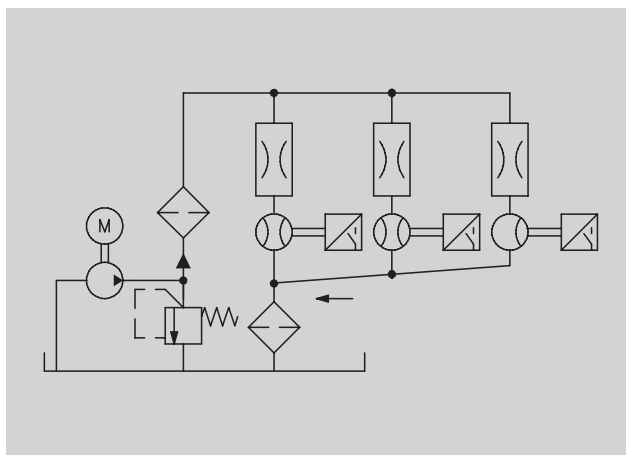


for intermittent and circulating central lubrication systems



171-210-051



GS6011

Flow monitors/sensors have the task of monitoring the flow of oil from the pump or a piston distributor element to the lube point. Flow monitors with various designs are used for this job.

Flow monitors/sensors keep an eye on the flow of oil from a piston distributor to the lube point, the piston distributor metering out a small amount of oil for only a short period of time. Depending on the type, flow monitors/sensors can monitor oil quantities ranging from 10 mm<sup>3</sup> all the way to 1500 mm<sup>3</sup> per lubricant pulse.

A further task involves monitoring a continuous flow of oil from a pump through a lubrication system. These flow monitors are designed for a throughput ranging from 50 ccm to 14,000 ccm.

So the following points have to be observed when selecting an appropriate flow monitor:

- intermittent or continuous operation
- oil quantity to be monitored
- eff. viscosity of the lubricant
- system pressure.

Designation	Order No.	Metered quantity, flow rate	Application	Port A	Port B 1)	Fig.
Flow monitor	<b>171-210-051</b>	50 - 100	Circulating central lubrication systems	M10x1	DIN2353 / ISO8434-1	1
	<b>171-210-052</b>	100 - 200				
	<b>171-210-053</b>	200 - 500				
	<b>171-210-054</b>	500 - 800				
	<b>171-210-055</b>	800 -1800				
Flow monitor	<b>171-210-061</b>	1.6 - 2.5	Circulating central lubrication systems	M10x1	DIN2353 / ISO8434-1	2
	<b>171-210-062</b>	2.3 - 4.0				
	<b>171-210-063</b>	3.6 - 6.0				
	<b>171-210-064</b>	5.5 -10.0				
	<b>171-210-065</b>	8.0 -14.0				
Flow sensor	<b>GS300</b> <b>GS304N</b> <b>GS304P</b>	10 - 600 mm³/pulse	Intermittent central lubrication systems, e.g. with piston distributors, metering elements, injection oilers Oil+air central lubrication systems			3
Oil-streak sensor	<b>GS4011</b> <b>GS6011</b>	≥ 1 mm³/min	Oil+air central lubrication systems			4

<sup>1)</sup> Only permissible for the use of preassembled fittings

We recommend use of a preassembled EO-2 screw union. (Example: GA21...23/GA30)

**Please note:** see leaflet 1-1730 US for associated line sockets..



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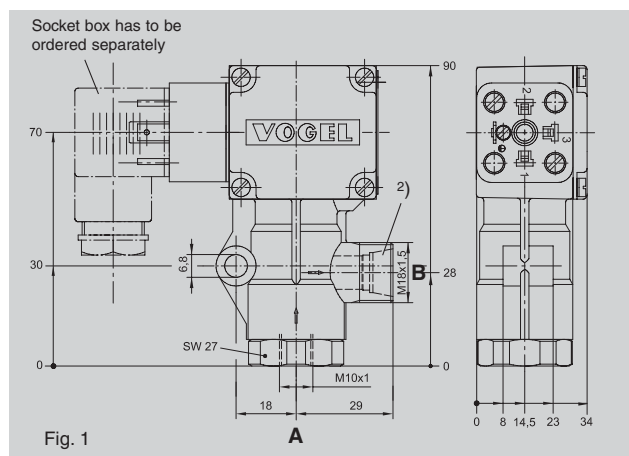
### Flow monitors for the monitoring of a continuous flow of oil (circulating lubrication system)

Order No.	Flow rate application range (ccm/min)	Order No.	Flow rate application range (l/min)
171-210-051	50 - 100	171-210-061	1.6 - 2.5
171-210-052	100 - 200	171-210-062	2.3 - 4
171-210-053	200 - 500	171-210-063	3.6 - 6
171-210-054	500 - 800	171-210-064	5.5 -10
171-210-055	800 -1800	171-210-065	8.0 -14

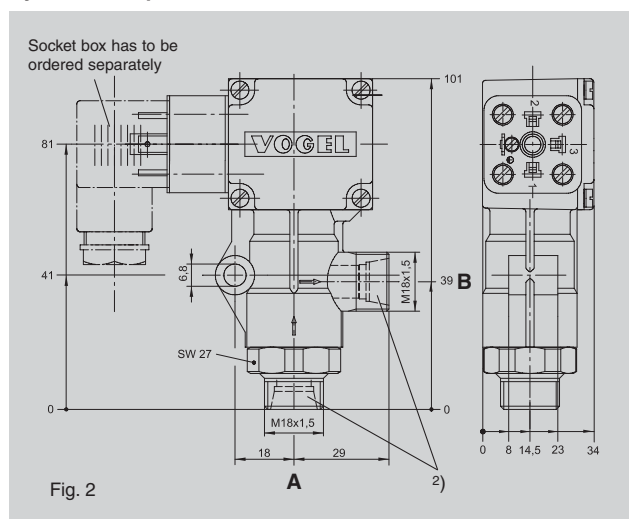
Operating viscosity .....	20-1000 mm <sup>2</sup> /s
Actuating pressure .....	min. 4 bars <sup>1)</sup> , max. 25 bars
Electr. switching .....	changeover 250 V AC, 0.5 A
Perm. operating temperature .....	+ 5 to +80 °C
Type of enclosure .....	IP 65
Mounting position .....	any
Materials	
housing .....	die-cast zinc, polyamide
seals .....	NBR (Viton version on request)

1) If the flow monitors are equipped with metering restrictors, at least 6 bars are required in the feed line.

### System examples I, II, III



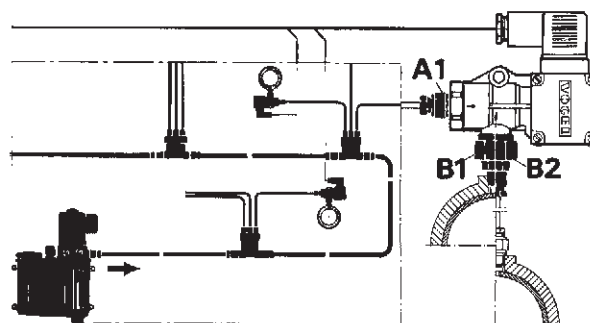
### System example IV



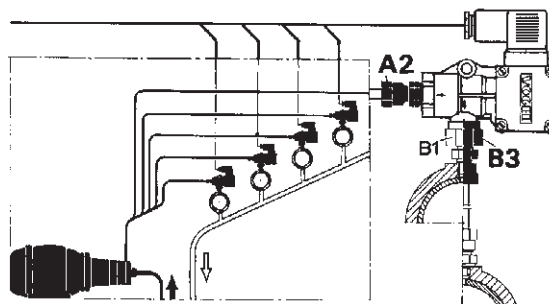
2) Port tapped for solderless cutting-sleeve screw union

## System examples

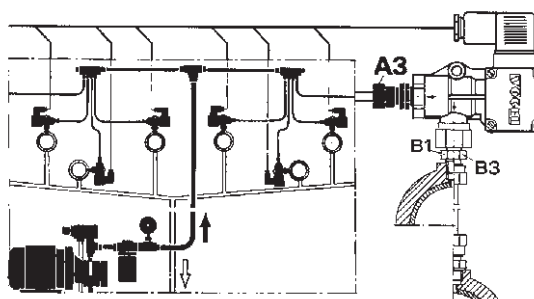
### Single-line, total-loss lubrication system with piston distributors



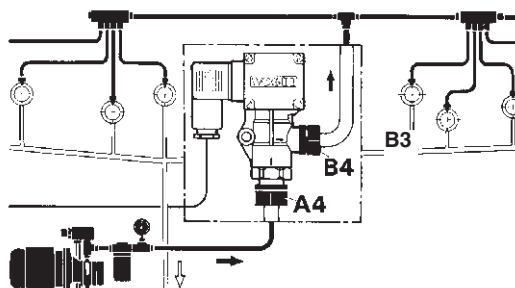
## II Circulating lubrication system with multicircuit pump unit



### III Circulating lubrication system with restrictors



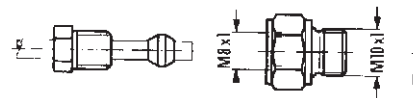
#### IV Circulating lubrication system with restrictor tubes



## Connection fittings

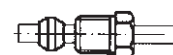
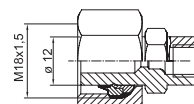
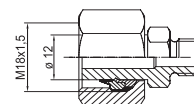
### Straight screw-in connector <sup>3)</sup>

Connection	for tubing diam.	Socket union order No.	Double tapered ring order No.	Adapter order No.	Washer order No.
<b>A1</b>	4	404-002	404-001	404-006	504-019



### Connection fittings with screwed stud end for direct attachment of flow monitor to the lube point

Connection	Adapter order No.	d1
<b>B1</b>	GA21 GA22 GA23 GA24	M 10 x 1 M 10 x 1 tap. R 1/8 tap. R 1/4 tap.

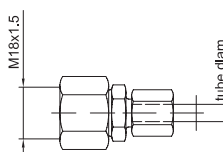
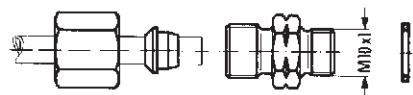


### Connection fitting for tubing <sup>3)</sup>

Connection	for tubing diam.	Adapter order No.	d2	Socket union order No.	Double tapered ring order No.
<b>B2</b>	4	GA30	M 8 x 1	404-002	404-001

### Connection piece without restrictor <sup>4)</sup> Straight screw-in connector

Connection	for tubing diam.	Union nut order No.	Cutting sleeve order No.	Adapter order No.	Washer order No.
<b>A2</b>	6 8 10	406-302 408-302 410-302	406-301 408-301 410-301	GD60.02 GD80.02 GD100.02	504-019

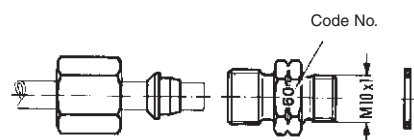


### Connection fitting for tubing <sup>4)</sup>

Connection	for tubing diam.	Adapter order No.
<b>B3</b>	6 8 10	473-806-391 473-808-392 473-810-391

### Connection piece with restrictor <sup>4)</sup> Straight screw-in connector

Connection	for tubing diam.	Union nut order No.	Cutting sleeve order No.	Adapter with restrictor (compl. with washer) order No.	order No.
<b>A3</b>	6	406-302	406-301	GD60	60
				GD61	61
				GD62	62
				GD63	63
				GD64	64
	8	408-302	408-301	GD65	65
				GD80	80
				GD81	81
				GD82	82
				GD83	83
<b>A3</b>	8	408-302	408-301	GD84	84
				GD85	85
				GD86	86
				GD87	87
				GD88	88
	10	410-302	410-301	GD89	89



The required restrictor sizes are determined with the nomograph on the next page

Only for a range of 1.6 to 14 l/min (flow monitor as per Fig. 2)

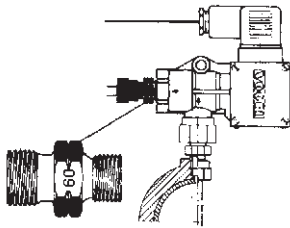
### Tube union <sup>4)</sup> for direct connection to the flow monitor

Connection	for tubing diam.	Function nut order No.
<b>A4</b>	12	460-212-001

<sup>3)</sup> Port tapped for solderless tube connection

<sup>4)</sup> Port tapped for solderless cutting-sleeve screw union to DIN 2353

## Nomograph for determination of restrictor sizes (connection A3, system example III)



The code number is impressed in the hexagon head of the restrictor

### Determining the restrictor size

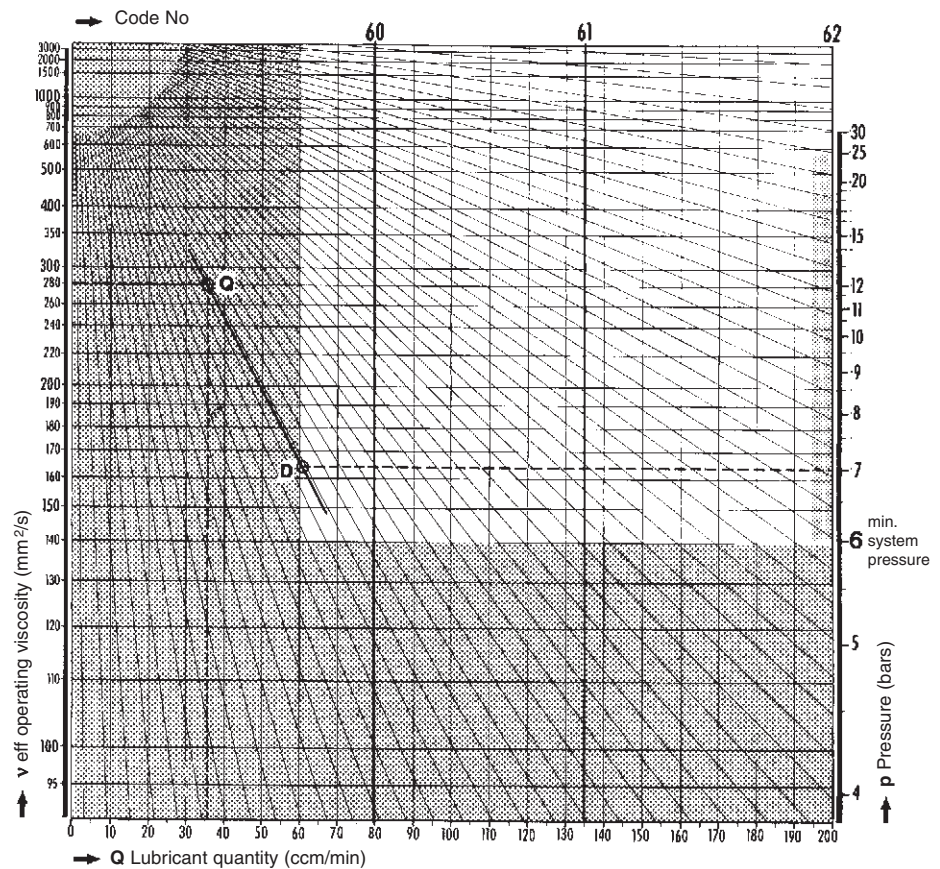
1. Draw a straight line along the index lines through point **Q**  $v_{eff}$
2. Determine the point at which **p** intersects with this line, resulting in **D**.
3. Select the restrictor **closest** to point **D**.

**D** must be inside the white field, i.e. small amounts cannot be "apportioned and monitored" with the unit.

### Example 1

**required:**  $Q = 36 \text{ ccm/min}$ ,  
**given:**  $v_{eff} = 280 \text{ mm}^2/\text{s}$   
 $p = 7 \text{ bars}$

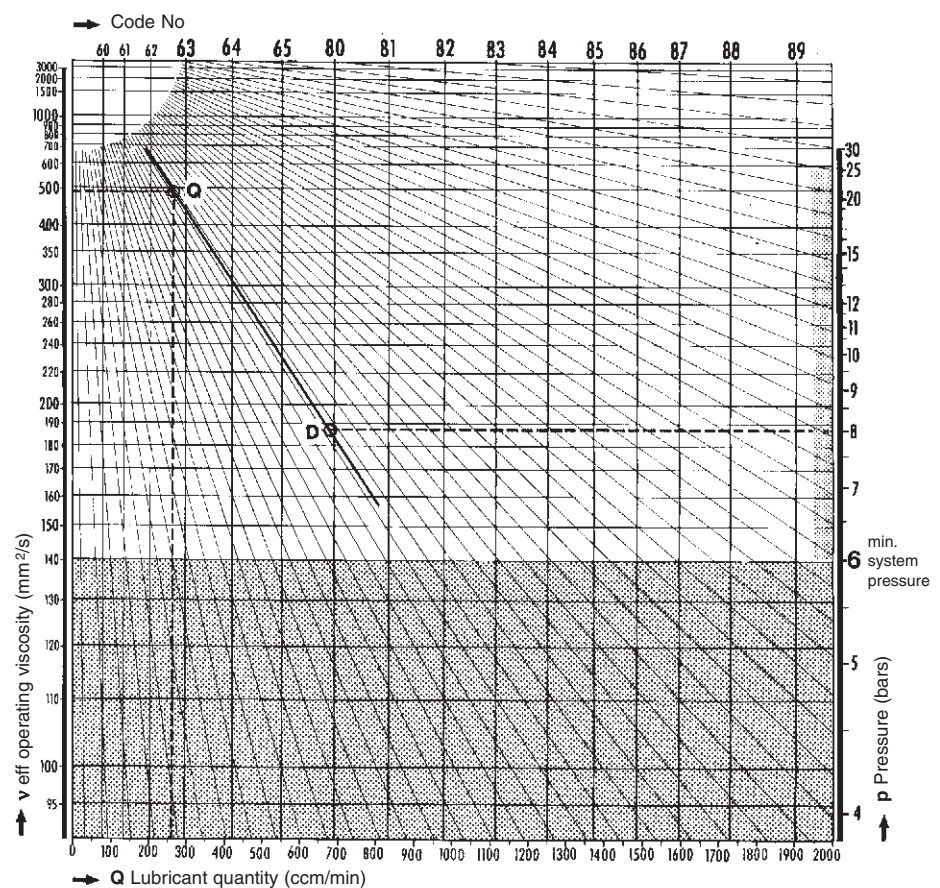
**Result: restrictor size No. 60**  
 (borderline case)



### Example 2

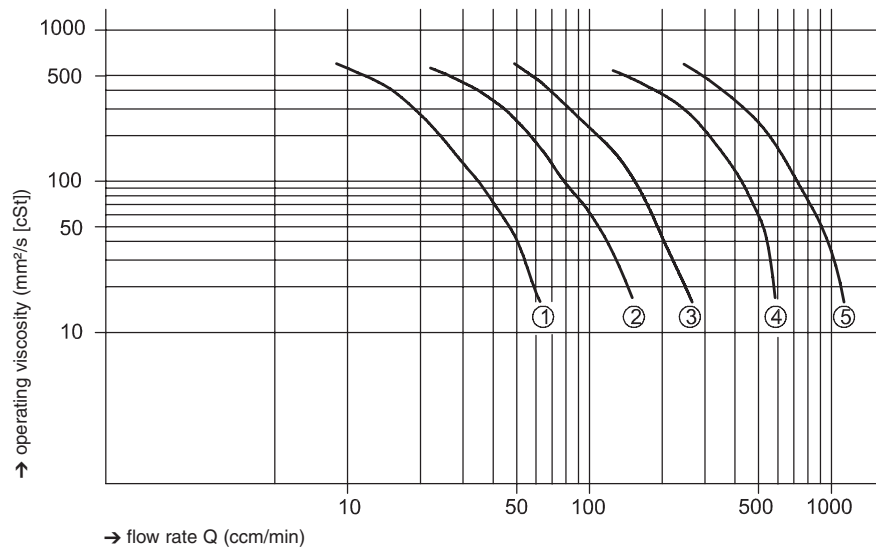
**required:**  $Q = 260 \text{ ccm/min}$ ,  
**given:**  $v_{eff} = 480 \text{ mm}^2/\text{s}$   
 $p = 8 \text{ bars}$

**Result: restrictor size No. 80**

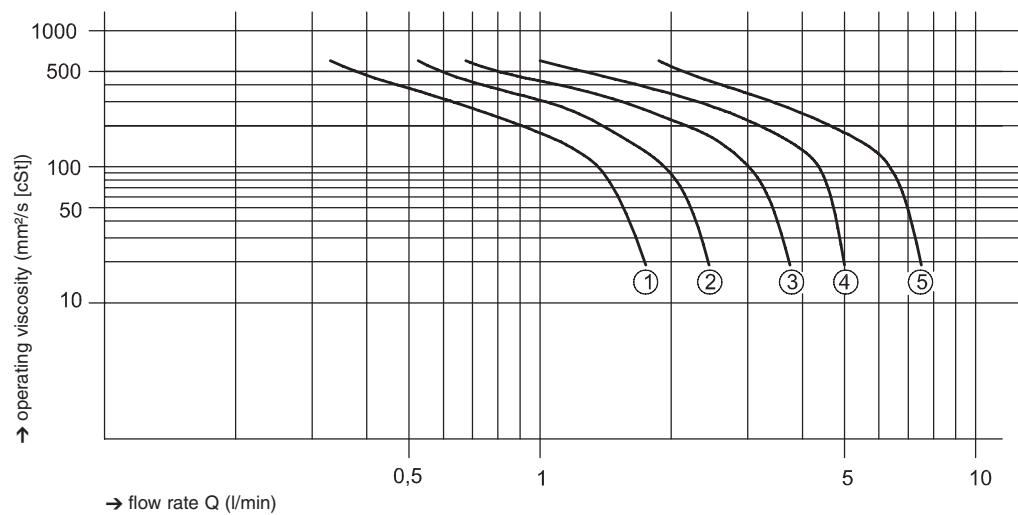


## Flow rate at activation point as a factor of the viscosity

Flow monitors to monitor a flow of oil (circulating lubrication system)



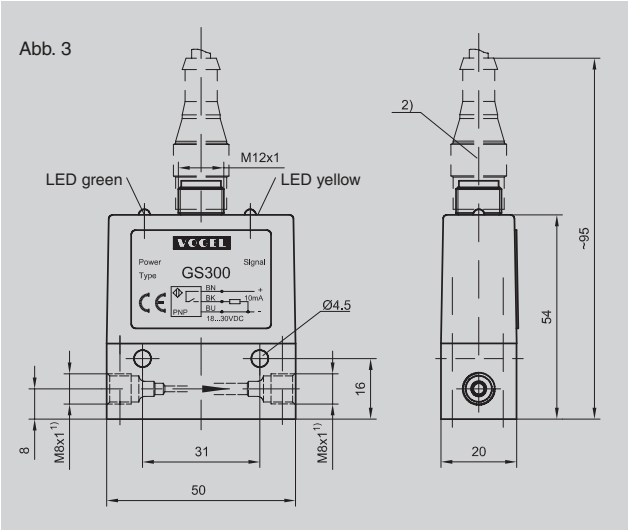
Order No.	Flow rate activation point (ccm/min)	Activation curve as per diagram
171-210-051	35	①
171-210-052	75	②
171-210-053	150	③
171-210-054	400	④
171-210-055	700	⑤



Order No.	Flow rate activation point (l/min)	Activation curve as per diagram
171-210-061	1.3	①
171-210-062	1.9	②
171-210-063	3.0	③
171-210-064	4.5	④
171-210-065	6.5	⑤

# GS300, GS304N, GS304P

Flow sensors for monitoring of lubricant feed  
right at the lube point



- 1) Port tapped for solderless 4 mm diam. tube connection
- 2) **Accessories**  
GS300: 5 m connection cable, **order No. GS200.U4**  
GS304P / GS304N: 5 m connection cable with straight line socket, 4-polig, **order No. DS-E.U2**

## Technical data

Suitable metered quantities from ..... 0.01 to 0.6 ccm/lpulse  
Clock frequency ..... max. 4 pulse/min  
Lubricant ..... oil (10 to 2000 mm<sup>2</sup>/s)  
Max. operating pressure ..... max. 40 bars  
Operating temperature ..... +10 °C to +50 °C  
Installation ..... directly upstream of lube point  
Vibration resistance ..... 20 g (DIN/IEC 68-2-27, 10-2000 Hz)  
Impact resistance ..... 50 g (DIN/IEC 68-2-27, 11 ms)

## Electrical data

Rated voltage  $U_N$  ..... 24 V DC  
Residual ripple ..... 10 %  
Working range  $U_A$  ..... 18 to 30 V DC  
Max. power consumption  $I_E$  ..... max. 25 mA  
Pulse output ..... 3 s  
Load current  $I_A$  for GS300 ..... max. 10 mA  
for GS304 ..... max. 500 mA per output  
Output protection ..... short-circuit protection  
Built-in plug ..... circular connector  
with M12x1 screw plug

Order No.	Switching function	Electrical connection
<b>GS300</b> 	<b>Pin 1</b> (BN - brown): + 24 V <b>Pin 3</b> (BU - blue): 0 V <b>Pin 4</b> (BK - black): PNP/NO – closes in event of flow	
<b>GS304P</b> 	<b>Pin 1</b> (BN - brown): + 24 V <b>Pin 2</b> (WH - white): PNP/NC – opens in event of flow <b>Pin 3</b> (BU - blue): 0 V <b>Pin 4</b> (BK - black): PNP/NO – closes in event of flow	
<b>GS304N</b> 	<b>Pin 1</b> (BN - brown): + 24 V <b>Pin 2</b> (WH - white): NPN/NC – opens in event of flow <b>Pin 3</b> (BU - blue): 0 V <b>Pin 4</b> (BK - black): NPN/NO – closes in event of flow	



## GS4011, GS6011

### The oil-streak sensors monitors the continuity of the oil flow in oil+air lubrication systems

So-called oil+air central lubrication systems are used in the case of minimal-quantity and oil+air lubrication systems, e.g. to supply high-speed rolling bearings in tool spindles. The bearings are supposed to be supplied with extremely small quantities of lubricant in the case of these applications. To achieve such small quantities of oil per unit of time, what was originally a relatively large drop of oil is torn apart by a current of air on its way from the metering point to the bearing. The oil to be delivered is fed in the line to the bearing as a thin flow of lubricant along the wall.

#### Monitoring:

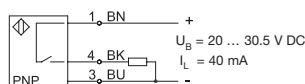
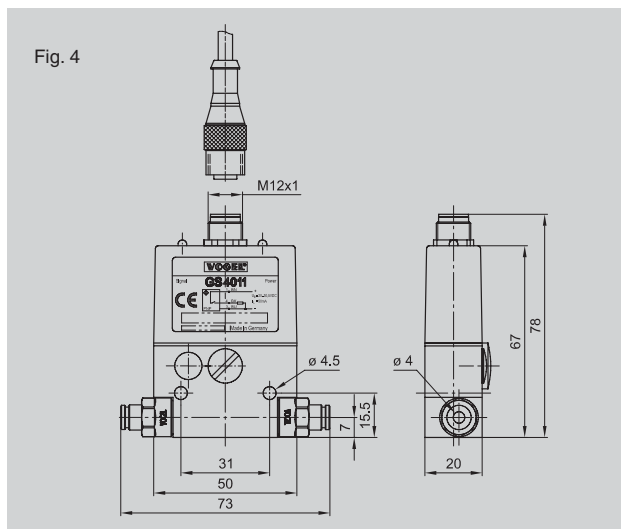
So far, only the metered quantity of oil from the metering element has been checked upstream of the oil and air mixing point. The oil-streak sensor makes it possible to monitor the transport of a fine current of oil along the secondary line's wall downstream of the oil and air mixing point. The closer the sensor is located to the lube point, the more reliable the system monitoring.

### Technical data

Order No.	GS4011
	for ø 4 mm plastic tubing
Order No.	GS6011
	for ø 6 mm plastic tubing
Max. sensitivity	1 mm <sup>3</sup> /min
Fluid	oil+air
Max. operating pressure	10 bars
Operating temperature	0 to +60 °C
Mounting position	any

Accessories: connection cable with straight cable socket, 4-pole type, length 5 m, order No. **DS-E.U2**

Fig. 4



### Electrical data

Rated voltage $U_N$	24 V DC 1)
Operating range $U_B$	20 to 30.5 V DC
Max. power consumption $I_E$ (without load current)	40 mA
Type of enclosure	IP54
Output	pnp type
	closes when oil streaks detected, opens when there are none
Color coding with standard sensor cables	
brown (BN)	+24 V
blue (BU)	GND
black (BK)	make contact
white (WH)	break contact

1) Protective measure to be taken for operation in conformity with "Functional Extra-Low Voltage with Safety Separation" (PELV = Protective Extra-Low Voltage)



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www.vogelfrance.com

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All products manufactured by VOGEL are not approved for use in conjunction with gases, liquefied gases, pressurized gases in solution and fluids with a vapor pressure exceeding normal atmospheric pressure (1013 mbars) by more than 0.5 bar at their maximum permissible temperature.