



## Capacity Sensor

VSA 24-Sx -Dx

## Installation and Operation Instructions

Original instructions





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Read this instruction carefully prior to installation and/or use. Pay attention particularly to all advises and safety instructions to prevent injuries. Bühler Technologies can not be held responsible for misusing the product or unreliable function due to unauthorised modifications.

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**Document information**

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# 1 Introduction

## 1.1 Intended Use

The capacity sensor VSA 24 is used to monitor the filter capacity in oil circuits. A microprocessor-controlled pressure sensor monitors the dynamic pressure upstream from the filter element which increases as the filter contamination increases, or the pressure drop above the filter element. The device is equipped with a temperature monitor and delay to prevent false alarms due to high viscosity during the cold start phase.

### WARNING



All device models are solely intended for industrial applications. They are **not safety components**. The devices must not be used if failure or malfunction thereof jeopardises the safety and health of persons.  
Use in explosive areas is **prohibited**.

## 1.2 Ordering Instructions

Item no.:	Type
13 20 099	Differential pressure gauge VSA 24-DM-2.0/2.8
13 20 199	Differential pressure gauge VSA 24-DH-2.0/2.8
13 20 299	Differential pressure gauge VSA 24-DM-4.1/5.5
13 20 399	Differential pressure gauge VSA 24-DH-4.1/5.5

Item no.:	Type
13 10 099	Capacity Sensor VSA 24-SM-2.2/2.9
13 10 199	Capacity Sensor VSA 24-SH-2.2/2.9

## 1.3 Contents

- Capacity sensor VSA 24-S
- Product documentation

## 2 Safety instructions

### 2.1 Important advice

Operation of the device is only valid if:

- the product is used under the conditions described in the installation- and operation instruction, the intended application according to the type plate and the intended use. In case of unauthorized modifications done by the user Bühler Technologies GmbH can not be held responsible for any damage,
- when complying with the specifications and markings on the nameplates.
- the performance limits given in the datasheets and in the installation- and operation instruction are obeyed,
- monitoring devices and safety devices are installed properly,
- service and repair is carried out by Bühler Technologies GmbH,
- only original spare parts are used.

This manual is part of the equipment. The manufacturer keeps the right to modify specifications without advanced notice. Keep this manual for later use.

### Signal words for warnings

DANGER	Signal word for an imminent danger with high risk, resulting in severe injuries or death if not avoided.
WARNING	Signal word for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.
CAUTION	Signal word for a hazardous situation with low risk, resulting in damaged to the device or the property or minor or medium injuries if not avoided.
NOTICE	Signal word for important information to the product.

### Warning signs

These instructions use the following warning signs:



Warns of a general hazard



General information



Voltage warning



Unplug from mains



High pressure warning

### 2.2 General hazard warnings

The equipment must be installed by a professional familiar with the safety requirements and risks.

Be sure to observe the safety regulations and generally applicable rules of technology relevant for the installation site. Prevent malfunctions and avoid personal injuries and property damage.

#### The operator of the system must ensure:

- Safety notices and operating instructions are available and observed,
- The respective national accident prevention regulations are observed,
- The permissible data and operational conditions are maintained,
- Safety guards are used and mandatory maintenance is performed,
- Legal regulations are observed during disposal,
- compliance with national installation regulations.

## Maintenance, Repair

Please note during maintenance and repairs:

- Repairs to the unit must be performed by Bühler authorised personnel.
- Only perform conversion-, maintenance or installation work described in these operating and installation instructions.
- Always use genuine spare parts.
- Do not install damaged or defective spare part. If necessary, visually inspect prior to installation to determine any obvious damage to the spare parts.

Always observe the applicable safety and operating regulations in the respective country of use when performing any type of maintenance.

### 3 Transport and storage

Only transport the product inside the original packaging or a suitable alternative.

The equipment must be protected from moisture and heat when not in use. It must be stored in a covered, dry, dust-free room at room temperature.

## 4 Installation and connection

### 4.1 Installation

The equipment must be installed by a professional familiar with the safety requirements and risks.

#### WARNING

#### System pressurised



De-pressurize the system prior to assembly.

### 4.1.1 VSA 24-SM and VSA 24-SH

The capacity sensor VSA 24-SM/-SH screws directly onto the return filter, resp. the designated connection bore "D" (multiterminal). Only hand tighten the VSA 24. Be sure the O-ring is not damaged.

### 4.1.2 VSA 24-DM and VSA 24-DH

The capacity sensor VSA 24-DM/-DH screws directly onto the line filter. Tighten the VSA 24-DM/-DH to a torque of approx. 25 Nm. Be sure the copper ring is not damaged.

The top of the VSA 24-DM/-DH can be turned after loosening a grub screw to adjust the cable outlet.

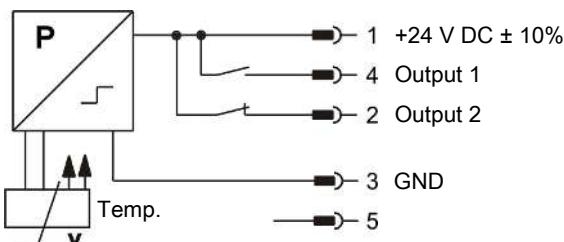
#### NOTICE



The top and bottom of the VSA 24-DM/-DH match. Therefore do not use a different top. The system could otherwise be damaged.

## 4.2 Electrical connections

The capacity sensor VSA 24 is powered with 24 V direct current. The sensor connects with a cable and standard M12 plug-in connectors. The following image shows the terminal assignment: The switching voltage of the outputs is max. 1 A at 24 VDC.



Output 1 = alert at approx. 75% filter contamination  
(NO contact with rising dynamic pressure or pressure drop)  
Output 2 = shut-off at 100% filter contamination  
(NC contact with rising dynamic pressure or pressure drop)



## 5 Operation and control

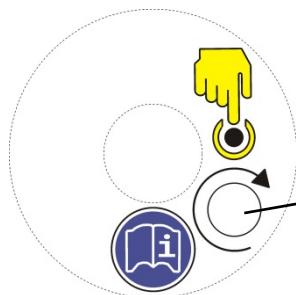
After switching on the device, the green LEDs blink during warm-up. Once the oil has a temperature of 30 °C (86 °F), the green LEDs will stay on and the sensor is ready for use.

As the filter element becomes more contaminated, the dynamic pressure or pressure drop over the filter slowly increases. If the remaining capacity is only approx. 25 % or the pressure reaches a specific value, an alarm is triggered. The yellow LEDs will light up and alarm output 1 will be active.

If the capacity of the filter element is depleted, the red LEDs will also light up and in addition to alarm output 1, alarm output 2 will also be activated.

To trigger a switching operation, the respective pressure must be overrun for at least 4 s. This prevents false alarms caused by brief pressure peaks.

The status of the capacity sensor remains unchanged, even if oil is no longer flowing through the filter. The status will not be reset until the sensor has been switched off, e.g. when switching off the system to change the filter element. Alternatively, press the Reset button.



LED	Status
Green LED blinks about twice per second	Warm-up, oil temperature <30 °C (86 °F)
Green LED steady	VSA 24 ready for use
Yellow LED steady	Alert filter element almost depleted, alarm output 1 active
Red LED steady	Filter element depleted, alarm output 2 active
Red LED blinks about twice per second	Error, see chapter 5

## 6 Maintenance

The capacity sensor VSA 24 is maintenance-free.

## 7 Service and repair

This chapter contains information on troubleshooting and correction should an error occur during operation.

Repairs to the unit must be performed by Bühler authorised personnel.

Please contact our Service Department with any questions:

**Tel.: +49-(0)2102-498955** or your agent

If the equipment is not functioning properly after correcting any malfunctions and switching on the power, it must be inspected by the manufacturer. Please send the equipment inside suitable packaging to:

**Bühler Technologies GmbH**

- Reparatur/Service -

**Harkortstraße 29**

**40880 Ratingen**

**Germany**

Please also attach the completed and signed RMA decontamination statement to the packaging. We will otherwise be unable to process your repair order.

You will find the form in the appendix of these instructions, or simply request it by e-mail:

[service@buehler-technologies.com](mailto:service@buehler-technologies.com).

### 7.1 Troubleshooting

The unit is self-monitoring. The red LEDs indicate a malfunction.

Problem/Malfunction	Possible cause	Action
Switching output 2 activated and red LED blinking	Pressure sensor failure Temperature sensor failure	Send in unit Send in unit
Switching output 2 activated and red LED lit	no error filter element depleted	replace filter element and press Reset button

### 7.2 Accessories

Item no.:	Type
914 405 0018	Connecting cable M12x1 (5-pin), length 3.0 m, angular coupling and strands

## 8 Disposal

Dispose of parts so as not to endanger the health or environment. Follow the laws in the country of use for disposing of electronic components and devices during disposal.

## 9 Appendices

### 9.1 Technical Data

#### Technical Data VSA 24-DM/-DH

##### Mechanical data

max. operating pressure:	400 bar	
Operating temperature:	-20 °C to 85 °C	
<b>Models</b>	<b>VSA 24-DM</b>	<b>VSA 24-DH</b>
Screw-in thread:	M20x1.5	G1/2
for filter housing models:	Filtration Group (Mahle)	Hydac

##### Material

Screw-in unit:	1.4305	1.4305
Seals:	CU/NBR	NBR
Top:	Anodised aluminium/PC (transparent)	

##### Weight

	220 g
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##### Electrical data

Plug connection:	M12x1 (5-pin)
Operating voltage:	24 VDC ± 10%
Power input:	< 100 mA
IP rating:	IP67 (with plug top)
Alarm	
Display:	visual (LED's)/electric
Approval:	30 °C and up (medium temperature)
Switching outputs:	2
Output 1 (NO contact):	Alarm at 75% ( $\Delta p$ 2.0 or $\Delta p$ 4.1 bar ±10%)
Output 2 (NC contact):	Cut-out at 100% ( $\Delta p$ 2.8 or $\Delta p$ 5.5 bar ±10%)
Max. switching current	1 A at 24 VDC

#### Technical Data VSA 24-SM/-SH

##### Mechanical data

max. operating pressure:	10 bar	
Operating temperature:	-20 °C to +85 °C	
<b>Models</b>	<b>VSA 24-SM</b>	<b>VSA 24-SH</b>
Screw-in thread:	M30x1.5	G1/2

##### for filter housing models:

	Filtration Group (Mahle)	Hydac
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##### Material

Screw-in unit:	1.4305	1.4305
Seals:	CU/NBR	NBR
Top:	Anodised aluminium/PC (transparent)	

##### Weight

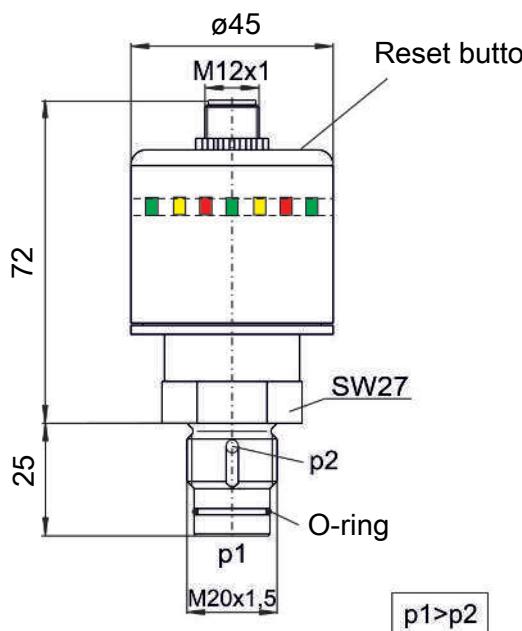
	200 g
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##### Electrical data

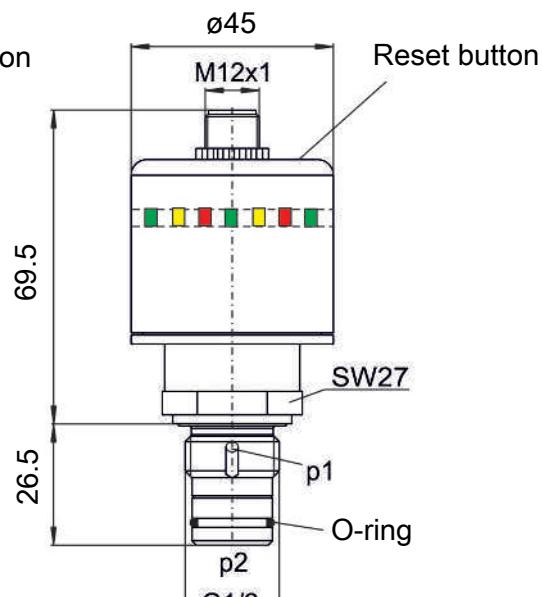
Plug connection:	M12x1 (5-pin)
Operating voltage:	24 VDC ± 10%
Power input:	< 100 mA
IP rating:	IP67 (with plug top)
Alarm	
Display:	visual (LEDs) / electric
Approval:	30 °C and up (medium temperature)
Switching outputs:	2
Output 1 (NO contact):	Alarm at 75% (2.2 bar)
Output 2 (NC contact):	Shut-off at 100% (2.9 bar)

## 9.2 Dimensions

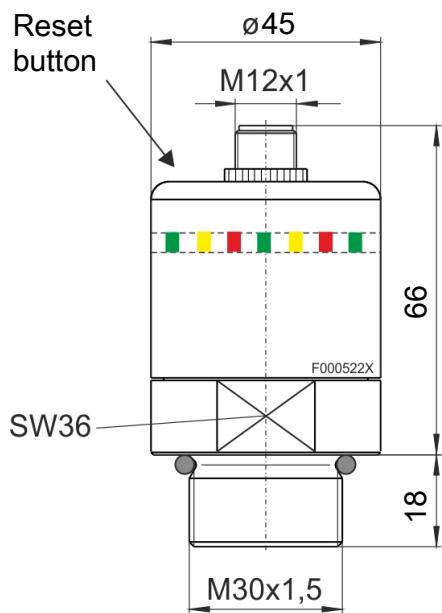
VSA 24-DM



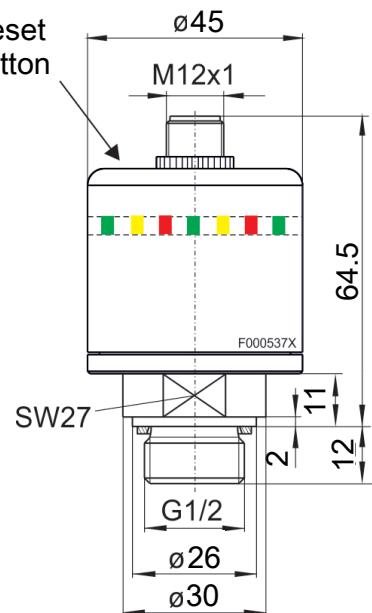
VSA 24-DH



VSA 24-SM



VSA 24-SH



The reset button must be pressed after every filter change.

## 10 Attached Documents

- Declaration of Conformity KX130020
- RMA - Decontamination Statement

**EU-Konformitätserklärung**  
**EU-declaration of conformity**



Hiermit erklärt Bühler Technologies GmbH,  
dass die nachfolgenden Produkte den  
wesentlichen Anforderungen der Richtlinie

*Herewith declares Bühler Technologies GmbH  
that the following products correspond to the  
essential requirements of Directive*

**2014/30/EU**  
**(Elektromagnetische Verträglichkeit / electromagnetic compatibility)**

in ihrer aktuellen Fassung entsprechen.

in its actual version.

**Produkt / products:** Verschmutzungsanzeiger / Filter capacity sensor  
**Typ / type:** VSA 24

Die Betriebsmittel dienen zur Überwachung der Filterkapazität in Ölkreisläufen.  
*The equipment is used to monitor the capacity of oil filters in oil-circulating systems.*

Das oben beschriebene Produkt der Erklärung erfüllt die einschlägigen  
Harmonisierungsrechtsvorschriften der Union:  
*The object of the declaration described above is in conformity with the relevant Union harmonisation  
legislation:*

**EN 61326-1:2013**

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.  
*This declaration of conformity is issued under the sole responsibility of the manufacturer.*

Dokumentationsverantwortlicher für diese Konformitätserklärung ist Herr Stefan Eschweiler mit  
Anschrift am Firmensitz.

*The person authorised to compile the technical file is Mr. Stefan Eschweiler located at the company's  
address.*

Ratingen, den 20.04.2016

A handwritten signature in black ink, appearing to read 'Stefan Eschweiler'.

Stefan Eschweiler  
Geschäftsführer – Managing Director

A handwritten signature in blue ink, appearing to read 'Frank Pospiech'.

Frank Pospiech  
Geschäftsführer – Managing Director

# RMA-Formular und Erklärung über Dekontaminierung

## RMA-Form and explanation for decontamination

RMA-Nr./ RMA-No.

Die RMA-Nummer bekommen Sie von Ihrem Ansprechpartner im Vertrieb oder Service./ You may obtain the RMA number from your sales or service representative.

Zu diesem Rücksendeschein gehört eine Dekontaminierungserklärung. Die gesetzlichen Vorschriften schreiben vor, dass Sie uns diese Dekontaminierungserklärung ausgefüllt und unterschrieben zurücksenden müssen. Bitte füllen Sie auch diese im Sinne der Gesundheit unserer Mitarbeiter vollständig aus./ This return form includes a decontamination statement. The law requires you to submit this completed and signed decontamination statement to us. Please complete the entire form, also in the interest of our employee health.



### Firma/ Company

Firma/ Company

Straße/ Street

PLZ, Ort/ Zip, City

Land/ Country

Gerät/ Device

Anzahl/ Quantity

Auftragsnr./ Order No.

### Ansprechpartner/ Person in charge

Name/ Name

Abt./ Dept.

Tel./ Phone

E-Mail

Serien-Nr./ Serial No.

Artikel-Nr./ Item No.

### Grund der Rücksendung/ Reason for return

- Kalibrierung/ Calibration       Modifikation/ Modification  
 Reklamation/ Claim       Reparatur/ Repair  
 andere/ other

bitte spezifizieren/ please specify

### Ist das Gerät möglicherweise kontaminiert?/ Could the equipment be contaminated?

- Nein, da das Gerät nicht mit gesundheitsgefährdenden Stoffen betrieben wurde./ No, because the device was not operated with hazardous substances.  
 Nein, da das Gerät ordnungsgemäß gereinigt und dekontaminiert wurde./ No, because the device has been properly cleaned and decontaminated.  
 Ja, kontaminiert mit:/ Yes, contaminated with:



explosiv/  
explosive



entzündlich/  
flammable



brandfördernd/  
oxidizing



komprimierte  
Gase/  
compressed  
gases



ätzend/  
caustic



giftig,  
Lebensgefahr/  
poisonous, risk  
of death



gesundheitsge-  
fährdend/  
harmful to  
health



gesund-  
heitsschädlich/  
health hazard



umweltge-  
fährdend/  
environmental  
hazard

### Bitte Sicherheitsdatenblatt beilegen!/ Please enclose safety data sheet!

Das Gerät wurde gespült mit:/ The equipment was purged with:

Diese Erklärung wurde korrekt und vollständig ausgefüllt und von einer dazu befugten Person unterschrieben. Der Versand der (dekontaminierten) Geräte und Komponenten erfolgt gemäß den gesetzlichen Bestimmungen.

Falls die Ware nicht gereinigt, also kontaminiert bei uns eintrifft, muss die Firma Bühler sich vorbehalten, diese durch einen externen Dienstleister reinigen zu lassen und Ihnen dies in Rechnung zu stellen.

Firmenstempel/ Company Sign

This declaration has been filled out correctly and completely, and signed by an authorized person. The dispatch of the (decontaminated) devices and components takes place according to the legal regulations.

Should the goods not arrive clean, but contaminated, Bühler reserves the right, to commission an external service provider to clean the goods and invoice it to your account.

Datum/ Date

rechtsverbindliche Unterschrift/ Legally binding signature



Die Analyse defekter Baugruppen ist ein wesentlicher Bestandteil der Qualitätssicherung der Firma Bühler Technologies.

Um eine aussagekräftige Analyse zu gewährleisten muss die Ware möglichst unverändert untersucht werden. Es dürfen keine Veränderungen oder weitere Beschädigungen auftreten, die Ursachen verdecken oder eine Analyse unmöglich machen.

Bei elektronischen Baugruppen kann es sich um elektrostatisch sensible Baugruppen handeln. Es ist darauf zu achten, diese Baugruppen ESD-gerecht zu behandeln. Nach Möglichkeit sollten die Baugruppen an einem ESD-gerechten Arbeitsplatz getauscht werden. Ist dies nicht möglich sollten ESD-gerechte Maßnahmen beim Austausch getroffen werden. Der Transport darf nur in ESD-gerechten Behältneren durchgeführt werden. Die Verpackung der Baugruppen muss ESD-konform sein. Verwenden Sie nach Möglichkeit die Verpackung des Ersatzteils oder wählen Sie selber eine ESD-gerechte Verpackung.

Beachten Sie beim Einbau des Ersatzteils die gleichen Vorgaben wie oben beschrieben. Achten Sie auf die ordnungsgemäße Montage des Bauteils und aller Komponenten. Versetzen Sie vor der Inbetriebnahme die Verkabelung wieder in den ursprünglichen Zustand. Fragen Sie im Zweifel beim Hersteller nach weiteren Informationen.

Analysing defective assemblies is an essential part of quality assurance at Bühler Technologies.

To ensure conclusive analysis the goods must be inspected unaltered, if possible. Modifications or other damages which may hide the cause or render it impossible to analyse are prohibited.

Electronic assemblies may be sensitive to static electricity. Be sure to handle these assemblies in an ESD-safe manner. Where possible, the assemblies should be replaced in an ESD-safe location. If unable to do so, take ESD-safe precautions when replacing these. Must be transported in ESD-safe containers. The packaging of the assemblies must be ESD-safe. If possible, use the packaging of the spare part or use ESD-safe packaging.

Observe the above specifications when installing the spare part. Ensure the part and all components are properly installed. Return the cables to the original state before putting into service. When in doubt, contact the manufacturer for additional information.

