

# Clogging Indicators for Filters



HYDAC clogging indicators are designed to show visually and/or electrically when a filter element has to be changed or cleaned. Operational safety of a system and efficient utilisation of a filter element can only be guaranteed if clogging indicators are used.

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1. RETURN LINE INDICATORS

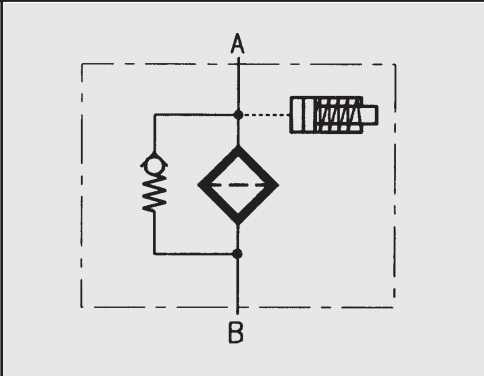
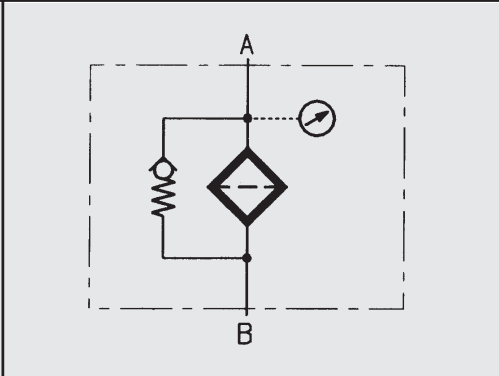
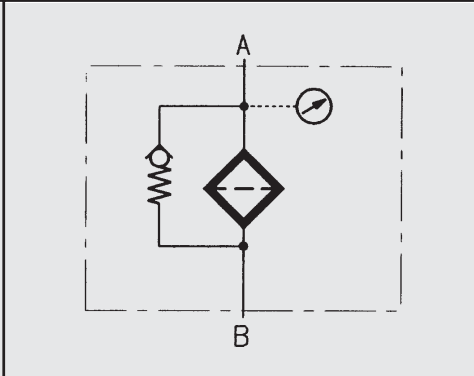
- 1.1. DESCRIPTION
- 1.1.1. General
- Return line indicators are used for return line and suction filters. In return line filters they react to the increasing static pressure before the filter element, caused by increasing contamination; in suction filters to the decreasing pressure after the filter element. On standard models the sealing material is NBR (Perbunan). All standard filters can be fitted with an indicator at any time by simply screwing it in. (EXCEPTION: The differential pressure indicator, type V02 must be fitted separately inline!)
- Please note:**
- For a return line filter/cooler/tank arrangement, differential pressure indicators must be used.

1.1.2. Selection table - Return line indicators

| Designation          | suitable for filter types                     |                                |                                     |                 |             |
|----------------------|-----------------------------------------------|--------------------------------|-------------------------------------|-----------------|-------------|
|                      | RF, RFD<br>RFM<br>(except size<br>75/165/185) | RFM<br>75/165/185<br>RFN ≤ 100 | NF/<br>NFD...<br>1.0<br>RFN/D ≥ 160 | MF/<br>MFD      | BF7<br>ELF7 |
| VR 2 B.1             | ●                                             |                                | ●                                   |                 |             |
| VMF 2 B.1            |                                               | ●                              |                                     |                 |             |
| VR 2 C.0             | ●                                             |                                | ●                                   |                 |             |
| VMF 2 C.0            |                                               | ●                              |                                     |                 |             |
| VR 2 D.0/-L          | ●                                             |                                | ●                                   |                 |             |
| VMF 2 D.0/-L         |                                               | ●                              |                                     |                 |             |
| VR 2 E.0             | ●                                             |                                | ●                                   |                 |             |
| VMF 2 E.0            |                                               | ●                              |                                     |                 |             |
| VMF 16 E.0           |                                               |                                |                                     | ●               |             |
| VR 2 ES.0            | ●                                             |                                | ●                                   |                 |             |
| VR 2 F.0             | ●                                             |                                | ●                                   |                 |             |
| VMF 2 F.0            |                                               | ●                              |                                     | ●               |             |
| VR 2 H.0             | ●                                             |                                | ●                                   |                 |             |
| VMF 2 H.0            |                                               | ●                              |                                     |                 |             |
| VMF 0.6 K.0          |                                               |                                |                                     |                 | ●           |
| VR 2 LE.1            | ●                                             |                                | ●                                   |                 |             |
| VR 2 LZ.1/-DB        | ●                                             |                                | ●                                   |                 |             |
| VR 2 LZ.1/-CN        | ●                                             |                                | ●                                   |                 |             |
| VR 2 GC.0            | ●                                             |                                | ●                                   |                 |             |
| VMF 1 UE.0           |                                               |                                |                                     | ● <sup>1)</sup> |             |
| VMF 0.2 UF.0         |                                               |                                |                                     | ● <sup>1)</sup> |             |
| VR 2.5 LZ.1/-BO      | ●                                             |                                | ●                                   |                 |             |
| VR 2.5 LZ.1/-AV      | ●                                             |                                | ●                                   |                 |             |
| VR 2.5 LZ.1/-D4C     | ●                                             |                                | ●                                   |                 |             |
| VR 2.5 LZ.1/-BO-LED  | ●                                             |                                | ●                                   |                 |             |
| VR 2.5 LZ.1/-GM      | ●                                             |                                | ● <sup>2)</sup>                     |                 |             |
| VMF 2.5 LZ.1/-D4C    |                                               | ●                              |                                     |                 |             |
| VMF 2.5 LZ.1/-BO-LED |                                               | ●                              |                                     |                 |             |

1) only when used in suction applications  
2) only sizes 250/500

1.2. TECHNICAL SPECIFICATIONS  
1.2.1. Return line indicators

|                                             |                                                                                       |                                                                                    |                                                                                       |                                                                                    |                                                                                       |
|---------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1.2. TECHNICAL SPECIFICATIONS               |                                                                                       |                                                                                    |                                                                                       |                                                                                    |                                                                                       |
| 1.2.1. Return line indicators               |                                                                                       |  |                                                                                       |  |                                                                                       |
|                                             |                                                                                       |  |                                                                                       |                                                                                    |                                                                                       |
| General details                             |                                                                                       |                                                                                    |                                                                                       |                                                                                    |                                                                                       |
| Designation of clogging indicator           | VR 2 B.1                                                                              | VMF 2 B.1 (not illustrated)                                                        | VR 2 E.0                                                                              | VMF 2 E.0 (not illustrated)                                                        | VR 2 ES.0                                                                             |
| Suitable for filter types                   | all RF, RFD, RFM (except size 75/165/185), NF/NFD...1.0                               | RFM 75/165/185 (please contact our sales/techn. department)                        | all RF, RFD, RFM (except size 75/165/185), NF/NFD...1.0                               | RFM 75/165/185 (please contact our sales/techn. department)                        | all RF, RFD, RFM (except size 75/165/185), NF/NFD...1.0                               |
| Weights                                     | 44 g                                                                                  | 84 g                                                                               | 140 g                                                                                 | 80 g                                                                               | 120 g                                                                                 |
| Type of indication                          | visual, red pin                                                                       |                                                                                    | visual-analogue scale green-yellow-red                                                |                                                                                    | visual-analogue scale green-yellow-red                                                |
| Hydraulic details                           |                                                                                       |                                                                                    |                                                                                       |                                                                                    |                                                                                       |
| Cracking pressure/ indication range         | 2 bar - 0.2 bar                                                                       |                                                                                    | 0 bar to +10 bar                                                                      |                                                                                    | 0 bar to +10 bar                                                                      |
| Permissible operating pressure              | 7 bar                                                                                 |                                                                                    | 7 bar -continuous                                                                     |                                                                                    | 7 bar -continuous                                                                     |
| Permissible temperature range <sup>1)</sup> | - 30 °C to +100 °C                                                                    |                                                                                    | - 20 °C to +60 °C                                                                     |                                                                                    | - 20 °C to +60 °C                                                                     |
| Accuracy class                              | -                                                                                     |                                                                                    | 1.6                                                                                   |                                                                                    | 1.6                                                                                   |
| Electrical details                          |                                                                                       |                                                                                    |                                                                                       |                                                                                    |                                                                                       |
| Switching type                              | -                                                                                     |                                                                                    | -                                                                                     |                                                                                    | -                                                                                     |
| Max. switching voltage                      | -                                                                                     |                                                                                    | -                                                                                     |                                                                                    | -                                                                                     |
| Electrical connection                       | -                                                                                     |                                                                                    | -                                                                                     |                                                                                    | -                                                                                     |
| Max. switching output at resistive load     | -                                                                                     |                                                                                    | -                                                                                     |                                                                                    | -                                                                                     |
| Switching capacity <sup>2)</sup>            | -                                                                                     |                                                                                    | -                                                                                     |                                                                                    | -                                                                                     |
| Safety type (to DIN 40050)                  | -                                                                                     |                                                                                    | -                                                                                     |                                                                                    | -                                                                                     |
| Symbols                                     |  |                                                                                    |  |                                                                                    |  |

<sup>1)</sup> Only NBR (Perbunan) seals can be used in the temperature range - 30 °C to - 10 °C.

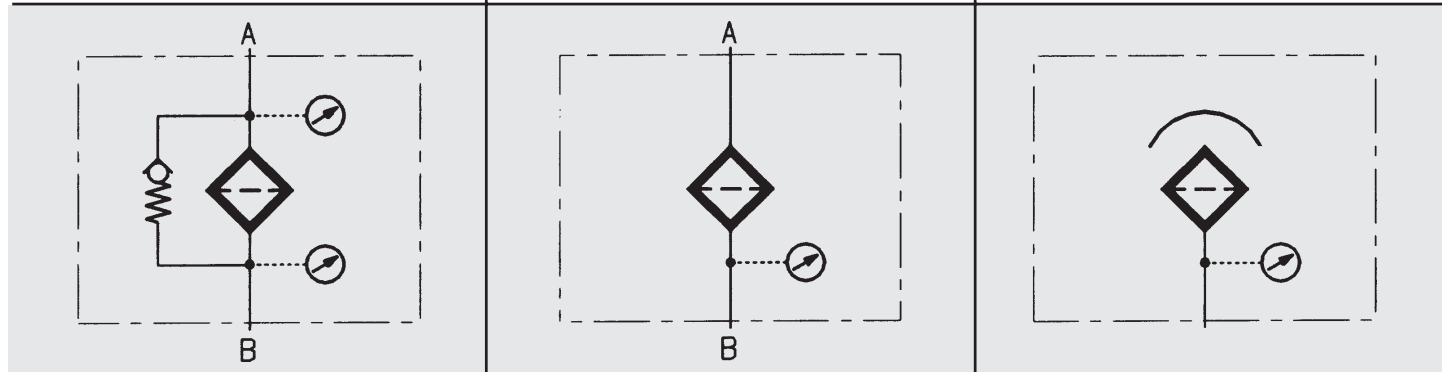
<sup>2)</sup> High voltage peaks sometimes occur when inductances are switched off. Therefore the use of protection diodes should be considered.

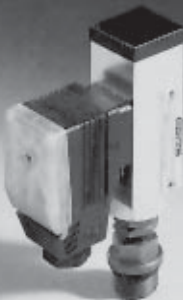
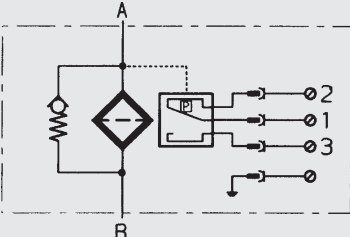
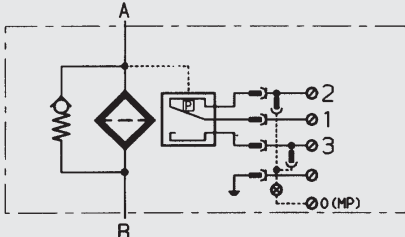
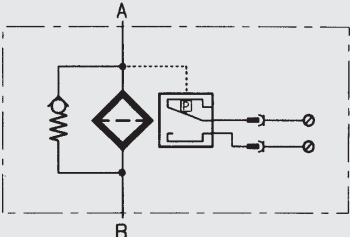
<sup>1)</sup> Only NBR (Perbunan) seals can be used in the temperature range - 30 °C to - 10 °C.  
<sup>2)</sup> High voltage peaks sometimes occur when inductances are switched off. Therefore the use of protection diodes should be considered.

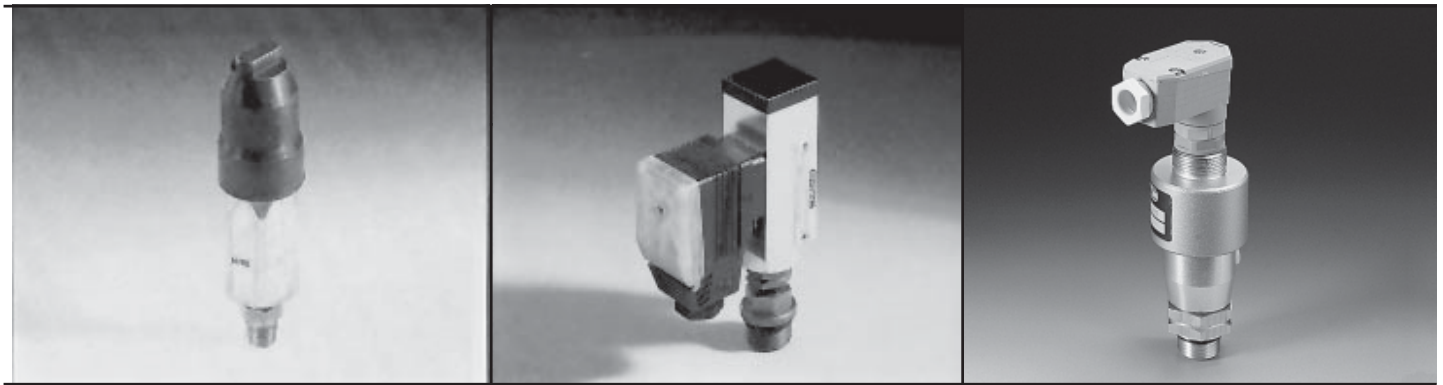




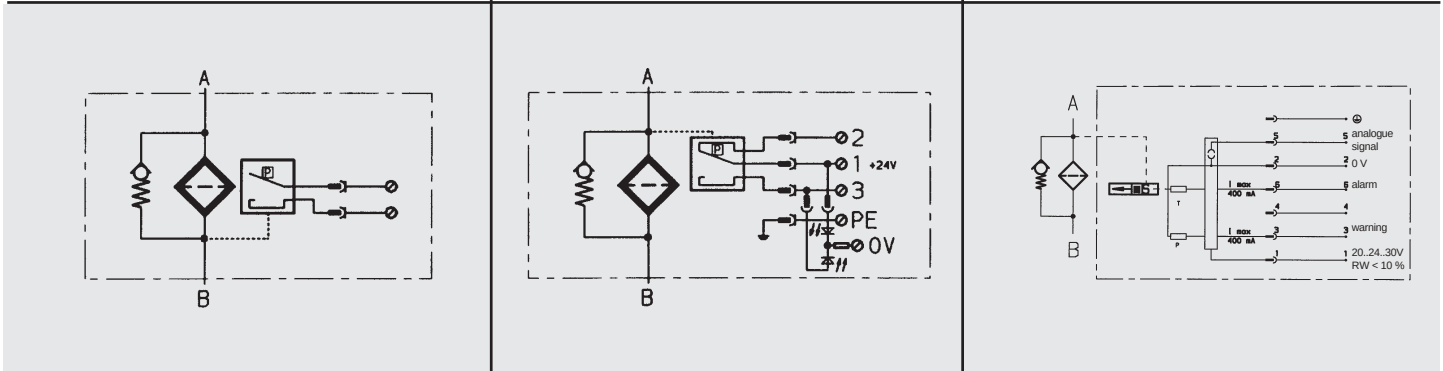
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|--------------------------------------------|--------------------------------------------|--------------------------------------------|
| VMF 16 E.0                                 | VMF 1 UE.0                                 | VMF 0.6 K.0                                |
| MF/MFD                                     | MF/MFD when used as suction filter         | BF/ELF 7                                   |
| 80 g                                       | 100 g                                      | 100 g                                      |
| visual-analogue,<br>scale white, graduated | visual-analogue,<br>scale white, graduated | visual-analogue,<br>scale white, graduated |
| 0 bar to +16 bar                           | - 1 bar to 0 bar                           | - 1 bar to +0.6 bar                        |
| 11 bar -continuous                         | - 0.7 to 0 bar -continuous                 | - 0.7 to +0.4 bar -continuous              |
| - 20 °C to +60 °C                          | - 20 °C to +60 °C                          | - 20 °C to +60 °C                          |
| 1.6                                        | 1.6                                        | 1.6                                        |
| -                                          | -                                          | -                                          |
| -                                          | -                                          | -                                          |
| -                                          | -                                          | -                                          |
| -                                          | -                                          | -                                          |
| -                                          | -                                          | -                                          |
| -                                          | -                                          | -                                          |

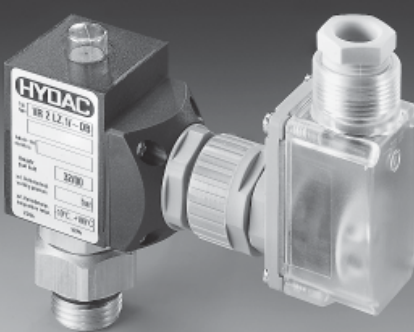
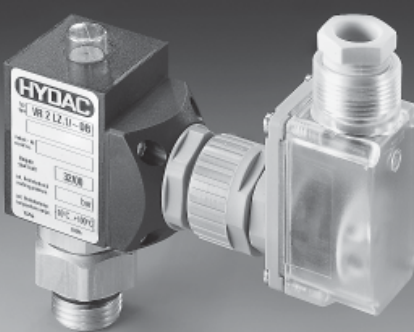
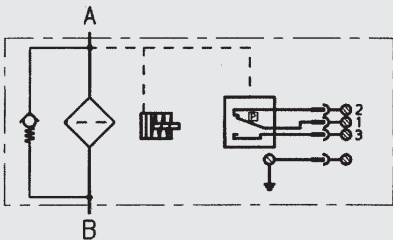
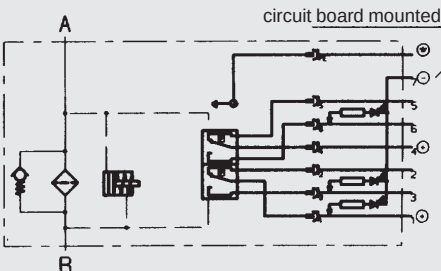
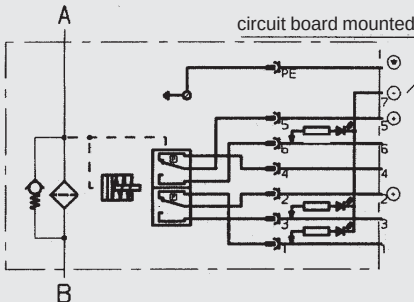


|                                                                                     |                                |                                                                                      |                                     |                                                                                       |                                                                 |
|-------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------|
|    |                                |     |                                     |    |                                                                 |
| VR 2 C.0                                                                            | VMF 2 C.0<br>(not illustrated) | VR 2 D.0/L...                                                                        | VMF 2 D.0/L...<br>(not illustrated) | VR 2 F.0                                                                              | VMF 2 F.0<br>(not illustrated)                                  |
| all RF, RFD, RFM<br>(except size<br>75/165/185),<br>NF/NFD...1.0                    | RFM 75/165/185                 | all RF, RFD, RFM<br>(except size<br>75/165/185),<br>NF/NFD...1.0                     | RFM 75/165/185                      | all RF, RFD, RFM<br>(except size<br>75/165/185),<br>NF/NFD...1.0                      | RFM 75/165/185,<br>MF/MFD<br>when used as<br>return line filter |
| 340 g                                                                               | 270 g                          | 360 g                                                                                | 300 g                               | 130 g                                                                                 | 75 g                                                            |
| electrical                                                                          |                                | visual/electrical                                                                    |                                     | electrical                                                                            |                                                                 |
| 2 bar ± 0.3 bar                                                                     |                                | 2 bar ± 0.3 bar                                                                      |                                     | 2 bar ± 0.4 bar                                                                       |                                                                 |
| 40 bar                                                                              |                                | 40 bar                                                                               |                                     | 40 bar                                                                                |                                                                 |
| - 30 °C to +100 °C                                                                  |                                | - 30 °C to +100 °C                                                                   |                                     | - 30 °C to +100 °C                                                                    |                                                                 |
| -                                                                                   |                                | -                                                                                    |                                     | -                                                                                     |                                                                 |
| N/O or N/C contacts<br>(change-over contacts)                                       |                                | N/O or N/C contacts<br>(change-over contacts)                                        |                                     | N/O contact                                                                           |                                                                 |
| 230 V                                                                               |                                | 24 V, 48 V, 110 V, 230 V<br>depending on type of light insert                        |                                     | 42 V                                                                                  |                                                                 |
| plug connection, PG11,<br>socket to DIN 43650                                       |                                | plug connection, PG11,<br>socket to DIN 43650                                        |                                     | threaded connection                                                                   |                                                                 |
| 250 W =<br>300 VA ~                                                                 |                                | 250 W =<br>300 VA ~                                                                  |                                     | 60 W =<br>100 VA ~                                                                    |                                                                 |
| ohmic 6 A at 24 V =<br>ohmic 0.03 to 6 A at max. 230 V ~                            |                                | ohmic 6 A at 24 V =<br>ohmic 0.03 to 6 A at max. 230 V ~                             |                                     | ohmic 2.5 A at 24 V =<br>ohmic 2.5 A at 42 V ~                                        |                                                                 |
| IP 65 (only if the plug is wired<br>and fitted correctly)                           |                                | IP 65 (only if the plug is wired<br>and fitted correctly)                            |                                     | IP 65, terminals IP 00                                                                |                                                                 |
|  |                                |  |                                     |  |                                                                 |



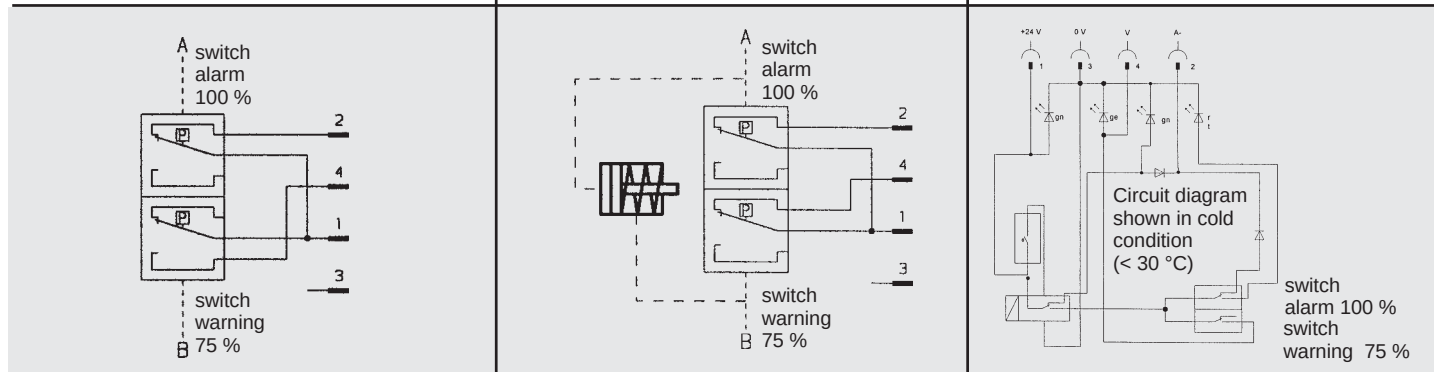
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|------------------------------------------------|------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VMF 0.2 UF.0                                   | VR 2 D.0/-LED                                                    | VMF 2 D.0/-LED<br>(not illustrated) | VR 2 GC.0                                                                                                                                                                                                                                                                                  |
| MF/MFD, when used as suction filter            | all RF, RFD, RFM<br>(except size<br>75/165/185),<br>NF/NFD...1.0 | RFM 75/165/185                      | all RF, RFD, RFM<br>(except size<br>75/165/185),<br>NF/NFD...1.0                                                                                                                                                                                                                           |
| 170 g                                          | 360 g                                                            | 300 g                               | 340 g                                                                                                                                                                                                                                                                                      |
| electrical                                     | visual/electrical<br>(visual = 2 light emitting diodes)          |                                     | electronic-analogue (4-20 mA or 1-10 V)<br>and 1 electr. switching contact at 75 %<br>and at 100 % of the cracking pressure<br>Analogue signal up to 20 % of the<br>cracking pressure remains constant at<br>4 mA or 1 V. It then increases linearly<br>with pressure up to 20 mA or 10 V. |
| - 0.2 bar $\pm$ 0.1 bar                        | 2 bar - 10 %                                                     |                                     | 2 bar - 10 %                                                                                                                                                                                                                                                                               |
| 20 bar                                         | 40 bar                                                           |                                     | 7 bar                                                                                                                                                                                                                                                                                      |
| - 30 °C to +100 °C                             | - 30 °C to +100 °C                                               |                                     | - 30 °C to +80 °C                                                                                                                                                                                                                                                                          |
| -                                              | -                                                                |                                     | -                                                                                                                                                                                                                                                                                          |
| N/O contact                                    | N/O contact                                                      |                                     | N/O or N/C contacts, electronic<br>PNP positive switching                                                                                                                                                                                                                                  |
| 42 V                                           | 24 V                                                             |                                     | operating voltage 20 - 30 V DC                                                                                                                                                                                                                                                             |
| threaded connection                            | plug connection PG 11<br>socket to DIN 43650                     |                                     | 7-pole plug connector<br>to DIN 43651                                                                                                                                                                                                                                                      |
| 60 W =<br>100 VA ~                             | 250 W =<br>300 VA ~                                              |                                     | 12 W                                                                                                                                                                                                                                                                                       |
| ohmic 2.5 A at 24 V =<br>ohmic 2.5 A at 42 V ~ | ohmic 6 A at 24 V =                                              |                                     | ohmic 0.4 A at 30 V =                                                                                                                                                                                                                                                                      |
| IP 65, terminals IP 00                         | IP 65 (only if the plug is wired<br>and fitted correctly)        |                                     | IP 65 (only if the plug is wired<br>and fitted correctly)                                                                                                                                                                                                                                  |



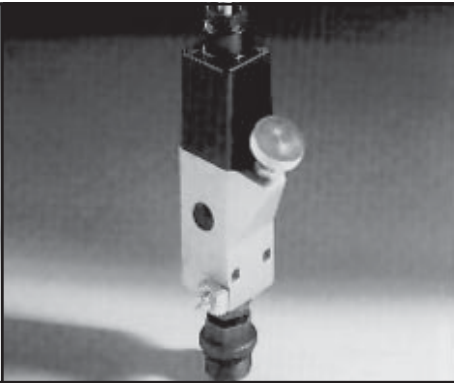
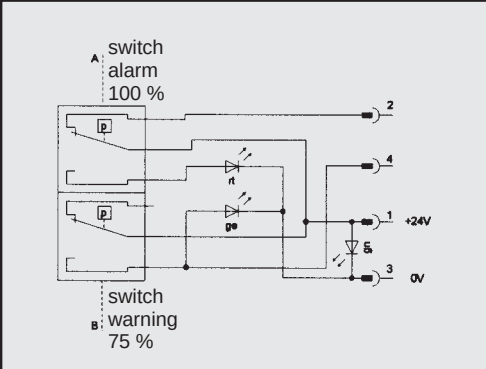
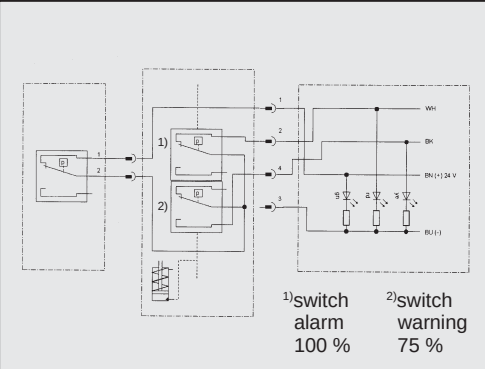
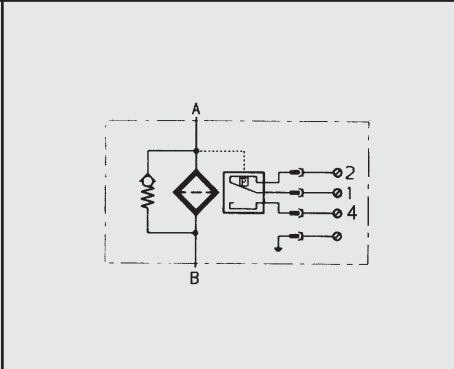
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|--|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |                     |                                                                                                                    |                                                                                                                           |
|  | VR 2 LE.1                                                                                            | VR 2 LZ.1/-DB                                                                                                                                                                                        | VR 2 LZ.1/-CN                                                                                                                                                                                                |
|  | RF, RFD, RFM<br>(except size<br>75/165/185)<br>NF/NFD...1.0                                          | RF, RFD, RFM<br>(except size<br>75/165/185)<br>NF/NFD...1.0                                                                                                                                          | RF, RFD, RFM<br>(except size<br>75/165/185)<br>NF/NFD...1.0                                                                                                                                                  |
|  | 143 g                                                                                                | 190 g                                                                                                                                                                                                | 190 g                                                                                                                                                                                                        |
|  | visual, red pin<br>and electrical switch<br>1 switching contact at 100 %<br>of the cracking pressure | visual, red pin<br>and 1 electr. switching contact at 75 % and<br>at 100 % of the cracking pressure<br>/-DB: 1 green LED constantly lit<br>1 yellow LED lit from 75 %<br>1 red LED lit from 100 % Δp | visual, red pin<br>and 1 electr. switching contact at 75 % and<br>at 100 % of the cracking pressure<br>/-CN : 1 green LED goes out from 75 % Δp<br>1 yellow LED lit from 75 %<br>1 red LED lit from 100 % Δp |
|  | 2 bar - 0.2 bar                                                                                      | 2 bar - 0.2 bar                                                                                                                                                                                      | 2 bar - 0.2 bar                                                                                                                                                                                              |
|  | 7 bar                                                                                                | 7 bar                                                                                                                                                                                                | 7 bar                                                                                                                                                                                                        |
|  | - 30 °C to +100 °C                                                                                   | - 30 °C to +100 °C                                                                                                                                                                                   | - 30 °C to +100 °C                                                                                                                                                                                           |
|  | -                                                                                                    | -                                                                                                                                                                                                    | -                                                                                                                                                                                                            |
|  | N/O or N/C contacts, reed contacts<br>(change-over contact)                                          | N/O or N/C contacts, reed contacts<br>(change-over contact)                                                                                                                                          | N/O or N/C contacts, reed contacts<br>(change-over contact)                                                                                                                                                  |
|  | 115 V                                                                                                | 24 V                                                                                                                                                                                                 | 24 V                                                                                                                                                                                                         |
|  | plug connection, PG 11<br>socket to DIN 43650                                                        | plug connection, PG 11<br>socket to DIN 43651,<br>with transparent housing and<br>3 built-in LED's                                                                                                   | plug connection, PG 11<br>socket to DIN 43651,<br>with transparent housing and<br>3 built-in LED's                                                                                                           |
|  | 15 W=<br>max. 15 VA~                                                                                 | 15 W=<br>max. 15 VA~                                                                                                                                                                                 | 15 W=<br>max. 15 VA~                                                                                                                                                                                         |
|  | ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                           | ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                                                                                                                           | ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                                                                                                                                   |
|  | IP 65 (only if the plug is wired<br>and fitted correctly)                                            | IP 65 (only if the plug is wired<br>and fitted correctly)                                                                                                                                            | IP 65 (only if the plug is wired<br>and fitted correctly)                                                                                                                                                    |
|  |                   |                                                                                                                  |                                                                                                                         |



|                                                                                                      |                                                                                                      |                                                                                                                                                                                                                                                                 |                                        |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| VR 2.5 LZ.1/-BO                                                                                      | VR 2.5 LZ.1/-AV                                                                                      | VR 2.5 LZ.1/-D4C                                                                                                                                                                                                                                                | VMF 2.5 LZ.1/-D4C<br>(not illustrated) |
| RFN, RFND, RF, RFD,<br>RFM (except size 75/165/185)<br>NF/NFD .. 1.0                                 | RFN, RFND, RF, RFD,<br>RFM (except size 75/165/185)<br>NF/NFD .. 1.0                                 | RFN, RFND, RF,<br>RFD, RFM (except<br>size 75/165/185)<br>NF/NFD .. 1.0                                                                                                                                                                                         | RFM 75/165 /185,<br>RFN 40/63/100      |
| 145 g                                                                                                | 145 g                                                                                                | 205 g                                                                                                                                                                                                                                                           | 245 g                                  |
| visual, red pin<br>and 1 electr. switching contact at 75 %<br>and at 100 % of the cracking pressure. | visual, red pin<br>and 1 electr. switching contact at 75 %<br>and at 100 % of the cracking pressure. | 1 electr. switching contact at 75 % and at<br>100 % of the cracking pressure and<br>suppression of the switching signal when<br>operating temperature is below 30 °C<br>1 green LED constantly lit<br>1 yellow LED lit from 75 %<br>1 red LED lit from 100 % Δp |                                        |
| 2 bar or 2.5 bar -10 %                                                                               | 2 bar or 2.5 bar -10 %                                                                               | 2.5 bar -10 %                                                                                                                                                                                                                                                   |                                        |
| 7 bar                                                                                                | 7 bar                                                                                                | 7 bar                                                                                                                                                                                                                                                           |                                        |
| - 10 °C to +100 °C                                                                                   | - 10 °C to +100 °C                                                                                   | - 10 °C to +100 °C                                                                                                                                                                                                                                              |                                        |
| -                                                                                                    | -                                                                                                    | -                                                                                                                                                                                                                                                               |                                        |
| N/O contact (75 %)<br>N/C contact (100 %)                                                            | N/C contact (75 % and 100 %)                                                                         | N/O contact (75 %)<br>N/C contact (100 %)                                                                                                                                                                                                                       |                                        |
| 24 V                                                                                                 | 24 V                                                                                                 | 24 V                                                                                                                                                                                                                                                            |                                        |
| plug connection<br>M 12 x 1                                                                          | plug connection<br>M 12 x 1                                                                          | plug connection<br>M 12 x 1                                                                                                                                                                                                                                     |                                        |
| 15 W=<br>max. 15 VA~                                                                                 | 15 W=<br>max. 15 VA~                                                                                 | 15 W=<br>max. 15 VA~                                                                                                                                                                                                                                            |                                        |
| ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                           | ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                           | ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                                                                                                                                                                                      |                                        |
| IP 67                                                                                                | IP 67                                                                                                | IP 67                                                                                                                                                                                                                                                           |                                        |



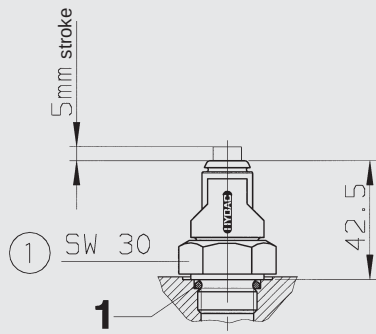


|                                                                                                                                                                    |  |                                                                                                                                                                                       |                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                                                                     |  |                                                                                                      |     |
| VR 2.5 LZ.1/-BO-LED                                                                                                                                                |  | VMF 2.5 LZ.1/-BO-LED (not illustrated)                                                                                                                                                | VR 2.5 LZ.1/-GM                                                                       |
| RFN, RFND, RF, RFD, RFM (except size 75/165/185)<br>NF/NFD .. 1.0                                                                                                  |  | RFM 75/165/185, RFN 40/63/100                                                                                                                                                         | RFN (only size 250/500)                                                               |
| 200 g                                                                                                                                                              |  | 240 g                                                                                                                                                                                 | 290 g                                                                                 |
| 1 electr. switching contact at 75 % and at 100 % of the cracking pressure<br>1 green LED constantly lit<br>1 yellow LED lit from 75%<br>1 red LED lit from 100% Δp |  | visual, red pin<br>and 1 electr. switching contact at 75 % and at 100 % of the cracking pressure.<br>Indicator function possible only in conjunction with the "No element" indicator. | electrical                                                                            |
| 2.5 bar -10 %                                                                                                                                                      |  | 2.5 bar -10 %                                                                                                                                                                         | 2 bar ± 0.3 bar                                                                       |
| 7 bar                                                                                                                                                              |  | 7 bar                                                                                                                                                                                 | 200 bar                                                                               |
| - 10 °C to +100 °C                                                                                                                                                 |  | - 10 °C to +100 °C                                                                                                                                                                    | - 30 °C to +80 °C                                                                     |
| -                                                                                                                                                                  |  | -                                                                                                                                                                                     | -                                                                                     |
| N/O contact (75 %)<br>N/C contact (100 %)                                                                                                                          |  |                                                                                                                                                                                       | N/O or N/C contacts (change-over contact)                                             |
| 24 V                                                                                                                                                               |  | 24 V                                                                                                                                                                                  | 250 V                                                                                 |
| plug connection<br>M 12 x 1                                                                                                                                        |  | plug connection<br>M 12 x 1                                                                                                                                                           | cable connection PG 9<br>cable length 2 m                                             |
| 15 W=<br>max. 15 VA~                                                                                                                                               |  | 15 W=<br>max. 15 VA~                                                                                                                                                                  | 62.5 W=<br>250 VA~                                                                    |
| ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                                                                                         |  | ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                                                                                                            | ohmic 0.25 A at 250 V =<br>ohmic 1 A at 250 V ~                                       |
| IP 67                                                                                                                                                              |  | IP 67                                                                                                                                                                                 | EEx d IICT6 (to EN 50014...50020)                                                     |
|                                                                                  |  |                                                                                                   |  |

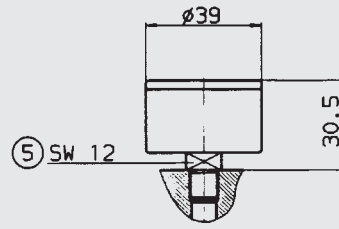


### 1.3. DIMENSIONS - RETURN LINE INDICATORS

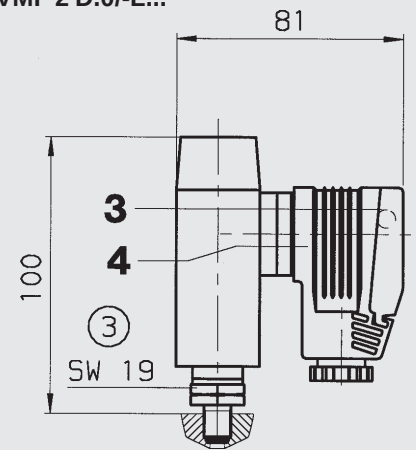
**VR 2 B.1**



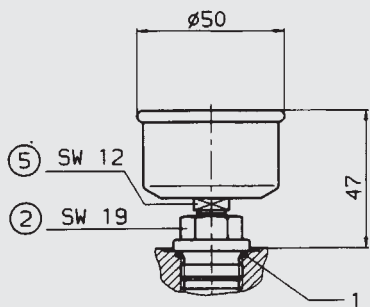
**VMF 0.6 K.0**



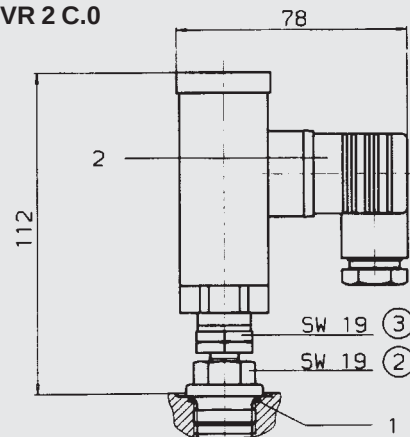
**VMF 2 D.0/-L...**



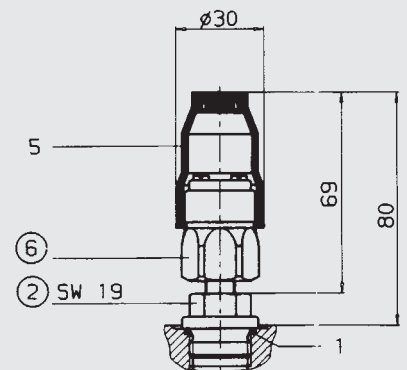
**VR 2 E.0**



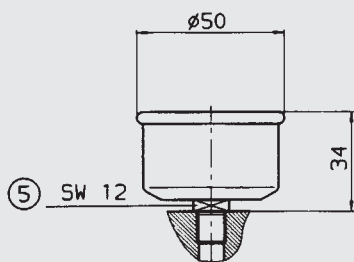
**VR 2 C.0**



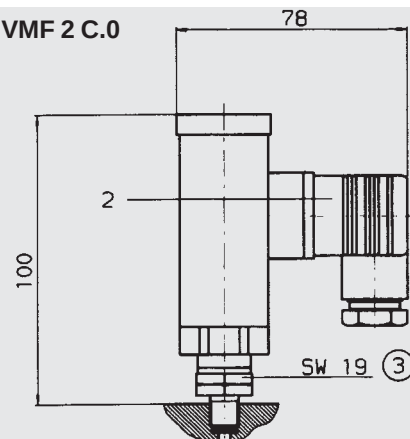
**VR 2 F.0**



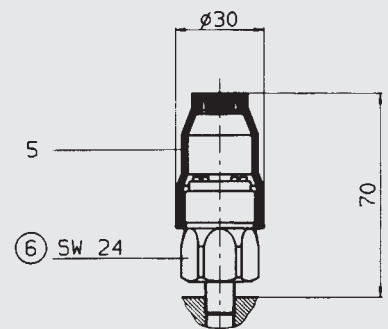
**VMF 2 E.0 / VMF 16 E.0  
VMF 1U E.0**



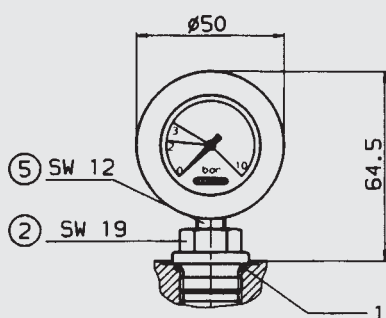
**VMF 2 C.0**



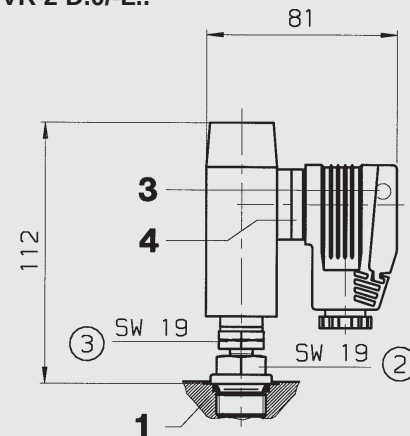
**VMF 2 F.0**



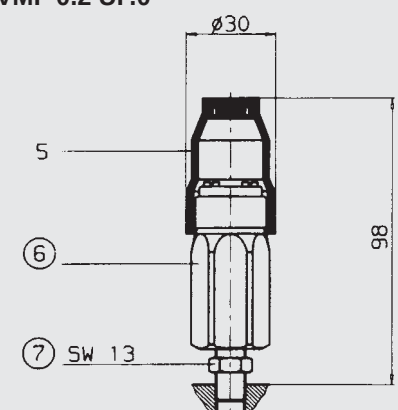
**VR 2 ES.0**



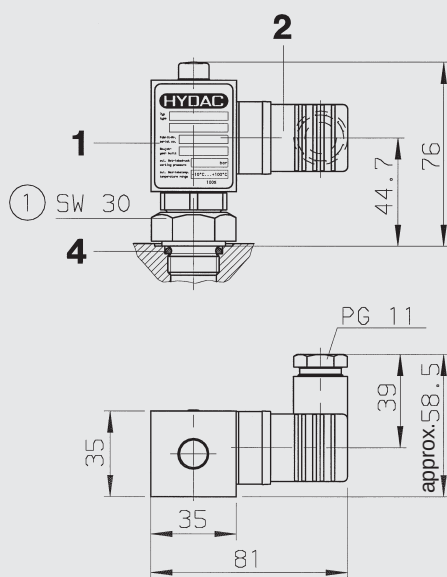
**VR 2 D.0/-L..**



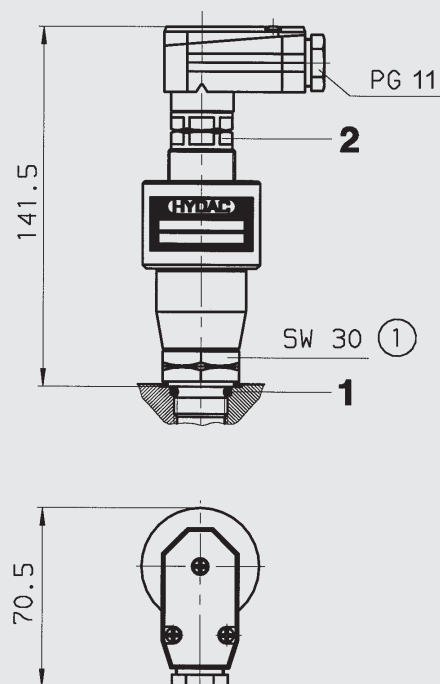
**VMF 0.2 UF.0**



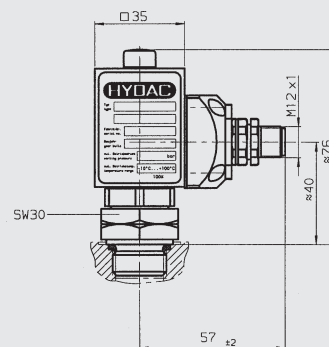
## VR 2 LE.1



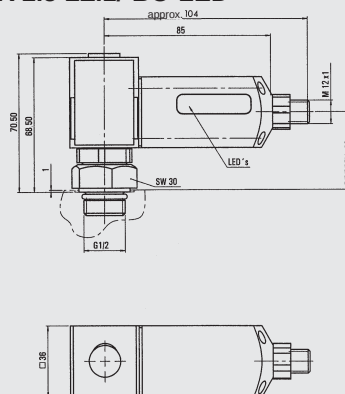
## VR 2 GC.0



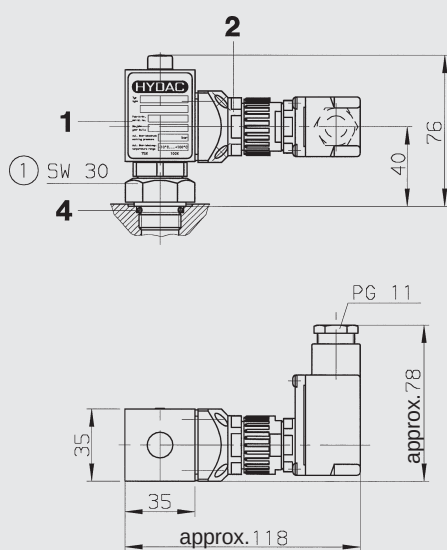
## VR 2.5 LZ.1/-BO VR 2.5 LZ.1/-AV



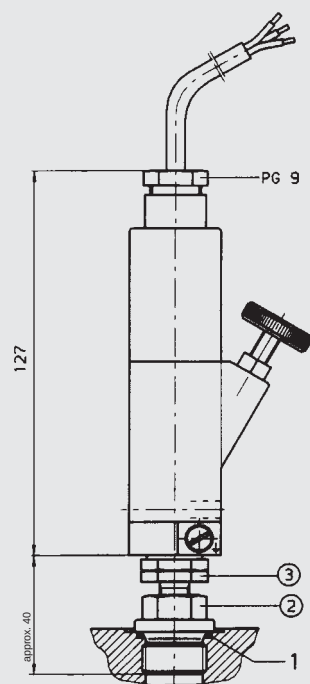
## VR 2.5 LZ.1/-D4C VR 2.5 LZ.1/-BO-LED



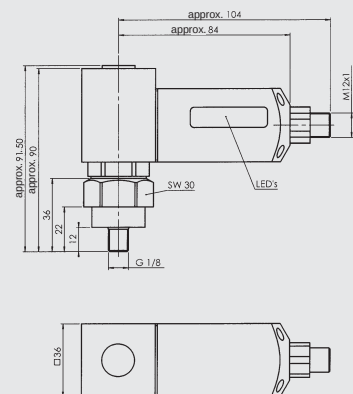
## VR 2 LZ.1/-DB VR 2 LZ.1/-CN



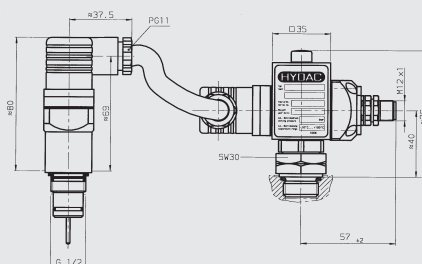
## VR 2 C.0/-EX



## VMF 2.5 LZ.1/-D4C VMF 2.5 LZ.1/-BO-LED



## VR 2.5 LZ.1/-GM





#### 1.4. TORQUE RATINGS - RETURN LINE INDICATORS

**Please note:** The clogging indicators must only be tightened/adjusted on the hexagon flats (SW) as stated below.

| Model                | Item | SW | Max. fitting torque (Nm) | Item | SW | Max. adjustment torque (Nm) | Threaded connection |
|----------------------|------|----|--------------------------|------|----|-----------------------------|---------------------|
| VR 2 B.1             | ①    | 30 | 15                       | -    | -  | -                           | G 1/2               |
| VR 2 E.0             | ②    | 19 | 30                       | ⑤    | 12 | 15                          | G 1/2               |
| VMF .. E.0           | ⑤    | 12 | 15                       | -    | -  | -                           | G 1/8               |
| VMF 1 UE.0           | ⑤    | 12 | 15                       | -    | -  | -                           | G 1/8               |
| VR 2 ES.0            | ②    | 19 | 30                       | ⑤    | 12 | 15                          | G 1/2               |
| VMF 0.6 K.0          | ⑤    | 12 | 15                       | -    | -  | -                           | G 1/8               |
| VR 2 C.0             | ②    | 19 | 30                       | ③    | 19 | 15                          | G 1/2               |
| VMF 2 C.0            | ③    | 19 | 15                       | -    | -  | -                           | G 1/8               |
| VR 2 D.0/-L ..       | ②    | 19 | 30                       | ③    | 19 | 15                          | G 1/2               |
| VMF 2 D.0/-L ..      | ③    | 19 | 15                       | -    | -  | -                           | G 1/8               |
| VR 2 F.0             | ②    | 19 | 30                       | -    | -  | -                           | G 1/2               |
| VMF 2 F.0            | ⑥    | 24 | 15                       | -    | -  | -                           | G 1/8               |
| VMF 0.2 UF.0         | ⑦    | 13 | 15                       | -    | -  | -                           | G 1/8               |
| VR 2 LE.1            | ①    | 30 | 15                       | -    | -  | -                           | G 1/2               |
| VR 2 LZ.1/-DB        | ①    | 30 | 15                       | -    | -  | -                           | G 1/2               |
| VR 2 LZ.1/-CN        | ①    | 30 | 15                       | -    | -  | -                           | G 1/2               |
| VR 2 GC.2            | ①    | 30 | 15                       | -    | -  | -                           | G 1/2               |
| VR 2 C.0/-EX         | ②    | 19 | 30                       | ③    | 19 | 15                          | G 1/2               |
| VR 2.5 LZ.1/-BO      | ①    | 30 | 15                       | -    | -  | -                           | G 1/2               |
| VR 2.5 LZ.1/-AV      | ①    | 30 | 15                       | -    | -  | -                           | G 1/2               |
| VR 2.5 LZ.1/-D4C     | ①    | 30 | 15                       | -    | -  | -                           | G 1/2               |
| VR 2.5 LZ.1/-BO-LED  | ①    | 30 | 15                       | -    | -  | -                           | G 1/2               |
| VR 2.5 LZ.1/-GM      | ①    | 30 | 15                       | -    | -  | -                           | G 1/2               |
| VMF 2.5 LZ.1/-D4C    | ①    | 30 | 15                       | -    | -  | -                           | G 1/8               |
| VMF 2.5 LZ.1/-BO-LED | ①    | 30 | 15                       | -    | -  | -                           | G 1/8               |

#### 1.5. SPARE PARTS LIST - RETURN LINE INDICATORS

|                      | Item        | 1*                     | 2                    | 3                  | 4                        | 5                    |
|----------------------|-------------|------------------------|----------------------|--------------------|--------------------------|----------------------|
| Model                | Description | O-ring<br>18 x 2.5 NBR | Plug-E<br>electrical | Light-<br>insert-E | Plug-E<br>visual/electr. | Safety cap<br>610307 |
| VR 2 B.1             |             | 1                      | -                    | -                  | -                        | -                    |
| VR 2 E.0             |             | 1                      | -                    | -                  | -                        | -                    |
| VMF .. E.0           |             | -                      | -                    | -                  | -                        | -                    |
| VMF 1 UE.0           |             | -                      | -                    | -                  | -                        | -                    |
| VR 2 ES.0            |             | 1                      | -                    | -                  | -                        | -                    |
| VMF 0.6 K.0          |             | -                      | -                    | -                  | -                        | -                    |
| VR 2 C.0             |             | 1                      | 1                    | -                  | -                        | -                    |
| VMF 2 C.0            |             | -                      | 1                    | -                  | -                        | -                    |
| VR 2 D.0/-L ..       |             | 1                      | -                    | 1                  | 1                        | -                    |
| VMF 2 D.0/-L ..      |             | -                      | -                    | 1                  | 1                        | -                    |
| VR 2 F.0             |             | 1                      | -                    | -                  | -                        | 1                    |
| VMF 2 F.0            |             | -                      | -                    | -                  | -                        | 1                    |
| VMF 0.2 UF.0         |             | -                      | -                    | -                  | -                        | 1                    |
| VR 2 LE.1            |             | 1                      | 1                    | -                  | -                        | -                    |
| VR 2 LZ.1/-DB        |             | 1                      | -                    | 1                  | 1                        | -                    |
| VR 2 LZ.1/-CN        |             | 1                      | -                    | 1                  | 1                        | -                    |
| VR 2 GC.2            |             | 1                      | 1                    | -                  | -                        | -                    |
| VR 2 C.0/-EX         |             | 1                      | -                    | -                  | -                        | -                    |
| VR 2.5 LZ.1/-BO      |             | 1                      | 1                    | -                  | -                        | -                    |
| VR 2.5 LZ.1/-AV      |             | 1                      | 1                    | -                  | -                        | -                    |
| VR 2.5 LZ.1/-D4C     |             | 1                      | -                    | -                  | 1                        | -                    |
| VR 2.5 LZ.1/-BO-LED  |             | 1                      | -                    | -                  | 1                        | -                    |
| VR 2.5 LZ.1/-GM      |             | 1                      | 1                    | -                  | -                        | -                    |
| VMF 2.5 LZ.1/-D4C    |             | -                      | -                    | -                  | 1                        | -                    |
| VMF 2.5 LZ.1/-BO-LED |             | -                      | -                    | -                  | 1                        | -                    |

\*Item 1 only available as part of the "Seal kit E VD/VM/VR"

Order example: Item 4 plug E D.0/-L24

## 1.6. MODEL CODE (also order example)

VR 2 GC . X / - V - 123

### Return line indicator

VR clogging indicator  
VMF clogging indicator

### Cracking pressure of clogging indicator

0.2 - 0.2 bar (only for VMF.. UF indicator)  
0.6 - 1.0 bar to + 0.6 bar (only for K indicator)  
1 - 1.0 bar to 0 bar (only for VMF..UE indicator)  
2 + 2.0 bar (for all, except K, UE, UF indicators)  
2.5 + 2.5 bar (only for RFN/D)  
16 + 16 bar (only for VMF..E indicator)

Cracking pressure of bypass valve must be taken into account.

### Type of clogging indicator

B<sup>1)</sup> visual indicator  
C electrical indicator  
D visual/electrical indicator  
E pressure gauge, horizontal  
ES pressure gauge, vertical  
F pressure switch  
K pressure gauge, horizontal  
LE visual mechanical indicator with 100 % switching contact  
LZ visual mechanical indicator with 75 % and 100 % switching contact  
GC electronic-analogue indicator  
UE vacuum gauge, horizontal  
UF vacuum switch

### Modification number

X the latest version is always supplied

### Supplementary details

without details = standard = NBR (Perbunan) seal  
-V FPM (Viton) seal, indicator suitable for phosphate ester (HFD-R)  
and rapidly biodegradable oils  
-W indicator suitable for oil-water emulsion (HFA, HFC)  
-L24 light with 24 Volt supply  
-L48 light with 48 Volt supply  
-L110 light with 110 Volt supply  
-L220 light with 230 Volt supply  
-LED 2 light emitting diodes up to 24 Volt supply  
-EX explosion-proof model only for model "C"

only for model "D"

### Details for "LZ" model

-CN electrical connection, 1 plug connector to DIN 43651 with 3 LEDs (to CNOMO standard NF E 48-700)  
-DB electrical connection, 1 plug connector to DIN 43651 with 3 LEDs (to Daimler-Benz and BMW standard)  
-BO plug and plug connection to BMW, Opel, Ford specification  
-AV plug and plug connection to AUDI, VW specification  
-D4C plug and plug connection to Daimler-Chrysler specification with cold start suppression 30 °C  
-BO-LED as for BO, but with progressive LED strip

### Details for "GC" model

-SP analogue signal: voltage output 1-10 V  
-SQ analogue signal: voltage output 4...20 mA (current source) ] if SP or SQ not specified  
] "current sink" model supplied  
-113 N/O function pressure peak suppression up to 10 sec  
cold start suppression of switching outputs  
(PNP technique, positive switching)  
up to 25 °C  
-123 N/C function pressure peak suppression up to 10 sec  
cold start suppression of switching outputs  
(PNP technique, positive switching)  
up to 25 °C  
-LED 3 LEDs (red, green, yellow) in terminal box  
-PF floating switching outputs (due to relay in the plug)  
-30C cold start suppression of switching outputs up to 30 °C  
(other temperatures on request)

must be specified

<sup>1)</sup> for model VMF, please contact our sales/technical department

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## 2. DIFFERENTIAL PRESSURE INDICATORS

### 2.1. DESCRIPTION

#### 2.1.1. **General**

Differential pressure indicators are used for all inline filters and react to the increasing pressure differential caused by increasing contamination of the filter element.

On standard models the sealing material is NBR (Perbunan). All standard filters can be fitted with an indicator at any time by simply screwing it in.

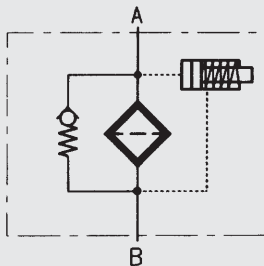
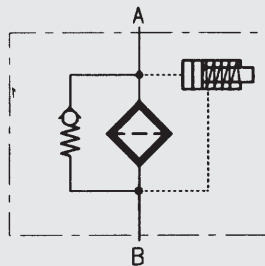
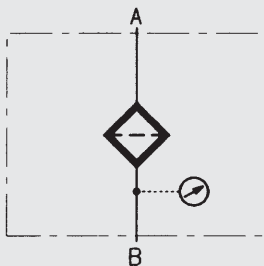
(EXCEPTION: The differential pressure indicator, type V02 must be fitted separately inline!)

2.1.2. Selection table - Differential pressure indicators  
Pressure setting (given in bar)

| Designation                | suitable for filter types |           |                    |            |                  |       |           |      |     |             |                     |
|----------------------------|---------------------------|-----------|--------------------|------------|------------------|-------|-----------|------|-----|-------------|---------------------|
|                            | RFL<br>RFLD               | LF<br>MDF | NF/NFD<br>2.0, 3.0 | DFF<br>DFG | DF..MA<br>DF..QE | DF..P | DF<br>DFN | DFDK | DFZ | LFN<br>LFNF | FLN<br>FLND<br>FMND |
| VM .. B.1                  | 2                         | 5         |                    |            | 5                |       |           |      |     | 5           | 5                   |
| VD .. B.1                  |                           |           |                    | 8          | 5                |       | 5         | 8    |     |             |                     |
| VM .. BM.1                 | 2                         | 5         | 2                  |            | 5                |       |           |      |     | 5           | 5                   |
| VD .. BM.1                 |                           |           |                    | 8          | 5                | 5     | 5         | 8    | 8   |             |                     |
| VM .. C.0                  | 2                         | 5         | 2                  |            | 5                |       |           |      |     | 5           | 5                   |
| VD .. C.0                  |                           |           |                    | 8          | 5                | 5     | 5         | 8    | 8   |             |                     |
| VM .. D.0/-L               | 2                         | 5         | 2                  |            | 5                |       |           |      |     | 5           | 5                   |
| VD .. D.0/-L               |                           |           |                    | 8          | 5                | 5     | 5         | 8    | 8   |             |                     |
| VD .. GC.0                 | 2                         | 5         | 2                  | 8          | 5                | 5     | 5         | 8    | 8   |             |                     |
| VD .. LE.1                 | 2                         | 5         | 2                  | 8          | 5                | 5     | 5         | 8    | 8   | 5           | 5                   |
| VD .. LZ.1/-DB             | 2                         | 5         | 2                  | 8          | 5                | 5     | 5         | 8    | 8   | 5           | 5                   |
| VD .. LZ.1/-CN             | 2                         | 5         | 2                  | 8          | 5                | 5     | 5         | 8    | 8   | 5           | 5                   |
| VRD 1 UE.0 <sup>1)</sup>   | -1                        | -1        |                    |            |                  |       |           |      |     |             |                     |
| VRD 0.2 UF.0 <sup>1)</sup> | -0,2                      | -0,2      |                    |            |                  |       |           |      |     |             |                     |
| V02 .. V.0                 | 2                         |           |                    |            |                  |       |           |      |     |             |                     |
| V02 .. VE.0                | 2                         |           |                    |            |                  |       |           |      |     |             |                     |
| V02 .. VZ.0                | 2                         |           |                    |            |                  |       |           |      |     |             |                     |
| VD .. LZ.1/-BO             | 2                         | 5         | 2                  | 8          | 5                | 5     | 5         | 8    | 8   | 5           | 5                   |
| VD .. LZ.1/-AV             | 2                         | 5         | 2                  | 8          | 5                | 5     | 5         | 8    | 8   | 5           | 5                   |
| VD .. LZ.1/-D4C            | 2                         | 5         | 2                  | 8          | 5                | 5     | 5         | 8    | 8   | 5           | 5                   |
| VD .. LZ.1/-BO-LED         | 2                         | 5         | 2                  | 8          | 5                | 5     | 5         | 8    | 8   | 5           | 5                   |

<sup>1)</sup> only when used in suction applications

2.2. TECHNICAL SPECIFICATIONS  
2.2.1. Differential pressure indicators

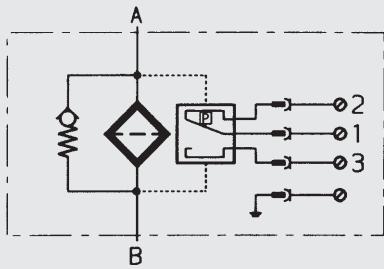
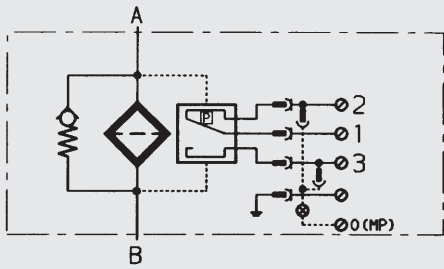
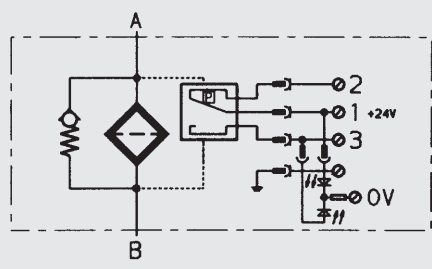
|                                                                          |                                                                                       |                                                                         |                                                                                       |                                                      |                                                                                       |
|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------|
| 2.2. TECHNICAL SPECIFICATIONS<br>2.2.1. Differential pressure indicators |    |                                                                         |    |                                                      |     |
| General details                                                          |                                                                                       |                                                                         |                                                                                       |                                                      |                                                                                       |
| Designation of clogging indicator                                        | VM..B.1                                                                               | VM..BM.1 (not illustrated)                                              | VD..B.1 (not illustrated)                                                             | VD..BM.1                                             | VRD 1 UE.0                                                                            |
| Suitable for filter types                                                | all RFL, RFLD, LF, MDF, DF..MA                                                        | all RFL/RFLD, LF, MDF, DF.MA<br>NF 1310/2610..2.0<br>NF 1310/2610..3.0, | all DF, DFF, DFG, DF..QE, DFDK                                                        | all DF, DFF, DFG, DF..QE, DF..P, DF..Z, DFDK         | all RFL/ RFLD, LF, MDF when used as suction filter                                    |
| Weights                                                                  | 55 g                                                                                  | 55 g                                                                    | 110 g                                                                                 | 110 g                                                | 180 g                                                                                 |
| Type of indication                                                       | visual, green-red display<br>automatic re-set<br>manual re-set                        |                                                                         | visual, green-red display<br>automatic re-set<br>manual re-set                        |                                                      | visual-analogue, scale white, graduated                                               |
| Hydraulic details                                                        |                                                                                       |                                                                         |                                                                                       |                                                      |                                                                                       |
| Cracking pressure/ indication range                                      | 2 bar - 10%<br>5 bar - 10%<br>8 bar ± 10%                                             | for standard cracking pressure, see housing brochure                    | 5 bar - 10%<br>8 bar ± 10%                                                            | for standard cracking pressure, see housing brochure | - 1 bar to 0 bar                                                                      |
| Permissible operating pressure                                           | 210 bar                                                                               |                                                                         | 420 bar                                                                               |                                                      | - 0.7 to + 0.4 bar -continuous                                                        |
| Permissible temperature range <sup>1)</sup>                              | - 30 °C to +100 °C                                                                    |                                                                         | - 30 °C to +100 °C                                                                    |                                                      | - 20 °C to +60 °C                                                                     |
| Accuracy class                                                           | -                                                                                     |                                                                         |                                                                                       |                                                      | 1.6                                                                                   |
| Electrical details                                                       |                                                                                       |                                                                         | -                                                                                     |                                                      |                                                                                       |
| Switching type                                                           | -                                                                                     |                                                                         | -                                                                                     |                                                      | -                                                                                     |
| Max. switching voltage                                                   | -                                                                                     |                                                                         | -                                                                                     |                                                      | -                                                                                     |
| Electrical connection                                                    | -                                                                                     |                                                                         | -                                                                                     |                                                      | -                                                                                     |
| Max. switching output at resistive load                                  | -                                                                                     |                                                                         | -                                                                                     |                                                      | -                                                                                     |
| Switching capacity <sup>2)</sup>                                         | -                                                                                     |                                                                         | -                                                                                     |                                                      | -                                                                                     |
| Safety type (to DIN 40050)                                               | -                                                                                     |                                                                         | -                                                                                     |                                                      | -                                                                                     |
| Symbols                                                                  |  |                                                                         |  |                                                      |  |

<sup>1)</sup> Only NBR (Perbunan) seals can be used in the temperature range - 30 °C to - 10 °C.

<sup>2)</sup> High voltage peaks sometimes occur when inductances are switched off. Therefore the use of protection diodes should be considered.

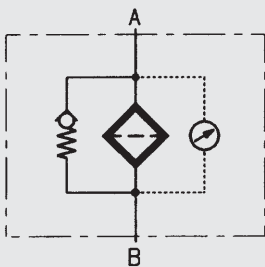
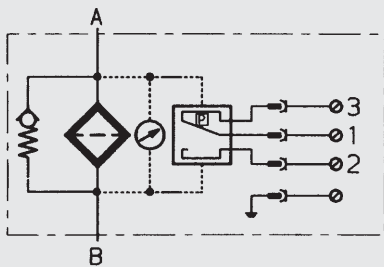
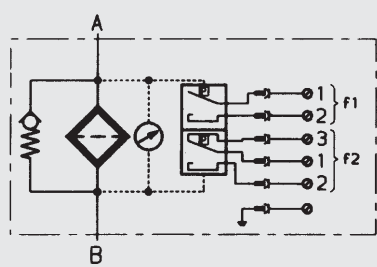
<sup>1)</sup> Only NBR (Perbunan) seals can be used in the temperature range - 30 °C to - 10 °C.  
<sup>2)</sup> High voltage peaks sometimes occur when inductances are switched off. Therefore the use of protection diodes should be considered.



| VM..C.0                                                                            | VD..C.0                                      | VM..D.0/-L...                                                                        | VD..D.0/-L...                                | VM..D.0/-LED                                                                          | VD..D.0/-LED                                 |
|------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------|
| all RFL/ RFLD, LF, MDF, DF..MA, NF 1310/2610..2.0, NF 1310/2610..3.0               | all DF, DFF, DFG, DF..QE, DF..P, DF..Z, DFDK | all RFL/ RFLD, LF, MDF, DF..MA, NF 1310/2610..2.0,                                   | all DF, DFF, DFG, DF..QE, DF..P, DF..Z, DFDK | all RFL/ RFLD, LF, MDF, DF..MA, NF 1310/2610..2.0, NF 1310/2610..3.0                  | all DF, DFF, DFG, DF..QE, DF..P, DF..Z, DFDK |
| 120 g                                                                              | 220 g                                        | 150 g                                                                                | 250 g                                        | 150 g                                                                                 | 250 g                                        |
| electrical                                                                         |                                              | visual/electrical<br>(visual = light)                                                |                                              | visual/electrical<br>(visual = 2 light emitting diodes)                               |                                              |
|                                                                                    |                                              |                                                                                      |                                              |                                                                                       |                                              |
| <div>2 bar - 10 %<br/>5 bar - 10 %<br/>8 bar ± 10 %</div> *                        | <div>5 bar - 10 %<br/>8 bar ± 10 %</div> *   | <div>2 bar - 10 %<br/>5 bar - 10 %<br/>8 bar ± 10 %</div> *                          | <div>5 bar - 10 %<br/>8 bar ± 10 %</div> *   | <div>2 bar - 10 %<br/>5 bar - 10 %<br/>8 bar ± 10 %</div> *                           | <div>5 bar - 10 %<br/>8 bar ± 10 %</div> *   |
| 210 bar                                                                            | 420 bar                                      | 210 bar                                                                              | 420 bar                                      | 210 bar                                                                               | 420 bar                                      |
| - 30 °C to +100 °C                                                                 |                                              | - 30 °C to +100 °C                                                                   |                                              | - 30 °C to +100 °C                                                                    |                                              |
| -                                                                                  |                                              | -                                                                                    |                                              | -                                                                                     |                                              |
|                                                                                    |                                              |                                                                                      |                                              |                                                                                       |                                              |
| N/O or N/C contacts<br>(change-over contact)                                       |                                              | N/O or N/C contacts<br>(change-over contact)                                         |                                              | N/O contact                                                                           |                                              |
| 230 V                                                                              |                                              | 24 V, 48 V, 110 V, 230 V<br>depending on type of light insert                        |                                              | 24 V                                                                                  |                                              |
| plug connection, PG 11,<br>socket to DIN 43650                                     |                                              | plug connection, PG 11,<br>socket to DIN 43650                                       |                                              | plug connection, PG 11,<br>socket to DIN 43650                                        |                                              |
| 60 W =<br>100 VA~                                                                  |                                              | 60 W =<br>100 VA~                                                                    |                                              | 60 W =<br>100 VA~                                                                     |                                              |
| ohmic 3 A at 24 V =<br>ohmic 0.03 to 6 A at max. 230 V ~                           |                                              | ohmic 3 A at 24 V =<br>ohmic 0.03 to 6 A at max. 230 V ~                             |                                              | ohmic 3 A at 24 V =                                                                   |                                              |
| IP 65 (only if the plug is wired<br>and fitted correctly)                          |                                              | IP 65 (only if the plug is wired<br>and fitted correctly)                            |                                              | IP 65 (only if the plug is wired<br>and fitted correctly)                             |                                              |
|  |                                              |  |                                              |  |                                              |

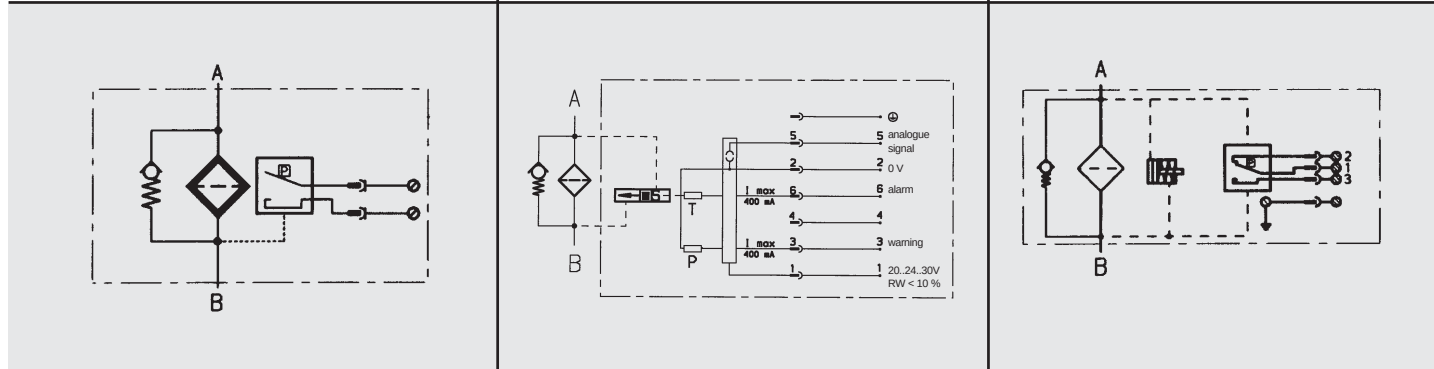
\* for standard cracking pressure, see housing brochure

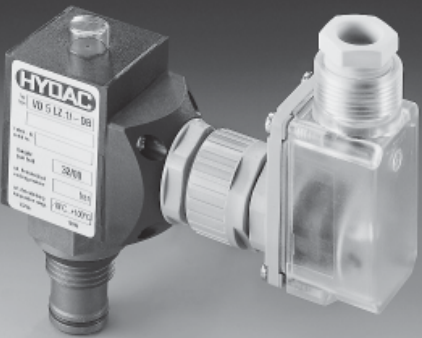
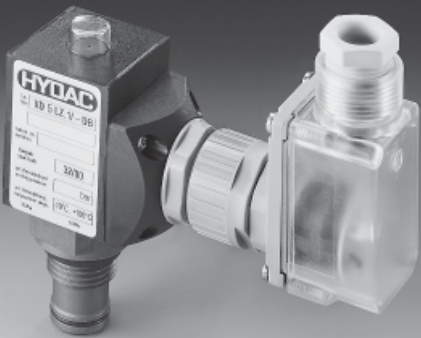
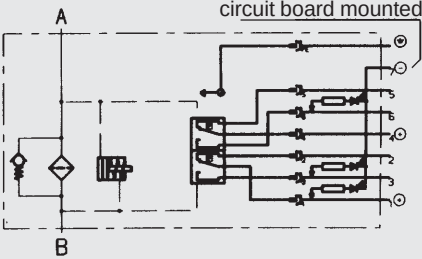
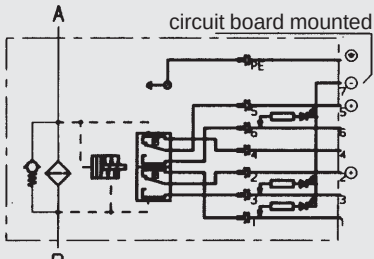
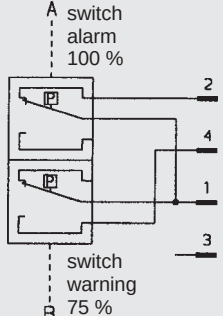


|  |                                                                                        |                                                                                             |                                                                                                            |
|--|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
|  |        |            |                         |
|  | V02..V.0                                                                               | V02..VE.0                                                                                   | V02..VZ.0                                                                                                  |
|  | RFL/RFLD 2500-15000,<br>for other types, please contact our<br>sales/techn. department | RFL/RFLD 2500-15000,<br>for other types, please contact our<br>sales/techn. department      | RFL/RFLD 2500-15000<br>for other types, please contact our<br>sales/techn. department                      |
|  | 580 g                                                                                  | 640 g                                                                                       | 650 g                                                                                                      |
|  | visual-analogue                                                                        | visual-analogue and<br>1 electrical switching contact<br>at 100 % of the cracking pressure. | visual-analogue and<br>1 electrical switching contact<br>at 75 % and at 100 % of the<br>cracking pressure. |
|  | 0.8 bar $\pm 10$ %<br>2.0 bar $\pm 10$ %<br>4.3 bar $\pm 10$ %                         | 0.8 bar + 10 %<br>2.0 bar + 10 %<br>4.3 bar $\pm 10$ %                                      | 0.8 bar $\pm 10$ %<br>2.0 bar $\pm 10$ %<br>4.3 bar $\pm 10$ %                                             |
|  | 160 bar                                                                                | 160 bar                                                                                     | 160 bar                                                                                                    |
|  | - 30 °C to +100 °C                                                                     | - 30 °C to +100 °C                                                                          | - 30 °C to +100 °C                                                                                         |
|  | -                                                                                      | -                                                                                           | -                                                                                                          |
|  | -                                                                                      | 100% contact<br>change-over contact                                                         | 75% - contact, N/O<br>100% - contact, change-over contact                                                  |
|  | -                                                                                      | 250V                                                                                        | 250 V                                                                                                      |
|  | -                                                                                      | threaded connection, PG 11                                                                  | threaded connection, PG 11                                                                                 |
|  | -                                                                                      | 100% contact<br>30 W = / 60 VA ~                                                            | 75%-contact<br>120 W = / 120 VA ~      100%-contact<br>30 W = / 60 VA ~                                    |
|  | -                                                                                      | ohmic 2.5 A at 24 V =<br>ohmic 1 A at 220 V ~                                               | ohmic 2.5 A at 24 V =<br>ohmic 1 A at 250 V ~                                                              |
|  | -                                                                                      | IP 55                                                                                       | IP 55                                                                                                      |
|  |     |         |                       |



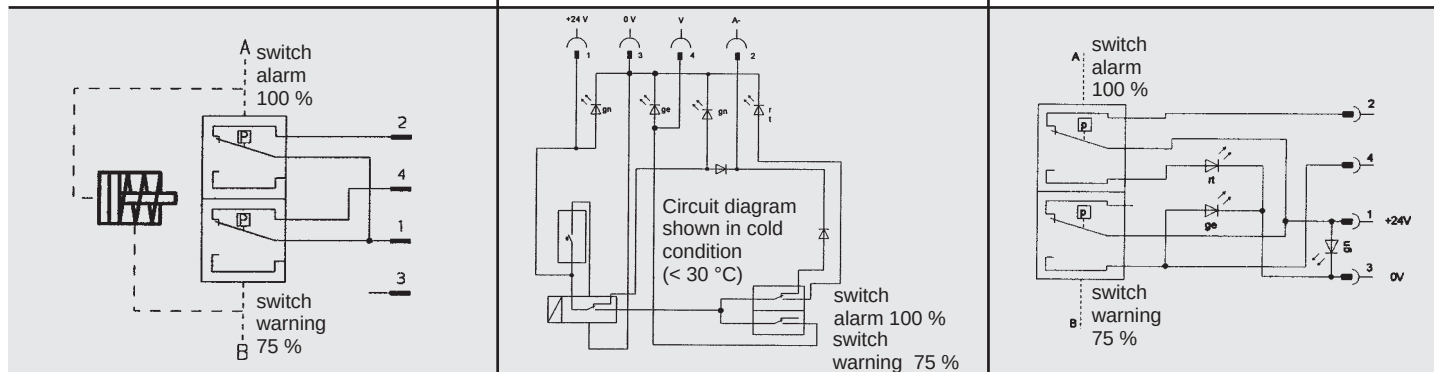
|                                                       |                                                                                                                                                                                                                                                                                                |                                                                                                               |
|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| VRD 0.2 UF.0                                          | VD..GC.0                                                                                                                                                                                                                                                                                       | VD..LE.1                                                                                                      |
| all RFL/RFLD, LF, MDF,<br>when used as suction filter | DF, LF, MDF, DFDK, DF..P, DFZ,<br>DF..MA, DFF, DFG, RFL, RFLD,<br>NF 1310/2610..2.0<br>NF 1310/2610..3.0                                                                                                                                                                                       | DF, LF, MDF, DFDK, DF..P, DFZ,<br>DF..MA, DFF, DFG, RFL, RFLD,<br>NF 1310/2610..2.0<br>NF 1310/2610..3.0      |
| 250 g                                                 | 400 g                                                                                                                                                                                                                                                                                          | 198 g                                                                                                         |
| electrical                                            | electronic-analogue (4-20 mA or 1-10 V) and<br>1 electrical switching contact<br>at 75 % and at 100 % of the cracking pressure.<br>Analogue signal up to 20 % of the cracking<br>pressure remains constant at 4 mA or 1 V.<br>It then increases linearly with pressure up to<br>20 mA or 10 V. | visual, red pin and electrical switch<br>1 electrical switching contact<br>at 100 % of the cracking pressure. |
| -0.2 bar $\pm$ 0.1 bar                                | 2 bar - 10 %<br>5 bar - 10 %<br>8 bar - 10 %                                                                                                                                                                                                                                                   | 2 bar - 10 %<br>5 bar - 10 %<br>8 bar - 10 %                                                                  |
| 20 bar                                                | 420 bar                                                                                                                                                                                                                                                                                        | 420 bar                                                                                                       |
| - 30 °C to +100 °C                                    | - 30 °C to +80 °C                                                                                                                                                                                                                                                                              | - 30 °C to +100 °C                                                                                            |
| -                                                     | -                                                                                                                                                                                                                                                                                              | -                                                                                                             |
| N/O contact                                           | N/O or N/C contacts, electronic<br>PNP positive switching                                                                                                                                                                                                                                      | N/O or N/C contacts, reed contacts<br>(change-over contact)                                                   |
| 42 V                                                  | operating voltage 20 - 30 V DC                                                                                                                                                                                                                                                                 | 115 V                                                                                                         |
| threaded connection                                   | 7-pole plug connector to DIN 43651                                                                                                                                                                                                                                                             | plug connection PG 11,<br>socket to DIN 43650                                                                 |
| 60 W =<br>100 VA~                                     | 12 W                                                                                                                                                                                                                                                                                           | 15 W =<br>max. 15 VA~                                                                                         |
| ohmic 2.5 A at 24 V =<br>ohmic 2.5 A at 42 V ~        | ohmic 0.4 A at 30 V =                                                                                                                                                                                                                                                                          | ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                                    |
| IP 65 terminals IP 00                                 | IP 65 (only if the plug is wired<br>and fitted correctly)                                                                                                                                                                                                                                      | IP 65 (only if the plug is wired<br>and fitted correctly)                                                     |



|  |                                                                                                                                                                                                        |                                                                                                                                                                                                            |                                                                                                                                         |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
|  |                                                                                                                       |                                                                                                                          |                                                      |
|  | VD..LZ.1/-DB                                                                                                                                                                                           | VD..LZ.1/-CN                                                                                                                                                                                               | VD..LZ.1/-BO                                                                                                                            |
|  | DF, LF, MDF, DFDK, DF..P, DFZ, DF..MA, DFF, DFG, RFL, RFLD, NF 1310/2610..2.0<br>NF 1310/2610..3.0                                                                                                     | DF, LF, MDF, DFDK, DF..P, DFZ, DF..MA, DFF, DFG, RFL, RFLD, NF 1310/2610..2.0<br>NF 1310/2610..3.0                                                                                                         | DF, LFN, LFNF, FLN, FLND, FMND, DF, LF, MDF, DFDK, DP..P, DFZ, DF..MA, DFF, DFG, RFL, RFLD, NF 1310/2610 .. 2.0,<br>NF 1310/2610 .. 3.0 |
|  | 245 g                                                                                                                                                                                                  | 245 g                                                                                                                                                                                                      | 197 g                                                                                                                                   |
|  | visual, red pin<br>and 1 electr. switching contact at 75 % and<br>at 100 % of the cracking pressure<br>1 green LED constantly lit<br>1 yellow LED lit from 75 %<br>1 red LED lit from 100 % $\Delta p$ | visual, red pin<br>and 1 electr. switching contact at 75 % and<br>at 100 % of the cracking pressure<br>1 green LED goes out from 75 %<br>1 yellow LED lit from 75 %<br>1 red LED lit from 100 % $\Delta p$ | visual, red pin<br>and 1 electrical switching contact<br>at 75 % and at 100 % of the<br>cracking pressure.                              |
|  | 2 bar - 10 %<br>5 bar - 10 %<br>8 bar - 10 %                                                                                                                                                           | 2 bar - 10 %<br>5 bar - 10 %<br>8 bar - 10 %                                                                                                                                                               | 2 bar - 10 %<br>5 bar - 10 %<br>8 bar - 10 %                                                                                            |
|  | 420 bar                                                                                                                                                                                                | 420 bar                                                                                                                                                                                                    | 420 bar                                                                                                                                 |
|  | - 30 °C to +100 °C                                                                                                                                                                                     | - 30 °C to +100 °C                                                                                                                                                                                         | - 10 °C to +100 °C                                                                                                                      |
|  | -                                                                                                                                                                                                      | -                                                                                                                                                                                                          | -                                                                                                                                       |
|  | N/O or N/C contacts, reed contacts<br>(change-over contact)                                                                                                                                            | N/O or N/C contacts, reed contacts<br>change-over contact)                                                                                                                                                 | N/O contact (75 %)<br>N/C contact (100 %)                                                                                               |
|  | 24 V                                                                                                                                                                                                   | 24 V                                                                                                                                                                                                       | 24 V                                                                                                                                    |
|  | plug connection, PG 11<br>socket to DIN 43651,<br>with transparent housing and<br>3 built-in LEDs                                                                                                      | plug connection, PG 11<br>socket to DIN 43651,<br>with transparent housing and<br>3 built-in LEDs                                                                                                          | plug connection<br>M 12 x 1                                                                                                             |
|  | 15 W =<br>max. 15 VA~                                                                                                                                                                                  | 15 W =<br>max. 15 VA~                                                                                                                                                                                      | 15 W =<br>max. 15 VA~                                                                                                                   |
|  | ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                                                                                                                             | ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                                                                                                                                 | ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                                                              |
|  | IP 65 (only if the plug is wired<br>and fitted correctly)                                                                                                                                              | IP 65 (only if the plug is wired<br>and fitted correctly)                                                                                                                                                  | IP 65                                                                                                                                   |
|  |                                                                                                                     |                                                                                                                        |                                                    |

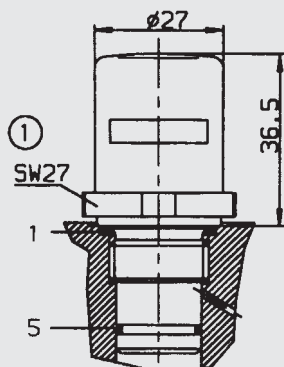


|                                                                                                                                                  |                                                                                                                                                                                                                                                                           |                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VD..LZ.1/-AV                                                                                                                                     | VD..LZ.1/-D4C                                                                                                                                                                                                                                                             | VD..LZ.1/-BO-LED                                                                                                                                                                   |
| DF, LFN, LFNF, FLN, FLND, FMND,<br>DF, LF, MDF, DFDK, DP..P, DFZ,<br>DF..MA, DFF, DFG, RFL, RFLD,<br>NF 1310/2610 .. 2.0,<br>NF 1310/2610 .. 3.0 | DF, LFN, LFNF, FLN, FLND, FMND,<br>DF, LF, MDF, DFDK, DP..P, DFZ,<br>DF..MA, DFF, DFG, RFL, RFLD,<br>NF 1310/2610 .. 2.0,<br>NF 1310/2610 .. 3.0                                                                                                                          | DF, LFN, LFNF, FLN, FLND, FMND,<br>DF, LF, MDF, DFDK, DP..P, DFZ,<br>DF..MA, DFF, DFG, RFL, RFLD,<br>NF 1310/2610 .. 2.0,<br>NF 1310/2610 .. 3.0                                   |
| 197 g                                                                                                                                            | 256 g                                                                                                                                                                                                                                                                     | 250 g                                                                                                                                                                              |
| visual, red pin and<br>1 electrical switching contact at 75 %<br>and at 100 % of the cracking pressure                                           | 1 electrical switching contact at 75 % and<br>at 100 % of the cracking pressure and<br>suppression of the switching signal when<br>operating temperature is below 30°C<br>1 green LED constantly lit<br>1 yellow LED lit from 75 %<br>1 red LED lit from 100 % $\Delta p$ | 1 electrical switching contact at 75 % and<br>at 100 % of the cracking pressure<br>1 green LED constantly lit<br>1 yellow LED lit from 75 %<br>1 red LED lit from 100 % $\Delta p$ |
| 2 bar - 10 %<br>5 bar - 10 %<br>8 bar - 10 %                                                                                                     | 2 bar - 10 %<br>5 bar - 10 %<br>8 bar - 10 %                                                                                                                                                                                                                              | 2 bar - 10 %<br>5 bar - 10 %<br>8 bar - 10 %                                                                                                                                       |
| 420 bar                                                                                                                                          | 420 bar                                                                                                                                                                                                                                                                   | 420 bar                                                                                                                                                                            |
| - 10 °C to +100 °C                                                                                                                               | - 10 °C to +100 °C                                                                                                                                                                                                                                                        | - 10 °C to +100 °C                                                                                                                                                                 |
| -                                                                                                                                                | -                                                                                                                                                                                                                                                                         | -                                                                                                                                                                                  |
| N/C contact (75 % and 100 %)                                                                                                                     | N/O contact (75 %)<br>N/C contact (100 %)                                                                                                                                                                                                                                 | N/O contact (75 %)<br>N/C contact (100 %)                                                                                                                                          |
| 24 V                                                                                                                                             | 24 V                                                                                                                                                                                                                                                                      | 24 V                                                                                                                                                                               |
| plug connection<br>M 12 x 1                                                                                                                      | plug connection<br>M 12 x 1                                                                                                                                                                                                                                               | plug connection<br>M 12 x 1                                                                                                                                                        |
| 15 W =<br>max. 15 VA~                                                                                                                            | 15 W =<br>max. 15 VA~                                                                                                                                                                                                                                                     | 15 W =<br>max. 15 VA~                                                                                                                                                              |
| ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                                                                       | ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                                                                                                                                                                                                | ohmic 1 A at 15 V =<br>ohmic 1 A at 15 V ~                                                                                                                                         |
| IP 65                                                                                                                                            | IP 65                                                                                                                                                                                                                                                                     | IP 65                                                                                                                                                                              |

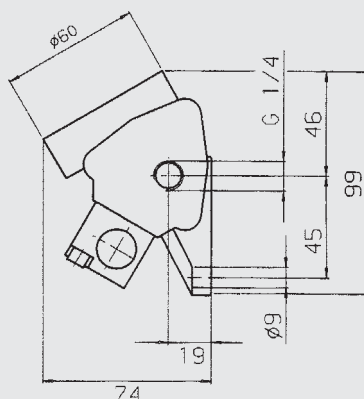


## 2.3. DIMENSIONS - DIFFERENTIAL PRESSURE INDICATORS

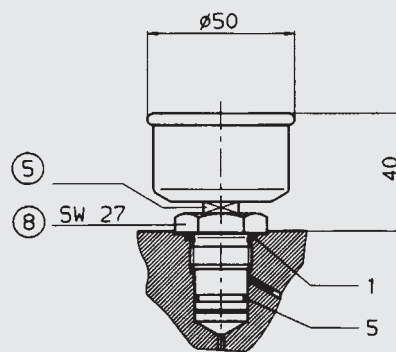
VM..B.1  
VD..B.1



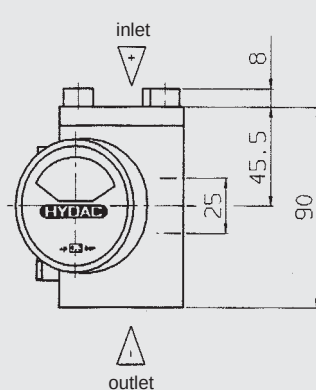
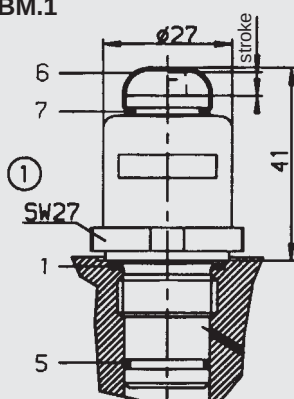
V02..VE.0  
V02..VZ.0



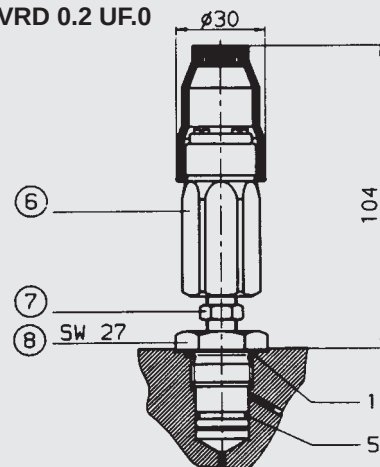
VRD 1 UE.0



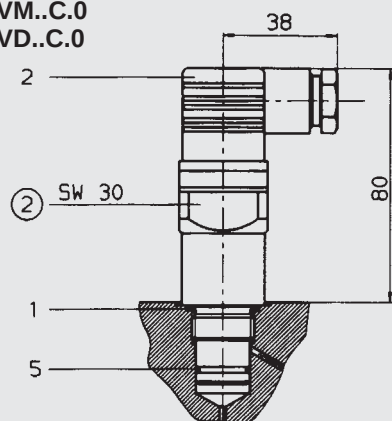
VM..BM.1  
VD..BM.1



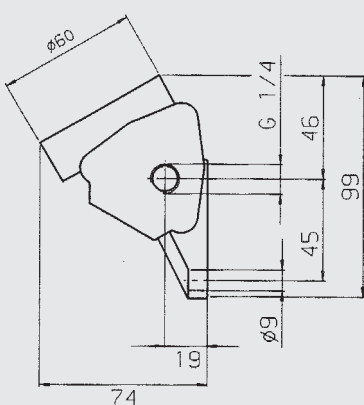
VRD 0.2 UF.0



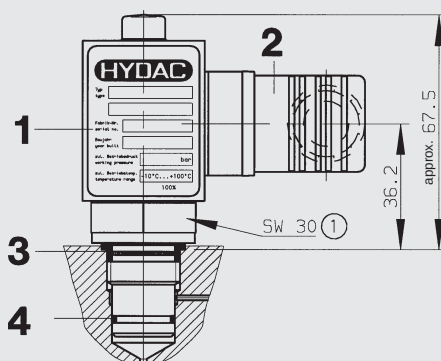
VM..C.0  
VD..C.0



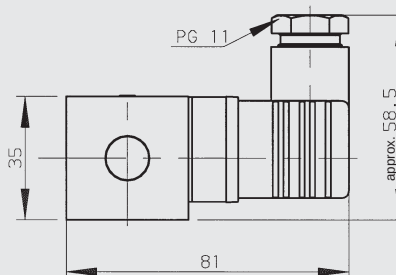
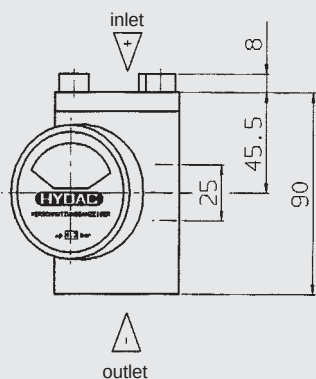
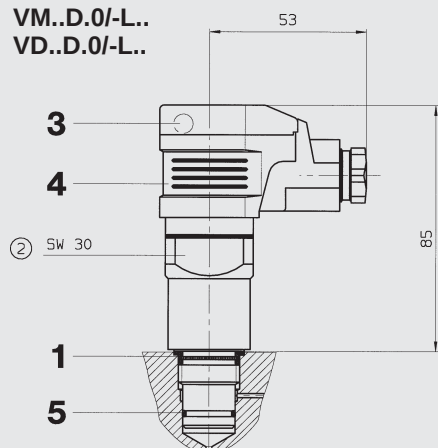
V02..V.0



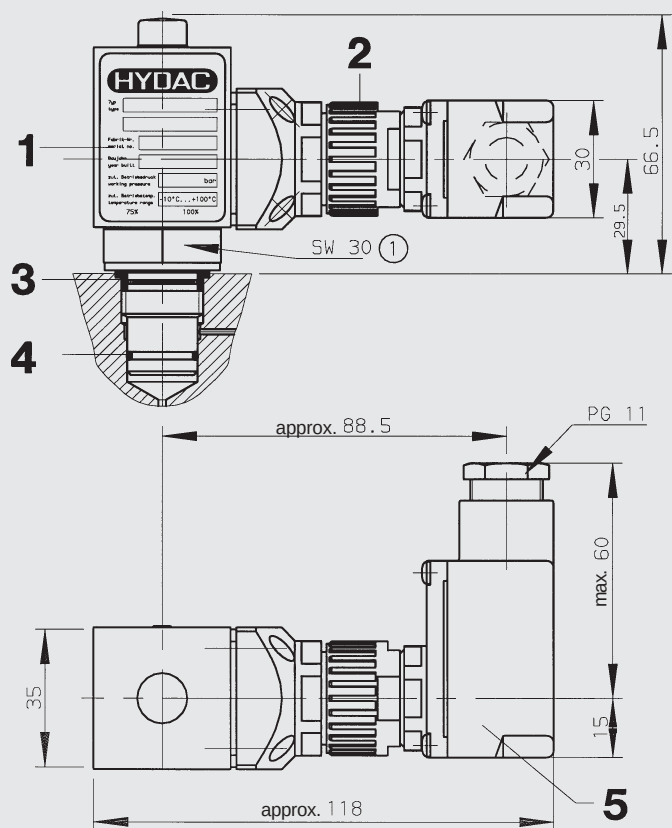
VD..LE.1



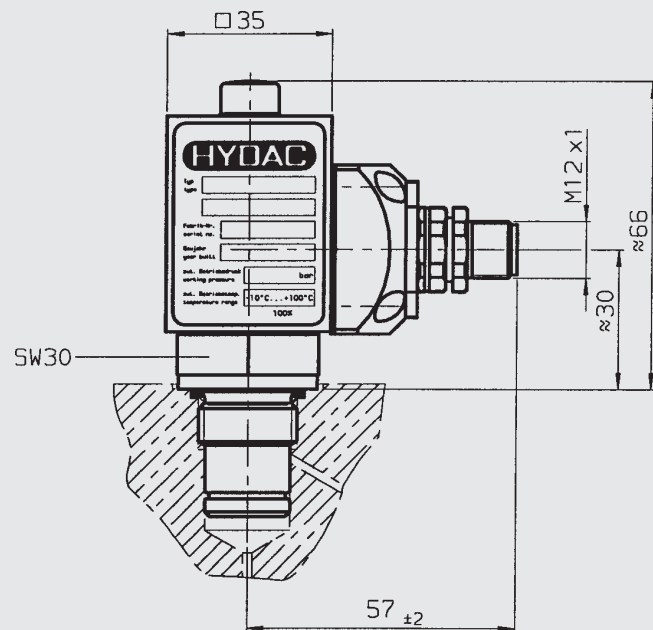
VM..D.0/-L..  
VD..D.0/-L..



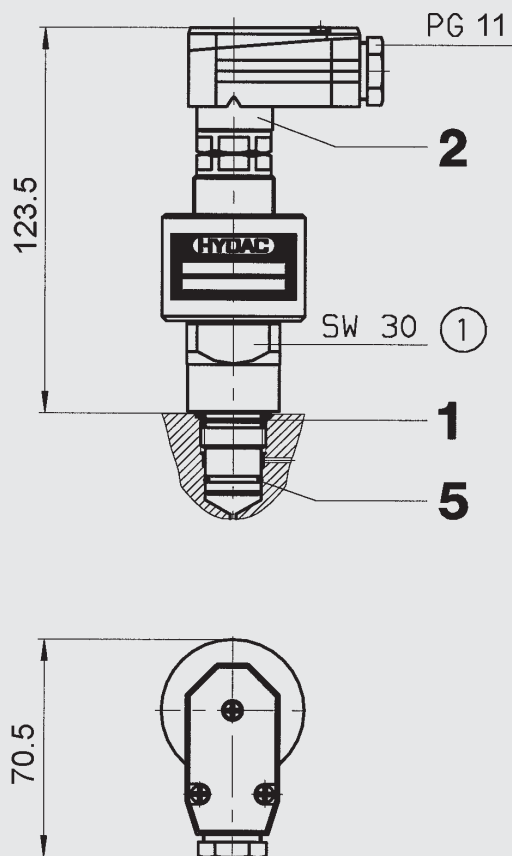
VD..LZ.1/-DB  
VD..LZ.1/-CN



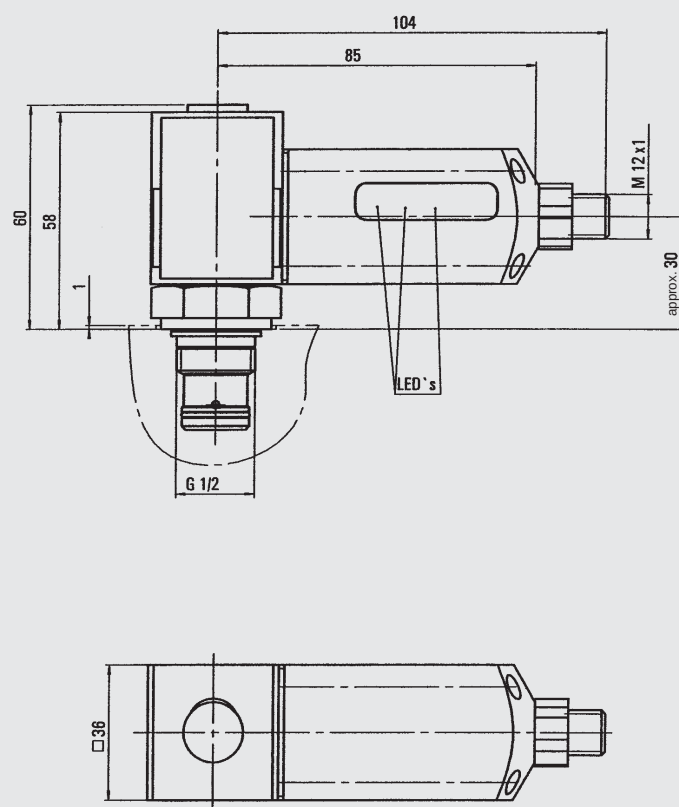
VD..LZ.1/-BO  
VD..LZ.1/-AV



VD..GC.0



VD..LZ.1/-D4C  
VD..LZ.1/-BO-LED





## 2.4. TORQUE RATINGS - DIFFERENTIAL PRESSURE INDICATORS

### Please note:

The clogging indicators must only be tightened/adjusted on the hexagon flats (SW) as stated below.

| Model              | Item | SW | Max. torque (Nm)       |
|--------------------|------|----|------------------------|
| VM .. B.1          | ①    | 27 | 33                     |
| VD .. B.1          | ①    | 27 | 100                    |
| VM .. BM.1         | ①    | 27 | 33                     |
| VD .. BM.1         | ①    | 27 | 100                    |
| VM .. C.0          | ②    | 30 | 33                     |
| VD .. C.0          | ②    | 30 | 100                    |
| VM .. D.0/-L..     | ②    | 30 | 33                     |
| VD .. D.0/-L..     | ②    | 30 | 100                    |
| VD .. GC.0         | ①    | 30 | 100 (33) <sup>3)</sup> |
| VD .. LE.1         | ①    | 30 | 50 (33) <sup>3)</sup>  |
| VD .. LZ.1/-DB     | ①    | 30 | 50 (33) <sup>3)</sup>  |
| VD .. LZ.1/-CN     | ①    | 30 | 50 (33) <sup>3)</sup>  |
| VRD .. UE.0        | ⑧    | 30 | 33                     |
| VRD .. UF.0        | ⑧    | 27 | 33                     |
| VD .. LZ.1/-BO     | ①    | 30 | 50 (33) <sup>3)</sup>  |
| VD .. LZ.1/-AV     | ①    | 30 | 50 (33) <sup>3)</sup>  |
| VD .. LZ.1/-D4C    | ①    | 30 | 50 (33) <sup>3)</sup>  |
| VD .. LZ.1/-BO-LED | ①    | 30 | 50 (33) <sup>3)</sup>  |

## 2.5. SPARE PARTS LIST - DIFFERENTIAL PRESSURE INDICATORS

| Item               | 1 <sup>1)</sup>            | 1 <sup>2)</sup>                      | 2                    | 3                             | 4                            | 5 <sup>1)</sup> | 6 <sup>1)</sup>         | 7 <sup>1)</sup>          |
|--------------------|----------------------------|--------------------------------------|----------------------|-------------------------------|------------------------------|-----------------|-------------------------|--------------------------|
| Model              | Seal ring<br>411600<br>NBR | Seal ring<br>1202776<br>PTFE special | Plug-E<br>electrical | Light<br>insert-E<br>D.0/-L.. | Plug-E<br>visual/<br>electr. | O-ring<br>NBR   | Trans-<br>parent<br>cap | O-ring<br>15 x 1.5<br>Si |
| VM .. B.1          | 1                          | -                                    | -                    | -                             | -                            | 15 x 1.5        | -                       | -                        |
| VD .. B.1          | -                          | 1                                    | -                    | -                             | -                            | 15 x 1.5        | -                       | -                        |
| VM .. BM.1         | 1                          | -                                    | -                    | -                             | -                            | 15 x 1.5        | 1                       | 1                        |
| VD .. BM.1         | -                          | 1                                    | -                    | -                             | -                            | 15 x 1.5        | 1                       | 1                        |
| VM .. C.0          | 1                          | -                                    | 1                    | -                             | -                            | 15 x 1.5        | -                       | -                        |
| VD .. C.0          | -                          | 1                                    | 1                    | -                             | -                            | 15 x 1.5        | -                       | -                        |
| VM .. D.0/-L..     | 1                          | -                                    | -                    | 1                             | 1                            | 15 x 1.5        | -                       | -                        |
| VD .. D.0/-L..     | -                          | 1                                    | -                    | 1                             | 1                            | 15 x 1.5        | -                       | -                        |
| VD .. GC.0         | -                          | 1                                    | 1                    | -                             | -                            | 15 x 1.5        | -                       | -                        |
| VD .. LE.1         | 1                          | -                                    | 1                    | -                             | -                            | 16 x 1          | -                       | -                        |
| VD .. LZ.1/-DB     | 1                          | -                                    | -                    | 1                             | 1                            | 16 x 1          | -                       | -                        |
| VD .. LZ.1/-CN     | 1                          | -                                    | -                    | 1                             | 1                            | 16 x 1          | -                       | -                        |
| VRD .. UE.0        | 1                          | -                                    | -                    | -                             | -                            | 15 x 1.5        | -                       | -                        |
| VRD .. UF.0        | 1                          | -                                    | -                    | -                             | -                            | 15 x 1.5        | -                       | -                        |
| VD .. LZ.1/-BO     | 1                          | -                                    | 1                    | -                             | -                            | 16 x 1          | -                       | -                        |
| VD .. LZ.1/-AV     | 1                          | -                                    | 1                    | -                             | -                            | 16 x 1          | -                       | -                        |
| VD .. LZ.1/-D4C    | 1                          | -                                    | -                    | -                             | 1                            | 16 x 1          | -                       | -                        |
| VD .. LZ.1/-BO-LED | 1                          | -                                    | -                    | -                             | 1                            | 16 x 1          | -                       | -                        |

<sup>1)</sup> Only available as complete seal kit  
Order example: Item 4 plug E D.0/-L24

<sup>2)</sup> Assembly tool required

<sup>3)</sup> In aluminium heads

## 2.6. MODEL CODE

(also order example)

VD 5 GC . X / - V - 123

### Differential pressure indicator

- VM clogging indicator
- VD clogging indicator
- V02 clogging indicator (fit separately inline)
- VRD clogging indicator

### Cracking pressure of clogging indicator

- 0.2 - 0.2 bar (only for VRD..UF indicator)
- 1 - 1.0 bar to 0 bar (only for VRD..UE indicator)
- 0.8 + 0.8 bar (only for V, VE, VZ indicators)
- 2 + 2.0 bar (for all, except UE, UF indicators)
- 4.3 + 4.3 bar (only for V, VE, VZ indicators)
- 5 + 5.0 bar (only for B, C, D, GC, LE, LZ indicators)
- 8 + 8.0 bar (only for B, C, D, GC, LE, LZ indicators)

### Type of clogging indicator

- B<sup>1)</sup> visual indicator with automatic re-set
- BM visual indicator with manual re-set
- C electrical indicator
- D visual/electrical indicator
- LE visual mechanical indicator with 100 % switching contact
- LZ visual mechanical indicator with 75 % and 100 % switching contact
- V visual/analogue indicator
- VE visual/analogue indicator with 100 % switching contact
- VZ visual/analogue indicator with 75 % and 100 % switching contact
- GC electronic-analogue indicator
- UE vacuum gauge, horizontal (only for VRD indicator)
- UF vacuum switch (only for VRD indicator)

<sup>1)</sup> only for vertical installation

### Modification number

- X the latest version is always supplied

### Supplementary details

without details = standard = NBR (Perbunan) seal

- V FPM (Viton) seal, indicator suitable for phosphate ester (HFD-R) and rapidly biodegradable oils

- W indicator suitable for oil-water emulsion (HFA, HFC)

- L24 light with 24 Volt supply
  - L48 light with 48 Volt supply
  - L110 light with 110 Volt supply
  - L220 light with 230 Volt supply
  - LED 2 light emitting diodes up to 24 Volt supply
- ] only for model "D"

- 30C cold start suppression of switching outputs up to 30 °C ± 5 °C

(only for C, D and LZ models; DC supply voltage only; on D indicators, contacts must be wired normally open only)

- S0135 indicator suitable for programmable logic controls via Gold-Crosspoint contacts (only for C and D models)

### Details for "LZ" model

- CN electrical connection, 1 plug connector to DIN 43651 with 3 LEDs (to CNOMO standard NF E 48-700)
- DB electrical connection, 1 plug connector to DIN 43651 with 3 LEDs (to Daimler-Benz and BMW standard )
- BO plug and plug connection to BMW, Opel, Ford specification
- AV plug and plug connection to AUDI, VW specification
- D4C plug and plug connection to Daimler-Chrysler specification with cold start suppression 30 °C
- BO-LED as for BO, but with progressive LED strip

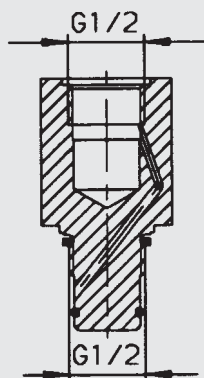
### Details for "GC" model

- SP analogue signal: voltage output 1-10 V
  - SQ analogue signal: voltage output 4 ... 20 mA (current source)
- ] if SP or SQ not specified  
] "current sink" model supplied

- 113 N/O function
  - 123 N/C function
- ] pressure peak suppression up to 10 sec  
] cold start suppression of switching outputs (PNP technique, positive switching) up to 25 °C  
] must be specified

- LED 3 LEDs (red, green, yellow) in terminal box
- PF floating switching outputs (due to relay in the plug)
- 30C cold start suppression of switching outputs up to 30 °C (other temperatures on request)

VD-D-S.0  
DF..QE with  
VD..GC-indicator



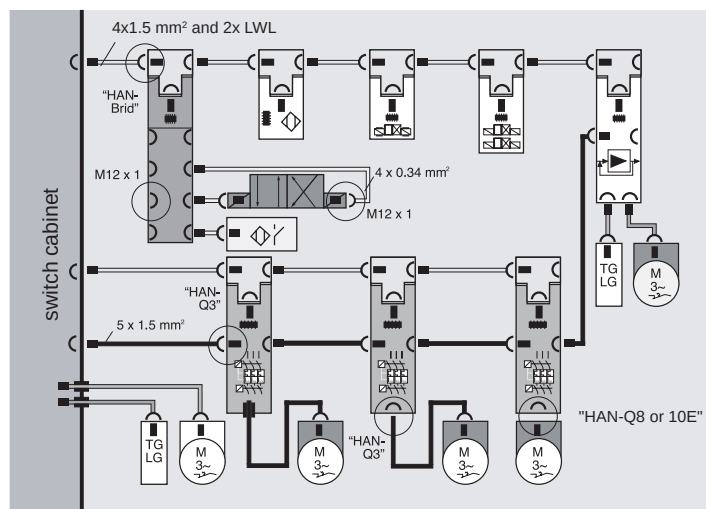
Technical drawing of a mechanical assembly showing a cross-section of a flange with two G1/2 ports and a central G1/2 port. The distance between the outer ports is 60.

Technical drawing of a mechanical part showing a cross-section. The drawing includes dimensions:  $G1/2$  (width of the top section),  $G1/4$  (width of the bottom section), and  $G1/4$  (width of the side section).

## 4. DESINA SPECIFICATION

DESINA is a fully comprehensive system intended to bring standardisation and decentralisation to the field of fluid technology and to electrical installation of machinery and systems. The system engineering, automotive and supply industries have worked together to draw up specifications of the necessary components. DESINA makes use of tried-and-tested solutions, such as open bus systems, standard industrial plugs etc. By standardising components, interfaces and connection systems, such as a hybrid field bus cable (Cu/LWL), a wide range of different field bus systems can be made compatible on a single physical base.

### 4.1. TOTAL CONCEPT FOR MACHINE TOOL INSTALLATION



### 4.2. CLOGGING INDICATORS

The following clogging indicators are approved to DESINA specification:

| Type                       |
|----------------------------|
| VD 5 LZ.1 /-D4C            |
| VR 2.5 LZ. 1 /-D4C         |
| VD 5 LZ.1 /-BO             |
| VR 2.5 LZ. 1 /-BO          |
| VD 5 LZ. 1 /-AV            |
| VR 2.5 LZ. 1 /-AV          |
| VR 2.5 LZ. 0 /-GM          |
| all with M12 x 1 connector |



The DESINA logo is shown on the type code label of approved clogging indicators.

## 5. NOTE

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.