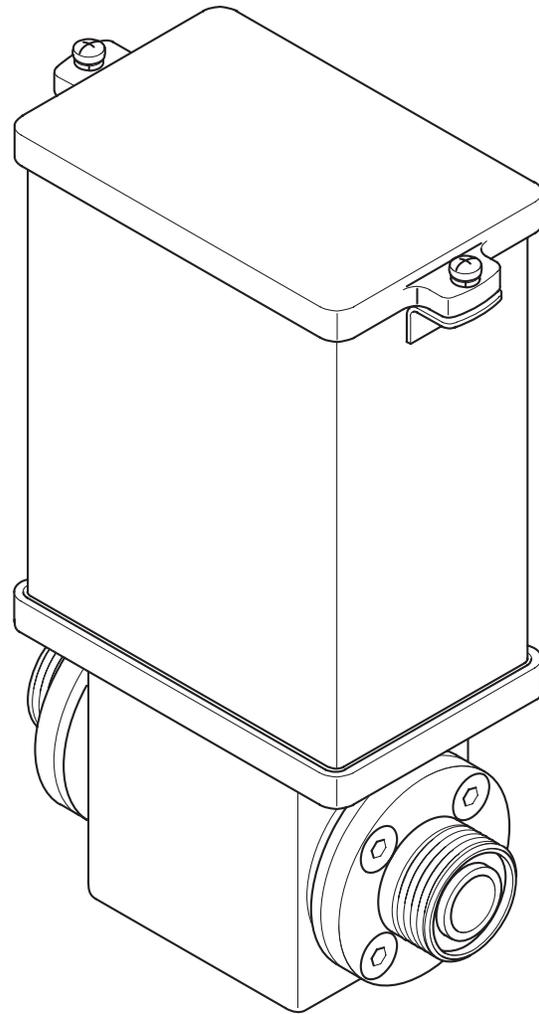
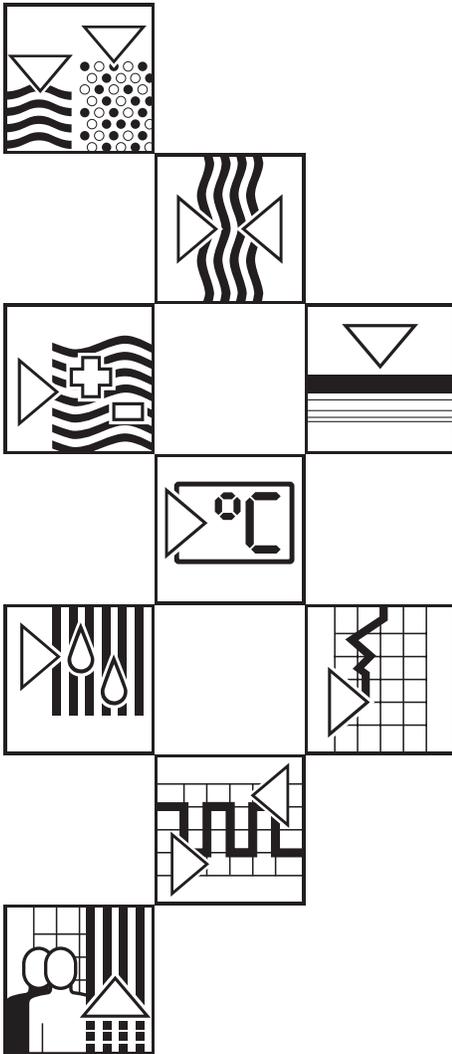


dosimag A Electromagnetic Flow Measuring System

Operating Instructions



IMPORTANT NOTICE RETURN AUTHORIZATION POLICY

Endress+Hauser must pre-approve and assign a Return Authorization number to any instrument you plan to return. Please identify the Return Authorization number clearly on all shipping cartons and paperwork.

Please note that the issuance of a Return Authorization number does not automatically mean that credit will be issued, or that the return is covered by our warranty. An Endress+Hauser associate will contact you regarding the disposition of your returned equipment.

In order to serve you better, and to protect our employees from any potentially hazardous contaminants, Endress+Hauser must return unopened, at the sender's expense, all items that do not have a Return Authorization number.

To get a Return Authorization number, call

**1-800-428-4344
In Canada 1-800-668-3199**

Please be sure to include the following information when requesting a Return Authorization number. This information will help us speed up the repair and return process.

Customer name:

Customer address:

Customer phone number:

Customer contact:

Equipment type:

Original sales order or purchase order number:

Reason for return:

Failure description, if applicable:

Process material(s) to which the equipment has been exposed:

OSHA Hazard Communication Standard 29CFR 1910.1200 mandates that we take specific steps to protect our employees from exposure to potentially hazardous materials. Therefore, all equipment so exposed must be accompanied by a letter certifying that the equipment has been decontaminated prior to its acceptance by Endress+Hauser.

The employees of Endress+Hauser sincerely appreciate your cooperation in following this policy.

Address your equipment to:

Endress+Hauser

2350 Endress Place

Greenwood, IN 46143

Return Authorization number:

In Canada:

Endress+Hauser

1440 Graham's Lane, #1, Burlington

Ont. Canada L7S 1W3

Return Authorization number:

Table of Contents

Return Authorization Policy	2
Section 1 Safety Instructions	
1.1 Approved Usage	5
1.2 Installation, Startup and Operation	5
1.3 Safety Conventions and Symbols	5
1.4 Repairs, Dangerous Chemicals	6
1.5 Technical Improvements	6
Section 2 System Description	
2.1 Areas of Application	7
2.2 Principle of Measurement	7
2.3 Design of the Measuring System	8
2.4 Operation	8
2.5 Safety	8
2.6 Calibration	9
2.7 Approvals	9
Section 3 Mounting and Installation	
3.1 Protection Type NEMA 4X (IP67) (EN60529)	11
3.2 Air Connection	11
3.3 Temperature Ranges	12
3.4 Mounting Guidelines	12
3.5 Mounting the Sensor	13
Section 4 Electrical Connection	
4.1 Wiring Diagram	15
4.2 Wiring and Cable Specifications	15
4.3 Potential Equalization	16
Section 5 Operation	
5.1 Setting Instrument Functions	17
5.2 Instrument Functions and Factory Settings	19
5.3 General Information	23
Section 6 Troubleshooting	
6.1 Troubleshooting Instructions	25
6.2 Replacing the Instrument	26
Section 7 Dimensions and Weights	
7.1 Dosimag A Dimensions and Weight	27
7.2 Sensor Process Connections	28
Section 8 Technical Data	
8.1 Sensor	29
8.2 Transmitter	30
8.3 Error Limits	31
8.4 Order Codes	32
Index	35

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1 Safety Instructions

1.1 Approved Usage

- The Dosimag A flow meter may only be used to measure the flow of conductive liquids.
- The Dosimag A flow meter is designed and checked according to the regulations in force EN 61010 (corresponding to VDE 0411, "Safety requirements for electrical equipment for measurement, control and laboratory use"). A hazardous situation may occur if the flow meter is not used for the purpose it was designed or is used incorrectly. See also Sections 2.5 "Safety" and 2.7 "Approvals"

For this reason, please note the information provided in the Operating Manual indicated by the pictograms listed under 1.3.1 Safety Conventions.

- The manufacturer assumes no liability for damage caused by incorrect use of the instrument.

1.2 Installation, Startup and Operation

- Mounting, electrical installation, startup and maintenance of the instrument may only be carried out by trained personnel authorized by the operator of the facility. Personnel must read and understand this Operating Manual and follow its instructions.
- The instrument may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.
- For special fluids, including those used for cleaning, E+H will be pleased to supply information concerning the chemical resistance properties of wetted parts.
- Ensure that the measuring system is correctly wired up according to the wiring diagrams. The measuring system is to be grounded.

1.3 Safety Conventions and Symbols

In order to highlight safety-relevant or alternative operating procedures in the manual, the following conventions have been used, each indicated by a corresponding icon. See also Sections 2.5 "Safety" and 2.7 "Approvals"

1.3.1 Safety Conventions

Note!

A note highlights actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned.



Note!

Caution!

Caution highlights actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the instrument.



Caution!

Warning!

A warning highlights actions or procedures which, if not performed correctly, will lead to personal injury, a safety hazard or destruction of the instrument.



Warning!

1.3.2 Electrical Symbols

 Direct voltage
A terminal to which or from which a direct current or voltage may be applied or supplied.

 Alternating voltage
A terminal to which or from which an alternating (sine-wave) current or voltage may be applied or supplied.

 Grounded terminal
A grounded terminal, which as far as the operator is concerned, is already grounded by means of an earth grounding system.

 Protective grounding (earth) terminal
A terminal which must be connected to earth ground prior to making any other connection to the equipment.

1.4 Repairs, Hazardous Materials

The following procedures must be carried out before a Dosimag A flow meter is sent to Endress+Hauser for repair:

- In every case, a note must be enclosed with the instrument, containing a description of the fault, the application and the chemical and physical properties of the product being measured.
- Remove all residue which may be present. Pay special attention to the gasket grooves and crevices where fluid may be present. This is especially important if the fluid is dangerous to health, e.g. corrosive, poisonous, carcinogenic, radioactive, etc.
- No instrument should be returned to us without all dangerous material being removed first (e.g. in scratches or diffused through plastic).

Incomplete cleaning of the instrument may result in waste disposal or cause harm to personnel (burns, etc.). Any costs arising from this will be charged to the owner of the instrument.

See Return Authorization Policy on page 2.

1.5 Technical Improvements

The manufacturer reserves the right to modify technical data without prior notice.

2 System Description

2.1 Areas of Application

The specially-developed Dosimag A field system is particularly suitable for the measurement of dynamic processes in a pipeline, e.g. dosing, rapid control, measurement after dosing or piston pumps, pulsing flows as well as short start/stop measurements in the filling industry. The Dosimag A electromagnetic measuring system fulfills the following requirements:

- short batch time
- high reproducibility
- easy cleaning
- compact design
- simple replacement

The Dosimag A operates on the electromagnetic measurement principle. It enables liquids to be measured which have a minimum conductivity of $5 \mu\text{S/cm}$. These include home domestic products such as cleaning agents, body lotions such as shampoo and liquid soap, car maintenance fluids such as antifreeze, and food products such as yogurt, ketchup and mayonnaise. Food products are not physically altered and their molecular structure remains unchanged.

2.2 Principle of Measurement

In accordance with Faraday's law of induction, a voltage is induced in a conductor that is moved through a magnetic field. In the magneto-inductive principle of measurement, the flowing medium represents the moving conductor. The induced voltage is proportional to the flow velocity and is fed to the measuring amplifier by a pair of electrodes. The flow volume is calculated from the cross-section of the pipe. The DC magnetic field is generated by a switched direct current of alternating polarity. Together with the patented "Integrating Autozero Circuit", this assures a stable zero point and makes measurement independent of the fluid and insensitive to entrained solid particles.

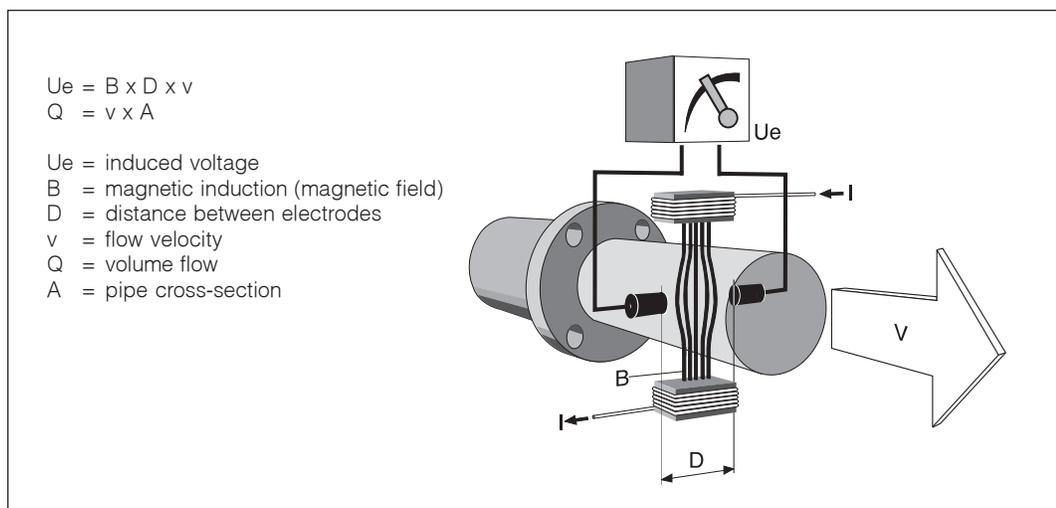


Figure 2.1
Principle of electromagnetic
flow measurement

2.3 Design of the Measuring System

The following illustration gives an overview of the Dosimag A measuring system.

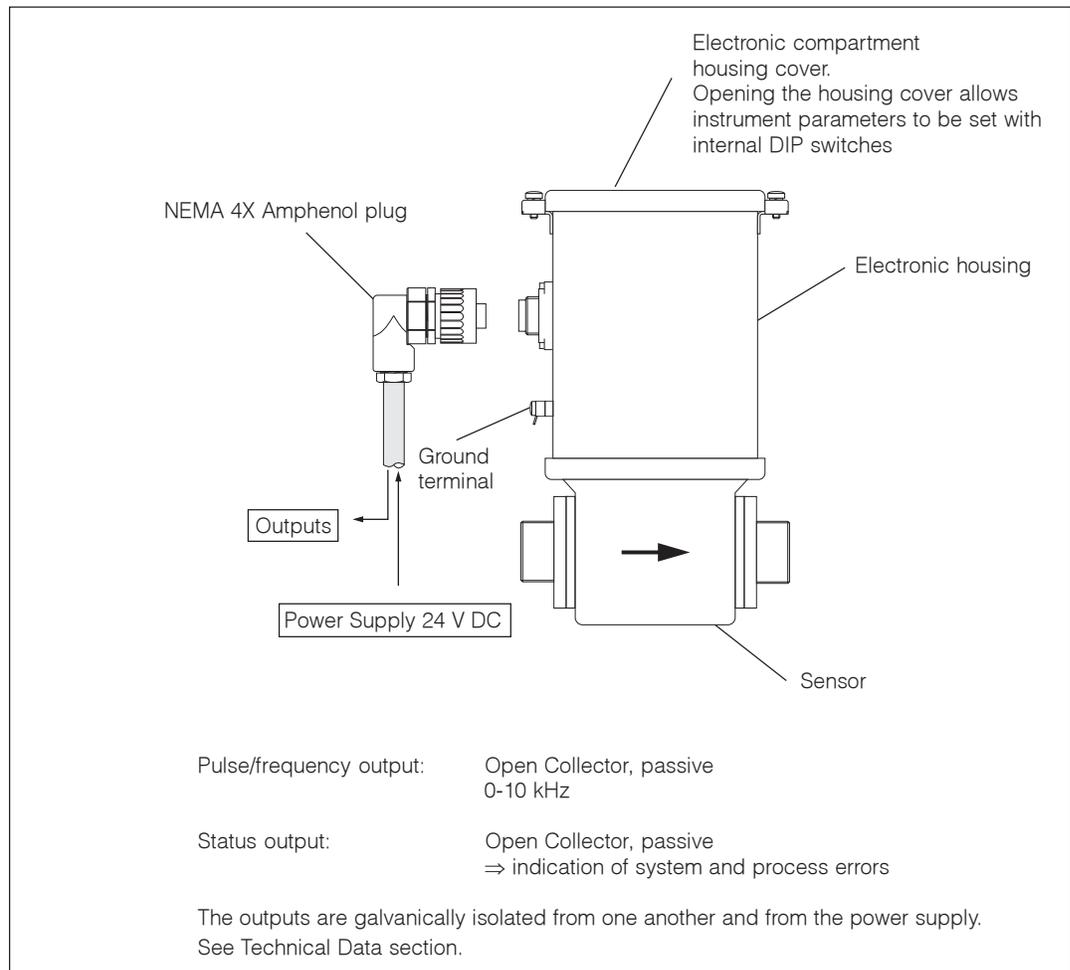


Figure 2.2
Design of the Measuring System

2.4 Operation

Inside the housing, there are miniature switches with which the following six system parameters can be set (see page 17):

- Selection of volume units for the pulse output (ml or fluid ounces)
- Noise suppression (on/off)
- Pressure pulse suppression (on/off)
- Sampling rate (55 or 83 per second)
- Creep suppression (on/off)
- Pulse value or frequency output

2.5 Safety

The measuring system's comprehensive self-monitoring assures maximum safety. Any error messages (power failure, process error, system error) are indicated by the status output.

- The Dosimag measuring system complies with the requirements for electromagnetic compatibility (EMC) as per CE (EN 50081-1-2 and EN 50082-1-2).
- Protection type NEMA 4X/IP 67 (EN 60529) is standard (also with unplugged Amphenol connector).
- The Dosimag measuring system complies with the requirements of European Standard EN 61010.

2.6 Calibration

The Dosimag A is available in two versions:

1. *Standard calibration*

A 0.5% calibration option is offered for those applications requiring an absolute measuring accuracy (e.g. adding disinfectant to a rinsing tub).

2. *Uncalibrated version*

Applications which need high reproducibility, e.g. filling processes (repetitive, short-cycle filling of a container), but require no absolute scaling of the pulse output, as filling machine while also finding the mechanical tolerances of valves when adjusting to the set volume.

	Standard calibration	Uncalibrated version
Absolute value	$\pm 0.5\%$ o.r. $\pm 0.01\%$ o.f.s.	Typical $\pm 5\%$ o.r.
Reproducibility	Standard deviation: $\pm 0.1\%$ at >5s batching time	Standard deviation: $\pm 0.1\%$ at >5s batching time
	For detailed specifications, see page 31	For detailed specifications, see page 31

2.7 Approvals

For the sanitary version (flat gasket), the Dosimag A is designed to meet the following standards:

- 3A (Sanitary Standards Symbol Administrative Council Application)*
- SK 344-001 (Beverage approval of the German beverage dispensing equipment regulation)

The respective approval symbols are shown on the nameplate.

Note!
The CE mark is always applied.
The SK number is only applied on European versions.



*Based on FDA listed material.

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3 Mounting and Installation

Caution!

The instructions given in this section on

- Protection type
- Temperature ranges, and
- Mounting

are to be observed in order to ensure safe operation of the measuring system.



Caution!

3.1 Protection Type NEMA 4X (IP 67) (EN 60529)

Dosimag A fulfills all the requirements of NEMA 4X (IP 67). After successful installation in the field or after replacing the instrument, the following points must be observed in order to guarantee NEMA 4X (IP 67) protection:

Gaskets

Housing gaskets must be clean and undamaged when inserted in the gasket groove. The gaskets may need to be dried, cleaned or replaced.

Screws

Both housing cover screws must be firmly tightened.

Amphenol plug

The cable used for the Amphenol plug must have an outer diameter of .31 - .39 in. (8-10 mm). Tighten the cable connector and Amphenol plug firmly.

The cable must loop down before the connection to the Amphenol plug. This prevents moisture from entering the plug.

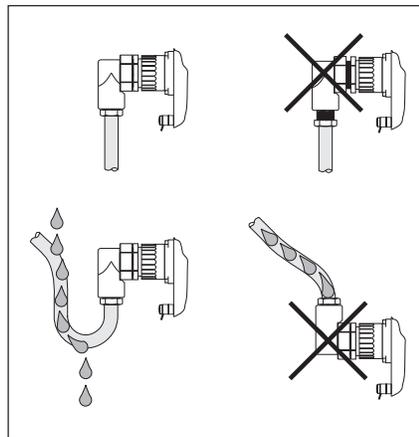
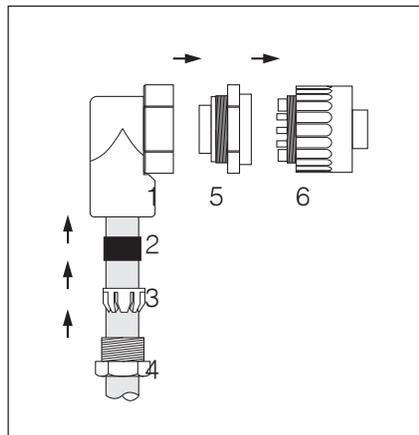


Figure 3.1
Mounting using Amphenol plug

Note the sequence when connecting the cable to the Amphenol plug:

1. 90° cable housing
2. Rubber gasket
3. Cable restraint
4. Cable connector
5. Connection piece
6. Plug



Caution!

Figure 3.2
Procedure for installing the Amphenol plug

Caution!

The screw connections must be firmly tightened in order to guarantee NEMA 4X (IP 67) protection of the Amphenol plug.

3.2 Air Connection

The Dosimag A has NEMA 4X (IP 67) protection type as standard, and therefore no additional measures are required regarding sealing. There is the possibility, however, of air purging the Dosimag A.

Air mechanical connection

The connection is via an internal G 1/8" thread, into which the fitting may be threaded to a maximum depth of .39 inches (10 mm).

Air pressure and quality

The Dosimag can be purged with a maximum pressure of 7.25 psig (0.5 bar). At higher pressure, there is a danger of destroying electronic components. Since the electronic components are sensitive to dirt and humidity, only pure instrument air may be used.



Warning!

To guarantee NEMA 4X (IP 67) protection type, with the use of the air connection, the device must be continuously purged, and the Amphenol connector must be plugged in (purged connector). If the air supply ceases, NEMA 4X (IP 67) protection type is not guaranteed.

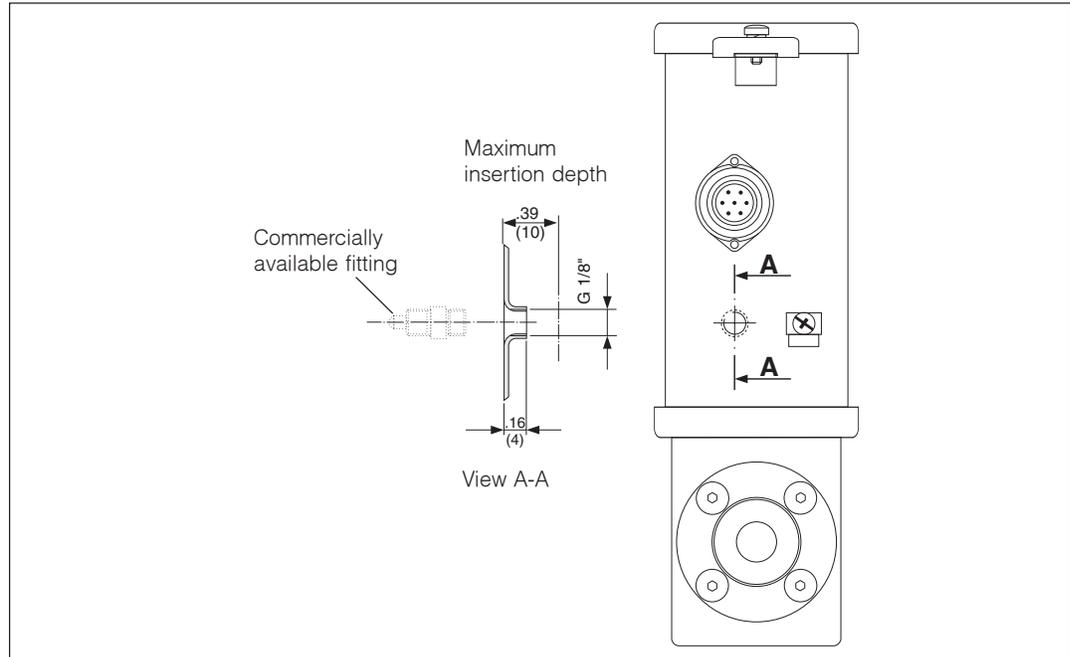


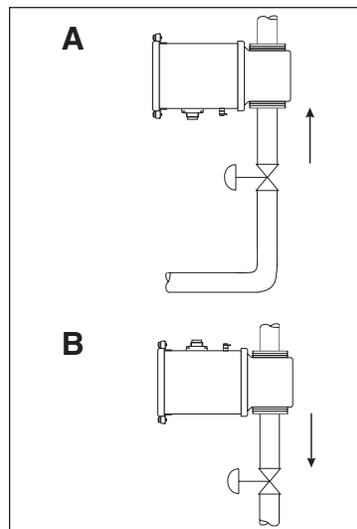
Figure 3.3
Air purge connection

3.3 Temperature Ranges

The maximum approved ambient and fluid temperatures must be observed (see p. 29 & 30).

3.4 Mounting Guidelines

High accuracy or reproducibility can only be ensured if the piping is completely filled (air bubbles in the product will produce measuring errors). Pumps must always be mounted upstream from the measuring system.



The preferred mounting position is vertical.

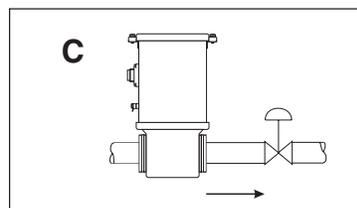
In this position, the entrained solids sink and fatty components in the stationary fluid rise away from the measuring electrodes.

A:

When installing in rising piping, ensure that the shut-off valve is mounted upstream from the Dosimag A.

B:

When installing in falling piping, ensure that the shut-off valve is mounted downstream from the Dosimag A in order to prevent the flow meter from running empty.



C:

If horizontal mounting is required, the axis of the electrodes must be horizontal (see page 16).

This prevents brief insulation of the electrodes by entrained air bubbles.

Ensure that the shut-off valve is downstream from the Dosimag A.

Figure 3.4
Installation in rising/falling piping

Figure 3.5
Installation in horizontal piping

3.5 Mounting the Sensor

The process connections are screwed on either directly onto the 1" threaded stub (Tri-Clamp®), or with a skirted nut.

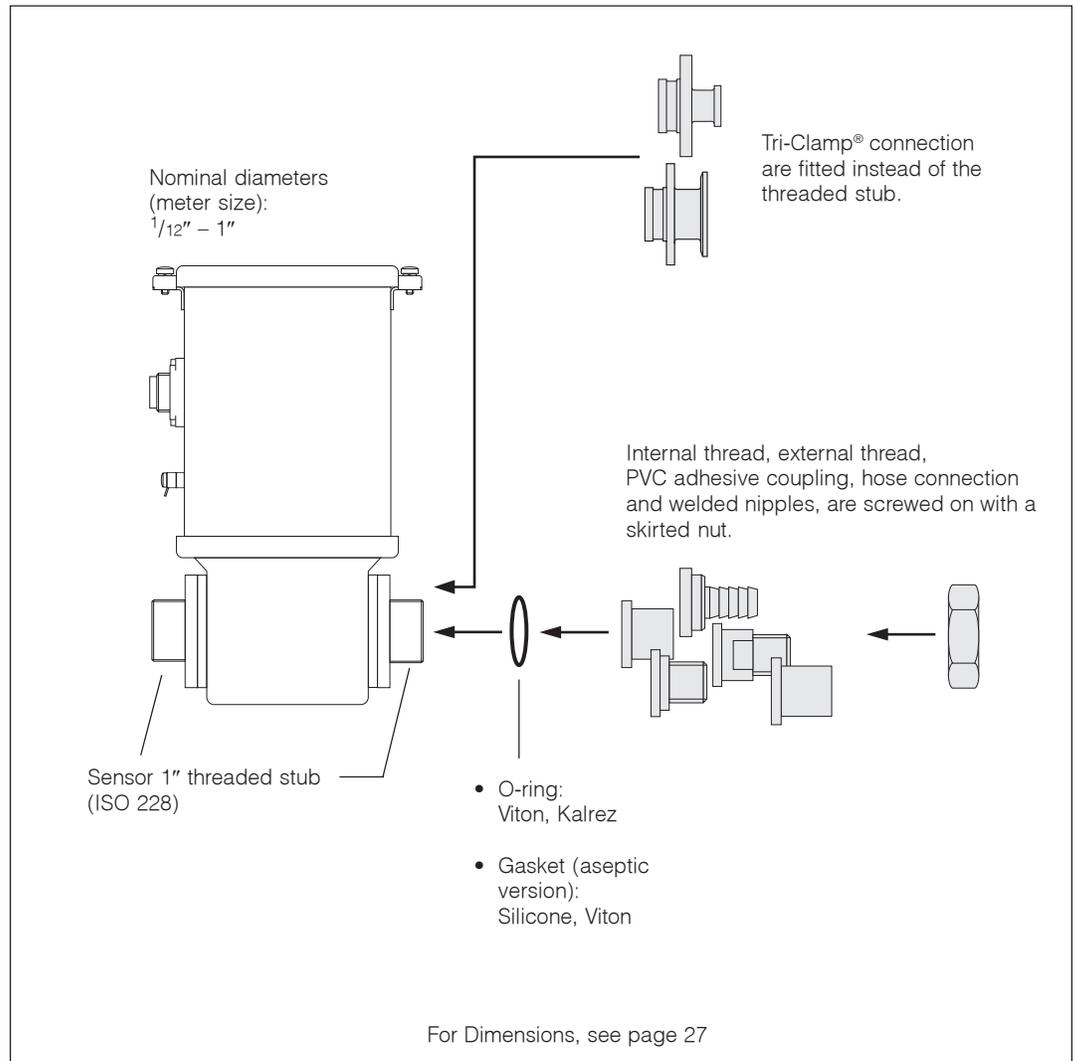


Figure 3.6
Types of sensor connection

Screw Tightening Torques and Gaskets

When screwing on the process connections (right to the stop) the O-ring or the flat gasket is pressed completely into the sealing groove of the threaded stub.

Wall Mounting for Dosimag A

Note!

If wall mounting of Dosimag A is required, a separate wall mounting set is available from E+H (P/N 50076604). See Figure 3.7.

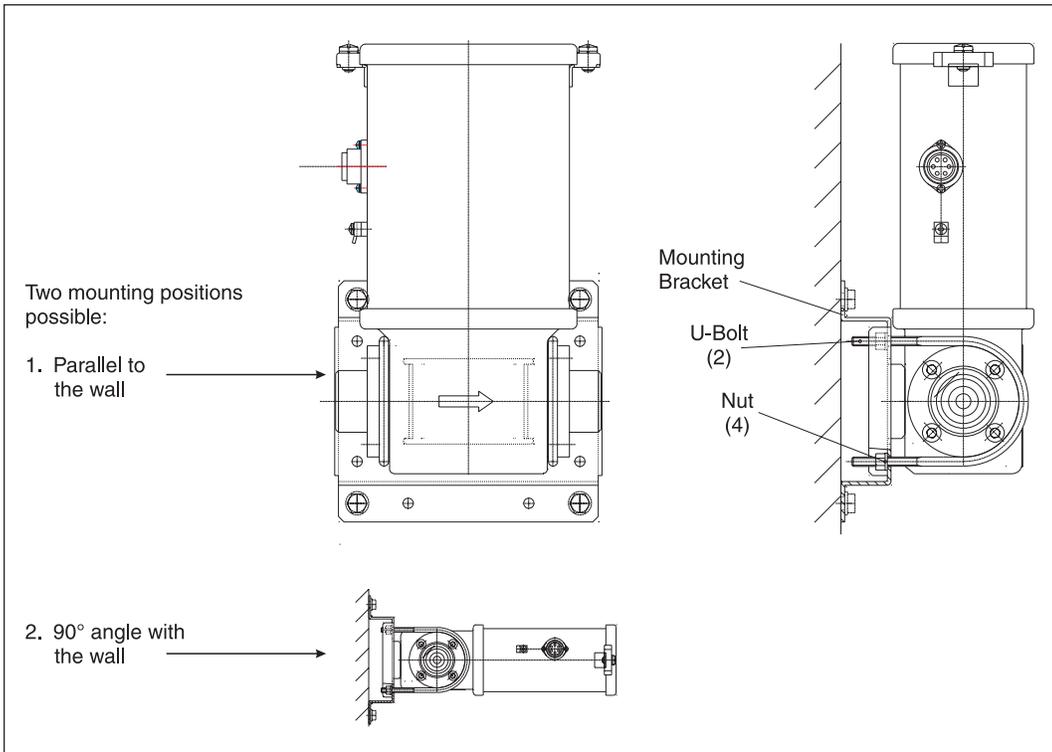


Figure 3.7
Wall Mounting Kit

4 Electrical Connection

Warning!

Do not install, wire up or disassemble when the unit is connected to a power supply. Observe both polarity and the operating voltage.



Warning!

4.1 Wiring Diagram

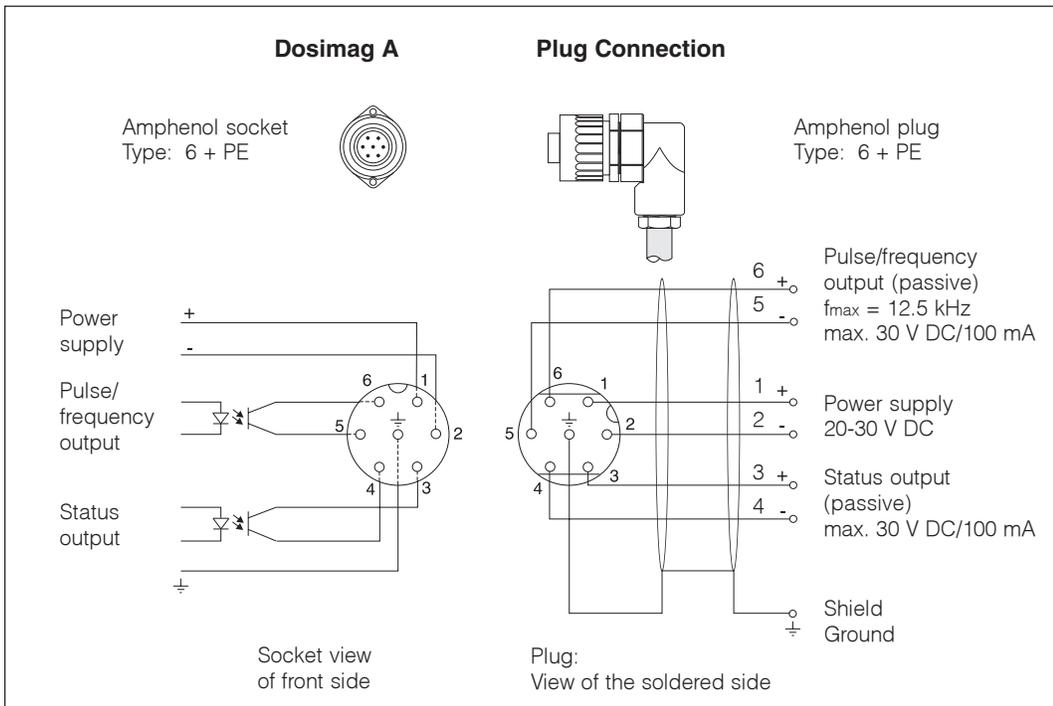


Figure 4.1
Electrical connection diagram

4.2 Wiring and Cable Specifications

Cable Gland: PG 9 (cable diameter .31 - .39 in. (8-10 mm))

Type of connection: Solder

Crimp (with air connection option)

Cable cross-section		
Solder	min. 0.15 mm ² AWG 26*	max. 0.75 mm ² AWG 18*
Crimp (with air connection option)	min. 0.5 mm ² AWG 20*	max. 1.5 mm ² AWG 16*

*American Wire Gauge

It is recommended that only shielded cables be used.

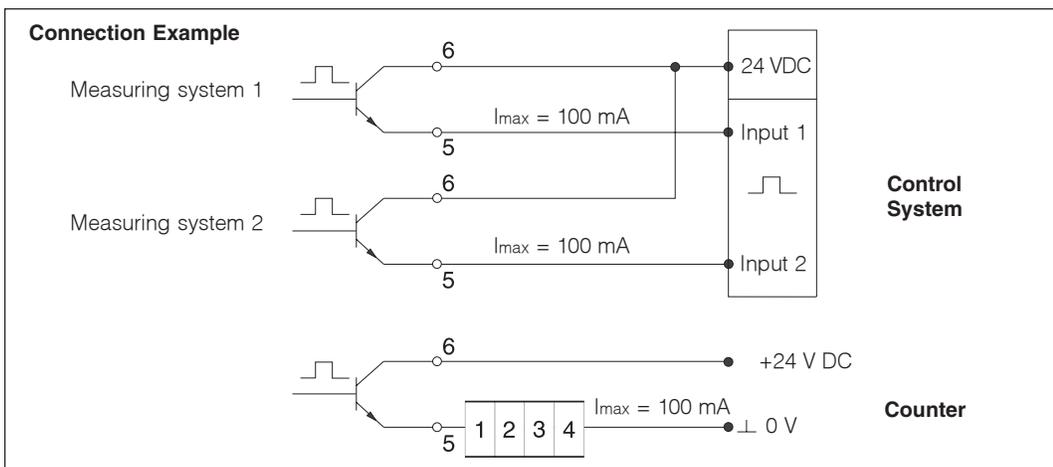


Figure 4.2
Connection example

4.3 Potential Equalization

Correct grounding of the sensor is important for accurate measurement. However, this is not critical when using metal piping under normal conditions.

Dosimag A is fitted with ground electrodes as standard. These produce a potential equalization between the sensor and fluid.

Position of electrodes

With horizontal mounting, the ground electrode must always be at the bottom.

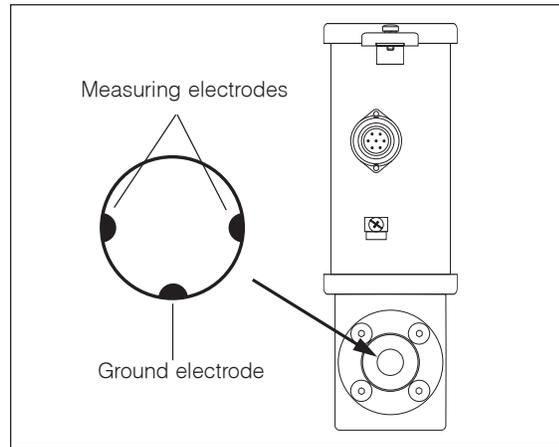


Figure 4.3
Position of electrodes

Potential-free installation

Caution!

Measurement of highly conductive fluids (e.g. acids, caustics) and the use of plastic or lined pipes or hose can cause electrode damage due to galvanic decomposition. In such cases, the instrument must be installed potential-free. Observe all national regulations regarding potential-free installation (e.g. VDE 0100)

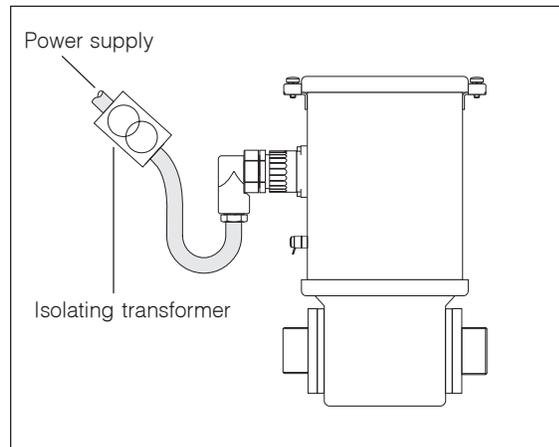


Figure 4.4
Use of an isolating transformer

Electromagnetic compatibility

In order to fully guarantee the electromagnetic compatibility (EMC) of the Dosimag A, it is recommended that the instrument is connected to ground using the ground terminal on the housing.

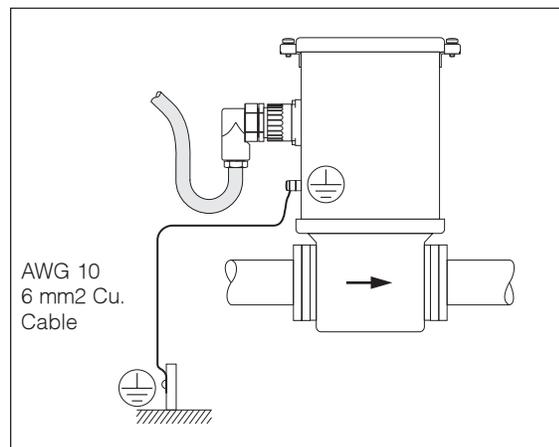


Figure 4.5
Grounding of Dosimag A

5 Operation

5.1 Setting Instrument Functions

Instrument functions are set using miniature DIP switches on the electronic circuit board.

Warning!
Switch off the power supply before unscrewing the cover to the electronic compartment.

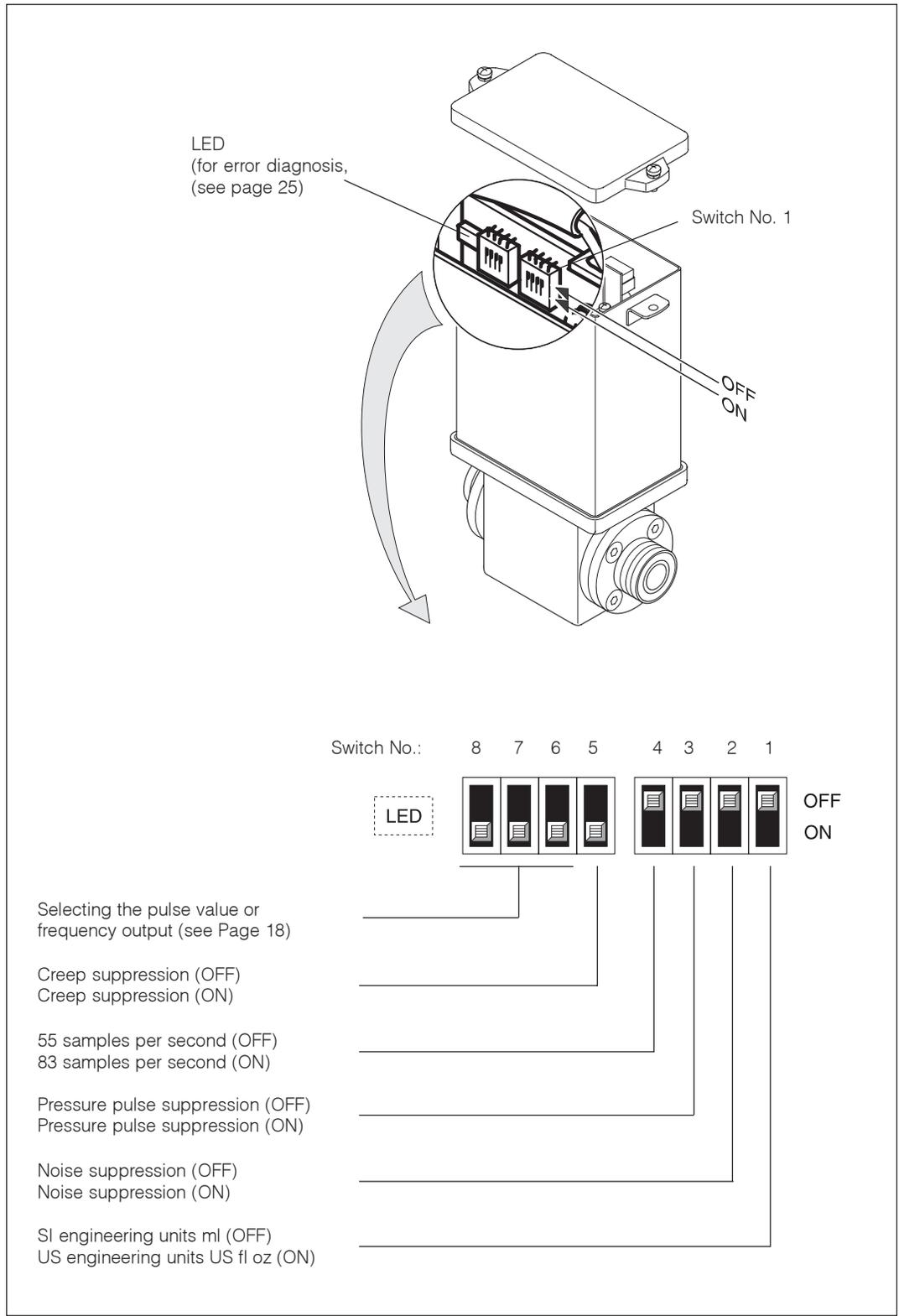


Figure 5.1
Setting the functions using
miniature switches

Table: Pulse values and frequency output

Seven pre-programmed pulse values are available for each meter size (nominal diameter). The frequency output is selected with the switch positions ON, ON, ON (f = 10 kHz at v = 33 ft/s (10 m/s)).

Note!
The pulse value should be selected so that the maximum frequency of 10 kHz is not exceeded during operation.

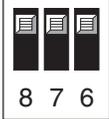
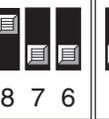
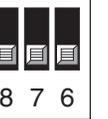
Pulse value (ml or floz)								Frequency output
OFF								
ON	8 7 6	8 7 6	8 7 6	8 7 6	8 7 6	8 7 6	8 7 6	8 7 6
SI engineering units (ml/pulse): Switch 1 OFF								
Nominal diameter	ml/pulse	ml/pulse	ml/pulse	ml/pulse	ml/pulse	ml/pulse	ml/pulse	f = 10 kHz at v = 10 m/s
1/12"/DN2	0.001	0.002	0.005	0.01	0.02	0.05	0.1	f _{out} 10 kHz
5/32"/DN4	0.001	0.002	0.005	0.01	0.02	0.05	0.1	f _{out} 10 kHz
5/16"/DN8	0.01	0.02	0.05	0.1	0.2	0.5	1.0	f _{out} 10 kHz
1/2"/DN15	0.1	0.2	0.5	1	2	5	10.0	f _{out} 10 kHz
1"/DN25	0.1	0.2	0.5	1	2	5	10.0	f _{out} 10 kHz
US engineering units (floz/pulse): Switch 1 ON								
Nominal diameter	floz/pulse	floz/pulse	floz/pulse	floz/pulse	floz/pulse	floz/pulse	floz/pulse	f = 10 kHz at v = 33 ft/s
1/12"/DN2	0.0001	0.0002	0.0005	0.001	0.002	0.005	0.01	f _{out} 10 kHz
5/32"/DN4	0.0001	0.0002	0.0005	0.001	0.002	0.005	0.01	f _{out} 10 kHz
5/16"/DN8	0.001	0.002	0.005	0.01	0.02	0.05	0.1	f _{out} 10 kHz
1/2"/DN15	0.01	0.02	0.05	0.1	0.2	0.5	1	f _{out} 10 kHz
1"/DN25	0.01	0.02	0.05	0.1	0.2	0.5	1	f _{out} 10 kHz

Figure 5.2
Pulse and frequency output

Calculating the pulse value

Example:

5/16" (DN 8), maximum rate of flow Q = 125 ml/s, maximum output frequency f_{max} = 1000 Hz (1000 pulses/s)

$$\text{Pulse value} = \frac{Q}{f_{\text{max}}} = \frac{125 \text{ ml/s}}{1000 \text{ Hz}} = 0.125 \text{ ml/pulse}$$

For 5/16" (DN 8), select the next higher pulse value - 0.2 ml/pulse ⇒



giving the maximum expected frequency

$$f_{\text{max}} = \frac{Q}{\text{Pulse value}} = \frac{125 \text{ ml/s}}{0.2 \text{ ml/pulse}} = 625 \text{ Hz}$$

5.2 Instrument Functions and Factory Settings

System units	<p>SI units: Volume in ml US units: Volume in floz (fluid ounces) (1 floz = 29.574 ml)</p> <p>Factory setting: SI units Switch No. 1: OFF</p>
Noise suppression	<p>The sensitivity of the output signal to transient flows and interference peaks can be reduced by using a digital filter function.</p> <p>Factory setting: Switched off Switch No. 2: OFF</p>
Pressure pulse suppression	<p>When batching valves are closed, strong, short duration liquid movements can occur in the piping and be detected by the sensor. Counting of such pulses leads to an incorrect totalizer value. For this reason, Dosimag A is equipped with pressure pulse suppression, permitting suppression of these system dependent interferences.</p> <p><i>Switch-on point:</i></p> <p>If the flow rate falls below a value of .07 ft/s (0.02 m/s), then pressure pulse suppression is activated and the pulse frequency output is inactivated for 500 ms (0 Hz), independent of the actual flow rate.</p> <p><i>Switch-off point:</i></p> <p>The pressure pulse suppression is deactivated after 500 ms.</p> <p>Factory setting: Switched off Switch No. 3: OFF</p> <div data-bbox="441 1386 1203 1848"> <p>The graph plots Flow velocity (ft/s and m/s) on the y-axis against Time (sec.) on the x-axis. A horizontal line at 0.07 ft/s (0.02 m/s) indicates the suppression threshold. A 'Command: Close value' is shown as a vertical line. When the flow velocity drops below this threshold, point 1 marks the 'Switch-on point of suppression', where the 'Pulse/frequency output' transitions from 'Active' to 'Inactive' for a duration of 500 ms. Point 2 marks the 'Switch-off point of suppression', where the output returns to 'Active'.</p> </div>

Instrument Functions and Factory Settings

<p>Sampling rate</p>	<p>The standard setting is 55 samples per second (= 55 SAPS). For accuracy optimization with dosing times of < approx. 1.5 s, a sample frequency of 83 can be selected. After setting to a higher sample frequency, it is recommended to recalibrate the system since minimal zero point shift can occur. This has no influence on the specified reproducibility.</p> <p>Factory setting: 55 SAPS Switch No. 4: OFF</p>
<p>Creep suppression</p>	<p>Creep suppression prevents “false flow” from being detected (e.g. varying liquid head at standstill).</p> <p><i>Switch-on point:</i></p> <p>If the flow rate falls below a value of $v = .07$ ft/s (0.02 m/s), then creep suppression is activated and the pulse/frequency output is deactivated.</p> <p><i>Switch-off point:</i></p> <p>If the flow rate rises above $v = .13$ ft/s (0.04 m/s), then creep suppression is deactivated.</p> <p>Factory setting: Switched on Switch No. 5: ON</p> <div style="text-align: center; margin-top: 20px;"> <p style="text-align: right; margin-right: 50px;">Hysteresis = 50% of low-flow cut-off</p> <p style="text-align: right; margin-right: 50px;">1: Switch-on point of suppression</p> <p style="text-align: right; margin-right: 50px;">2: Switch-off point of suppression</p> </div>

Instrument Functions and Factory Settings

Pulse/
frequency
output

The output can be used either as a pulse output or as a frequency output, depending on the position of the miniature switches.

Pulse output:

The pulse output is scaled within the range $v = 0$ to 33 ft/s or 0 to 10 m/s (max. 41 ft/s (12.5 m/s)), i.e. the user assigns a pulse weight to a particular volume (volume/pulse). These pulses are added by an external totalizer for determining total volumetric flow rate.

Frequency output:

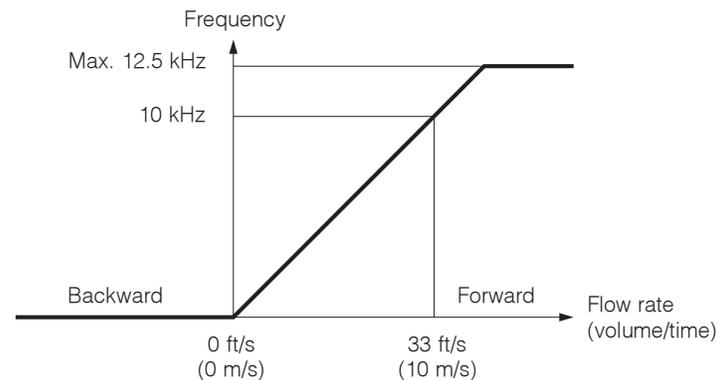
The frequency output 0 to 10 kHz is permanently assigned a flow rate of 0 to 33 ft/s (0 to 10 m/s).

The measuring system measures unidirectionally, i.e. it will produce a signal for flow in a positive direction only. Signals for negative flow are suppressed.

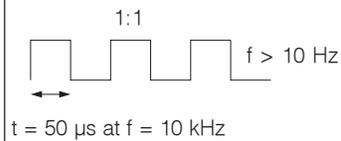
The results of measurement are linear up to a set full scale value (0 to 10 kHz). Exceeding the pulse/frequency range is possible up to max. 12.5 kHz.

Factory setting: Frequency output
Switch No. 6, 7, 8: ON - ON - ON

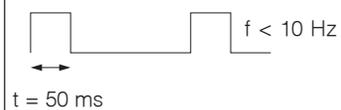
Pulse/frequency output (passive)



Note!



With frequencies above 10 Hz the on/off ratio is about 1:1. The pulse width in seconds is $t = 0.5/f$ (Hz). At $f = 10$ kHz the pulse width is 50 μs .



With frequencies below 10 Hz the on/off ratio is asymmetrical. The pulse width is constant at 50 ms.

The behavior of the pulse/frequency output is also dependent upon the status output configuration (see page 22).



Instrument Functions and Factory Settings

Status output	<p>Any error messages that occur are given at the status output.</p> <p>The following error conditions are registered:</p> <p>Power supply error</p> <p>System error: Coil current error (Self-diagnostics) Amplifier error EEPROM error ROM error RAM error</p> <p>Process errors: Exceeding the measuring range ($v > 41 \text{ ft/s}$ (12.5 m/s))</p> <p>Max. frequency Exceeding max. output frequency due attained to too low pulse scaling value ($f > 12.5 \text{ kHz}$ and $v < 41 \text{ ft/s}$ (12.5 m/s))</p> <p>The status output has a fail-safe mode, i.e. with normal and error-free measuring range, the output is closed (Open Collector closed).</p> <p>The status output cannot be affected by miniature switches.</p>		
Status	Behavior of the status output		Behavior of the pulse/frequency output
System OK.	Closed		f_{out} 0-12.5 kHz dependent on set pulse value and actual flow rate
Power supply error	Open		$f_{\text{out}} = 0 \text{ kHz}$
System error	Open		$f_{\text{out}} = 0 \text{ kHz}$
Process error $v > 41 \text{ ft/s}$ (12.5 m/s)	Open		$f_{\text{out}} = 0 \text{ kHz}$
Maximum frequency attained pulse value too small $f > 12.5 \text{ kHz}$ and $v < 41 \text{ ft/s}$ (12.5 m/s)	Open		$f_{\text{out}} = 12.5 \text{ kHz}$ Continuous output of 12.5 kHz even with overdriving the instrument

5.3 General Information

Repeat the following checks before switching on the measuring equipment for the first time:

- Check the electrical connections and pin assignments.
- Check the maximum expected flow rate and corresponding frequency.
- Check the polarity of the connections.
- Does the direction of the arrow on the nameplate agree with the actual direction of flow in the piping?
- Is the measuring pipe completely filled?

If these checks are successful, then switch on the supply voltage. The unit is now ready for operation.

The outputs have the following status:

Pulse/frequency output	Status output	LED
$f_{out} = 0 - 12.5 \text{ kHz}$	closed 	lights up

Note!

Ensure that, e.g. with a piston pump, all pressure peaks are detected.
For piston pumps the flow peaks are 3 to 4 times the average delivery.



With extremely short peaks in the flow rate and/or batching times under 1.5 sec., the measuring accuracy reproducibility may be slightly below the specified error limits (depending on the process).

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6 Troubleshooting and Remedies

6.1 Troubleshooting Instructions

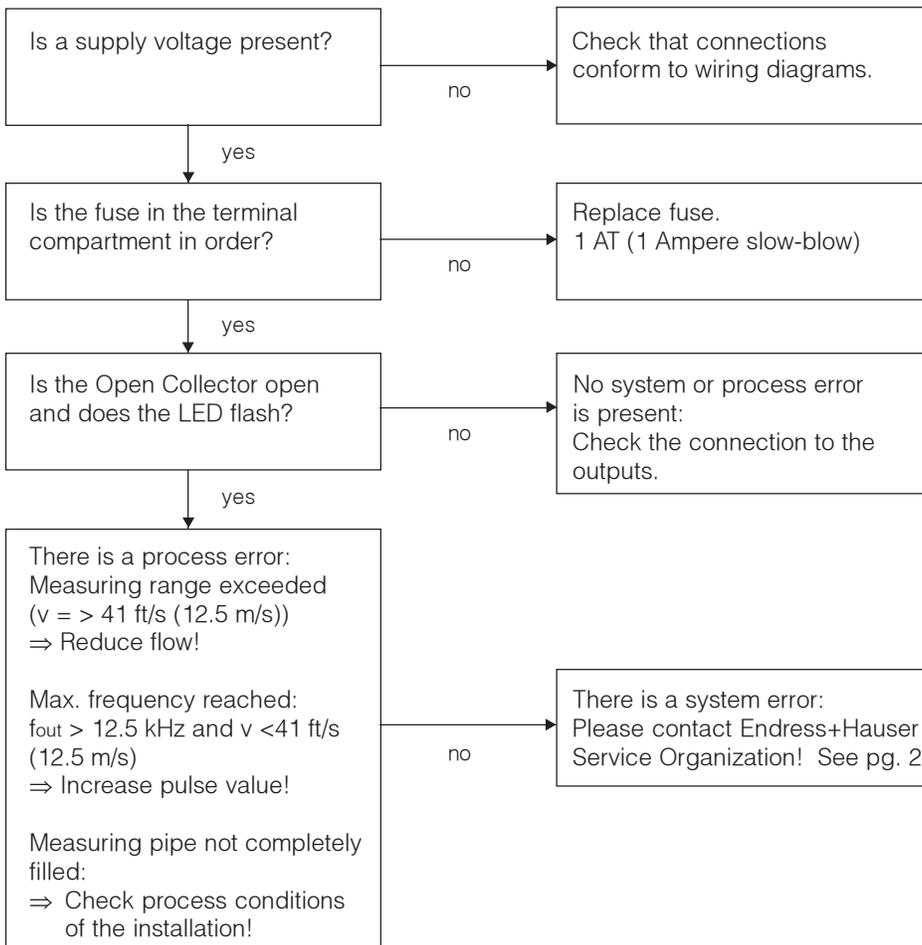
Note!
Error indications which occur during operation are given at the status output.

Type of error	Response of the status output	Response of the pulse/frequency output
Power supply error system error process error: ($v > 41$ ft/s (12.5 m/s))	Switch is open (Open Collector is open)	No output of pulses until the error has been cleared.
Maximum frequency attained, pulse value too small ($f > 12.5$ kHz and $v < 41$ ft/s (12.5 m/s))	Switch is open (Open Collector is open)	Continuous output of pulses. Output at 12.5 kHz.

An LED is also situated on the amplifier board of the Dosimag A:

The LED remains lit to indicate operation without error. If an error is present, then this is shown by the LED flashing.

Flow diagram for correcting errors:



6.2 Replacing the Instrument



Warning!

- Switch off the power supply before removing the Amphenol plug.
- Note that when replacing an uncalibrated version, the system control must normally be rescaled to a new pulse value.
- If returning a Dosimag A measuring system to Endress+Hauser for repair, please follow the safety instructions on page 6 and the Return Authorization Policy on page 2.

7 Dimensions and Weight

7.1 Dosimag A Dimensions and Weights

(All dimensions in inches (mm)).

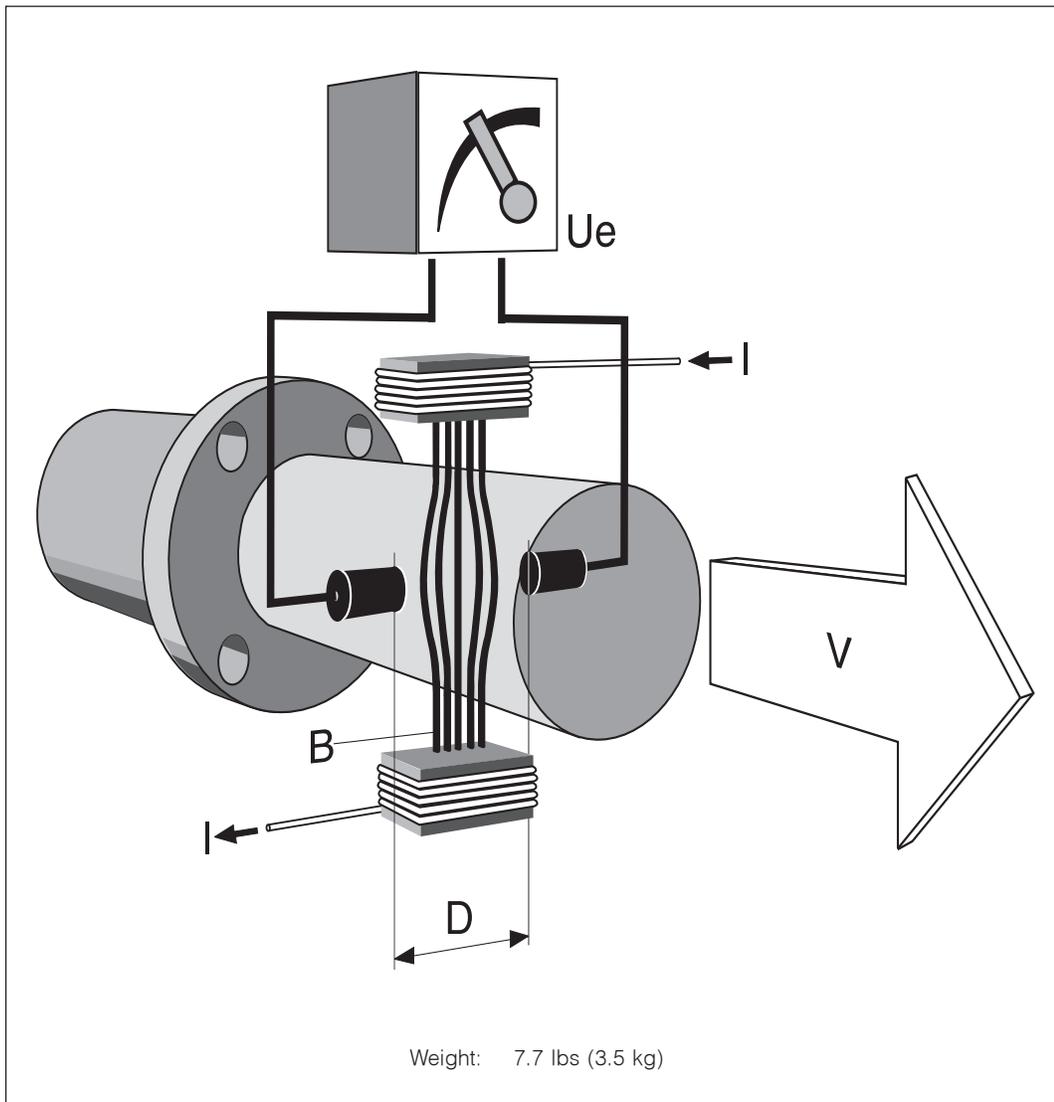
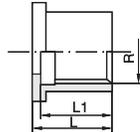


Figure 7.1
Dimensions

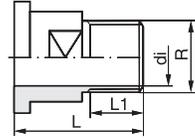
7.2 Sensor Process Connections

Internal thread



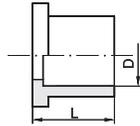
	Meter Size	L	L1	R (NPT)
0	1/12 to 1/2 (2 to 15)	0.79 (20.0)	0.71 (18.0)	1/2" (13.0)
1	1 (25)	1.77 (45.0)	0.87 (22.0)	1" (25.0)

External thread



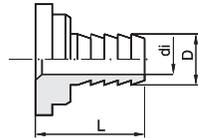
	Meter Size	L	L1	di	R (NPT)
2	1/12 to 1/2 (2 to 15)	1.38 (35.0)	0.52 (13.2)	0.63 (16.1)	1/2" (13.0)
3	1 (25)	1.97 (50.0)	0.66 (16.8)	0.87 (22.0)	1" (25.0)

PVC bonding sleeve



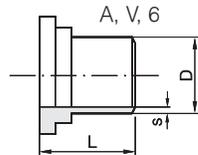
	Meter Size	L	D
4	1/12 to 1/2 (2 to 15)	0.75 (19.0)	0.79 (20.0)
5	1 (25)	2.60 (66.0)	0.98 (25.0)

Flexible Tubing connection



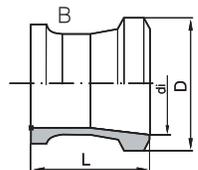
	Meter Size	L	D	di	LW
K	1/12 to 1/2 (2 to 15)	1.18 (30.0)	0.57 (14.5)	0.35 (8.9)	0.50 (13.0)
H	1/12 to 1/2 (2 to 15)	1.18 (30.0)	0.69 (17.5)	0.50 (12.6)	0.63 (16.0)
G	1/12 to 1/2 (2 to 15)	1.18 (30.0)	0.83 (21.0)	0.63 (16.1)	0.75 (19.0)

Welded nipple 1/12" to 1/2" (DN2 to DN15)



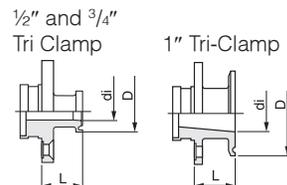
		PIPE		
	Meter Size	L	D	S
A	1/12 to 1/2 (2 to 15)	0.79 (20.0)	0.84 (21.3)	0.10 (2.5)
B	1 (25)	1.18 (30.0)	1.33 (33.8)	0.067 (1.7)

Welded nipple 1" (DN 25)



		SANITARY TUBING		
	Meter Size	L	D	S
V	1/12 to 1/2 (2 to 15)	0.79 (20.0)	0.84 (21.3)	0.10 (2.5)
6	1 (25)	0.79 (20.0)	1.00 (25.0)	0.065 (1.6)

Tri Clamp® Stainless steel 316L



	Meter Size	Tri-Clamp	L	D	di
	1/12 to 5/16 (2 to 8)	1/2	0.94 (24.0)	1 (25.0)	.07 (1.83)
	1/2 (15)	3/4	0.94 (24.0)	1 (25.0)	.06 (1.45)
	1/12 to 5/16 (2 to 8)	1	0.94 (24.0)	1.98 (50.4)	.04 (1.00)
	1/2 (15)	1	0.94 (24.0)	1.98 (50.4)	.04 (1.00)
	1 (25)	1	0.94 (24.0)	1.98 (50.4)	.07 (1.83)

All dimensions in inches (mm)

8 Technical Data

8.1 Sensor

Meter size (Nominal diameter)

DN mm	Size inches	Pipe inner Ø inches (mm)
2	1/12	.09 (2.2)
4	5/32	.18 (4.6)
8	5/16	.34 (8.6)
15	1/2	.63 (16.1)
25	1	.87 (22.0)

Nominal pressure

- PVC threaded stubs
- 316L threaded stubs (PN 16 for sanitary version with gasket)

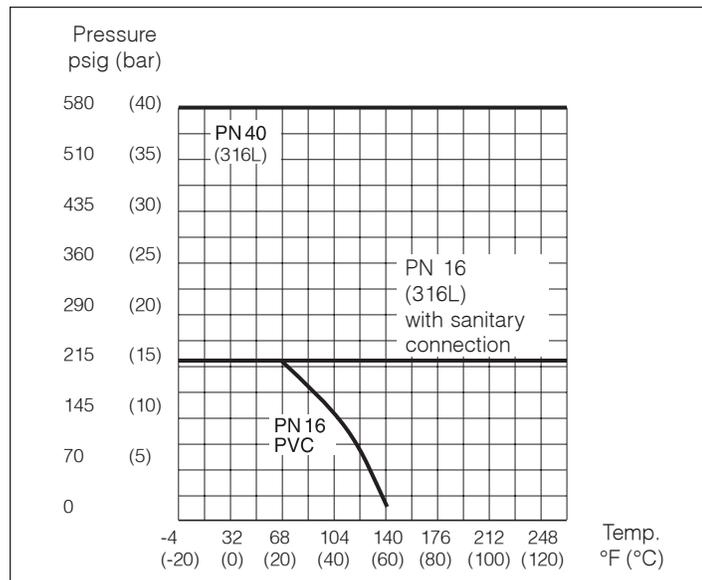


Figure 8.1
Temperature/pressure
diagram

Process connection
(option)

External and internal thread 316L
PVC adhesive-coupling
Hose connection 316L
Weld stub 316L
Sanitary weld stub for pipelines 316L
Tri-Clamp® 316L

Fluid temperature/liner material -4 to +266 °F (-20 to +130 °C) PFA

Vacuum resistance 0 psia/bar abs

Housing material 304SS (investment casting), bare

Wetted parts 316LSS, bare

Electrodes fitted/material Measuring and reference electrodes,
316LSS standard. Tantalum or Hastelloy C-22 optional

Minimum conductivity 5 µS/cm

Gasket material Viton O-ring
Kalrez O-ring

Silicone Flat gasket (sanitary version)
Viton Flat gasket (sanitary version)

CIP cleanability Yes (note max. temperature)

The following tables give an overview of the max. full-scale values at different flow velocities:

Nominal width inch	Velocity	1.64 ft/s	3.28 ft/s	6.56 ft/s	9.84 ft/s	16.4 ft/s	32.8 ft/s
	Value	floz/s	floz/s	floz/s	floz/s	floz/s	floz/s
1/12		0.053	0.106	0.212	0.318	0.531	1.062
5/32		0.212	0.424	0.849	1.274	2.124	4.249
5/16		0.849	1.699	3.399	5.098	8.498	16.996
1/2		2.987	5.975	11.950	17.926	29.875	59.753
1		8.299	16.598	33.196	49.794	82.990	165.981

Nominal width inch	Velocity	1.64 ft/s	3.28 ft/s	6.56 ft/s	9.84 ft/s	16.4 ft/s	32.8 ft/s
	Value	GPM(US)	GPM(US)	GPM(US)	GPM(US)	GPM(US)	GPM(US)
1/12		0.024	0.049	0.097	0.149	0.248	0.498
5/32		0.097	0.199	0.398	0.597	0.996	1.992
5/16		0.398	0.796	1.593	2.390	3.984	7.968
1/2		1.400	2.801	5.602	8.403	14.006	28.012
1		3.890	7.781	15.562	23.344	38.906	77.813

Nominal width mm	Velocity	0.5 m/s	1 m/s	2 m/s	3 m/s	5 m/s	10 m/s
	Value	ml/s	ml/s	ml/s	ml/s	ml/s	ml/s
DN 2		1.571	3.142	6.283	9.425	15.708	31.416
DN 4		6.283	12.566	25.133	37.699	62.832	125.664
DN 8		25.133	50.266	100.531	150.797	251.328	502.656
DN 15		88.358	176.715	353.430	530.145	883.575	1767.150
DN 25		245.438	490.875	981.750	1472.625	2454.375	4908.750

Nominal width mm	Velocity	0.5 m/s	1 m/s	2 m/s	3 m/s	5 m/s	10 m/s
	Value	l/min	l/min	l/min	l/min	l/min	l/min
DN 2		0.094	0.188	0.377	0.565	0.942	1.885
DN 4		0.377	0.754	1.508	2.262	3.770	7.540
DN 8		1.508	3.016	6.032	9.048	15.080	30.159
DN 15		5.301	10.603	21.206	31.809	53.015	106.029
DN 25		14.726	29.453	58.905	88.358	147.263	294.525

Figure 8.2
Table showing maximum flow rates

8.2 Transmitter

Housing material	304SS (1.4301) electronic housing, bare 304SS (1.4308) cover (investment casting), bare
Protection type	NEMA 4X (IP 67)
Ambient temperature	32 °F to +122 °F (0 °C to +50 °C)
Shock and vibration resistance	Acceleration up to 2 g (.07 oz.)/2 h per day 10 to 100 Hz
Cable entry	Amphenol plug NEMA 4X (IP 67) (NEMA 4X/IP 67 also guaranteed with unplugged connector)

Air connection (option)	G 1/8", instrument air max. 7.25 psig (0.5 barg) (NEMA 4X/IP 67 only with air purging and plugged in connector)
Power Supply	20 to 30 V DC, reverse polarity protected
Power consumption	< 12 W
Galvanic isolation	Input and outputs galvanically isolated from power supply, from sensor and from one another
Pulse/frequency output (Open Collector)	$f_{max} = 12.5$ kHz, $U_{max} = 30$ V DC, $I_{max} = 100$ mA, Galvanically isolated, pulse value adjustable, on/off ratio, see page 21
Status output (Open Collector)	$U_{max} = 30$ V DC, $I_{max} = 100$ mA System and process error messages
Electromagnetic Compatibility (EMC)	As per CE EN 50081-1-2 and EN 50082-1-2

8.3 Error Limits

Error limits Uncalibrated version, typical $\pm 5\%$ o.r.
Standard calibration $\pm 0.5\%$ o.r. $\pm 0.01\%$ o.f.s.
(full-scale value = 33 ft./s (10 m/s))

Reproducibility t_d : batch time
(Uncalibrated version σ : standard deviation
and standard calibration)

1σ : $\pm 0.4\%$ with batch times 1.5 s < t_d < 3 s
 1σ : $\pm 0.2\%$ with batch times 3 s < t_d < 5 s
 1σ : $\pm 0.1\%$ with batch times 5 s < t_d

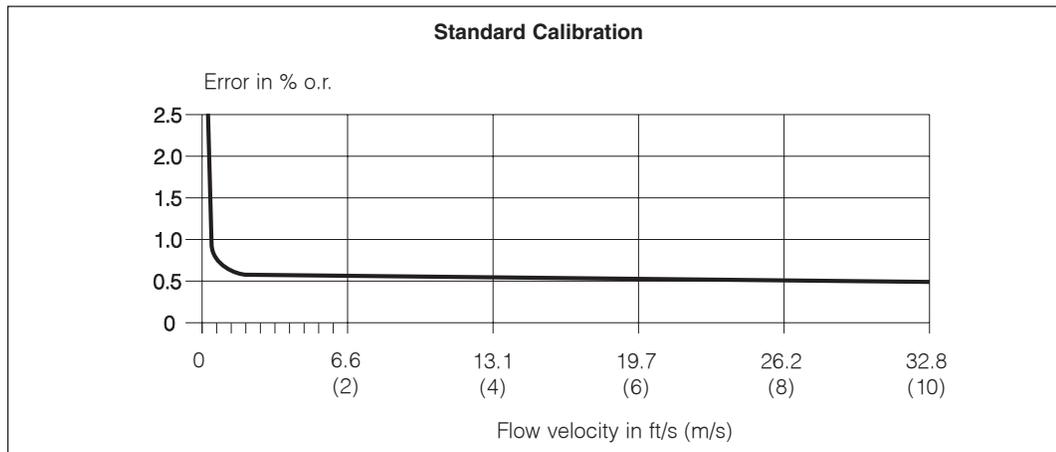


Figure 8.3
Standard calibration

Reference Conditions (DIN 19200 and VDI/VDE 2641): NIST Traceable

Fluid temperature	82.4 °F \pm 35.6 °F (28 °C \pm 2 °C)
Ambient temperature	71.6 °F \pm 35.6 °F (22 °C \pm 2 °C)
Fluid pressure	29 psi \pm 2.9 psi (+2 bar \pm 0.2 bar)
Inlet length	>10 x DN (pipe diameter)
Outlet length	>5 x DN (pipe diameter)

8.4 Order Codes

DOSIMAG A

ORDER STRUCTURE: DDA -

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

1	LINER MATERIAL				
	T	Teflon (PFA)			
2	SIZE	Full Scale GPM			
		in	mm	min	max
	02	1/12"	2	0.02	0.5
	04	5/32"	4	0.1	2
	08	5/16"	8	0.5	10
	15	1/2"	15	1.5	30
	25	1"	25	5	100
3	PROCESS CONNECTION/MATERIAL				
	A*	1" threads/316LSS, Viton O-ring			
	B*	1" threads/316LSS, Kalrez O-ring			
	C*	1" threads/316LSS, Silicone gasket - 3A sanitary			
	D*	1" threads/PVC, Viton gasket			
	E*	1" threads/PVC, Kalrez gasket			
	F*	1" threads/316LSS, Viton gasket- 3A sanitary			
	G*	1" threads/PVC, Viton gasket-3A sanitary			
	H	1" Tri-clamp/316L SS, Silicone gasket-3A sanitary			
	K	1" Tri-clamp/316L SS, Viton gasket-3A sanitary			
	L	1/2" Tri-clamp/316L SS, Silicone gasket-3A sanitary-for 1/12"-5/16" meter only			
	M	1/2" Tri-clamp/316L SS, Viton gasket-3A sanitary-for 1/12"-5/16" meter only			
	N	3/4" Tri-clamp/316L SS, Silicone gasket-3A sanitary-for 1/2" meter only			
	P	3/4" Tri-clamp/316L SS, Viton gasket-3A sanitary-for 1/2" meter only			
	9	Other			
4	ELECTRODES/MATERIALS				
	1	316LSS measuring/grounding electrodes			
	2	Hastelloy C-22 measuring/grounding electrodes			
	3	Tantalum measuring/grounding electrodes			
	9	Other			
5	ELECTRICAL CONNECTION				
	A	Amphenol connector			
	B	Amphenol connector and air connection			
	9	Other			
6	CALIBRATION				
	1	Uncalibrated			
	2	3-point 0.5% standard			
	9	Other			
7	APPROVALS				
	A	For use in non-hazardous area			
	9	Other			

*Dosimag A with threaded connections require an additional DK1A process connection mounting kit.

DOSIMAG A Mounting Kits

ORDER STRUCTURE: **DK1A** -

1	2	3	4	5	6
---	---	---	---	---	---

1 SENSOR SIZE (IN.)

02	1/12
04	5/32
08	5/16
15	1/2
25	1

2 PROCESS CONNECTION

	Connection Style	Compatible Sensor sizes	Compatible Gaskets
A	Weld connection for 1/2" pipe	1/12-1/2"	Viton, Kalrez
B	Weld connection for 1" pipe	1"	Viton, Kalrez
0	Internal thread for 1/2" NPT pipe	1/12-1/2"	Viton, Kalrez
1	Internal thread for 1" NPT pipe	1"	Viton, Kalrez
2	External thread for 1/2" NPT pipe	1/12-1/2"	Viton, Kalrez
3	External thread for 1" NPT pipe	1"	Viton, Kalrez
G	Flexible tubing fitting for 19 mm ID tubing	1/12-1/2"	Viton
H	Flexible tubing fitting for 16 mm ID tubing	1/12-1/2"	Viton
K	Flexible tubing fitting for 13 mm ID tubing	1/12-1/2"	Viton
4	Bonding sleeve for 1/2" PVC pipe	1/12-1/2"	Viton
5	Bonding sleeve for 1" PVC pipe	1"	Viton
V	Sanitary weld connection for 3/4" tubing	1/12-1/2"	Silicone
6	Sanitary weld connection for 1" tubing	1"	Silicone
9	Other		

3 MATERIAL: PROCESS CONNECTION

1	316LSS (not for bonding sleeves)
2	PVC (only for bonding sleeves)
9	Other

4 MATERIAL: BOLTS/NUTS

1	Standard
9	Other

5 MATERIAL: GASKETS

A	Viton O-ring (not for sanitary weld)
B	Kalrez O-ring (only for threaded and weld)
C	Silicone gasket (only for sanitary weld)
9	Other

6 OPTION

1	Standard
9	Other

OTHER ACCESSORIES

50076604 Wallmount kit for Dosimag A

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Index

A

Accuracy	31
Ambient temperature	30, 31
Amphenol plug	11
Areas of application	7

C

Cable cross-section	15
Cable diameter	11
Cable entry	30
Cable specifications	15
Calibration	9
Compressed air supply	11
Correcting errors	25
Creep suppression	8, 17, 20

D

Design of the measuring system	8
Dimensions	27

E

Electrical connection	15
Electromagnetic compatibility	31
Engineering units (SI/US)	18
Error limits	31

F

Factory settings	19
Fluid temperature	29

G

Gasket material	29
General information	23
Ground electrode	16
Ground terminal	8

H

Hazardous materials	6
Housing material	29, 30

I

Installation	11, 15
Instrument functions	17, 19

L

Liner material	29
----------------------	----

M

Meter size (nominal diameter)	29
Miniature DIP switches	8, 17
Minimum conductivity	7, 29
Mounting	11, 15
Mounting guide lines	12
Mounting position	12
Mounting the sensor	13
Mounting using amphenol plug	11

N

Noise suppression	8, 17, 19
Nominal diameter (meter size)	29
Nominal pressure	29

O

Operation	8
Order codes	32

P

Potential equalization	16
Power consumption	31
Power supply	31
Pressure pulse suppression	8, 19
Pressure shock suppression	17
Principle of measurement	7
Procedure for installing the amphenol plug	11
Process connections	28, 29
Protection	11
Protection type	8
Pulse value	17, 18
Pulse/frequency output	8, 17, 18, 21, 31

R

Reference conditions	31
Regulations	5
Remedies	25
Replacing the instrument	26
Reproducibility	31

S

Safety	8
Safety instructions	5
Safety requirements	5
Sampling rate	8, 20
Selection of volume units (ml/floz)	8
Sensor technical data	29
Setting instrument functions	17
Standard calibration	9
Status output	22, 23
System parameters	8
System units (SI/US)	19

T

Technical data	29
Temperature ranges	12
Troubleshooting	25

U

Uncalibrated version	9
----------------------------	---

V

Vacuum resistance	29
-------------------------	----

W

Weight	27
Wiring	15

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