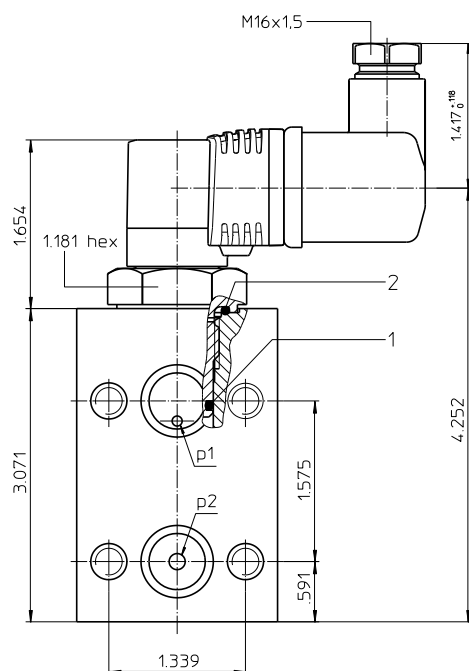
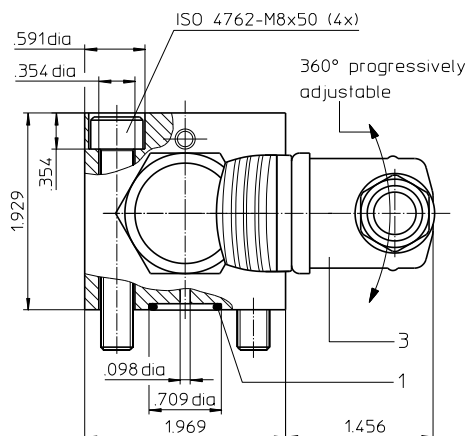


# CLOGGING INDICATOR

Series AE (electrical / visual-electrical, block execution)

Sheet No.  
**1609 P**



## 1. Clogging indicator AE

### 1.1. Type index: (ordering example)

**AE. 30. 1,5. P. - B**

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

#### 1 series:

AE = clogging indicator, electrical / visual-electrical

#### 2 version:

30-90 = see table below

#### 3 indicator-pressure difference: $\Delta p$ -nominal

0,6 = 9 PSI

0,8 = 12 PSI

**1,5 = 22 PSI**

2,5 = 36 PSI

5,0 = 73 PSI

#### 4 sealing material:

**P = Nitrile (NBR)**

V = Viton (FPM)

#### 5 material:

- = standard (aluminium)

VA = stainless steel

#### 6 execution:

- = block execution

## 2. Technical data:

temperature ranges

- operating temperature: +14°F to +176°F  
(for a short time +212°F)

- resistant to compression: -22°F to +212°F

- survival temperature: -40°F to +212°F

max. operating pressure: 6000 PSI

max. pressure difference: 2320 PSI

| Version   | luminous indication | contact                           | voltage                      | max. rupturing capacity (resistive load) | max. switching current (resistive load) | connection protection                                        |
|-----------|---------------------|-----------------------------------|------------------------------|------------------------------------------|-----------------------------------------|--------------------------------------------------------------|
| 30        | -                   | contact maker and contact breaker | max. 175V DC<br>max. 125V AC | 10 Watt/VA                               | 0,5 A                                   | DIN EN 175301-803-A, ISO 4400                                |
| 40        | -                   |                                   | max. 175V DC<br>max. 230V AC | 20 VA<br>10 Watt                         | 1,0 A<br>0,5 A                          |                                                              |
| <b>70</b> | 2x LED              |                                   | 24V DC                       | 10 VA                                    | 0,4 A with 24V DC                       | IP65 acc. to DIN EN 60529<br>screw connection M20 on request |
| 80        | 2x LED              |                                   | 24V DC                       | 20 VA                                    | 0,8 A with 24V DC                       |                                                              |
| 90        | 2x LED              |                                   | 110...230V AC/DC             | 20 Watt                                  | 1,0 A                                   |                                                              |

calibrated with oil at 182 SUS

Dimensions: inches

EDV 03/21

Designs and performance values are subject to change.

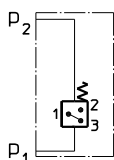
### 3. Spare parts:

| item | qty. | designation                      | dimension                                                                                         | article-no.  | type               |
|------|------|----------------------------------|---------------------------------------------------------------------------------------------------|--------------|--------------------|
| 1    | 3    | O-ring                           | 14 x 2                                                                                            | 304342 (NBR) | versions 30 - 90   |
|      |      |                                  |                                                                                                   | 304722 (FPM) |                    |
| 2    | 1    | O-ring                           | 22 x 2                                                                                            | 304708 (NBR) |                    |
|      |      |                                  |                                                                                                   | 304721 (FPM) |                    |
| 3    | 1    | line adapter                     | DIN EN 175301-803-A, ISO 4400<br>IP65 acc. to DIN EN 60529<br><br>screw connection M20 on request | 312492       | versions 30 and 40 |
|      | 1    | line adapter with LED 24V        |                                                                                                   | 315012       | versions 70 and 80 |
|      | 1    | line adapter with LED 110...230V |                                                                                                   | 354242       | version 90         |

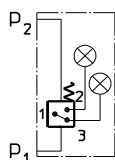
### 4. Symbols:

hydraulic-electrical symbol

versions  
30 and 40



versions  
70, 80 and 90

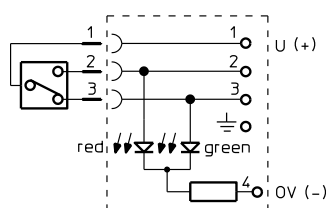


p<sub>1</sub> = measure connection supply  
p<sub>2</sub> = measure connection output

connection configuration for LED

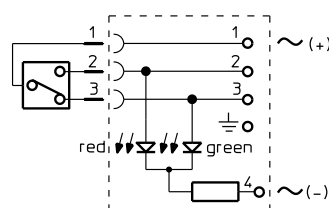
versions  
70 und 80

LED 24V, U<sub>n</sub> = +24DC



version  
90

LED 110...230V, ~



### 5. Description:

The AE 30 and AE 40 pollution indicators are electrical differential pressure indicators.

The AE 70 to AE 90 pollution indicators are combined optical and electrical differential pressure indicators. These differential pressure indicators can be fitted to all pressure filters  $p \leq 6000$  PSI for which there is a corresponding assignment on the relevant dimension drawing. As the degree of pollution of the filter element rises, so the difference between the entry pressure p<sub>1</sub> and the exit pressure p<sub>2</sub> of the filter increases.

Depending on this pressure difference and irrespective of the operating pressure, in the pollution indicators:

- AE 30 and AE 40, two electrical signals (contact maker/contact breaker) are triggered
- AE 70, AE80 and AE 90, two electrical signals (contact maker/contact breaker) are triggered and two optical signals are formed.

A metering piston subjected to the entry and exit pressure moves against a metering spring according to the pressure differential. Depending on the path, a permanent magnet integrated in the metering piston activates a reed contact (electromagnetic switch) and triggers the electrical signal. The electrical and optical indication is effected as a digital signal at the given switching pressure. Versions 70 to 90 of the pollution indicator are fitted with additional LED displays. The optical LED signal becomes visible according to the selected version in the translucent cover plate of the line box on the pollution indicator.

In the pollution indicators

- AE 70, AE80 and AE 90, the green LED signals the normal operating state (filter element not yet polluted to an unacceptable level), while the red LED signals that the filter element needs to be changed.

The clogging indicators meet protection class 2 according to DIN EN 61140.

### 6. Operating instructions:

Normally filters are supplied with mounted clogging indicator.

It is necessary to make sure the availability and the right positioning of sealing parts

- O-ring 22 x 2 and
- O-ring 14 x 2

as well as a dirt-free mounting. The electrical contacts are to be connected according to the graphical symbol shown on the type plate of the clogging indicator.

### 7. Maintenance:

The device is maintenance-free, however, note that no cleaning fluids and solvents get on the transparent cap of the optical indicator.

# **PRESSURE FILTER, change-over**

**Series DU 631-1950**

**DN 65-80**

**PN 32**

Sheet No.  
**2118 G**

## **1. Type index:**

### **1.1. Complete filter: (ordering example)**

**DU. 631. 10VG. 30. E. P. -. FS. 9. -. -. AE**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|----|----|----|
|---|---|---|---|---|---|---|---|---|----|----|----|

- 1 **series:**  
DU = pressure filter, change-over
- 2 **nominal size:** 631, 1001, 1950
- 3 **filter-material and filter- fineness:**  
80 G = 80 µm, 40 G = 40 µm, 25 G = 25 µm stainless steel wire mesh,  
25 VG = 20 µm<sub>(c)</sub>, 16 VG = 15 µm<sub>(c)</sub>, 10 VG = 10 µm<sub>(c)</sub>, 6 VG = 7 µm<sub>(c)</sub>, 3 VG = 5 µm<sub>(c)</sub> Interpor fleece (glass fibre)  
25 P = 25 µm, 10 P = 10 µm paper
- 4 **resistance of pressure difference for filter element:**  
30 = Δp 30 bar (01NL. 630) 10 = Δp 10 bar (01NR. 1000);
- 5 **filter element design:**  
E = single-end open (DU 631) B = both sides open (DU 1001/1950)  
S = with by-pass valve Δp 2,0 bar (DU 631) S1 = with by-pass valve Δp 3,5 bar (DU 631)
- 6 **sealing material:**  
P = Nitrile (NBR) V = Viton (FPM)
- 7 **filter element specification:** (see catalog)  
- = standard VA = stainless steel IS06 = see sheet-no. 31601 IS07 = see sheet-no. 31602
- 8 **connection:**  
FS = SAE-flange connection 3000 PSI
- 9 **connection size:**  
9 = 2 1/2 " (DU 631) A = 3" (DU 1001/1950)
- 10 **filter housing specification:** (see catalog)  
- = standard IS06 = see sheet-no. 31605 IS12 = see sheet-no. 41028
- 11 **internal valve:**  
- = without  
S = with by-pass valve Δp 2,0 bar (DU 1001/1950)  
S1 = with by-pass valve Δp 3,5 bar (DU 1001/1950)
- 12 **clogging indicator or clogging sensor:**  
- = without, OP = visual, see sheet-no. 1628  
AOR = visual, see sheet-no. 1606, OE = visual-electrical, see sheet-no. 1628  
AOC = visual, see sheet-no. 1606, VS1 = electronical, see sheet-no. 1607  
AE = visual-electrical, see sheet-no. 1609, VS2 = electronical, see sheet-no. 1608

### **1.2. Filter element: (ordering example)**

**01NL. 630. 10VG. 30. E. P. -**

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

- 1 **series:**  
01NL. = standard filter element according to DIN 24550, T3  
01NR. = standard-return-line filter element according to DIN 24550, T4
- 2 **nominal size:** 630 (01NL.), 1000 (01NR.)
- 3 - 7 see type index-complete filter

## **2. Accessories:**

- measure- and bleeder connections, see sheet-no. 1650
- evacuation and bleeder-connections, see sheet-no. 1651
- counter flanges, see sheet-no. 1652
- shut-off valve, see sheet-no. 1655

## **3. Dimensions:**

| type    | connection | SAE-connection size | A    | B   | C   | D    | E   | F    | G   | H   | J   | K   | L   | M   | N   | O   | P   | Q    | R    | S     | T            | weight kg |
|---------|------------|---------------------|------|-----|-----|------|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-------|--------------|-----------|
| DU 631  | DN 65      | SAE 2 1/2"          | 693  | 568 | 497 | 110  | 115 | 24   | 160 | 284 | 120 | 121 | 83  | 140 | 115 | 210 | 185 | 13,5 | 50,8 | 89    | M12, 18 deep | 90        |
| DU 1001 | DN 80      | SAE 3"              | 717  | 586 | 505 | 93,5 | 140 | 28,5 | 205 | 380 | 142 | 137 | 101 | 210 | 170 | 265 | 225 | 18   | 62   | 106,4 | M16, 23 deep | 116       |
| DU 1950 | DN 80      | SAE 3"              | 1119 | 988 | 907 | 93,5 | 140 | 28,5 | 205 | 380 | 142 | 137 | 101 | 210 | 170 | 265 | 225 | 18   | 62   | 106,4 | M16, 23 deep | 170       |

Changes of measures and design are subject to alteration!

#### 4. Spare parts:

| item | designation                           | qty. | dimension and article-no.<br>DU 631          | qty.                                         | dimension and article-no.<br>DU 1001    | qty. | dimension and article-no.<br>DU 1950    |
|------|---------------------------------------|------|----------------------------------------------|----------------------------------------------|-----------------------------------------|------|-----------------------------------------|
| 1    | filter element                        | 2    | 01NL 630                                     | 2                                            | 01NR 1000                               | 4    | 01NR 1000                               |
| 2    | O-ring                                | 2    | 60 x 3,5<br>304377 (NBR)<br>304398 (FPM)     | 4                                            | 90 x 4<br>306941 (NBR)<br>307031 (FPM)  | 8    | 90 x 4<br>306941 (NBR)<br>307031 (FPM)  |
| 3    | O-ring                                | 2    | 125 x 3<br>306025 (NBR)<br>307358 (FPM)      | 2                                            | 185 x 4<br>305593 (NBR)<br>306309 (FPM) | 4    | 185 x 4<br>305593 (NBR)<br>306309 (FPM) |
| 4    | O-ring                                | 1    | 24 x 3<br>303038 (NBR)<br>304397 (FPM)       | 24 x 3<br>303038 (FPM)<br>304397 (FPM)       |                                         |      |                                         |
| 5    | O-ring                                | 2    | 115 x 3<br>303963 (NBR)<br>307762 (FPM)      | 140 x 3<br>304604 (NBR)<br>307541 (FPM)      |                                         |      |                                         |
| 6    | O-ring                                | 1    | 96 x 4<br>305190 (NBR)<br>308148 (FPM)       | 120 x 4<br>305300 (NBR)<br>307991 (FPM)      |                                         |      |                                         |
| 7    | O-ring                                | 1    | 32 x 2,5<br>306843 (NBR)<br>308268 (FPM)     | 32 x 2,5<br>306843 (NBR)<br>308268 (FPM)     |                                         |      |                                         |
| 8    | O-ring                                | 2    | 69,45 x 3,53<br>305868 (NBR)<br>307357 (FPM) | 85,32 x 3,53<br>305590 (NBR)<br>306308 (FPM) |                                         |      |                                         |
| 9    | screw plug                            | 8    | G ½<br>304678                                | 8                                            | G ½<br>304678                           | 10   | G ½<br>304678                           |
| 10   | screw plug                            | 2    | G ¼<br>305003                                |                                              |                                         |      |                                         |
| 11   | connecting pipe                       | 2    | -                                            |                                              |                                         |      | Ø 90<br>313233                          |
| 12   | clogging indicator, visual            | 1    | AOR or AOC see sheet-no. 1606                |                                              |                                         |      |                                         |
| 13   | clogging indicator, visual            | 1    | OP see sheet-no. 1628                        |                                              |                                         |      |                                         |
| 14   | clogging indicator, visual-electrical | 1    | OE see sheet-no. 1628                        |                                              |                                         |      |                                         |
| 15   | clogging indicator, visual-electrical | 1    | AE see sheet-no. 1609                        |                                              |                                         |      |                                         |
| 16   | clogging sensor, electronical         | 1    | VS1 see sheet-no. 1607                       |                                              |                                         |      |                                         |
| 17   | clogging sensor, electronical         | 1    | VS2 see sheet-no. 1608                       |                                              |                                         |      |                                         |
| 18   | O-ring                                | 1    | 15 x 1,5<br>315357 (NBR)<br>315427 (FPM)     |                                              |                                         |      |                                         |
| 19   | O-ring                                | 1    | 22 x 2<br>304708 (NBR)<br>304721 (FPM)       |                                              |                                         |      |                                         |
| 20   | O-ring                                | 2    | 14 x 2<br>304342 (NBR)<br>304722 (FPM)       |                                              |                                         |      |                                         |
| 21   | screw plug                            | 2    | G ¼<br>305003                                |                                              |                                         |      |                                         |
| 22   | pressure balance valve                | 1    |                                              |                                              |                                         |      |                                         |

item 21 execution only without clogging indicator or clogging sensor

#### 5. Description:

Pressure filters, change-over series DU 631-1950 are suitable for operating pressure up to 32 bar.

Pressure peaks can be absorbed with a sufficient margin of safety.

A three-way-change-over valve which is, integrated in the middle of the housing, makes it possible to switch from the dirty filter-side to the clean filter-side without interrupting operation.

These filters can be installed as suction filters, pressure filters or return-line filters.

The filter element consists of star-shaped, pleated filter material which is supported on the inside by a perforated core tube and is bonded to the end caps with a high-quality adhesive. The flow direction is from outside to the inside.

Filter finer than 40 µm should use throw-away elements made of paper or Interpor fleece (glass fibre). Filter elements as fine as 5 µm are available; finer filter elements on request.

INTERNORMEN-Filter elements are known as elements with a high intrinsic stability and an excellent filtration capability, a high dirt-retaining capacity and a long service life.

INTERNORMEN-Filter are suitable for all petroleum based fluids, HW-emulsions, most synthetic hydraulic fluids and lubrication oils.

Approvals according to TÜV, and the major „Shipyards Classification Societies“ D.N.V.; B.V.; G.L.; L.R.S.; R.I.N.A.; A.B.S. and others are possible.

The internal valve is integrated in the filter cover. After reaching the opening pressure the by-pass valve causes that an unfiltered partial flow passes the filter.

#### 6. Technical data:

|                                    |                                                          |
|------------------------------------|----------------------------------------------------------|
| temperature range:                 | - 10°C to + 80°C (for a short time + 100°C)              |
| operating medium:                  | mineral oil, other media on request                      |
| max. operating pressure:           | 32 bar                                                   |
| test pressure:                     | 64 bar                                                   |
| connection system:                 | SAE-flange connection 3000 PSI                           |
| housing material:                  | EN-GJS-400-18-LT                                         |
| sealing material:                  | Nitrile (NBR) or Viton (FPM), other materials on request |
| installation position:             | vertical                                                 |
| mini-measuring connections:        | G ¼                                                      |
| evacuation-or bleeder connections: | G ½                                                      |
| volume tank DU 631:                | 2x 5,7 l                                                 |
| DU 1001:                           | 2x 13,0 l                                                |
| DU 1950:                           | 2x 23,3 l                                                |

Classified under the Pressure Equipment Directive 97/23/EC for mineral oil (fluid group 2), Article 3, Para. 3.

Classified under ATEX Directive 94/9/EC according to specific application (see questionnaire sheet-no. 34279-4)

#### 7. Symbols:

| without indicator                   | with by-pass valve                     | with electrical indicator<br>AE 30 and AE 40 | with visual-electrical indicator<br>AE 50 and AE 62 | with visual-electrical indicator<br>AE 70 and AE 80 |
|-------------------------------------|----------------------------------------|----------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|
|                                     |                                        |                                              |                                                     |                                                     |
| with visual indicator<br>AOR/AOC/OP | with visual-electrical indicator<br>OE | with electronical clogging sensor<br>VS1     | with electronical clogging sensor<br>VS2            |                                                     |
|                                     |                                        |                                              |                                                     |                                                     |

#### 8. Pressure drop flow curves:

Precise flow rates see 'INT-Expert-System Filter', respectively Δp- curves; depending on filter fineness and viscosity.

#### 9. Test methods:

Filter elements are tested according to the following ISO standards:

|           |                                                         |
|-----------|---------------------------------------------------------|
| ISO 2941  | Verification of collapse/burst resistance               |
| ISO 2942  | Verification of fabrication integrity                   |
| ISO 2943  | Verification of material compatibility with fluids      |
| ISO 3723  | Method for end load test                                |
| ISO 3724  | Verification of flow fatigue characteristics            |
| ISO 3968  | Evaluation of pressure drop versus flow characteristics |
| ISO 16889 | Multi-pass method for evaluating filtration performance |