (1,1 kΩ..5,5 MΩ) programmable
Accuracy	: ± 5 %, ± 1 kΩ in the range 1 kΩ..5 MΩ
Hysteresis	: 10..100 % of the setpoint programmable
Measuring time	: see table1
System leakage capacity	: max. 500 µF
Display	: LCD Dot-Matrix, 2 lines 8 characters each, character height 5 mm, with back light
Indicating range	: 1 kΩ..9.9 MΩ
Solution	
1 MΩ..9.9 MΩ	: 0.1 MΩ
1 kΩ..999 kΩ	: 1 kΩ

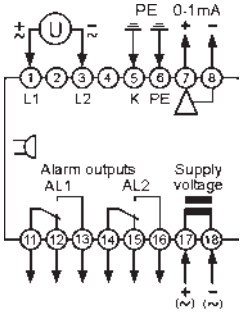
Output

Relay SPDT	: < 250 V AC < 250 VA < 5 A; < 300 V DC < 50 W < 2 A
Analogue	: 0..1 mA, R_F (Insulation resistance)
Case	: Polyamide (PA) 6.6 , UL94V-0, acc. to DIN EN 60715:2001-09
Weight	: approx. 390 g
Connection	: screw terminals 4 mm²
Protection class	: case IP40, terminals IP20, BGV A3

Dimensions



Connection diagram



Ordering code

IW1000 - 1. - 2. - 3. - 4.

1.	**Model**		
	1	2 inputs L1 + L2 ,	
		output 0..1 mA for ext. pointer instruments	
	3	as 1, for health care facilities	
2.	**Supply voltage**		
	0	230 V AC	±10 % 50-60Hz
	1	115 V AC	±10 % 50-60Hz
	4	24 V AC	±10 % 50-60Hz
	5	24 V DC	16.6..33.6 V DC
	6	12 V DC	10.8..15.6 V DC
3.	**Options**		
	00	without option	
	01	device for rail vehicles	
	02	measuring time 1 s $C_{E\,max}$ < 200 µF)	
4.	**Additional text** above the display (3x50 mm HxW)		
	Accessories		
	KA-IW1000-1	terminal cover for U_{meas} > 400 V	
	IS96-DS-01	pointer instrument DIN 96x96 mm, mounting depth 63mm	

Pointer instrument IS96

Power electronic

www.ghm-group.de

GHMGROUP
Specialists by Competence.

Product information

Power electronics

Power electronic

Members of GHM GROUP: GREISINGER | HONSBERG | Martens | IMTRON | DeltaOHM | VAL.CO

Characteristics

System

- Solid State Relays from 25 up to 125 A
- Relay coupler up to 8 A
- Power supply 5-24 V DC max. 10 A
- DC/DC converter max. 2 A
- Power modules up to 80 A
- Heating current monitoring modules
- SSR control module
- Current transformer for primary current from 1 A up to 1000 A

Applications

- **Power supplies for sensors and control cabinets**
- **Controlling and monitoring of injection molding machines**
- **Signal coupling**
- **Electronic power switches**

General information

Inputs

- 0/4..20 mA
- 0/2..10 V DC
- Voltage AC/DC
- Current AC
- Resistance/Potentiometer
- Supply voltages from 24V DC..230 V AC
- Bistable 0/24 V DC

Contact termination

- Plug-in terminals
- Screw terminals
- Bushing connection

Outputs

- Impulse output 0/18 V DC
- Relay output SPDT
- Transistor output PNP
- Electronic output 24V DC up to 230V AC
- Power outputs for heating current control up to 125 A
- Controlled DC power supplies

Device overview

Device	Function	Input	Output	Page
Power supplies				
NG1000	Supply voltage	24..230 V AC/DC	5..24V DC max. 2A	196
DR	Supply voltage	115/230 V AC	22,5..28,5 V DC max. 0,6A	197
DPP15	Supply voltage	100..240 V AC	22,5..28,5 V DC	198
Module				
LM	Electronic power module	Control circuit 3..28 V DC	Load circuit 48..530 V AC	199
K20, K40	Heat sink for SSR			200
D2425	SSR	Control circuit 3..32 V DC	Load circuit 1 ~ 24..280 V AC	200
D2450	SSR	Control circuit 3..32 V DC	Load circuit 1 ~ 24..280 V AC	200
HD4850	SSR	Control circuit 3..32 V DC	Load circuit 1 ~ 48..530 V AC	200
SC869110	SSR	Control circuit 3..32 V DC	Load circuit 1 ~ 48..530 V AC	200
D53TP50D	SSR	Control circuit 3..32 V DC	Load circuit 3 ~ 48..530 V AC	200
H2CM	Heating-current monitoring module	Control circuit 3..32 V DC	Depends to the control input	201
STM40	Control module for SSR	Control circuit 0/4..20 mA, 0..10 V Potentiometer	0/8 V DC bistable	202
CKRD2340	Electronic power module	Control circuit 4,5..32 V DC	Load circuit 24..280 V AC	203
CMRD	Electronic power module	Control circuit 4,5..32 V DC	Load circuit 48..660 V AC	204
STU500	Control module for SSR DIN rail case TS35	Control circuit 0/4..20 mA, 0..10 V Potentiometer	0/12 V DC bistable	205
DC30-D3	SSR for inductive loads	Control circuit 3..24 V DC	Load circuit max. 30 V DC , 3A	206
Switching relay				
RT424	Relay coupler	24V DC, 24V..230V AC	2 contacts SPDT max. 8 A	207
PT570	Relay coupler	24V DC, 24V..230V AC	4 contacts SPDT max. 6 A	208
Current transformer				
ASW	Slip-over current transformer	50..1000 A AC	1/5 A AC	209
WSW	Wounded primary current transformer	1..40 A AC	1/5 A AC	209

Mistakes reserved, technical specifications subject to change without notice.

DC Power Supply NG1000

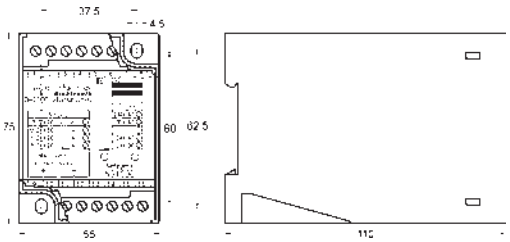
Characteristics

- **Full 2-port isolation**
- **Adjustable output voltage**
- **Current up to 2 A**
- **Stabilized, short circuit proof**
- **Power limiting with positive characteristics**

Technical data

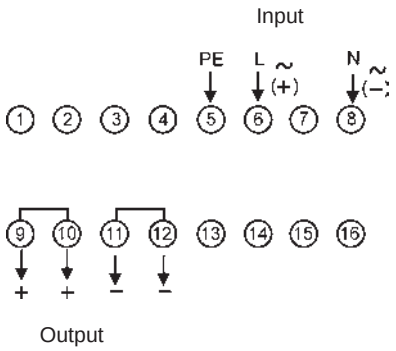
Input	: see ordering code
Frequency	: 47..63 Hz
Operating temperature	
NG1000-1/2-X	: -10..+50 °C
NG1000-3/4-X	: -10..+40 °C
CE-conformity	: EN 61326-1:2013 EN 60664-1:2007
Output	
Voltage	: 5..12 / 24 V DC, adjustable via trimpot
Max. current	: see ordering code
Overload	: output voltage will be reduced
Load control	
NG1000-1/2-X	: <50 mV
NG1000-3/4-X	: <70mV
Residual ripple	
NG1000-1/2-X	: <20 mV
NG1000-3/4-X	: <40 mV
Short circuit current approx.	
NG1000-1-X	: 290 mA
NG1000-2-X	: 220 mA
NG1000-3-X	: 2 A
NG1000-4-X	: 4 A
Case	: standard case of polycarbonate 8020 UL94V-1
Weight	: max. 380 g
Connection	: screw terminals with pressure plate, max. 2.5 mm²
Protection class	
NG1000-1/2	: case IP40,
NG1000-3/4	: case IP30 terminals IP20 acc. to BGV A3

Dimensions



DIN rail mounting TS35 or 2 screws M4

Connection diagram



Ordering code

AC/DC Power supplies input 230 V AC ±10 %	
Type	**Output***
NG1000-1-0	5..12 V DC; max. 250 mA
NG1000-2-0	12..24 V DC; max. 150 mA
NG1000-3-0	5..24 V DC; max. 1 A
NG1000-4-0	5..24 V DC; max. 2 A

DC/DC converter output 5..24V DC max. 1 A*	
Type	**Input**
NG1000-3-5	24 V DC ±20 %
NG1000-3-6	48 V DC ±20 %
NG1000-3-7	60 V DC ±20 %
NG1000-3-8	80 V DC ±20 %
NG1000-3-9	110 V DC ±20 %
NG1000-3-10	220 V DC ±20 %
DC/DC converter output 5..24V DC max. 2 A*	
Type	**Input**
NG1000-4-5	24 V DC ±20 %
NG1000-4-6	48 V DC ±20 %
NG1000-4-7	60 V DC ±20 %
NG1000-4-8	80 V DC ±20 %
NG1000-4-9	110 V DC ±20 %
NG1000-4-10	220 V DC ±20 %

* The output voltage is adjusted to the minimum at delivery.

DC Power Supplies Series DR

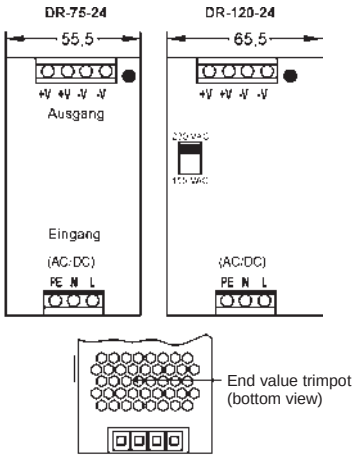
Characteristics

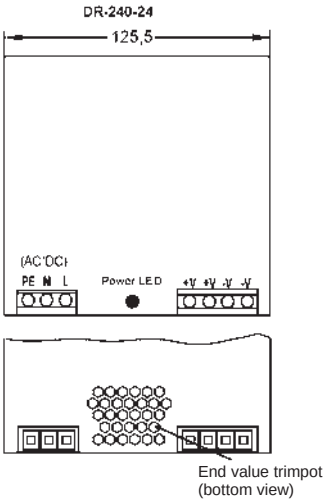
- **2-port isolation**
- **Output voltage 24 V DC**
- **Output current 3A up to 10 A**
- **Stabilized and short circuit protected**
- **Power limiting with positive characteristic curve**

Technical data

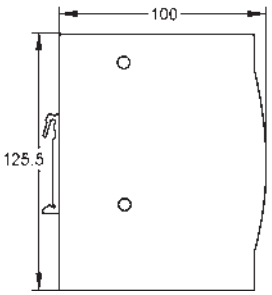
Input	:	115 / 230 V AC
Frequency	:	47..63 Hz
Power consumption		
DR- 75-24	:	77 W
DR-120-24	:	120 W
DR-240-24	:	240 W
Operating temperature	:	-10..+60 °C
CE-conformity	:	EN 60950-1:2006; EN 55022:2010; EN 61000-3-2:2014; EN 61000-3-3:2013; EN 55024:2010; EN 61000-4-2:2009; EN 61000-4-3:2006; EN 61000-4-4:2012; EN 61000-4-5:2014; EN 61000-4-6:2014; EN 61000-4-8:2010; EN 61000-4-11-2004
Humidity	:	20..90 % RH, non condensation
Output		
Voltage	:	24..28 V DC, adjustable via trim pot
Max. current	:	see ordering code
Overload performance	:	voltage reducing, positive curve
Load regulation	:	±1 %
Residual ripple	:	<150 mV
Case	:	aluminum case DIN rail mounting TS35 acc. to DIN EN 60715:2001-09
Weight		
DR- 75-24	:	approx. 600 g
DR-120-24	:	approx. 800 g
DR-240-24	:	approx. 1200 g
Connection	:	screw clamps with pressure plate, max. 2.5 mm²
Protection class	:	IP20 acc. to BGV A3

Dimensions and connection diagram





Side view (all types^)



Ordering code

AC/DC Supplies input 115 / 230 V AC	
Type	**Output**
DR- 75-24	24 V DC max. 3.2 A
DR-120-24	24 V DC max. 5.0 A
DR-240-24	24 V DC max. 10.0 A

DC Power Supply DPP15

Characteristics

- Full 2-port isolation
- Adjustable output voltage 22,5..28,5 V DC
- Current up to 0,6 A
- Stabilized, short circuit proof
- Power limiting with positive characteristics

Technical Data

Input

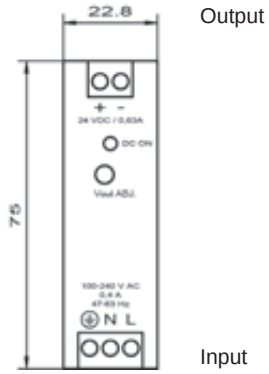
Supply voltage	:	85..264 V AC, 50..60 Hz or 90..375 V DC
Efficiency factor	:	80 %
Power factor	:	acc to EN6100-3-2 class A
Operating temperature	:	-10..+70 °C
CE-conformity	:	EN 60950-1:2006; EN 61204-3:2001; EN 61000-6-3:2007; EN 61000-6-2:2005; EN 55024:2010, EN 55022:2010
Approvals	:	UL 508 listed, UL 60950-1, NEC Class 2

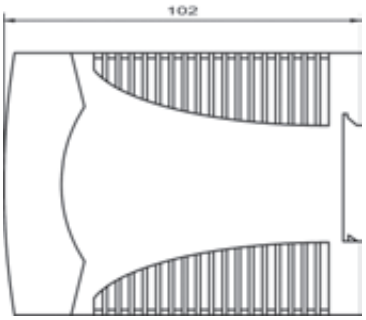
Output

Voltage	:	22,5..28,5 V DC, adjustable with trimpot
max. output current	:	0,6 A
Overload	:	current increases, output voltage will be reduced, so that power can remains constant
max. overload current	:	150% of output current
Residual ripple	:	< 50 mV
Load control	:	< 0,5 %
Temperature coeff.	:	< 1 %

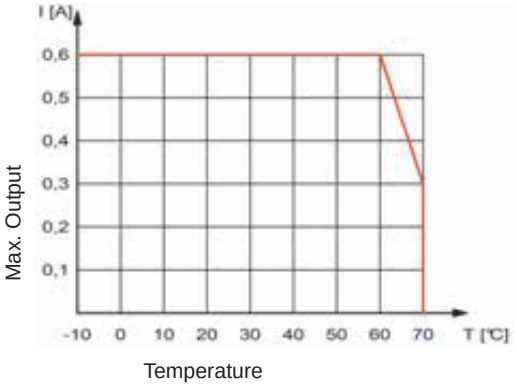
Case	:	standard case of plastic
Weight	:	approx. 0,13 kg
Electrical connection	:	screw terminal with pressure plate, max. 2,5 mm²
Protection class	:	IP20

Dimensions and Connection diagram





Output diagram



Ordering Code

	1.
DPP15 -	

1.	Output	
	24	24 V DC

Power Module Series LM

Characteristics

- **Load current 20, 40, and 80 A**
- **Full 2-port isolation**
- **Additional mounted modules: Current-Alarm module H2CM and continuous drive module STM40**
- **DIN rail mounting TS35**

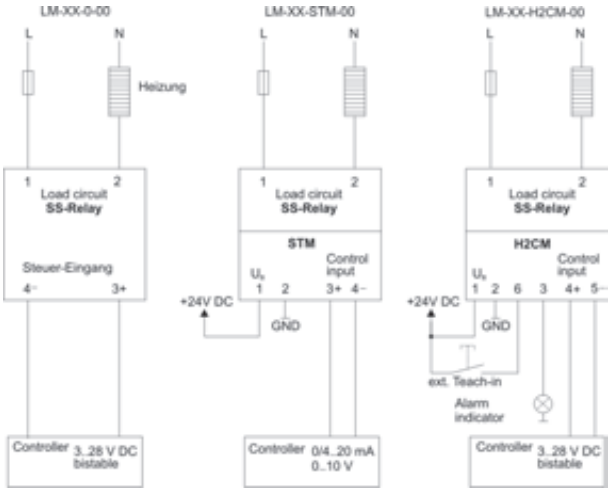
Technical data

Look at the data sheets solid state relay (SSR) and heat sinks (K20/K40).

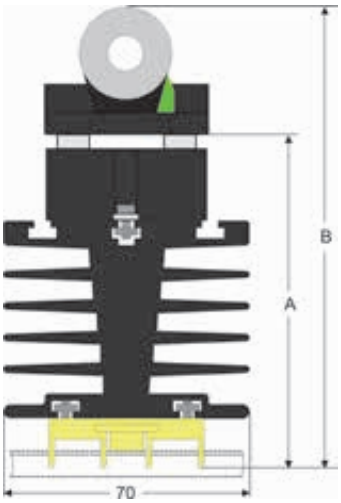
Module dimensions [mm]

Type	A	B	depth
LM-20-0-00	93		75
LM-20-STM-00		116	75
LM-20-H2CM-00		129	75
LM-40/80-0-00	130		100
LM-40/80-STM-00		153	100
LM-40/80-H2CM-00		165	100

Connection diagrams



Dimensions



Ordering code

LM - 1. - 2. - 3.

1.	**Load current at 45 °C and 100 % duty cycle**	
	20	Max. 20 A AC
	40	Max. 40 A AC
	80	Max. 80 A AC
2.	**Additional accessories**	
	0	without (terminal cover included)
	H2CM	with current alarm module
	STM	with continuous control module
3.	**Options**	
	00	without option

1 ~ and 3 ~ Solid State Relay

1 ~ SSR

3 ~ SSR

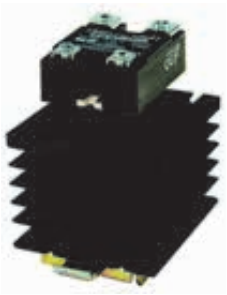
Characteristics

- Load circuit from 24V AC up to 530 V AC
  Current from 25 A up to 125 A
- Zero voltage switch
- 2-port isolation
- Dedicated for loads up to cosφ 0.5
- Case isolated
- Test voltage 4 kVeff
- Voltage drop at I_{max} 1.6 V
- UL and CSA certification

Ordering code / technical data

Type 1 ~	Drive circuit [V]	Load circuit [V AC]	Current [A]	Terminal cover
D2425	3-32 DC	24-280	25	KS100
D2450	3-32 DC	24-280	45	KS100
HD4850	3-32 DC	48-530	50	KS100
SC869110	3-32 DC	48-530	125	KS100
3 ~				
D53TP50D	3-32 DC	48-530	50	KS300
Accessories				
KS100	Terminal cover acc. to German BGV A3			
KS300	Terminal cover acc. to German BGV A3			

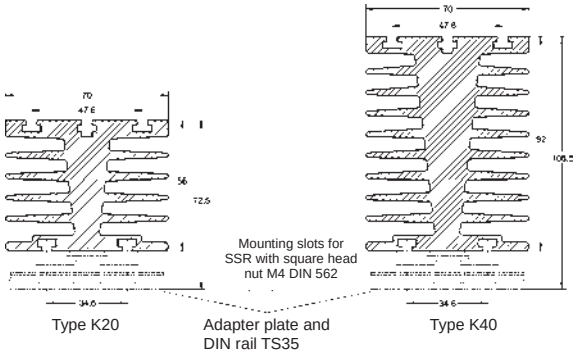
Heat sink K20, K40



Characteristics

- Aluminum heat sink
- DIN rail mounting TS35
- Mounting of the SSR without mechanical processing

Dimensions



Ordering code / technical data

Type	Length [mm]	Thermal resistance [kW]	Weight [kg]
K20-75	75	1.5	0.42
K20-100	100	1.2	0.55
K40-75	75	1	0.72
K40-100	100	0.8	0.93
Accessories			
K-MSSR1P	Mounting set for 1 ~SSR		
K-MSSR3P	Mounting set for 3 ~SSR		
WLP35	Thermal compound 35 gr. box		

Dimensioning instructions for heat sinks

Typical current SSR	without cooling	Mounting at K20-75	Mounting at K20-100	Mounting at K40-75	Mounting at K40-100	Max. current Fuse characteristic B
25 A	6 A	12 A	18 A	20 A	20 A	10 A
50 A	8A	20 A	25 A	35 A	40 A	25 A
125 A	16 A	40 A	50 A	60 A	80 A	63 A
3 x 50 A	3 x 4 A		3 x 15 A		3 x 25 A	20 A

Max. current at 45°C ambient temperature

Current Alarm Module H2CM

Characteristics

- **Load circuit 1~ 48..530 V AC**
- **Load current 1..80 A max.**
- **2-port isolation**
- **Drive circuit 3..28 V DC, bistable**
- **DIN rail mounting TS35**

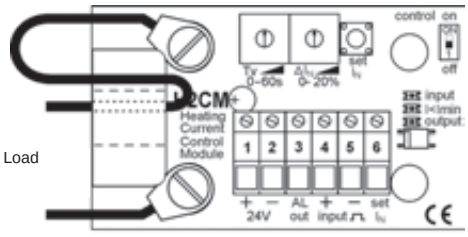
Applications

H2CM-modules are used for quality supervision in production of plastic parts in injection molding machines, thermoform-machines and even in the production of rubber parts. In temperature control circuits operating with solid state relays (SSR), the H2CM modules monitors the correct function of the installed heating elements in a molding tool by measuring the total heating current. Even the correct function of the SSR will be checked continuously.

Technical data

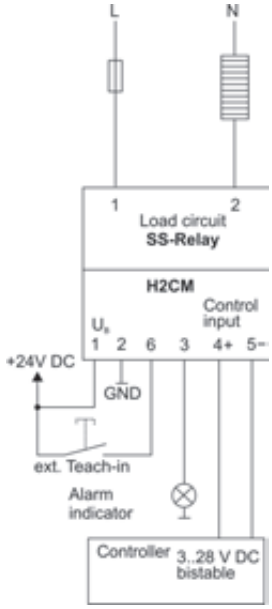
Supply voltage	:	10..30 V DC, max. 5 % ripple voltage
Current consumption	:	< 20 mA (output with no load)
Operating temperature	:	-10..+60 °C
CE-conformity	:	EN 61326-1:2013 EN 60664-1:2007
Measuring range	:	1..80 A, 50/60 Hz
Alarm delay	:	0..60 s adjustable
Control input	:	via opto coupler, Ri > 3.3 kΩ; off ≤ 1 V DC, on 3 ... 28 V DC
Teach-in input	:	Ri > 20 kΩ; off ≤ 2 V DC, on 6..30 V DC
Alarm output	:	PNP-transistor open collector, 50 mA max.(short circuit proof) via dip switch on/off selectable
Terminal cover (Load)	:	(including) finger safe acc. to BGV A3
Connection (Control circuit)	:	Screw terminal 1.5 mm² flexible or 2.5 mm² single wire
Mounting	:	fits for SS-Relay, D-type
Dimensions	:	46 x 75 x 32 mm (W x L x H)

Connection diagram



Control in- and outputs

Example



Ordering code

H2CM - 1. ☐ - 2. ☐

1.	**Terminal connection** (part of delivery)fitting for SS-Relay	
	US	US-thread 6-32 / 8-32
	M3 / M4	DIN thread M3 / M4
	M3 / M5	DIN thread M3 / M5
2.	**Options**	
	00	without options

Accessories:
SSRelay and Heat-sinks see page Fehler: Verweis nicht gefunden

Continuous Input Drive Module STM40

- **Direct mounting on the SSR**
- **Multi purpose input for 0/4..20 mA, 0..10 V DC**
- **Supply isolated**
- **Driving max. 3 SSR in parallel mode**

Characteristics

STM40 modules are used in temperature control systems in connection with solid-state-relays (SSR). It converts continuous input-signals from SPS or other controllers into a pulse-width-controlled signal, suitable to operate with SSR. Input-signal may be 0/4..20 mA or 0..10 V or an external potentiometer. One STM40 module can drive additional 2 external SSR, except when operating in potentiometer mode.

Technical data

Power supply

Supply voltage	: 10.8..30 V DC, 17..30 V AC
Power consumption	: appr. 1.3 VA
Operating temperature	: -10..+60 °C
CE-conformity	: EN 61326-1:2013 EN 60664-1:2007

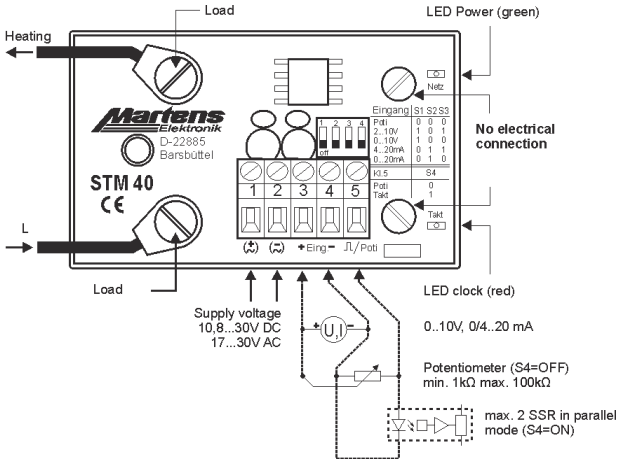
Control input

Voltage	: 0..10 V DC, Ri = 40 kΩ, 3-times overload
Current	: 0/4..20 mA, Ri = 125 Ω, 3-times overload
Resistance	: or potentiometer 1 kΩ..100 kΩ

Output

Output clock	: bistable 0/8 V DC, max. 20 mA additional output for 2 SSR in parallel mode
Clock cycle	: 1 s
Terminal cover (Load)	: acc. to German BGV A3 (included)
Connection (Control circuit)	: screw terminal 1.5 mm² flexible wire or 2.5 mm² single wire
Mounting	: on SSR, D-type
Dimensions	: 46x75x32 mm (WxLxH)

Connection diagram

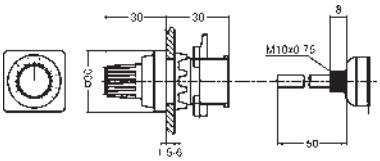


Ordering code

STM40 - 1. - 2.

1.	**Terminal connection** (including) fitting for SSR	
	US	US-thread 6-32 / 8-32
	M3 / M4	DIN thread M3 / M4
	M3 / M5	DIN thread M3 / M5
2.	**Options**	
	00	without option
	Accessories	
	PES30-10k	Potentiometer installation set, complete with 10 k Poti, mounting hole 22,5mm

Potentiometer installation set

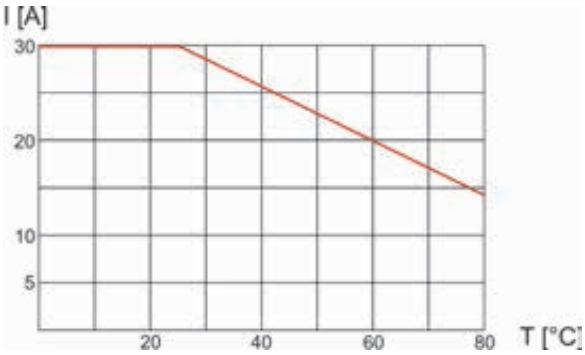


Solid State Relay CKRD2430

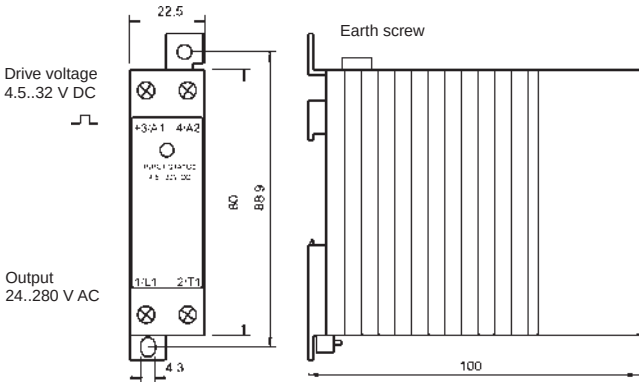
Technical data

- SSR relay with integrated heat-sink
- Power circuit 1 ~ 24..280 V AC / max. 30A*
- Zero voltage switch
- Voltage drop at max. load 1.6 V
- Leak current without drive 10 mA
- Full 2-port isolation
- Test voltage 4 kV ~
- Drive circuit 4.5..32 V DC with LED green
- Input current 15 mA/12 V DC or 20 mA/24 V DC with internal short circuit poof
- Screw terminals for input and output max. AWG 6 (10 mm²)
- Dedicated for loads with cosφ = 0.5
- DIN rail mounting TS35
- International approvals UL, CSA, VDE, CE

***Derating**



Dimensions / connection diagram



Note:
Mounting space between multiple devices, minimum 20mm.

Ordering code

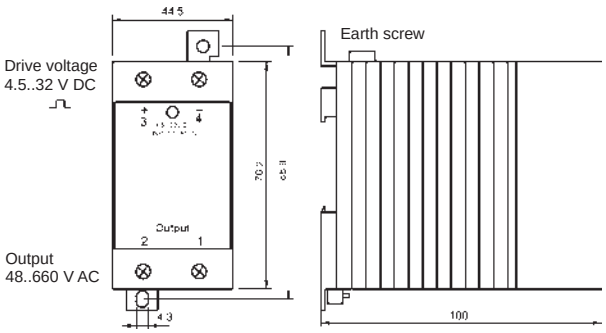
CKRD2430

Solid State Relay CMRD

Technical data

- SSR relay with integrated heat-sink
- Power circuit 1 ~ 48..660 V AC, max. 65A*
- Zero voltage switch
- Voltage drop at max. load 1.7 V
- Leak current without drive 10 mA
- Full 2-port isolation
- Test voltage 4 kV ~
- Drive circuit 4.5..32 V DC with LED green
- Input current 30 mA max. with internal short circuit poof
- Screw terminals for input AWG12 (2,5mm²) and output AWG 6 (10 mm²) max.
- Dedicated for loads with cosφ = 0.5
- DIN rail mounting TS35
- International approvals UL, CSA, VDE, CE

Dimensions / connection diagram



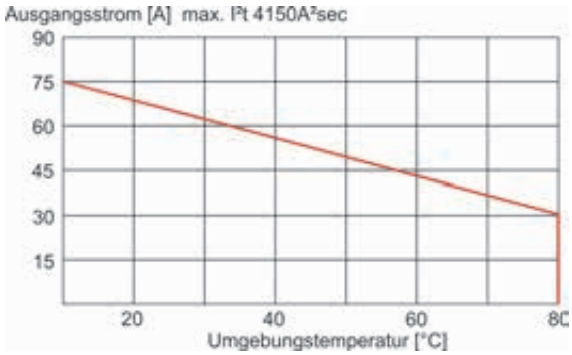
Note:
Mounting space between multiple devices, minimum 20mm.

Ordering code

CMRD6065	48..660 V AC, max. 65A

***Derating**

CMRD6065



Analog Pulse Converter STU500

- **Switch selectable input signal 0/4..20 mA, 0/2..10 V DC and Potentiometer**
- **Bistable output voltage 0/12 V DC**
- **Indicators for power and output**

Characteristics

STU500 converts an analogue input signal into a bistable output signal 0/12V DC. The duty cycle of the output signal is proportional to the input signal level. It can be used for power control in heating circuits in combination with solid state relays (SSR).

Technical data

Power supply

Supply voltage	: 85..265 V AC or 10.8..30 V AC/DC
Frequency AC	: 47..63 Hz
Power consumption	: <1.5 VA
Operating temp.	: -10..+60 °C
Rated voltage	: 500 V≃ acc to VDE 0110 group 2, full 3-port isolation
CE-conformity	: EN 61326-1:2013 EN 60664-1:2007

Inputs

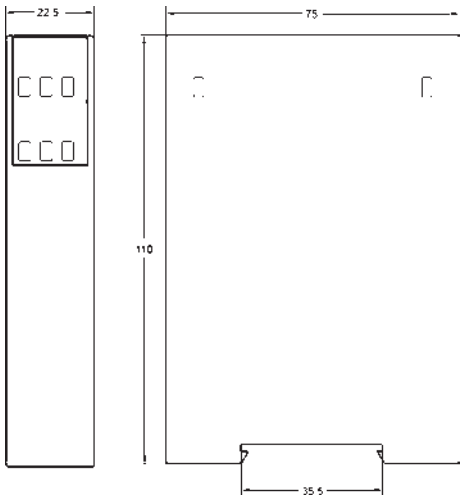
Voltage	: 0/2..10 V, Ri = 40 kΩ, 3-times overload
Current	: 0/4..20 mA, Ri = 125 Ω, 3-times overload
Resistance	: and Potentiometer from 1 kΩ..100 kΩ

Output

Output clock	: bistable 0/12 V DC, max. 20 mA, short-circuit-proof
Clock cycle	: approx. 1 pulse/s

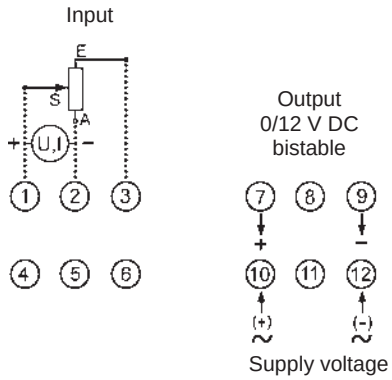
Case	: standard case polycarbonate 8020 UL 94 V-1 acc. to DIN EN 60715:2001-09
Weight	: approx. 140 g
Protection class	: case IP30, terminals IP20, (BGV A3)
Electrical connection	: screw terminals with pressure plate max. 2.5 mm²

Dimensions



DIN rail TS35

Connection diagram

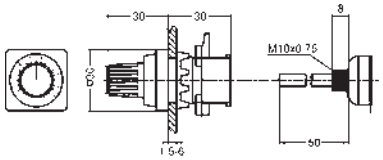


Ordering code

STU500 - 10 - 1.

1.	**Supply voltage**	
	0	85..265V AC
	5	10.8..30 V AC/DC
	Accessories	
	PES30-10k	Potentiometer installation set incl. 10 k poti for mounting hole 22.5mm, IP65

Potentiometer installation set

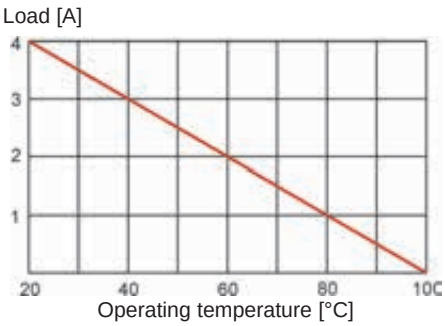


Solid State Relay DC30-D3

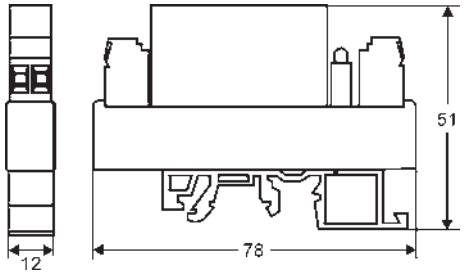
Technical data

- DC-switching module for **inductive load**
- Load circuit max. 30 V DC / 3 A*
- Peak current 1 sec 5A
- Voltage drop at max. load 1.5 V
- Leak current at off-mode 1 mA
- Fully 2-port isolation
- Drive circuit 3..24 V DC with LED indicator green
- Input resistance 1 kΩ
- DIN rail mounting TS35

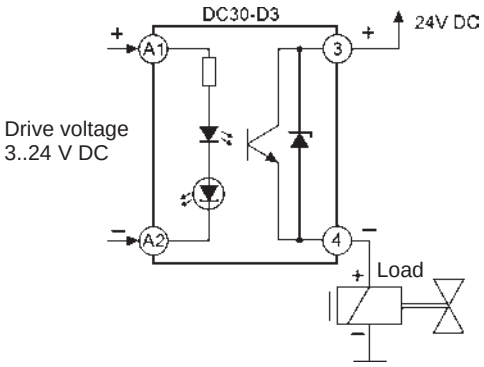
*** Derating**



Dimensions



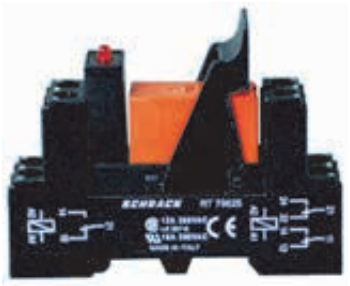
Connection diagram



Ordering code

DC30-D3	max. 30V DC , 3 A

Relay Coupler RT424



depth 60 mm

Technical data

- Plug-in relay
- Switching current 8 A / 250 V AC
- Contact material AgNi 90/10
- Safety protection acc. VDE 0106
- Protection class III acc. to VDE 0700
- Test voltage 5 kV
- DIN rail mounting TS35
- International certifications

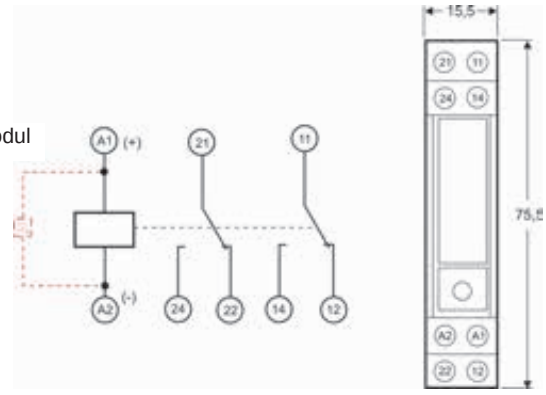
Ordering code

Storage program

Description	Supply voltage	Ordering number
Relay	24V DC (1440Ω)	RT424024
Relay	24V AC (350Ω)	RT424524
Relay	230 V AC (32500Ω)	RT424730
Socket		RT78625
Retaining clip		RT 16016
Labeling shield		RY 16040
LED-module red*	24 V DC	RPML 0024
LED-module red	24 V AC	RPML0524
LED-module red	230 V AC	RPML 0730
*including inverse diode		
Package program (contains 1 relay, socket, LED-module, retaining clip and labeling shield)		
Package 24 V DC		RT4P4L24
Package 24 V AC		RT4P4R24
Package 230 V AC		RT4P4T30

Dimensions / connection diagram

LED-Modul



Relay Coupler PT570

depth 73 mm

Technical data

- Plug-in relay
- Switching current 6 A / 250 V AC
- Contact material AgNi 90/10
- Safety protection acc. to IEC664 / VDE 0106
- Protection class III acc. to VDE 0110b
- Test voltage 2 kV
- Finger safe test button, lock or unlock possible
- DIN rail mounting TS35
- International certifications

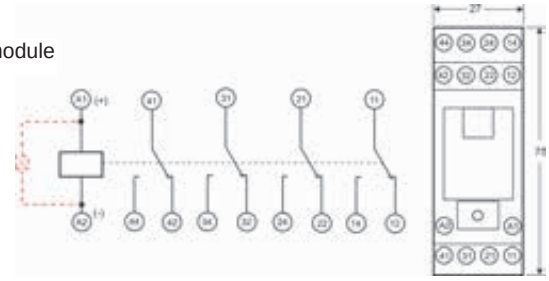
Ordering code

Storage program

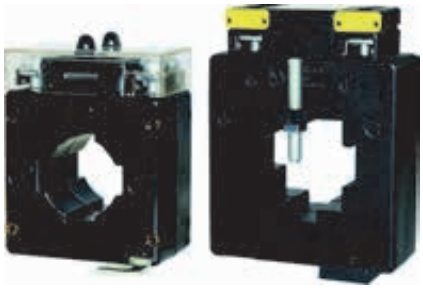
Description	Supply voltage	Ordering number
Relay	24 V DC (1780 Ω)	PT570024
Relay	24 V AC (190 Ω)	PT570524
Relay	230 V AC (19470 Ω)	PT570730
Socket		PT78704
Retaining clip		PT16016
Labeling shield		PT16040
LED-module red*	24 V DC	RPML0024
LED-module red	24 V AC	RPML0524
LED-module red	230 V AC	RPML0730
*including inverse diode		
Package program (contains 1 relay, socket, LED-module, retaining clip and labeling shield)		
Package 24 V DC		PT4P4L24
Package 24 V AC		PT4P4R24
Package 230 V AC		PT4P4T30

Dimensions / connection diagram

LED-module



Slip-Over Current Transformer ASW

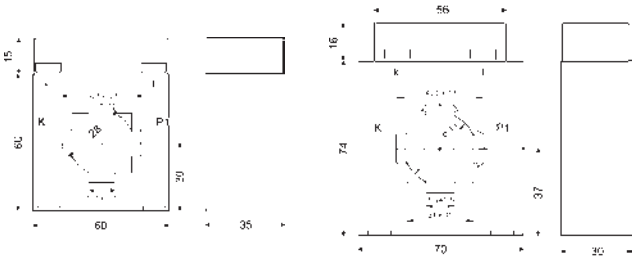


Model A Model B

Characteristics

- **Primary current from 50 A up to 1000 A**
- **Slip whole for different squares**
- **Easy handling**
- **Extended secondary terminal cover**
- **Innovative secondary clamp technology**
- **Break check plastic case**
- **Casting compound**
- **Isolation class E**
- **Accuracy class 3, > 75 A class 1**
- **Frequency 50-60 Hz**

Dimensions



Ordering code

ASW - 1. [ ] - 2. [ ]

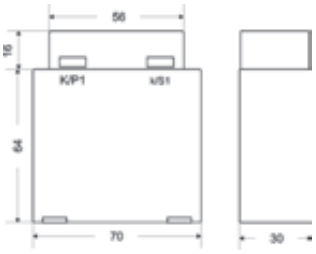
1.	**Primary current [A]** (please state in clear text)			
	50/ 60/ 75/ 80/ (power consumption 1.25 VA; **model A**)			
	100/ 125/ 150/ 200/ 250/ 300/ 400/ 500/ 600/ 750/ 800/ 1000 (power consumption 2.5 VA; **model B**)			
2.	**Secondary current [A]**		**1.25 VA**	**2.5 VA**
	1	max. burden [Ω]	1.25	2.5
	5	max. burden [Ω]	0.05	0.1
	Accessories incl. by delivery:			
	1 primary rail clamp,			
	2 secondary terminal covers yellow			
	2 wall mounting clips			
	Accessories			
	Snap clamps for DIN rail mounting TS35			

Wounded Current Transformer WSW

Characteristics

- **Primary current from 1 A up to 40 A**
- **Easy handling**
- **Extended secondary terminal cover**
- **Innovative secondary clamp technology**
- **Break check plastic case**
- **Casting compound**
- **Isolation class E**
- **Accuracy class 1**
- **Frequency 50-60 Hz**

Dimensions



Ordering code

WSW - 1. [ ] - 2. [ ]

1.	**Primary current [A]** (please state in clear text)	
	1/ 2/ 2.5/ 5/ 6/ 7.5/ 10/ 12.5/ 15/ 20/ 25/ 30/ 40	
2.	**Secondary current [A]**	
	1	
	5	
	Accessories incl. by delivery:	
	2 secondary terminal covers yellow	
	2 wall mounting clips	
	Accessories	
	Snap clamps for DIN rail mounting TS35	

GHM Messtechnik GmbH – General Terms and Conditions of Business

§ 1 Scope of Application and Definitions

1. These General Terms and Conditions of Business ("GTC") shall apply exclusively to legal relations between GHM Messtechnik GmbH ("GHM"), consisting of GHM Greisinger, GHM Honsberg, GHM Martens and GHM IMTRON, and customers. The GTC also apply to the sale of DELTA Ohm products as a member of the GHM Group via GHM Messtechnik GmbH. Any provisions which deviate from, contradict or supplement these GTC shall, even upon knowledge thereof, not be recognised and are hereby expressly objected to, unless there is express and written agreement to the customer's contradicting terms and conditions of business.
2. A customer within the meaning of these GTC is an entrepreneur (§ 14 BGB), legal person under public law or special fund under public law which submits an order to GHM or concludes a contract with GHM. GHM does not supply to consumers (§ 13 BGB).
3. GHM reserves the right to change the GTCs for future orders. In this regard, please check the GHM website.

§ 2 Conclusion of Contract

1. The product catalogues issued by GHM as well as other brochures and technical documentation do not constitute an offer to conclude a contract but rather merely an invitation to the customer to submit a written offer to GHM to conclude a contract.
2. Offers by GHM are subject to confirmation and are non-binding, unless expressly designated as binding by GHM. Contracts are only concluded by way of written order confirmation by GHM or by way of delivery. Orally issued orders shall only become effective once confirmed in writing by GHM. Amendments to a concluded contract must be confirmed in writing by GHM in order to be effective.
3. A customer order which qualifies as an offer to conclude a contract may be accepted by GHM within 2 weeks. Acceptance and dispatch of the ordered products shall have the same effect.

§ 3 Scope of performance obligation

1. The scope of the performance obligation of GHM shall be determined in accordance with the relevant contract. GHM reserves the right to make changes to technical data as well as changes to form, colour and/or weight within reasonable bounds.
2. GHM is entitled to render partial performance where this is reasonable according to the individual circumstances of the customer. The invoices issued in this regard are payable independently of the total delivery.
3. Product details and usage criteria in product catalogues, brochures and technical documentation as well as other information material provided by GHM to the customer and product descriptions are not to be understood as either guarantees of a particular quality of the products or as a simple agreement as to quality; such quality guarantees and quality agreements must be expressly agreed in writing.

§ 4 Prices / Payments / Interest on Late Payments / Set-off

1. All prices specified in the product catalogues, brochures and technical documentation as well as other information material issued by GHM are exclusive of the relevant applicable VAT, unless they are stated to include VAT. Packaging, freight, postage, requested export certificates as well as any other shipping costs and insurance are additionally to be paid by the customer unless otherwise agreed.
2. Unless fixed prices are expressly agreed, the specified prices are based on GHM's production costs at the time of order confirmation. In the event of unforeseeable increases in production costs that are beyond GHM's control, GHM reserves the right to increase prices accordingly where the delivery or service is not required to be rendered within 4 months of conclusion of the contract.
3. Unless otherwise agreed in writing, all payments must be made within 30 days of the date of invoice without deduction in full to the specified payment agent.
4. If payments are deferred or the customer is in default of payment, the statutory interest for late payment between businesses shall be due (currently 9 percentage points over the relevant base interest rate in accordance with § 288 para 2 BGB). According to § 286 para 3 BGB, default of payment – even without a notice – occurs where the customer does not make payment within 30 days of the due date for payment and receipt of an invoice or or an equivalent payment schedule.
5. The customer only has rights of set-off or retention to the extent that its claim is legally established or undisputed. In the event of defective delivery, the counter-rights of the customer in particular in accordance with § 8.2 of these GTC shall remain unaffected.

§ 5 Force Majeure

Unforeseen breakdowns, delayed deliveries or non-delivery by suppliers of GHM (including intra-group suppliers of GHM), shortage of labour, power or raw materials, strikes, lockouts, difficulties in providing means of transport, traffic disruptions, government orders, embargoes, boycotts and other events of force majeure shall relieve the party affected thereby of its obligation to supply or accept the items, as the case may be, for the duration of and to the extent of such hindrance. If, in consequence, delivery or acceptance is delayed by more than one month, either party may, to the exclusion of all further claims, withdraw from the contract in respect of the quantities affected by such delivery or acceptance hindrance.

§ 6 Delivery and Transfer of Risk

1. The place of performance and fulfilment is the place from which delivery is effected.
2. In the event that the customer requests that the contractual item is sent to another location, the risk of accidental loss passes to the customer upon handover of the item to the first freight carrier. This shall also apply if the customer refuses to accept the delivery. Unless agreed otherwise, GHM is free to select the manner of shipping. The packaging material is to be recycled or properly disposed of by the customer at its own cost. § 11 shall apply mutatis mutandis.
3. Delivery dates and deadlines are only binding if the contracting parties have made an express agreement to this effect. In case of doubt, delivery deadlines begin on the date of order confirmation. If there is a temporary hindrance to performance which is beyond GHM's control, the delivery dates and deadlines shall be extended correspondingly. This applies in particular in cases of force majeure within the meaning of § 5. Occurrence of delivery delay by GHM shall be determined in accordance with legal regulations. In any case a notice by the customer shall however be necessary.

§ 7 Retention of Ownership

1. Until full payment of all of our present and future claims arising out of the ongoing business relationship with the customer ("secured claims") we retain ownership of the contractual items. The customer shall handle the contractual items with care and shall store them safely at no cost.
2. Prior to full payment of the secured claims, the contractual items subject to retention of ownership may not be pledged to third parties or used as security. The customer shall notify GHM promptly in writing if an application is filed for the initiation of insolvency proceedings or where third parties have access (e.g. by way of pledges) to the contractual items belonging to GHM.
3. Where the customer is in breach of the contract, in particular in the case of non-payment of the due amount under the contract, GHM may in accordance with legal regulations withdraw from the contract and/or demand that contractual items be returned on the basis of the retention of ownership. The demand for return does not simultaneously constitute the withdrawal; GHM is moreover entitled to make the demand for return and reserve the right to withdraw. If the customer does not pay the due amount under the contract, GHM may only assert these rights if GHM has given the customer a reasonable deadline to make payment without success or where such a setting of a deadline is not required in accordance with legal regulations.
4. Until the time of withdrawal in accordance with (c) below, the customer is authorised to continue to sell on and/or to process the contractual items which are subject to retention of ownership within the ordinary course of business. In such a case the following supplemental provisions shall apply:
a) The retention of ownership shall extend to the full value of products resulting from the processing or combining of the contractual items, whereby GHM shall remain the manufacturer. In the event that processing or combining uses third party items which are subject to ownership rights, the customer hereby transfers to GHM co-ownership in the proportion of the invoice value of the processed or combined contractual items. GHM hereby accepts the transfer. Otherwise, the same shall apply to the resulting product as to the contractual items delivered under retention of ownership.
b) The customer hereby assigns to GHM as security any claims against third parties arising out of the onward sale of the contractual items in their entirety or in the amount of any proportion co-owned by GHM in accordance with the previous paragraph. GHM hereby accepts the assignment. The obligations of the customer set out in paragraph 2 shall also apply in regard to assigned claims.
c) The customer shall remain authorised to redeem the claim in addition to GHM. GHM is obliged not to redeem the claim as long as the customer meets its payment obligations to GHM, there is no defect in its ability to perform and GHM does not assert ownership by exercising a right in accordance with paragraph 3. If this is however the case, GHM may demand that the customer discloses the claims assigned to GHM and their creditors, provides all necessary information for redemption, hands over the associated documentation and informs the (third party) creditor of the assignment. Furthermore, in such a case GHM shall be entitled to revoke the authorisation of the customer for the onward sale and processing of the items subject to retention of ownership.
d) If the realisable value of the security exceeds the claims of GHM by more than 10%, GHM shall at the request of the customer select and release security.

§ 8 Guarantee

1. The customer shall check whether the delivered contractual item is in accordance with the contract and is suitable for the intended purpose. The obligation to inspect and issue a complaint in accordance with §§ 377, 381 HGB shall also apply to customers who are not fully vested commercial agents within the meaning of the law. Apparent defects shall be notified to GHM within two weeks and non-apparent defects promptly after discovery. Damage to packaging is to be noted in the freight paperwork or notified in writing to the delivery shipping service and to GHM by the 6th day after delivery at the latest.
2. In the case of duly notified defects, at its own choice and taking into consideration the interests of the customer, GHM shall either rectify the defect or deliver defect-free replacement items. If these measures are not successful after two attempts to rectify, the customer may exercise its statutory rights. The right of GHM to refuse to rectify in accordance with the statutory requirements shall remain unaffected.
3. All guarantee claims lapse 12 months after the statutory start date of the prescription period. This deadline does not apply if the law according to § 438 para 1 number 2 BGB (buildings and items for buildings) and § 634a para 1 no 2 BGB (building faults) prescribes longer deadlines, or in case of deliberate action, fraudulent concealment of the fault, or if a guarantee of quality has not been fulfilled.

§ 9 Exchanges and Repairs outside of the Guarantee

1. GHM is not obliged to give an exchange and in the event of custom orders, exchange shall be excluded.
2. Where GHM however voluntarily declares that it will take back a standard item, without any obligation in accordance with guarantee regulations or any guarantee given, 20% of the purchase price shall be retained where the item is undamaged. In the case of damaged goods, any additional necessary repair costs shall also be deducted.
3. Where GHM is to perform repairs for the customer which do not follow within the framework of the guarantee or any given guarantee, the repair item shall be sent back at the cost of the customer. Where a cost estimate is requested by the customer for the repair, GHM is entitled to additionally invoice this work in the amount actually incurred.

§ 10 Limitation of Liability

1. The liability of GHM for damages, regardless of the legal basis, in particular due to impossibility, delay, defective or incorrect delivery, breach of contract, breach of obligations in contractual negotiations and unlawful acts (unerlaubte Handlungen) is, to the extent that this involves culpability (Verschulden), limited in accordance with this § 10.
2. GHM is not liable in the case of simple negligence of its management bodies, legal representatives, employees or other vicarious agents (Erfüllungsgehilfen), to the extent that this does not relate to a breach of material contractual obligations (vertragswesentliche Pflichten). Material contractual obligations are obligations compliance with which facilitates proper performance of the contract, so in particular the obligation to deliver in a timely manner, the conformity of the delivered items with the agreed quality characteristics, as well as advisory, protective and due care obligations, and the protection of life or health of the customer's personnel or the protection of its property from material damage.
3. Where GHM is liable in accordance with and on the grounds of § 10.2, such liability shall be limited to damages which GHM foresaw upon conclusion of the contract as a possible consequence of a breach of contract or which GHM should have foreseen when exercising due care and attention (verkehrsübliche Sorgfalt). Indirect damages and consequential damages, which are the consequence of defects in the delivered item, shall only be compensated to the extent they are typically to be expected in the course of a proper use of the delivered item.
4. In the event of a delivery delay caused by our simple negligence, the amount of default damages which the customer may claim shall be limited to a maximum of 5 % of the agreed net contract price for each complete week of delivery delay and in total to a maximum of 20 % of the agreed net contract price.
5. Where we provide technical information or act in a consulting capacity and such information or consulting is not included in the contractually agreed scope of performance owed by us, this shall take place free of charge and under exclusion of any liability.
6. The aforementioned exclusions and limitations on liability shall apply to the same extent for the benefit of management bodies, legal representatives, employees or other vicarious agents (Erfüllungsgehilfen) of GHM.
7. The limitations set out in this § 10 shall not apply to liability of GHM for wilful misconduct, for guaranteed quality characteristics, for damage to life, body or health or in accordance with the German Product Liability Act (ProdHaftG).
8. If the customer sells the delivered item unchanged or after processing, transforming or combining with other items, the customer shall release us internally from all product liability claims by third parties, to the extent that the customer is responsible for the circumstances giving rise to the liability.

§ 11 Disposal of Electronic Devices

1. To the extent that electronic devices are the contractual items, the disposal of old devices (§ 3 no 3 ElektroG) used outside private households (§ 3 no 5 ElektroG) shall be subject to the following paragraphs. For any technical questions, please contact info@greisinger.de.
2. The customer shall dispose of the delivered electronic devices at the end of their useful lives at its own cost and in accordance with the relevant legal regulations. The customer shall release GHM from manufacturer obligations under § 19 ElektroG and in that context from any associated claims by third parties.
3. In the event that delivered devices are transferred to commercial third parties, the customer is obliged to also subject such third parties in writing to the obligation to properly dispose of the devices at the end of their useful lives, to bear the costs thereof and in the event of a further transfer, to effect a transfer of the obligation in accordance with this provision.
4. In the event that the customer fails to contractually oblige third parties to undertake proper disposal and to oblige third parties to pass on the obligation in accordance with § 11.2, the customer shall be obliged to take back the delivered goods at the end of their useful lives at its cost and to dispose of them properly in accordance with legal regulations. This shall also apply where the obligation of the third party was not made in writing and the third party disputes contractual assumption of the duty to dispose.
5. GHM's right to have the customer hold harmless and release GHM will not expire before two years have passed after the final use of the device. This two-year expiry restriction begins no earlier than the date of GHM receiving a written notification from the customer of the end of the device's use. However, the claim to hold harmless and release will expire no later than 30 years after it comes into existence.

§ 12 Miscellaneous

1. Unless otherwise agreed, the law of the Federal Republic of Germany shall exclusively apply, under the exclusion of the rules concerning the conflict of laws applicable under that law. The United Nations Convention on Contracts for the International Sale of Goods of 11.04.1980 is not applicable.
2. The place of jurisdiction shall be Wuppertal or at the election of GHM, the competent court at the seat of the customer.
3. In the event that a provision of these GTC or of the contract is or becomes wholly or partly void, ineffective or unenforceable, the effectiveness and enforceability of all other remaining provisions shall not be affected thereby. The void, ineffective or unenforceable provision shall be deemed replaced by such effective and enforceable provision which comes as close as possible to the commercial meaning and purpose of the void, ineffective or unenforceable provision with regard to its object, scope, time, place and scope of application. This shall apply mutatis mutandis to any gaps in these GTC or the contract.
4. The contractual language shall be German. In the event that interpretation is necessary, only the German version of this text shall be relevant. Translations into other languages are exclusively for information purposes.

Status: 11 / 2018

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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

Your ideas and requests are our inspiration.
Challenge us.

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.

GHMGROUP
Specialists by Competence.

GREISINGER	HONSBERG	Martens	IMTRON	DeltaOHM	VAL.CO
Center of Competence Portable Measuring Devices	**Center of Competence** Industrial Sensors	**Center of Competence** Industrial Electronics	**Center of Competence** Signal-Conditioning and Data Acquisition	**Center of Competence** Environmental Measuring Technology & Meteorology	**Center of Competence** Industrial Sensors

INDUSTRIAL

- Sensors for a variety of process variables such as temperature, flow, level and pressure
- Transmitters and isolators for various input/ output variables
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- Test bench measurement technology wit up to 40,000 measurement in the secondary
- Stationary and mobile systems for universal use
- Modular systems for individual adaption to the process needs

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05 / 2019 / en