AFRISO
Technik für Umweltschutz
Messen. Regeln. Überwachen.

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Translation of the Original Operating Manual

Pressure Transmitters / screw-in probes

DMU 01, DMU 01 K, DMU 03, DMU 03 HD,

DMU 04, DMU 05P, DMU 07, DMU 07 FG

READ THOROUGHLY BEFORE USING THE DEVICE
KEEP FOR FUTURE REFERENCE

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1. General and Safety-Related Information on this Operating Manual

This operating manual enables safe and proper handling of the product, and forms part of the device. It should be kept in close proximity to the place of use, accessible for staff members at any time.

All persons entrusted with the mounting, installation, putting into service, operation, maintenance, removal from service, and disposal of the device must have read and understood the operating manual and in particular the safety-related information.

The following documents are an important part of the operating manual:

- *Data sheet*

For specific data on the individual sensors, please refer to the respective data sheet.

Download these by accessing www.afriso.com or request them by e-mail or phone: info@afriso.com | Fon: +49 7135 102-211

In addition, the applicable accident prevention regulations, safety requirements, and country-specific installation standards as well as the accepted engineering standards must be observed.

1.1 Symbols Used

Warning word	- Type and source of danger - Measures to avoid the danger

Warning word	Meaning
DANGER	- Imminent danger! - Non-compliance **will result in** death or serious injury.
WARNING	- Possible danger! - Non-compliance **may result in** death or serious injury.
CAUTION	- Hazardous situation! - Non-compliance **may result in** minor or moderate injury.

NOTE – draws attention to a possibly hazardous situation that may result in property damage in case of non-compliance.

✓ Precondition of an action

1.2 Staff Qualification

Qualified persons are persons that are familiar with the mounting, installation, putting into service, operation, maintenance, removal from service, and disposal of the product and have the appropriate qualification for their activity.

This includes persons that meet at least one of the following three requirements:

- They know the safety concepts of metrology and automation technology and are familiar therewith as project staff.
- They are operating staff of the measuring and automation systems and have been instructed in the handling of the systems. They are familiar with the operation of the devices and technologies described in this documentation.
- They are commissioning specialists or are employed in the service department, and have completed training that qualifies them for the repair of the system. In addition, they are authorized to put into operation, to ground, and to mark circuits and devices according to the safety engineering standards.

All work with this product must be carried out by qualified persons!

1.3 Intended Use

The devices are used to convert the physical parameter of pressure into an electric signal.

The **pressure transmitters** are exclusively suited for measuring positive, negative and absolute pressures.

The **screw-in probes** are exclusively suited to filling-level and process measuring technology.

The user must check whether the device is suited for the selected use. In case of doubt, please contact our sales department (info@afriso.com | Fon: +49 7135 102-211). AFRISO assumes no liability for any wrong selection and the consequences thereof!

The fluids that can be measured are gases and liquids that are compatible with the materials in contact with the fluids, described in the data sheet. For application, it must additionally be ensured that the fluid is compatible with the parts in contact with the fluid.

1.4 Limitation of Liability and Warranty

Failure to observe the instructions or technical regulations, improper use and use not as intended, and alteration of or damage to the device will result in the forfeiture of warranty and liability claims.

1.5 Safe Handling

NOTE – Treat the device with care both in the packed and unpacked condition!

NOTE – The device must not be altered or modified in any way.

NOTE – Do not throw or drop the device!

NOTE – Excessive dust accumulation (over 5 mm) and complete coverage with dust must be prevented!

The device is state-of-the-art and is operationally reliable. Residual hazards may originate from the device if it is used or operated improperly.

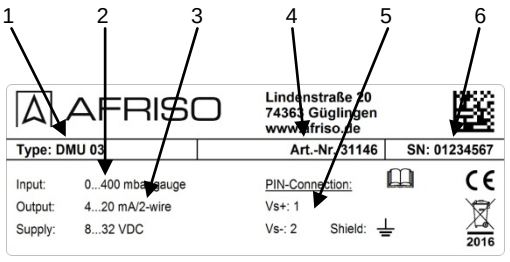
1.6 Scope of Delivery

Check that all parts listed in the scope of delivery are included free of damage, and have been delivered according to your purchase order:

- Pressure transducer or screw-in probe
- for mech. connections to DIN 3852: O-ring (premounted)
- this operating manual

2. Product Identification

The device can be identified by means of the type plate with order code. The most important data can be gathered therefrom.



1	Type designation	**4**	Order code
2	Input	**5**	Terminal assignment
3	Output	**6**	Serial number

Fig. 1: Type plate

NOTE – The type plate must not be removed!

3. Mounting

3.1 Mounting and Safety Instructions

DANGER	- airborne parts, leaking fluid, electric shock - Always mount the device in a depressurized and de-energized condition!

NOTE – If there is increased risk of damage to the device by lightning strike or overvoltage, increased lightning protection must additionally be provided!

NOTE – Treat any unprotected diaphragm with utmost care; this can be damaged very easily.

NOTES – for mounting outdoors or in a moist environment:

- Connect the device electrically straightaway after mounting or prevent moisture penetration, e.g. by a suitable protective cap. (The protection rating specified on the data sheet applies to the connected device.)
- Select the mounting position such that splashed and condensed water can drain off. Stationary liquid on sealing surfaces must be excluded!
- If the device has a cable outlet, the outgoing cable must be routed downwards. If the cable needs to be routed upwards, this must be done in an initially downward curve.
- Mount the device such that it is protected from direct solar radiation. In the most unfavorable case, direct solar radiation leads to the exceeding of the permissible operating temperature. This must be excluded if the device is used in any explosion-hazardous area!
- A device with gauge reference in the housing (small hole next to the electrical connection) must be mounted such that the gauge reference is protected against dirt and humidity. If the transducer is exposed to liquid admission, the gauge reference will be blocked, and the equalization of air pressure will be prevented. In this condition, a precise measurement is impossible and damage to the transducer may occur.
- Provide for a cooling section if the device is used in a steam line.

NOTE – When installing the device, avoid high mechanical stresses on the pressure port! This will result in a shift of the characteristic curve or to damage, in particular in case of very small pressure ranges and devices with a pressure connection/port made of plastic.

NOTE – In hydraulic systems, arrange the device such that the pressure port points upwards. (venting)

NOTE – If the device is installed with the pressure port pointing upwards, ensure that no liquid drains off on the device. This could result in humidity and dirt blocking the gauge reference in the housing, and could lead to malfunctions. If necessary, dust and dirt must be removed from the edge of the screwed joint of the electrical connection.

NOTE – Do not remove the packaging or protective caps of the device until shortly before the mounting procedure, in order to exclude any damage to the diaphragm and the threads!

Protective caps must be kept! Dispose of the packaging properly!

NOTE – The specified tightening torques must not be exceeded!

3.2 Mounting Steps for Connections According to DIN 3852

NOTE – Do not use any additional sealing material such as tow, hemp or Teflon tape!

✓ The O-ring is undamaged and seated in the designated groove.

✓ The sealing face of the mating component has a flawless surface. (R_Z 6.3)

1 Screw the device into the mating thread by hand.

2 Devices with a wrench flat must be tightened using a suitable open-end wrench.
Wrench flat made of steel:
G1/4: approx. 5 Nm; G1/2: approx. 10 Nm;
G3/4: approx. 15 Nm; G1: approx. 20 Nm
Wrench flat made of plastic:
max. 3 Nm)

3 Devices equipped with a knurled ring:
only tighten by hand

3.3 Mounting Steps for Connections According to EN 837

✓ A suitable seal for the measured fluid and the pressure to be measured is available. (e.g. a copper seal)

✓ The sealing face of the mating component has a flawless surface. (RZ 6.3)

1 Screw the device into the mating thread by hand.

2 Then tighten it using an open-end wrench: G1/4: approx. 20 Nm; G1/2: approx. 50 Nm

3.4 Mounting Steps for NPT Connections

✓ Suitable fluid-compatible sealing material, e.g. PTFE tape, is available.

1 Screw the device into the mating thread by hand

2 Then tighten it using an open-end wrench: 1/4" NPT: approx. 30 Nm; 1/2" NPT: approx. 70 Nm

3.5 Mounting Steps for Female Threads M20x1.5 and 9/16" UNF (for Extreme-Pressure Devices)

WARNING	- Due to wrong installation - Do not use any seal!

NOTE – The high-pressure tube will seal metallically in the chamfer on the pressure port. (sealing cone 60°)

1 Screw the high-pressure fitting into the female thread on the pressure transducer.

2 Then tighten it using an open-end wrench: approx. 120 Nm.

3.6 Mounting Steps for Milk Pipe Connections

✓ The O-ring is undamaged and seated in the designated groove.

1 Center the milk pipe connection in the corresponding mating fitting.

2 Screw the sleeve nut onto the mating fitting.

3 Then tighten it using a hook wrench.

3.7 Mounting Steps for Clamp and Varivent® Connections

✓ A suitable seal for the measured fluid and the pressure to be measured is available.

1 Place the seal onto the corresponding mating fitting

2 Center the clamp connection or Varivent® connection above the corresponding mating fitting

3 Then fasten the device using a suitable fastener (e.g. half-ring or retractable ring clamp connection) according to the instructions specified by the manufacturer

3.8 Mounting Steps for Flange Connections

✓ A suitable seal for the measured fluid and the pressure to be measured is available. (e.g. a fiber seal)

1 Position the seal between the connecting flange and the mating flange

2 Then attach the device to the mating flange using 4 or 8 bolts/nuts (depending on flange design)

4. Electrical Connection

4.1 Connection and Safety Instructions

WARNING	- Improper installation may result in electric shock - Always mount the device in a depressurized and de-energized condition!

NOTE – If the device is equipped with a **cable fitting** and/or **cable box**, it must be ensured that the outer diameter of the line used is within the permissible clamping range. Additionally it must be ensured that this is seated firmly and gaplessly in the cable fitting!

NOTE – Use a shielded and twisted multicore cable for the electrical connection.

NOTE – for devices with **cable outlet**

- When routing the cable, the following minimum bend radii must be observed:
  Cable without air hose:
  fixed installation: 5-fold cable diameter
  flexible use: 10-fold cable diameter
  Cable with air hose:
  fixed installation: 10-fold cable diameter
  flexible use: 20-fold cable diameter
- In case of devices with **cable outlet** and integrated ventilation hose, the PTFE filter located at the cable end on the relative pressure hose must neither be damaged nor removed!

NOTE – When devices with **ISO 4400** are used, the cable box must be properly mounted so that the protection rating specified on the data sheet is ensured! Ensure that the seal supplied is installed between the connector and the cable box. After connecting the cable, attach the cable box to the device by means of the screw.

NOTE – On a device equipped with **field housing**, the connection terminals are located underneath the housing cover. The cover must be screwed off in order to connect the device electrically. Before the cover is screwed on again, the O-ring and sealing surface on the housing must be checked for damage and, if necessary, replaced! Then screw on the cover by hand and make sure that the field housing is tightly closed again.

4.3 Electrical Installation

Connect the device electrically according to the information specified on the type plate, the following table, and the connection circuit diagram.

Terminal assignment table:

Electrical connections	ISO 4400	Binder 723 (5-pin)	M12x1 (4-pin)
Supply +	1	3	1
Supply –	2	4	2
Shield	ground pin	5	4

Electrical connections	Bayonet MIL-C-26482 (10-6)
Supply +	A
Supply –	B
Shield	Pressure port

Electrical connections	Field housing	Cable colors (IEC 60757)
Supply +	IN +	wh (white)
Supply –	IN -	bn (brown)
Shield	⏚	gnye (green-yellow)

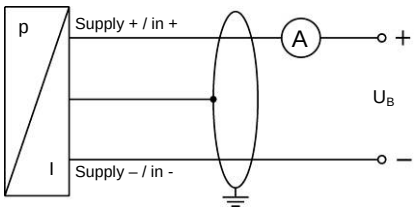


Fig. 4: Connection circuit diagram

NOTE – For unambiguous identification, the intrinsically safe cable is marked with a light blue shrinkable tube (around the cable insulation). If a modification (e.g. a shortening) of the cable is inevitable whereby the marking at the end of the cable is lost, the marking must be restored! (Renewed marking by a light blue shrinkable tube or by an appropriate marking label)

NOTE – In the case of relative pressure gauges, the cable contains a ventilation hose for pressure equalization. Route the end of the cable into an area or suitable connection box which is as dry as possible and free from aggressive gases, in order to prevent any damage.

5. Commissioning

- ✓ The device has been installed properly
- ✓ The device does not have any visible defect

In case of highly precise devices with an accuracy of 0.1 % FSO, a microcontroller-controlled electronic system is used for signal processing. This electronic system is used for signal improvement. Due to the principle, the processing of measured values requires a longer time than with purely analog sensors, which only comprise amplification circuitry. Due to the longer processing time, the output signal follows the measured value not continuously but in jumps. In case of relatively stable and slowly changing measured values, this property plays a minor role. Compare this with the information on the adjusting time in the data sheet.

In the case of i-devices with communications interface, the offset, range, and damping can be adjusted within the limits specified in the data sheet, due to the electronic system. The CIS 510 programming kit is required for the configuration. The kit consists of: Adapt 1, Windows□-compatible P-Scale 510 programming software, power pack and connection cable. This can be ordered from AFRISO as an accessory.

6. Maintenance

DANGER	- Airborne parts, leaking fluids, electric shock - Always service the device in a depressurized and de-energized condition!
Attention	- due to aggressive fluids - Wear suitable protective clothing, e.g. gloves, safety goggles.

In principle, the device requires no maintenance.
If necessary, clean the housing of the device using a moist cloth and a non-aggressive cleaning solution.

Cleaning of the diaphragm:
Deposits or contamination may occur on the diaphragm in case of certain fluids. It is recommended to establish appropriate maintenance intervals for checking in connection with a function control purposes.

Clean the diaphragm cautiously using a non-aggressive cleaning solution and a soft paintbrush or sponge.
If the diaphragm is calcified, it is recommended to have the decalcification performed by AFRISO. Please note the chapter “Service/Repair” with regard to this.

NOTE – Wrong cleaning may damage the measuring cell beyond repair. Do not use any sharp or pointed item to clean the diaphragm.

7. Troubleshooting

CAUTION	- Airborne parts, leaking fluids, electric shock - If malfunctions cannot be resolved, put the device out of service and proceed according

In case of malfunction, it must be checked whether the device has been correctly installed mechanically and electrically. Use the following table to analyze the cause and resolve the malfunction, if possible.

Fault: no output signal	
Possible cause	**Fault detection / remedy**
connected incorrectly	Checking of connections
Conductor/wire breakage	Checking of all line connections.
Defective measuring device (signal input)	Checking of ammeter (miniature fuse) or of analog input of your signal processing unit

Fault: analog output signal too low/small	
Possible cause	**Fault detection / remedy**
Load resistance too high	Checking of load resistance (value)
Supply voltage too low	Checking of power pack output voltage
Defective energy supply	Checking of the power pack and the supply voltage being applied to the device

Fault: slight shift of the output signal	
Possible cause	**Fault detection / remedy**
Diaphragm of measuring cell is severely contaminated	Cleaning using a non-aggressive cleaning solution and soft paintbrush or sponge
Diaphragm of measuring cell is calcified or crusted	**Recommendation:** Have the decalcification or cleaning performed by AFRISO

Fault: large shift of the output signal	
Possible cause	**Fault detection / remedy**
Diaphragm of measuring cell is damaged (caused by overpressure or mechanically)	Checking of diaphragm; when damaged, send the device to AFRISO for repair

Fault: wrong or no output signal	
Possible cause	**Fault detection / remedy**
Cable damaged mechanically, thermally or chemically	Checking of cable; pitting corrosion on the stainless-steel housing as a result of damage on cable; when damaged, send the device to AFRISOfor repair

8. Removal from Service

DANGER	- Airborne parts, leaking fluids, electric shock - Always dismount the device in a depressurized and de-energized condition!
Attention	- due to aggressive fluids. - Wear suitable protective clothing, e.g. gloves, safety goggles.

NOTE – After dismounting, mechanical connections must be fitted with protective caps.

9. Service/Repair

Information on service / repair:

- www.afriso.com
- info@afriso.com
- Service phone: +49 7135 102-211

9.1 Recalibration

The offset value or range value may shift during the life of the device. In this case, a deviating signal value in relation to the set lower or upper measuring range value is output. If one of these two phenomena occurs after extended use, a recalibration in the factory is recommended. Please note the chapter “Service/Repair” with regard to this.

9.2 Return

WARNING	- due to pollutants - Wear suitable protective clothing, e.g. gloves, safety goggles

For every return shipment, whether for recalibration, decalcification, alteration or repair, the device must be cleaned thoroughly and packed in a break-proof manner. A return declaration with a detailed fault description must be added to the defective device. If your device has come into contact with pollutants, a declaration of decontamination is additionally required. . Appropriate templates can be found on our homepage. Download these by accessing www.afriso.com or request them by e-mail or phone: info@afriso.com | Fon: +49 7135-102-211

In case of doubt regarding the fluid used, devices without a declaration of decontamination will only be examined after receipt of an appropriate declaration.

10. Disposal

WARNING	- due to pollutants - Wear suitable protective clothing, e.g. gloves, safety goggles

The device must be disposed of according to the European Directive 2012/19/EU (waste of electrical and electronic equipment). Waste equipment must not be disposed of in household waste!

NOTE – Dispose of the device properly!

11. Warranty Terms

The warranty terms are subject to the legal warranty period of 24 months, valid from the date of delivery. If the device is used improperly, modified or damaged, we will rule out any warranty claim. A damaged diaphragm will not be accepted as a warranty case. Likewise, there shall be no entitlement to services or parts provided under warranty if the defects have arisen due to normal wear and tear.

12. EU Declaration of Conformity / CE

The delivered device fulfils all legal requirements. The applied directives, harmonised standards and documents are listed in the EC declaration of conformity, which is available online at www.afriso.com.
Additionally, the operational safety is confirmed by the CE sign on the manufacturing label.