

Installation and Maintenance Instruction Manual



Differential pressure gauge, model F5510
(non-electrical device) in a 100=F5510=###=ATEX configuration
for explosion risk areas pursuant to Directive 94/9/EC (ATEX)
Zone 1 and 2, and Zone 21 and 22; risk from gases and dry dust



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1 General remarks

1.1 Purpose of this Manual



This Operating Manual contains fundamental and essential advice to be followed for the installation, operation and servicing of the device. It must be read without fail before installation and start-up of the device by the fitter, the operator and the specialist personnel responsible for the device. This Operating Manual must be available at the point of use of the device at all times.

The following sections about Safety (2) and also the following specific advice regarding the Use in accordance with intended purpose (2.2) and through to Disposal (11.3) contain important safety information which, if not followed, may result in risks for people and animals, or to property and buildings.

1.2 Symbols



Warning!

This indicates a possibly hazardous situation where failing to follow advice may result in risks to people, animals, the environment and buildings.



Information!

This emphasizes key information for efficient, fault-free operation.

1.3 Limits of liability

Failure to respect this safety information, the intended uses or the limit values relating to use indicated in the technical data for the device may result in risk or to injury to people, the environment or the plant.

Claims for compensation for damage against the device supplier are excluded in such an eventuality.

1.4 Copyright

Without special permission from the publisher, this Operating Manual may be copied and passed on as a complete document only.

1.5 Warranty

For the product described here, we offer a warranty pursuant to Section 6, 'Guarantee in Respect of Defects' in our General Terms and Conditions of Delivery and Payment.

1.6 Manufacturer's address, customer services

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2 Safety

2.1 General sources of hazards

Pressure gauges are pressurized parts where failure can result in hazardous situations. The selection of pressure gauge should be made in accordance with the rules set out in EN 837-2.

2.2 Use in accordance with intended purpose

The devices are only to be used for the intended purpose as described by the manufacturer.

The devices are used for direct display of differential pressures.

For each use scenario, the corresponding set-up regulations must be respected. If used in explosion risk areas, the following conditions must be respected.

2.3 Operator's responsibility

Safety instructions for proper operation of the device must be respected. They must be provided by the operator for use by the respective personnel for installation, servicing, inspection and operation. Risks from electrical energy and from the released energy of the medium, from escaping media and from improper connection of the device must be eliminated. The details for this are to be found in the corresponding applicable set of regulations, such as DIN EN, UVV (accident prevention regulations) and in sector-specific instances of use (DVWG, Ex- GL, etc.) the VDE guidelines and the regulations supplied by local utilities companies.

The device must be taken out of service and secured against inadvertently being restarted, if the presumption is that risk-free operation is no longer possible (see Chapter 10 Faults).

Conversion works or other technical alterations to the device by the customer are not permitted. This also applies to installation of spare parts. Possible conversions or alterations may only be carried out by the manufacturer.

The operational safety of the device is only guaranteed where it is used for its intended purpose. The specification of the device must be suited to the medium used in the plant. The limit values indicated in the technical data must not be exceeded.

The safety information detailed in this Operating Manual, existing national regulations for accident prevention, and the operator's internal regulations regarding working, operations and safety must be respected.

The operator is responsible for all specified servicing, inspection and installation works being carried out by authorized and qualified specialists.

2.4 Staff qualifications (target group assessment)

The device may only be installed and started up by specialist staff who are familiar with installation, start-up and operation of the product.

Specialist staff are people who are able to assess the work assigned to them on the basis of their specialist training, their knowledge and experience and their knowledge of the relevant standards, and can identify possible risks.

For devices in explosion-protected configuration, these staff must have been trained or instructed in, or be authorized for, working on explosion-protected devices in potentially explosive plants.

2.5 Signs/Safety markings

The pressure gauge and its surrounding packaging carry markings. These markings show the article number, measurement range and manufacturer. The pressure gauge can be provided with additional signs and safety markings advising on special conditions:

- Advice on the filling liquid
- Advice on calibration
- Ex (for ATEX configuration)
- Oil-can deleted (if oxygen is used)

2.6 Safety equipment

The window uses multi-layer safety glass.

2.7 Environmental protection

This device may optionally contain a filling liquid (e.g. glycerine or silicone oil). The provisions set out in the REACH regulation on production and use of chemicals must be respected, and the relevant safety data sheets from the manufacturers of the chemicals are available on our website for download.

3 Use in explosion risk areas pursuant to Directive 94/9/EC (ATEX)

Area of use:

Explosion risk areas Zone 1 and 2, and 21 and 22, risk from gases and dry dust.

Permitted temperatures:

The maximum occurring surface temperature of 95 °C was determined with no covering of dust and with no safety factor.

Permitted ambient temperature -20 °C to +60 °C.

Permitted medium temperature in the pressure gage < 85 °C.



Warning! With gaseous media, the device temperature may increase due to compression heat. In such cases, the rate of the pressure change must be regulated or the permitted temperature of the measuring medium reduced.

Note:

For a change in differential pressure between 10 % and 90 % of the measuring range and a pulse frequency of < 0.06 Hz, the temperature increase is <10 K.

To avoid additional temperature increase, the devices should not be exposed to direct exposure to sunlight when in operation!

For the non-electrical part of the devices, the standards EN 13463-1, EN 13463-5 and EN 60079-0 are applicable with regard to explosion protection. The relevant requirements of these standards are satisfied.

The documentation has been filed with TÜV-Nord-Cert (see declaration of conformity).

Labeling:

CE  II 2 GD c 95°C IP65

4 Technical data

The detailed technical information can be found in the documents in the Appendix, Chapter 12.

5 Labeling on the device



The label with the serial number and type designation is located on the outside right of the housing. The materials identifier is encoded in the type designation.

5.1 Labeling on the device for explosion risk areas (ATEX)

The label with the marking for explosion risk areas is located on the outside left of the housing.

Type designation

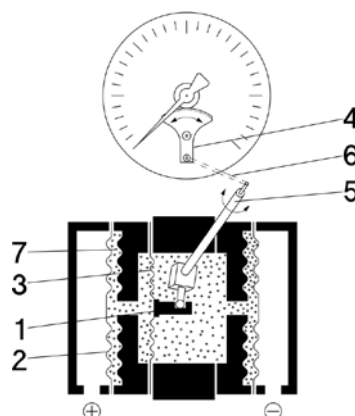
100=F5510=###=ATEX

CE   II 2 GD c 95°C IP65
-20°C ≤ T_{amb} ≤ 60°C

6 Construction and function

6.1 Overview

- 1 Coupling rod
- 2 Separating diaphragm
- 3 Measuring diaphragm
- 4 Movement
- 5 Torsion tube
- 6 Transfer lever
- 7 Pressure transfer liquid



6.2 Description of function

The pressures to be compared act hydraulically via the separating diaphragm on the measuring diaphragm. When the pressure is equal, the measuring diaphragm is in the rest position. In the event of a pressure difference, a force is generated on the measuring diaphragm which causes it to be deflected in the direction of the lower pressure. Using a torsion tube, the movement along the measurement path is conveyed out of the closed measurement system as a rotary movement, and translated via the attached movement into an angle of turn of between 0 and 270°.

If a unilateral stress on the measurement system occurs which exceeds the measurement range, the separating diaphragms are supported on similarly-contoured molded parts of the system housing, thereby protecting the measurement system against overload.

6.3 Description of components

6.3.1 Scale with pointer

The pressure gauge is equipped with a dial and pointer similar to EN 837, nominal size 100 mm.

6.3.2 Instrument connection

The instrument connection is located on the underside of the pressure gauge and can be a threaded or flanged connector pursuant to DIN EN 61518.

6.4 Accessories

Please contact the manufacturer regarding special tools and accessories.

7 Transport

7.1 Safety

The pressure gauge should be protected against the effects of knocks and impacts. The device should only be transported in the packaging provided, to protect against glass breakage. The device should only be transported in a clean condition (free from residues of measuring media).

7.2 Transport inspection

The delivery must be checked for completeness and damage during transport. In the event of damage during transport, the delivery must not be accepted, or only accepted subject to reservation of the scope of the damage being recorded and, if necessary, a complaint initiated.

7.3 Storage

The pressure gauge must be stored in dry, clean conditions, within a temperature range of -40 to +60 °C, protected against direct exposure to sunlight and protected against impact damage.

8 Mounting/Installation

8.1 Safety

To ensure safe working during installation and servicing, suitable shut-off valves must be installed in the plant (see 6.4 Accessories), enabling the device:

- To be depressurized or taken out of operation;
- To be disconnected from the mains supply for repair or checks within the relevant plant;
- Or to enable function tests of the device to be performed “on site”.

During the works to mount/install the gauge, the plant must be protected against being switched back on.

8.2 Preparations (requirements for the installation location)

- A check on suitability of the device for the medium to be measured, the scope of the measurement range and the extent of the protection against special conditions such as vibrations, pulsations and pressure blows.
- A bracket must be installed to support the pressure gauge if the pipe is not able to provide adequate support.
- The installation location should be chosen such that the work-spaces for operating personnel are not located to the rear of the pressure gauge.

8.3 Assembly/Installation

Using appropriate accessories, the device can be installed on flat walls, mounting plates, on pipes or in panels or boards.

Ex works, the device is supplied and calibrated for vertical installation. In the event of an installation orientation deviating from the vertical (max. $\pm 10^\circ$), the zero setting of the display must be corrected (see 8.4.1 Zero point adjustment).

8.3.1 Process connection

- Connection must be undertaken by authorized and qualified specialist staff only.
- Use only with the mechanical process connection provided – regarding the configuration, see order code on the device type label, with a matching threaded seal.
- When connecting the device, the pipes must be depressurized.
- The pressure metering pipe must be laid inclined in such a way that, for example, for measurements of fluids no air pockets can form, and for measurements of gases no water pockets. If the necessary incline is not achieved, then at suitable points water separators or air separators must be installed.
- The pressure metering pipe must be kept as short as possible and laid without sharp bends, to avoid the occurrence of irritating delays.
- The pressure connectors are labeled with + and – symbols on the device. The pressure connection pipes must be fitted in accordance with this labeling.
 - + high pressure port
 - low pressure port
- With liquid measurement media, the pressurized connection pipe must be degassed, since any gas bubble inclusions result in measurement error.
- If water is used as the measurement medium, the device must be frost-protected.



Safety notice: Only mount using the correct open-jawed wrench, and do not twist the device itself.

8.3.2 Grounding

For grounding, an external connection to ground for fine-wire conductors up to 4 mm² or single-wire conductors up to 6 mm² is provided.

Grounding connection



8.4 Starting up

The precondition for start-up is proper installation of all electrical feed lines and metering pipes. All connecting pipes must be laid such that no mechanical forces can act on the device.

Before start-up, the seal on the pressurized connection line must be checked.

8.4.1 Zero point adjustment

The devices are supplied calibrated ex works, so that as a rule there is no need for calibration operations at the installation point. However, it is possible to adjust the zero point on site, and this is performed as follows:

- Switch the pressure metering pipe so that it is depressurized, or charge it with the existing static pressure.
- Open the front face of the device, by loosening the bayonet ring. This may require a belt wrench.
- Hold the pointer in place and adjust the pointer bushing using a screwdriver, until the pointer (when released) is pointing correctly to zero.



- Close the case again and ensure that the seal, glass plate and locking ring are seated correctly.



Liquid-filled devices must be dismantled for the zero point adjustment, and placed on a horizontal surface for adjustment, since otherwise the liquid would run out.

8.5 Subsequent relocation of the gauge (by the customer)



Recommendation: Do not remove the pressure gauge from one metering point and fit it in a different place, as there is a risk of the measuring media being mixed, with unforeseeable chemical reactions.

9 Servicing

The device is maintenance-free. However, to ensure reliable operation and a long lifetime for the device, we recommend that it is checked regularly.

9.1 Safety

When undertaking servicing work on the device, the pressure lines must be depressurized and the plant secured against being switched on again.

9.2 Check on function, and recalibration

The check on function and recalibration is carried out at regular intervals, depending on the application. The precise testing cycles should be adjusted in line with the operating conditions and ambient conditions. In the event of various device components interacting, the operating instructions for all other devices should also be taken into account.

- Check on display.
- Check on function, in conjunction with downstream components.
- Check of pressurized connection pipes for seal condition.
- Check of electrical connections.

9.3 Cleaning and maintenance

Cleaning is carried out using a non-aggressive cleaning agent, respecting the protection category of the device.

10 Faults

10.1 Safety

Defective or faulty pressure gauges put the operational safety and process safety of the plant at risk, and can lead to a risk of injury to persons, the environment or the plant.

10.2 Conduct in the event of faults

All defective or faulty devices must be taken out of service. If a repair is required, the device must be sent directly to our Repairs Department. We request that all returns of devices are agreed with our Service Department.

10.3 Fault table

Possible situations indicating a fault:

- Jerky or random movement of the pointer
- Pointer does not set to zero for pressure-less display
- Bent or loose pointer
- Cracked window
- Leaks when the device is filled
- Damage to housing
- Indications that the measurement system seal is imperfect (discoloration to dial or of filling liquid)
- Extended storage at temperatures above 60 °C

In these instances, replacement of the gage is always required.

10.4 Conduct following fault rectification

See Chapter 8 Mounting/Installation.

11 Removal, disposal

11.1 Safety



Residues of measuring media in and on removed gauges can constitute a risk to people, the environment and equipment. Adequate precautionary measures must be adopted. If necessary, the devices must be cleaned thoroughly (see advice in safety data sheets).

11.2 Removal

- When undertaking servicing work on the device, the pressure lines must be depressurized and the plant secured against being switched on again.
- Remove the gauge using a suitable tool.

11.3 Disposal



Please help to protect the environment and dispose of or recycle the devices and components used in accordance with the applicable regulations.

12 Appendix

12.1 Declaration of conformity



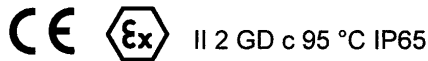
EG-Konformitätsbescheinigung (gemäß RL 94/9/EG Anhang X)



EC-Declaration of Conformity (according to RL 94/9/EC appendix X)

Die Firma Ashcroft Instruments GmbH erklärt in alleiniger Verantwortung die Übereinstimmung mit den harmonisierten Europäischen Normen für mechanische Betriebsmittel in explosionsgefährdeten Bereichen für Differenzdruckmanometer Typ F5510.
Ashcroft Instruments GmbH declares in sole responsibility the conformity with the harmonized European Standards for mechanical equipment in potentially explosive areas for differential pressure gauge model F5510.

Kennzeichnung
Marking:



Die Unterlagen werden aufbewahrt unter der Aktennummer 35078199 bei der benannten Stelle 0044, TÜV NORD CERT.

The dossier is retained under file no. 35078199 at the notified body 0044, TÜV NORD CERT.

Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch die Übereinstimmung mit

The fundamental safety and health requirements are fulfilled in compliance with

DIN EN 13463-1 DIN EN 13463-5

Diese Konformitätserklärung bezieht sich auf Konzeption und Fertigung des oben beschriebenen Gerätes gemäß der Richtlinie 94/9/EG (ATEX).

This declaration of conformity applies to the development and production of the above-mentioned equipment according to directive 94/9/EC (ATEX).

Baesweiler, Februar 2011

(Operation Manager)

12.2 Data sheet for the F5510 Differential Pressure Gauge

Stainless steel differential pressure gauge

Model F5510

Max. static pressure 100 bar

Nominal size 100 mm

Accuracy: Class 2,5 (EN), optional 1,6 %

Features

- Stainless steel case and wetted parts
- Static pressure 100 bar, one side load permitted
- Protection IP65
- High corrosive resistance
- Dry or liquid filled
- Smooth internal surface without recesses
- Flush dual diaphragm, safety design

Ranges

0 ... 1 bar up to 0 ... 16 bar

Applications

Chemical and petrochemical industry

Machine and apparatus construction

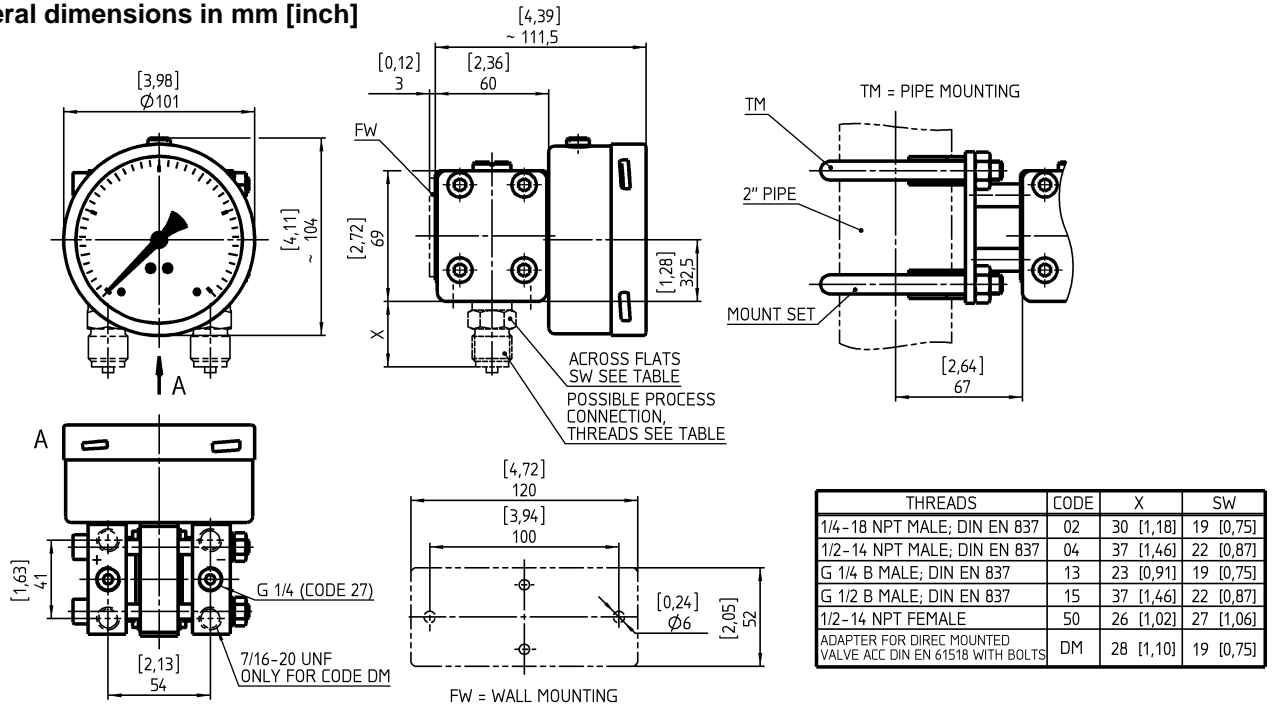
Food and beverage industry

Pulp and paper industry



Technical specification	F5510
Dial size in mm	100
Construction	Cylindrical case with bayonet ring
Zero adjustment	Micro adjustment pointer
Measuring principle	Dual diaphragm (see back side), safety design
Range in bar	1 1,6 2,5 4 6 10 16
Max. static pressure	100 bar
Overload capability	Static pressure is also maximum pressure allowed on one side
Pressure type	Differential
Process connection	G ¼ B female, G ½ B male ¼ NPT male, ¼ NPT female, ½ NPT male, ½ NPT female, Adapter for direct mounted valve acc. DIN EN 61518 with bolts, others on request
Connection location	Lower
Material	Pressure connection Stainless steel 316L (1.4404), optional Hastelloy C Pressure chamber Stainless steel 316L (1.4404), optional Hastelloy C, Viton O-ring, optional PTFE coated gaskets Separating diaphragm Hastelloy C Intermediate plate AlMgSiPb HART-COAT® Case/bayonet ring Stainless steel 304 (1.4301), optional 316L (1.4404) Movement Stainless steel 304 (1.4301) Window Laminated safety glass Dial Aluminum, black markings on white background Pointer Aluminum, black, micrometer adjustable, optional red set hand or minimum/maximum indication
Accuracy	Class 2,5 (2,5 % F.S.), optional 1,6 %
Permissible	Ambient temperature -20 ... 80 °C, with option ATEX -20 ... 60 °C Medium temperature Max. 100 °C Storage temperature -40 ... 60 °C Effect Max. 0,3 % / 10 K
Protection according EN 60 529/IEC 529	IP65
Conformity according to RL 94/9/EC appendix X for mechanical equipment in potential hazardous areas	Optional, marking CE II 2 GD c 95°C IP65 File No. 35078199 at notified body 0032, TÜV NORD CERT
Filling liquids	Glycerin, silicone, others on request
Mounting	Direct, optional wall or 2" pipe mounting
Weight dry/filled in kg	2,2/2,5
Accessories, options	3 or 5 way direct or remote mounted manifolds, diaphragm seals, NACE/ISO 15156

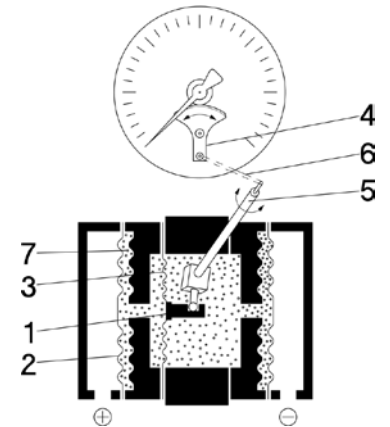
General dimensions in mm [inch]



Construction and Operation

The pressures to be compared act by separating two diaphragms hydraulically from the sensing diaphragm. When pressures are equal on both separating diaphragms they are at zero position. Pressure differences deflect the sensing diaphragm to the lower pressure side. The measurement is transmitted from the closed measuring system using a torque rod, and indicated on a 0-270° dial. When the measuring system is stressed on one side beyond the measuring range the separating diaphragms protect the measuring system from overload and damage.

- 1 Connecting rod
- 2 Separating diaphragm
- 3 Sensing diaphragm
- 4 Movement
- 5 Torque rod
- 6 Lever
- 7 Pressure transfer liquid



Order information

Size	System material	Execution	Process connection	Connection orientation	Range	Engineering unit	Filling/case	Options
(100) 100 mm	(SH) Pressure chamber diaphragm Hastelloy C (HH) Pressure chamber and diaphragm Hastelloy C	(=) IP65 standard case (L) Liquid filled IP65	(27) G ¼ female (02) ¼ NPT male (04) ½ NPT male (15) G ½ B male (25) ¼ NPT female (50) ½ NPT female (DM) Adapter for direct mounted valve acc. DIN EN 61518 with bolts Others on request	(L) Lower	0/ 1 0/ 1,6 0/ 2,5 0/ 4 0/ 6 0/ 10 0/ 16	(BAR) psi and others on request	(=) Standard no filling (GV) Silicone (GR) Glycerin (YW) Case material 316L (1.4404)	(NH) Tagging wired (AN) Accuracy class 1,6 (6B) Oxygen service (body filled with fluid S4) (CS) Dual scale (DA) Dial marking (FW) Wall mounting bracket (PT) PTFE gasket (TM) 2" pipe mounting bracket (LJ) Field fillable (only for execution =) (ATEX) ATEX listed

Order example

Size	Type	System material	Execution	Process connection	Connection orientation	Range	Engineering unit	Filling/case	Option
100	F5510	S	=	50	L	0/1	BAR	=	NH