

Measurement technology for nuclear and conventional applications

Nuclear Power Plant Technology

- Capturing process variables safely
- Safeguarding of international standards



THE COMPANY

For more than 65 years, we have been impressing with innovative product concepts for industrial requirements



LOCATION

FISCHER Mess- und Regeltechnik GmbH is headquartered in Bad Salzuflen in the heart of East Westphalia. This region belongs to Germany's strongest industrial locations and is conveniently situated between the exhibition locations Hanover and Düsseldorf. The economy is predominantly characterized by mediumsized companies and oriented towards machinery and plant engineering. From the cultural point of view, the Hermann Monument (Hermannsdenkmal) is one of Germany's nationwide known landmarks.



ORGANISATION

FISCHER Mess- und Regeltechnik GmbH is positioned as a leading manufacturer of innovative products and customer-specific application solutions in different industrial sectors. As an owner-operated company we are completely independent.

This independence is also reflected in our high level of vertical manufacturing. Traditionally, about 10% of the annual turnover is invested for research and development.

Short decision paths and flat hierarchies guarantee prompt implementation of requirements in development, production and sales at the central production and administration site.

PRODUCT RANGE

Measuring instruments are essentially used for monitoring the process variables pressure, differential pressure, temperature, flow rate, filling level and humidity. The range of products covers everything from simple pressure switches up to multifunctional measuring

converters. The product range is extended by control systems partly elaborated with customers. Monitoring primary and secondary loops for neutral gases and fluids, in special executions for aggressive media is paramount.



MEASUREMENT TECHNOLOGY FOR NUCLEAR TECHNICAL APPLICATIONS

In the course of the cooperative partnership with German plant manufacturers and operators FISCHER Mess- und Regeltechnik GmbH has developed special measuring converters complying with the high and sensitive requirements in this area. Monitoring filter functions, flow rates and filling levels is paramount. Moreover, measuring devices for non-safety-relevant applications are available.

FISCHER Mess- und Regeltechnik GmbH is certified as a supplier for nuclear technical power plants according to KTA (Nuclear Safety Standards Commission) rules and standards 1401 in Germany. For safety-critical applications in the field of annular spaces FISCHER Messund Regeltechnik GmbH provides measuring converters without microprocessor technology. This ensures that the operational capability and reliability of the devices is not impaired by radiation or intervention on the processor.

Apart from these requirements (KTA 3505 and KTA 3507) applicable in line with the German KTA (Nuclear Safety Standards Commission) regulations there are also measuring devices available without such approvals.

DEVICE OVERVIEW

| Function Classification according to: IEEE | Measurement | devices | | | | | |
|--|-------------|---|------|---|----------------|------|------|
| 1E | | ME05 KTA approval | | DE KTA a | E05 oproval | | |
| 2E and 3E | | ME05 | | DE | E05 | | |
| 2E and 3E | DE50 | | | DE13 | | | |
| No requirements | DA55 | DA03/DA01 | DA09 | TW39 | NC57 | NC56 | MA15 |
| Monitoring | | 13943 bor → ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ | | 15.8° | | | |

E1: Electrical function class 1E (Electrical safety functions - may give an increase in radioactive emissions from the plant in the event of a malfunction after disturbances or incidents) E2: Electrical function class 2E (Operational functions - cannot cause an increase in radioactive emissions to the environment in the event of a fault, but are important for the trouble free operation of the plant)

E3: Electrical function class 3E (Service functions - have no effect on reactor safety or production availability)

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FASCHER

DEVICE PROFILES

Differential Pressure Transmitter DE05

Level measurement Flow measurement Monitoring filters, pumps and compressors



Monitoring of extraction

systems etc.

▲ Highly corrosion-resistant materials

- ▲ Wear-resistant meter movement
- ▲ Rinsable pressure chambers
- ▲ Also for aggressive media

Measurement ranges: 0 ... 100 mbar, 0 ... 25 bar

Measurement accuracy: ≤ 0.75 %

Max. stat. pressure: 250 bar

Operating temperature: -10°C ... +70°C Technology: Analogue

Electrical connection type:

4-wire, galvanically isolated Operating voltage: 24V DC

Output signal: 0/4 ... 20 mA

Characteristic curve: Linear, increasing or decreasing (switchable): root-extracting

Pressure Transmitter ME05

Pressure measurement of liquids and gases up to 250 bar

- ▲ Highly corrosion-resistant materials
- ▲ Wear-resistant meter movement
- ▲ Also for aggressive media



Measurement ranges: 0 ... 1 bar to 0 ... 250 bar

Measurement accuracy: ≤ 0.75 %

Operating temperature:

-10°C ... +70°C

Technology: Analogue

Electrical connection type: 4-wire, galvanically isolated

Output signal: 0/4 ... 20 mA

Characteristic curve: Linear, increasing

▲ Highly corrosion-resistant materials

or decreasing (switchable)

Air-conditioning, ventilation ▲ Capsule-type measuring system for over-, low and differential pressure and environmental technology, ventilator regulation measurements

Differential Pressure Transmitter DE50

▲ Integrated LC display



Measurement accuracy: ±1 % Max. stat. operating pressure: 3 bar

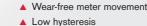
Adm. media temperature: -20°C ... +70°C

Operating voltage: 24V AC/DC Output signal: 0 ... 10 V / 0/4 ... 20 mA

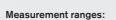
Display: 31/2-digit LC display 2 contacts: 250/30V AC/DC, 2 A

Differential Pressure Transmitter DE13

Filter monitoring Flow monitoring Δ p monitoring at valves Pump control



- Rinsable pressure chambers
- Resistant to pollution



0 ... 40 mbar, 0 ... 25 bar

Linearity: < 1% FS

Max. stat. operating pressure: 100 bar Adm. media temperature: 70°C Operating voltage: 24V AC/DC

Electrical connection: Two-wire/three-wire

0 ... 10 V / 0/4 ... 20 mA

Display: 31/2-digit LC display

Absolute Pressure Gauge DA55

Pressure measurement under severe conditions

Diaphragm Pressure Gauge MA15

for aggressive media and aggressive environment



▲ Corrosion-resistant

- ▲ High overpressure protection
- Corrosion-resistant materials A Suitable for open-air installation
 - ▲ Connection flanges conforming to standards are available for viscous media or media containing solids

Measurement ranges:

0 ... 25 mbar, 0 ... 25 bar Measurement accuracy:

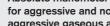
+1.6 % resp. +2.5 %

Adm. media temperature: +100°C Display accuracy: Class 1.6 / class 2.5 for devices with PTFE-protective film

Overpressure protection: 5-fold, max. 40 bar

Measurement display:

Bayonet ring casing Ø 100 or 160 mm Safety casing Ø 100 or 160 mm



Absolute manometer for aggressive and non aggressive gaseous and liquid media



Additional equipment on request:

- ▲ Liquid filling
- ▲ Contact devices
- ▲ Execution for oxygen applications

Measurement ranges:

0 ... 25 mbar abs. 0 ... 6 bar abs Measurement accuracy: ±1.6 % resp. ±2.5 %

Adm. media temperature: -10°C ... +80°C

Housing: NG100 or NG160 of 1.4404

Media-contacting parts: of 1.4404 or Hastelloy C 276

Differential Pressure Gauge DA03 and DA01

Level measurement

Flow measurement

Monitoring pumps, compressors, filters and valves



- ▲ Highly corrosion-resistant materials
- ▲ Wear-resistant meter movement ▲ Resistant to pollution
- ▲ Rinsable pressure chambers
- Additional equipment on request:
- ▲ Slow action and magnetic snap action contacts
- ▲ NAMUR inductive contacts

Measurement ranges: 0 ... 40 mbar, 0 ... 25 bar

Measurement accuracy: ±1.6 %

Operational pressures:

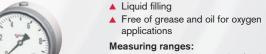
40, 100, 250, 400 bar Adm. media temperature: max. +100°C

Overload capacity: On one side safe against overpressure up to nominal pressure of measurement system, at (+) and (-) safe against underpressure

Differential Pressure Gauge DA09

Level measurement Flow measurement

Monitoring pumps, compressors, filters, valves



Measuring ranges:

▲ Contact devices

0 ... 25 mbar to 0 ... 250 mbar/10 bar Characteristics deviation: ±2.5 %

▲ Highly corrosion-resistant materials

Optional supplementary equipment:

▲ Variable connection technology

▲ Application in aggressive media

Nominal pressure of measuring system:

Pressure connections: Internal thread G1/4, various connection ports and connecting branches with internal thread

Medium-contacted parts: 1.4404, 1.4571 Sealing: Viton®, FEP-coated

▲ Sturdy device execution, IP67

TW3x Screw-in / TW4x Weld-in Resistance Thermometer

Process technology Power plant technology **Boiler construction**

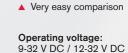


for direct measurement of gaseous and liquid media

- ▲ High measuring accuracy
- ▲ Exchangeable measurement inserts
- ▲ Easy to exchange
- ▲ Economic measuring principle
- ▲ Application possible even for greatdistance measurements to point of measuring
- ▲ Installation of double Pt 100 possible
- ▲ Head transmitter on request for high medium temperatures
- ▲ Sheath measurement inserts available

Capacitive Filling Level Probe NC56, NC57

For measuring tank filling levels in plastic and metal tanks for fresh, process and wastewater



▲ Integrated electronics

Output signal: 0 ... 10 V / 0/4 ... 20 mA

Housing:

Media-contacting: Stainless steel 1.4404, ECTFE, Shrink hose (polyolefin)

Plastic (NC56), stainless steel (NC57) Special coating PFA

Level Gauge EA14 with LCD Display and Colour changer

Differential pressure measurements

compressors

Filter monitoring Level measurement Monitoring of pumps and



The EA14 is applied as a transmitter and display device. The device evaluates an external transmitter signal

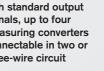
- ▲ Switchable pressure units
- ▲ Signal output with characteristic curve spread and reverse ▲ Characteristic curve implementation via
- table with max, 30 measuring points ▲ Optional PC parameterization adapter

Input signal: 0 ... 10 V / 0/4 ... 20 mA Operating voltage: 12 ... 32 V AC/DC Type of connection: Three-wire Output signal: 0 ... 10 V / 0/4 ... 20 mA Connection: 2 M12 panel plug

External transmitter: M12 plug Switch contacts: 2 potential-free relay contacts, freely adjustable

Measurement Indicating Device with 2.8" Touch LCD EA15

For measuring converters with standard output signals, up to four measuring converters connectable in two or three-wire circuit



15.8%

67.4™

21.0℃

[™] ▲ 18500 №

- - characteristic curve with any kind of offset ▲ 2 ... 4 switchpoints capable of
 - Digital interfaces for I²C. SPI. Modbus ▲ Mathematical functions
 - ▲ Data logger function on SD cards ▲ Setting of all parameters as well as a

▲ 2.8" (7.2 cm) touch LCD colour display

signals (0/4 ... 20 mA, 0 ... 10 V)

▲ 2 ... 4 analogue outputs capable of para-

meterization, spreading and inversion of

▲ 2 ... 4 analogue inputs for standard

measuring point protocol are possible Analogue input signals: 0 ... 10 V / 0/4 ... 20 mA

Operating voltage: 12 ... 32 V AC/DC Output signal: 0 ... 10 V / 0/4 ... 20 mA Interfaces: USB, SD card slot

PROCESS SAFETY

Our devices are produced in line with the requirements of DIN EN ISO 9001:2008.

Devices for safety-relevant applications in nuclear-technical plants are subject to the extended requirements according to KTA* 1401 standards and rules.

The job of KTA is to provide for establishing safety-technical rules and for supporting their

application in fields of nuclear technology where due to experience an uniform opinion of manufacturers, creators and operators of nuclear plants, experts and authorities is becoming apparent.

* KTA (Kerntechnischer Ausschuss) = Nuclear Safety Standards

High quality standard thanks to specifically developed testing facilities

In pre-fabrication, the considerable production steps contain processing raw material at modern production centers.

High manufacturing penetration aims at expressing an almost autarkic production, high quality standard and short-term response to customer needs.

Assembly and testing of measuring devices is ensured at especially provided production

Considerable aspects are separately applicable processes, reproducibility and stamping of especially qualified procurement material as well as testing devices and documentation of test results on testing equipment especially developed for the high requirements.

All devices are subject to an entire testing procedure in the course of a testing mode according to certain pressure and temperature processes in special calibration furnaces. In addition, artificial ageing is created for ensuring the interaction of components.



Finally, the devices are calibrated and test documents issued in the testing laboratory at the end of the production chain.



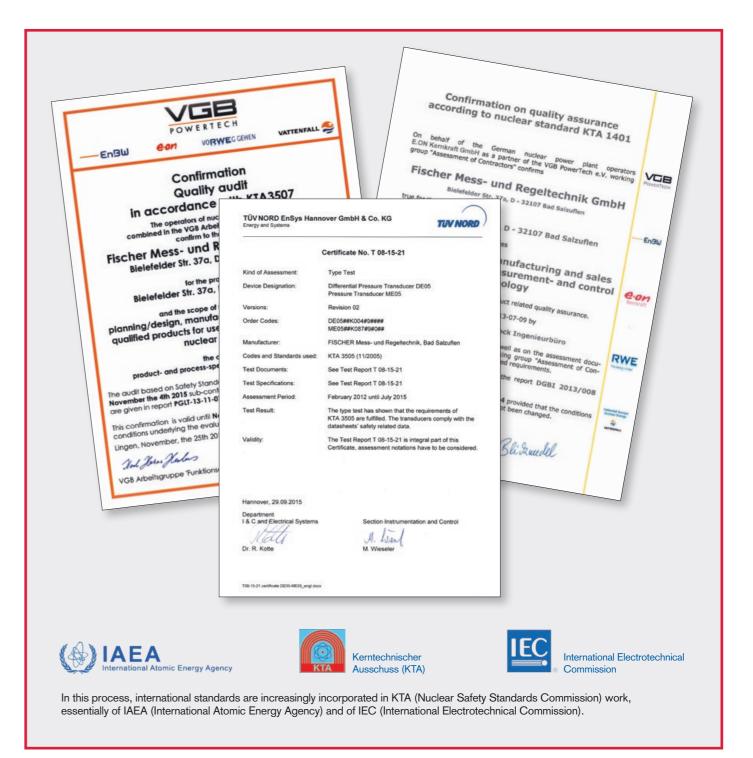




SAFEGUARDING OF INTERNATIONAL STANDARDS

All processes are subject to the statutes of standards KTA 1401, 3505 and 3507. They attest the successful qualification of FISCHER Messund Regeltechnik GmbH as an executing company (contractor assessment), type testing of devices for safety-relevant processes, execution

of relevant testing as well as evidence of operational reliability of assemblies. Implementation was carried out together with involved bodies of certification companies, operators and authorized bodies.



For further information about our products and contact data please refer to www.fischermesstechnik.de/en/solutions/nuclear-power.



FISCHER Mess- und Regeltechnik GmbH provides a perfectly tailored range of models for power plants (nuclear and conventional), as well as for many other applications.

The measuring instruments are distinguished by:

- Families of measuring instruments for various measuring tasks
- Comfortable user prompt
- Some instruments with extended proofs (EAC, SIL, GL, KTA, structural testing, etc.)
- Industry-compliant equipment for housings and process connections
- Special instruments with colour-change displays for visualisation of operating conditions (e.g. warnings, alarms)
- ▲ Customer-specific system solutions

Numerous references prove the quality of our products.

FISCHER Mess- und Regeltechnik GmbH offers individual concept solutions for your application.

We are an owner-operated family business with efficient decision-making processes.

We offer our customers tailored systems and product solutions, as well as OEM products.

Our devices and solutions are optimally suited for a variety of applications, such as:

- Pressure measurement (under- and over-pressure)
- Differential pressure measurement
- Flow measurement
- ▲ Temperature measurement
- ▲ Level measurement
- ▲ Humidity measurement
- ▲ Control systems

Our sales engineers are available for a detailed consultation regarding our products and solutions.

www.fischermesstechnik.de

FISCHER Mess- und Regeltechnik GmbH

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