HYDAC INTERNATIONAL

Change-over
Inline Filters NFD
Flow rates up to 2,000 l/min
Pressure range 25 bar
Material: Aluminium / Cast Iron
With Ball Change-Over Valve

NFD change-over filters are designed for tank-top mounting and for inline mounting on hydraulic systems which operate non-stop, with a comprehensive build-up range using manifolds.

These filters can also be used on filling, flushing and off-line units.

1. TECHNICAL DESCRIPTION

1.1. FILTER HOUSING

Construction

The filter consists of a filter housing and an easily removable cover plate with central thread. The housings are connected by means of a ball change-over valve (negative overlap).

1.2. FILTER ELEMENTS

Hydac filter elements fulfil all ISO test criteria.

Reliable filter operation is only guaranteed for original Hydac filter elements.

The filter elements are also suitable for dynamic conditions due to their high pressure stability; max permissible Δp across the element:

Betamicron® (BN3HC)	:	25 bar
Paper (P/HC)	:	10 bar
Wire mesh (W/HC)	:	30 bar
Stainless steel fibre (V)	:	30 bar
Betamicron®/Aquamicron® (BN/AM)	:	10 bar
Aquamicron® (AM)	:	10 bar

Fluid compatibility

Suitable for mineral oils, lubrication oils, non-flam fluids, synthetic and rapidly biodegradable fluids. For use with water, please contact our sales/technical department.

For further details on filter elements, please see brochure, **no.: E 7.200../..**

1.3. CLOGGING INDICATORS

VR 2 D. 0 / -L220

Type of indicator
VR return line indicator (only for filters with type code 1)
VM differential pressure indicator (only for filters with type code 2 and 3)

Pressure setting
2 2 bar
5 5 bar

Indicator type
B. = visual
C. = electrical
D. = visual/electrical

Modification number
0 = the latest version is always supplied

Supplementary details
-V Viton
-Lxx voltage details for type "D"

Please note:
The clogging indicator must not be screwed into the cover plate.

For further details on clogging indicators, please see brochure, **no. E 7.050../..**

1.4. SEALS

Perbunan (= NBR) or Viton (= FPM for HFD oils).

1.5. SPECIAL MODELS AND ACCESSORIES

Please contact our sales/technical department.

1.6. SPARE PARTS

Please see Spare Parts List and Maintenance Instructions.

2. GENERAL

Mounting

Tank-top mounted return line filter or inline filter

Temperature range

-10 °C to +100 °C

Pressure setting of the differential pressure clogging indicator

Δp_a = 2 bar -10 %

Other pressure settings on request

Cracking pressure of the bypass valve

Δp_o = 3 bar +0.5 bar
optionally 6 bar

Other cracking pressures on request

3. MODEL CODE

(also order example)

3.1. COMPLETE FILTER

NFD BN/HC 2610 D A P 10 D 1 . X /-L24-06

Filter type

Filter material of element

BN/HC Betamicron® (BN3HC)
AM Aquamicron®
BN/AM Betamicron®/Aquamicron®
P/HC Paper
W/HC Stainless steel wire mesh
V Stainless steel fibre

Housing material / Size

Al/GGG 1310, 2610, 5210, 7810, 10410

Operating pressure

D = 25 bar

Type of change-over

A = ball

Type and size of port

Type	Port	Filter size				
		1310	2610	5210	7810	10410
P	SAE DN 100	●	●	●	●	●

Further types / sizes of port on request!
For examples, see point 3.3.

Filtration rating in µm

BN3HC, V : 3, 5, 10, 20
BN/AM : 3, 10
P/HC : 10, 20
W/HC : 25, 50, 100, 200
AM : 40

Type of clogging indicator

A without clogging indicator, steel blanking plug in indicator port
B with visual clogging indicator (only for tank-top mounted return line filters)
BM with visual clogging indicator, manual re-set (all types)
C with electrical clogging indicator
D with visual and electrical clogging indicator
LE visual-mechanical/electrical clogging indicator with 100% switching contact
LZ visual-mechanical/electrical clogging indicator with 75% and 100% switching contact

for other clogging indicators see brochure no. E 7.050../..

Type code

1 Tank-top return line filter
– return line indicator
– inlet flange horizontal at top, outlet vertical, from size 5210, horizontal
– tank seal supplied

2 Inline filter
– differential pressure indicator
– inlet flange horizontal at bottom, outlet vertical, from size 5210, horizontal

Type code	Filter size				
	1310	2610	5210	7810	10410
1	●	●	●		
2	●	●	●	●	●

Modification number

X the latest version is always supplied

Supplementary details

V FPM (Viton) seals, filter suitable for rapidly biodegradable oils and phosphate esters (HFD-R)
L... light with appropriate voltage (24V, 48V, 110V, 220V)
LED 2 light emitting diodes up to 24 volt

only on type D indicators

KB without bypass valve
B6 cracking pressure of the bypass valve 6 bar
SB4 filling line with 4 mm Ø orifice
EM manual vent with shut-off valve
EP permanent vent via Minimess hose
39 connection alternative
(filters are supplied as per standard type printed in bold in Point 3.1.1, unless specified otherwise)
VKD drain fitted with ball shut-off valve

3.1.1 **Connection alternatives**
(Example)

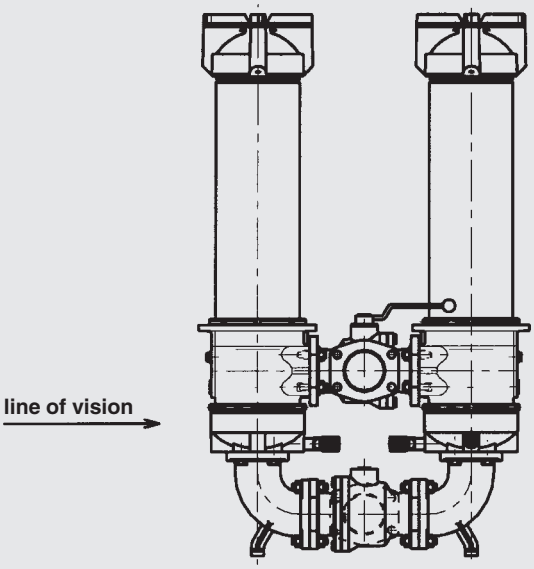
Type code .. / – 0 3

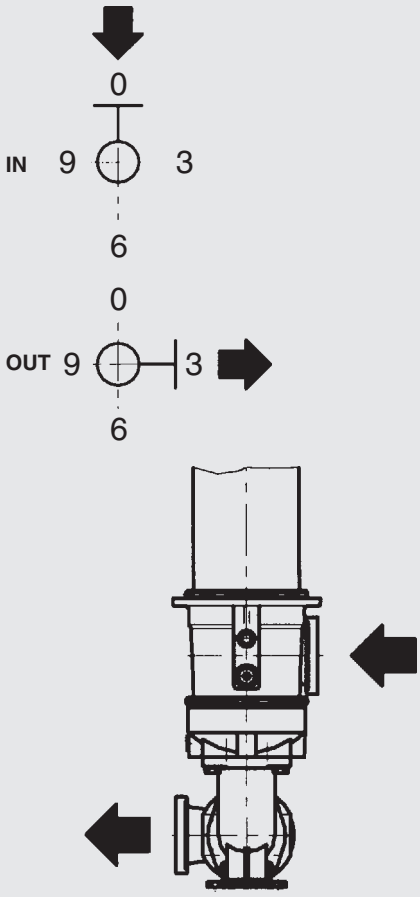
1st digit = position of the inlet valve

2nd digit = position of the outlet valve

33 stand. **= Standard model**
type code is not given in the model code

~~63~~ **= Not available!**



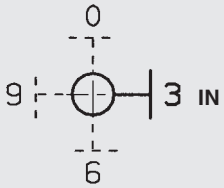


line of vision
Type code .. / –39

NFD 2610 .. A1.0 / –XX
(possible supplementary type code)

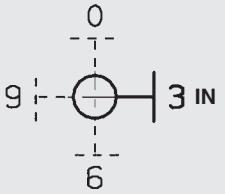
0	3 stand.	~~8~~	9 1)

1) corresponds to type 3

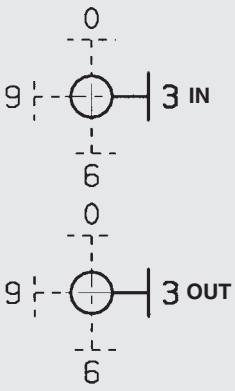


NFD 5210 .. A1.0 / –XX
(possible supplementary type code)

0	3 stand.	~~8~~	9



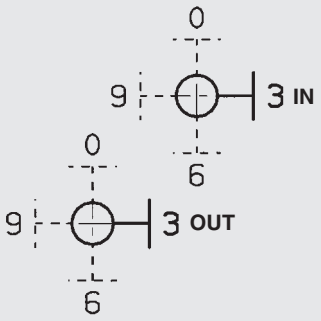
NFD 2610 .. A2.0 / –XX
(possible supplementary type code)



~~00~~	03	06	09 1)
30	33 stand.	36	39
~~60~~	~~63~~	~~66~~	~~69~~
~~90~~	~~93~~ 2)	96	~~99~~ 3)

1) corresponds to type 03
2) corresponds to type 39
3) corresponds to type 33

NFD 5210 .. A2.0 / –XX
(possible supplementary type code)



00	03	06	09
30	33 stand.	36	39
60	~~63~~	66	69
90	93	96	99

3.2. REPLACEMENT ELEMENT

1300 R 010 BN3HC /-KB

Size
1300, 2600

Type
R

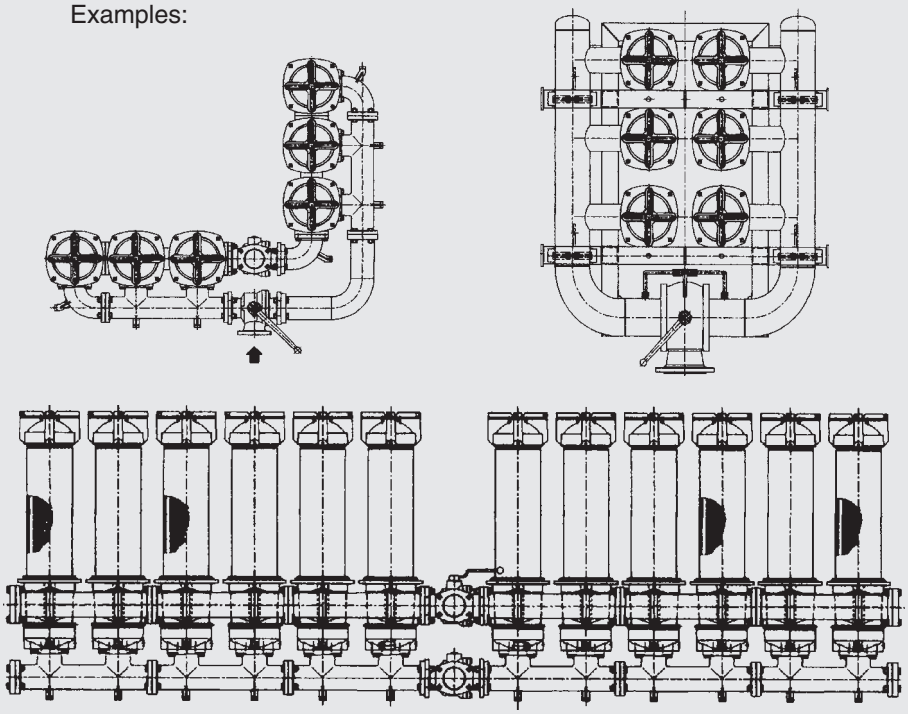
Filtration rating in µm
BN3HC, V : 3, 5, 10, 20
BN/AM : 3, 10
P/HC : 10, 20
W/HC : 25, 50, 100, 200
AM : 40

Filter material
BN3HC; V; BN/AM; P/HC; W/HC; AM

Supplementary details
V = FPM (Viton) seals, filter suitable for rapidly biodegradable oils and phosphate esters (HFD-R)
W = filter suitable for oil-water emulsions (HFA, HFC), NBR seals
KB = without bypass valve

3.3. FURTHER PORT TYPES / SIZES ON REQUEST!

Examples:



4. FILTER SPECIFICATIONS

Filter type	Port	Element size	Number of elements	Weight (kg) with element
1310	SAE DN 100	1300 R...	1	74
2610	SAE DN 100	2600 R...	2	94
5210	SAE DN 100	2600 R...	4	258
7810	SAE DN 100	2600 R...	6	342
10410	SAE DN 100	2600 R...	8	446

5. FILTER CALCULATION / SIZING

The total pressure drop of a filter at a certain flow rate is the sum of the housing Δp (including change-over valve!) and element Δp.

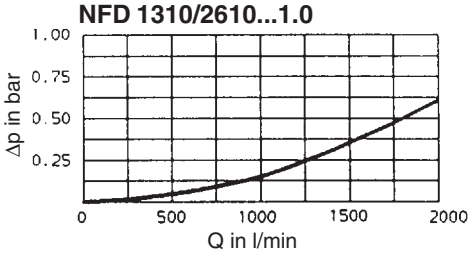
The pressure drop can be determined either with the aid of our Filter Sizing Program FSP, which is available free of charge, or by using the following graphs.

It must be stressed that all of the technical documentation from HYDAC Filtertechnik always states the pressure drop of the complete filter, i.e. including the change-over valve.

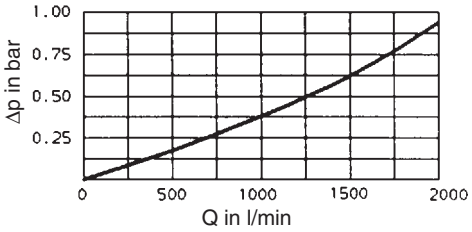
5.1. ΔP-Q HOUSING GRAPHS TO ISO 3968

The housing graphs apply to mineral oil with a density of 0.86 kg/dm³ and a viscosity of 30 mm²/s. In this case, the differential pressure changes proportionally to the density.

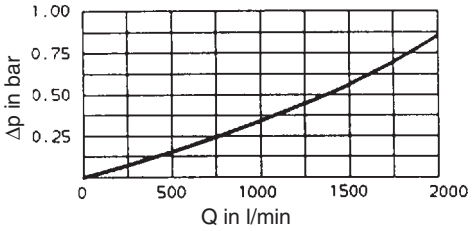
NFD 1310/2610...1.0



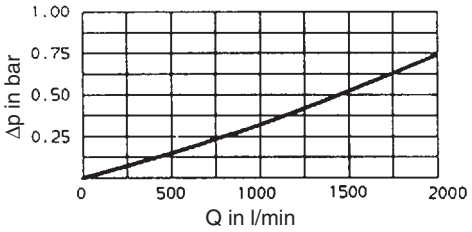
NFD 1310/2610...2.0



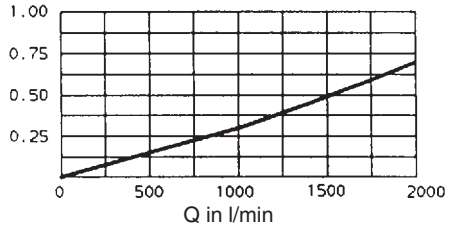
NFD 5210...1.0/2.0



NFD 7810...2.0



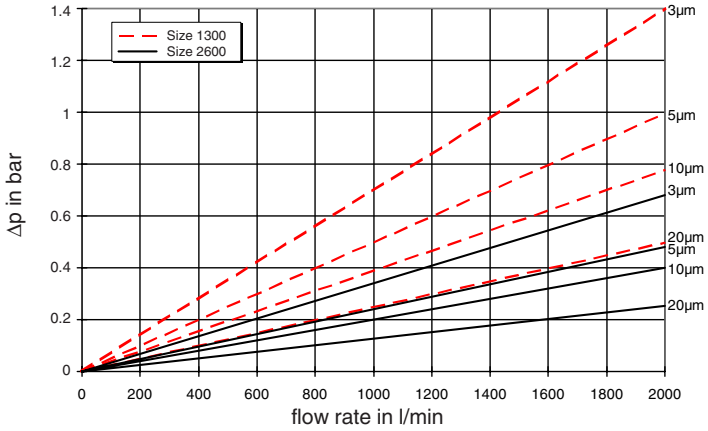
NF 10410...2.0



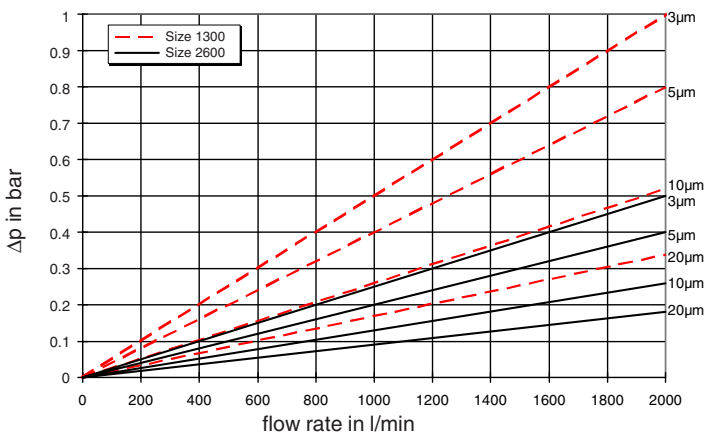
5.2. ΔP-Q GRAPHS FILTER ELEMENTS

The element graphs apply to mineral oil with a kinematic viscosity of 30 mm²/s. The pressure drop changes proportionally to the change in viscosity (see Example 5.3.).

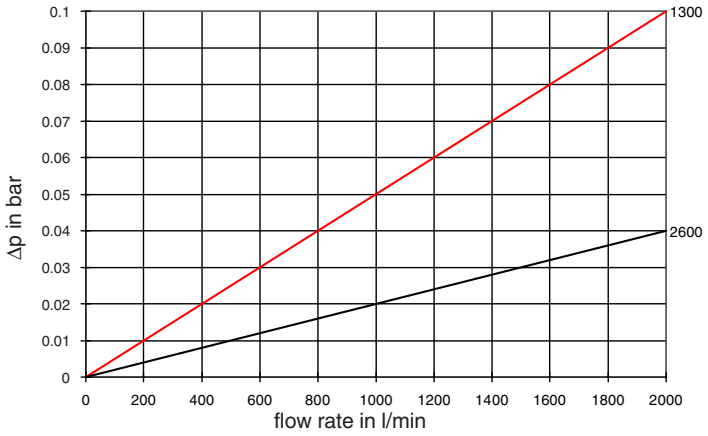
BN3HC



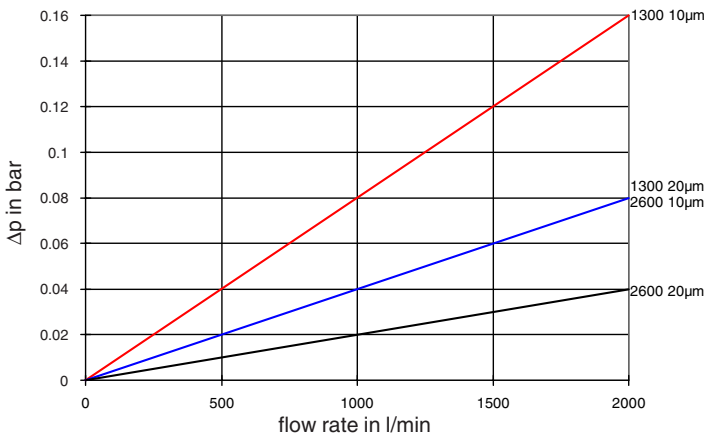
V



W/HC



P/HC



5.3. EXAMPLE

General

$$\Delta p_{total} = \Delta p_{housing} + \Delta p_{element} \times \frac{\text{viscosity (mm}^2\text{/s)}}{30\ \text{mm}^2\text{/s}}$$

$\Delta p_{housing}$ = to be determined in accordance with Point 5.1.

$\Delta p_{element}$ = element pressure drop at flow rate Q/n and viscosity = 30 mm²/s determined according to Point 5.2.

n = no. of elements in accordance with Point 4 Filtration specifications

Example

System parameters: NFD 5210 with BN3HC element (10 µm);
Viscosity = 68 mm²/s (ISO VG 68 at 40 °C);
Q = 500 l/min; n = 2

$$\Rightarrow \frac{Q}{n} = \frac{500}{2} = 250\ \text{l/min}$$

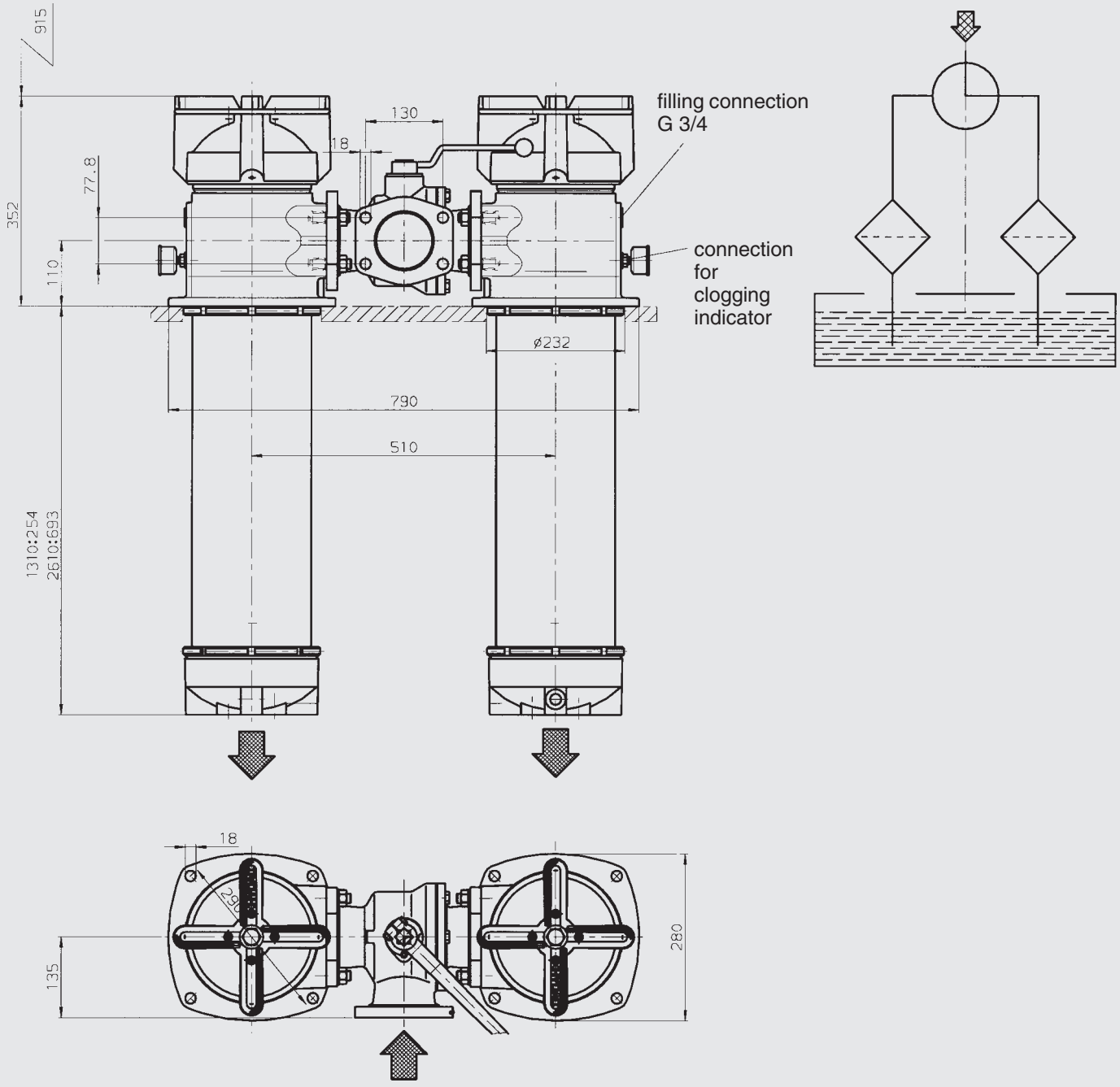
$\Rightarrow \Delta p_{housing} = 0.15$ bar (NFD 5210)
$\Delta p_{element} = 0.05$

$$\Delta p_{total} = 0.15\ \text{bar} + 0.05 \times \frac{68\ \text{mm}^2\text{/s}}{30\ \text{mm}^2\text{/s}} = 0.26\ \text{bar}$$

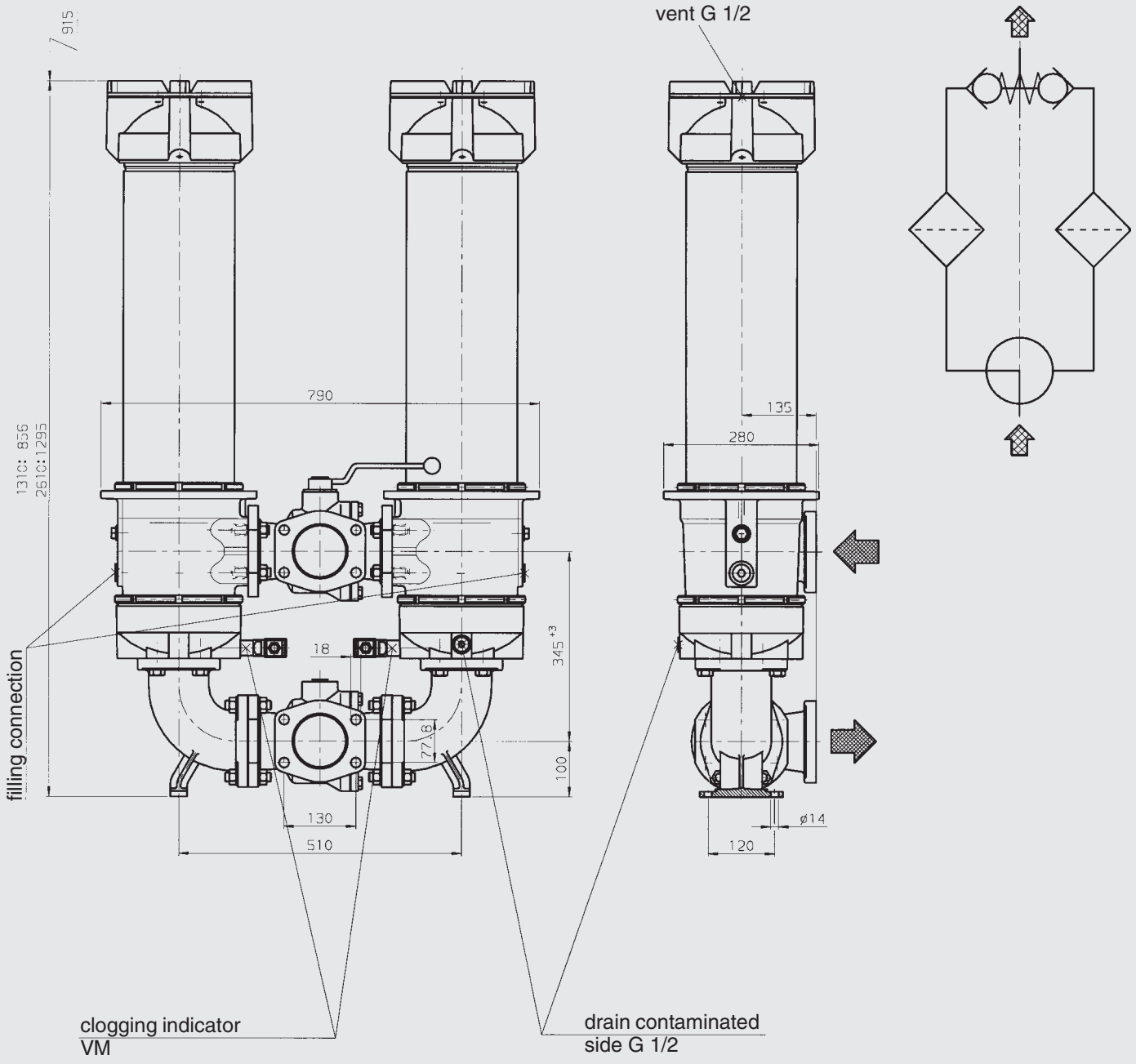
For ease of calculation, our Filter Sizing Program can be downloaded from our website www.hydac.com

6. DIMENSIONS

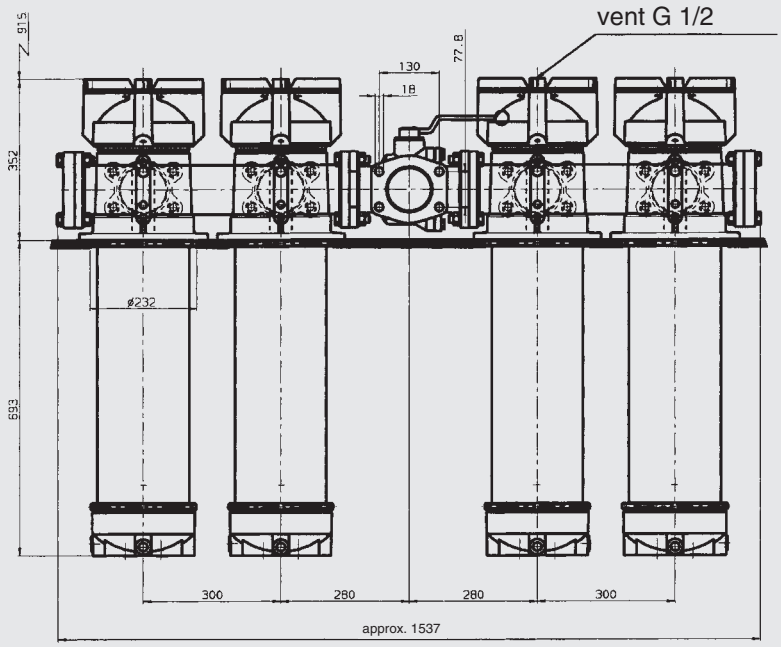
6.1. NFD 1310/2610...1.0

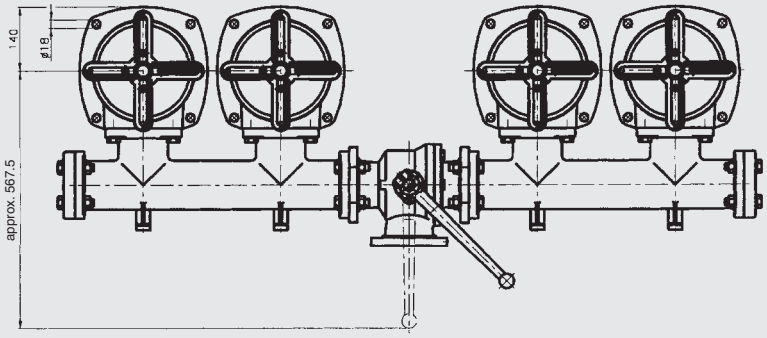


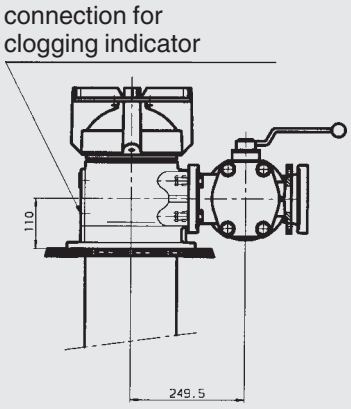
6.2. NFD 1310/2610...2.0

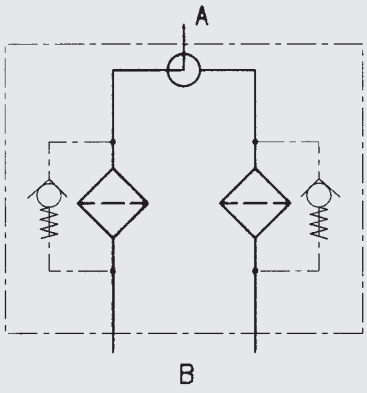


6.3. NFD 5210...1.0

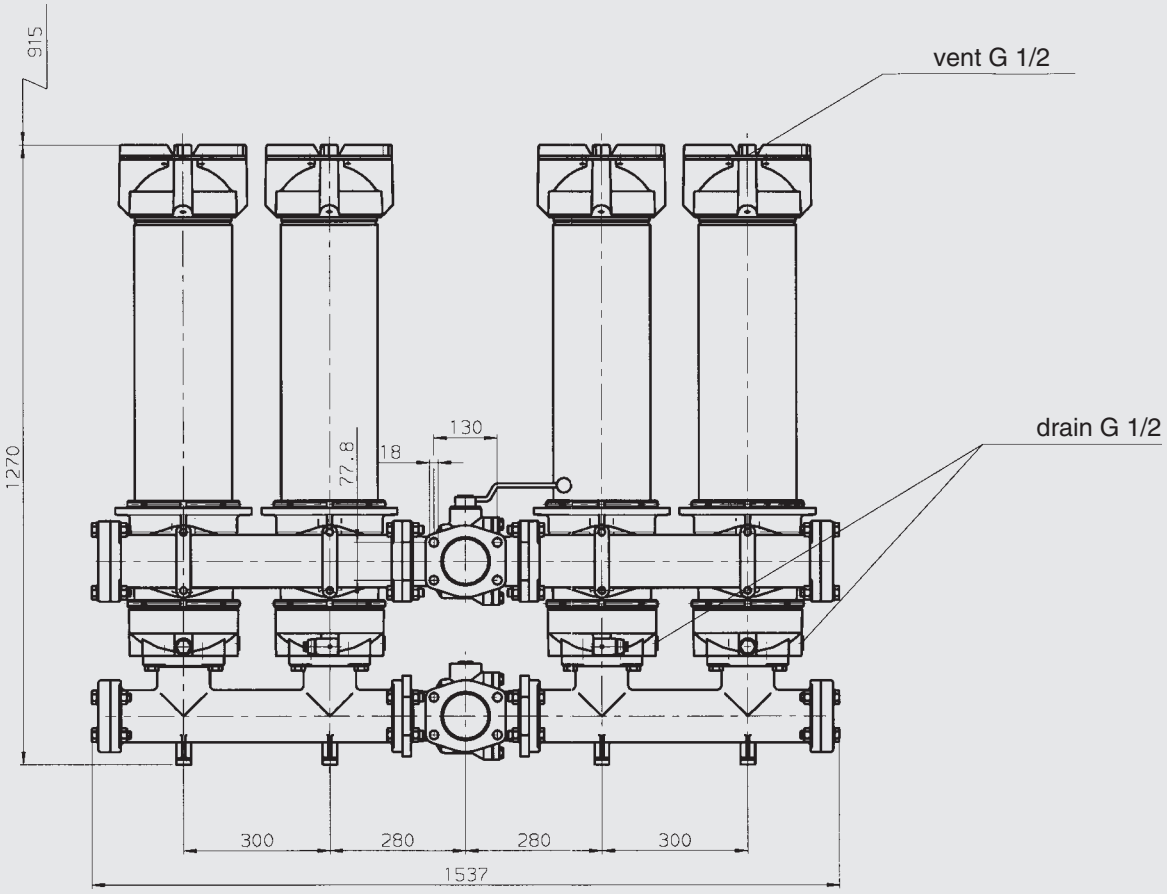


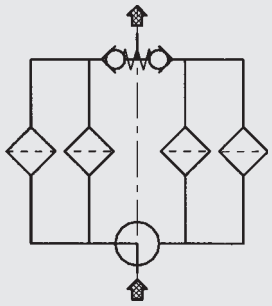


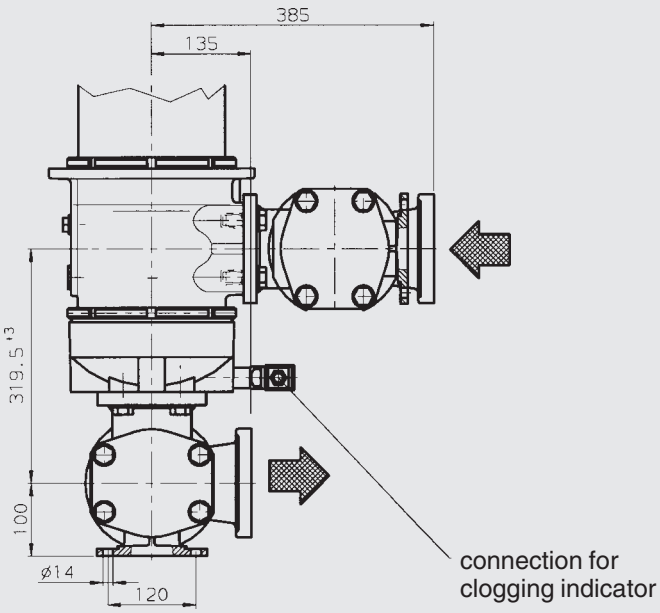




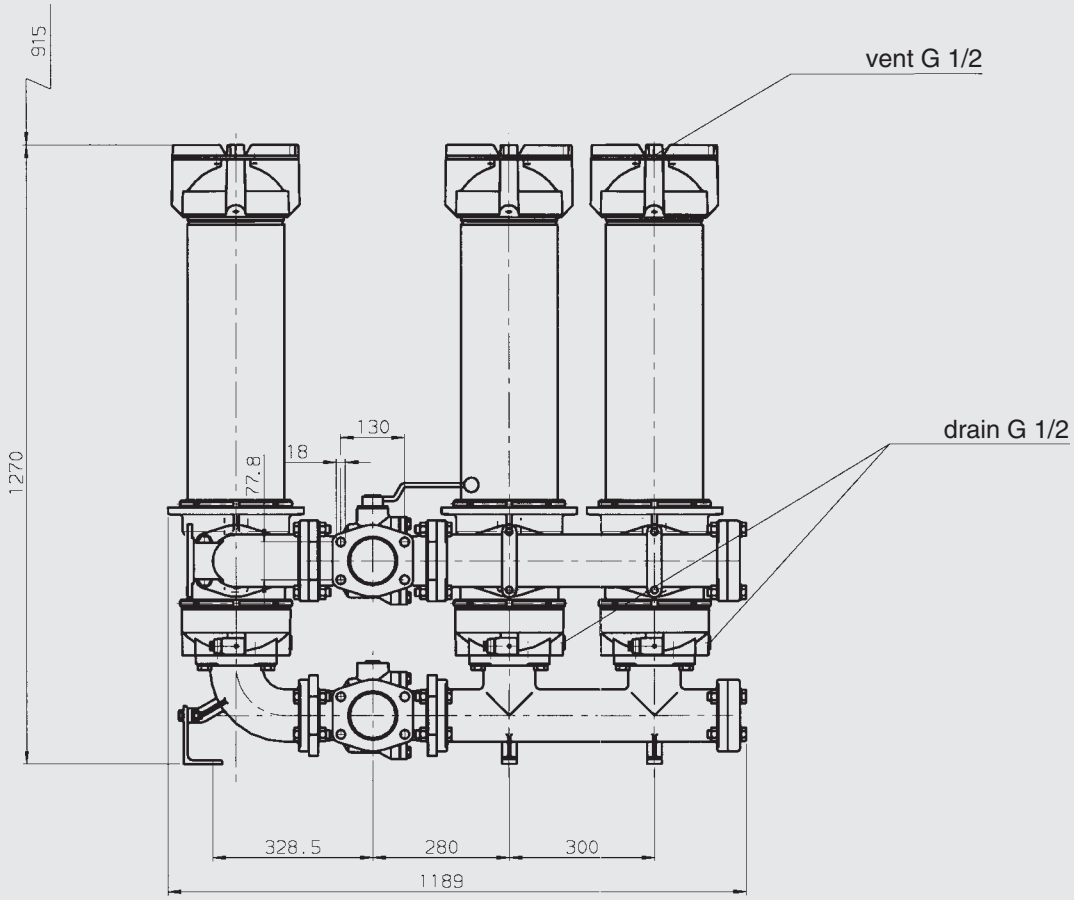
6.4. NFD 5210...2.0

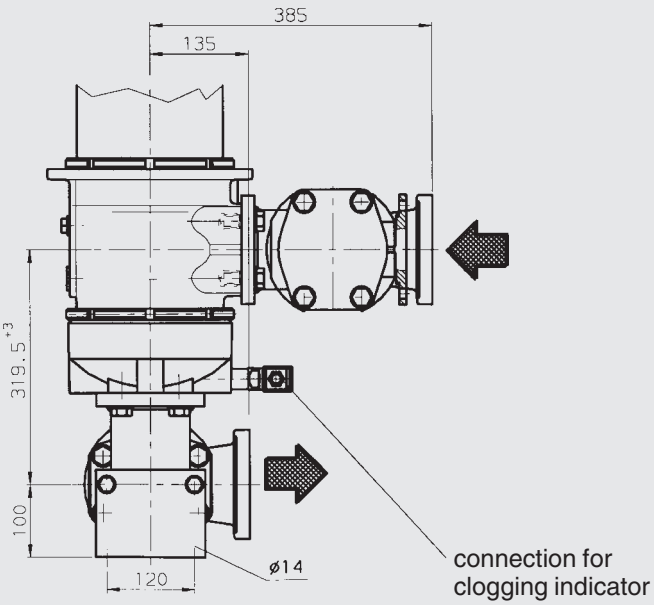


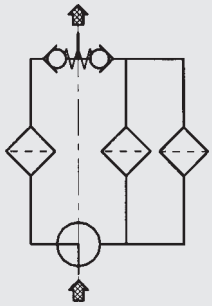




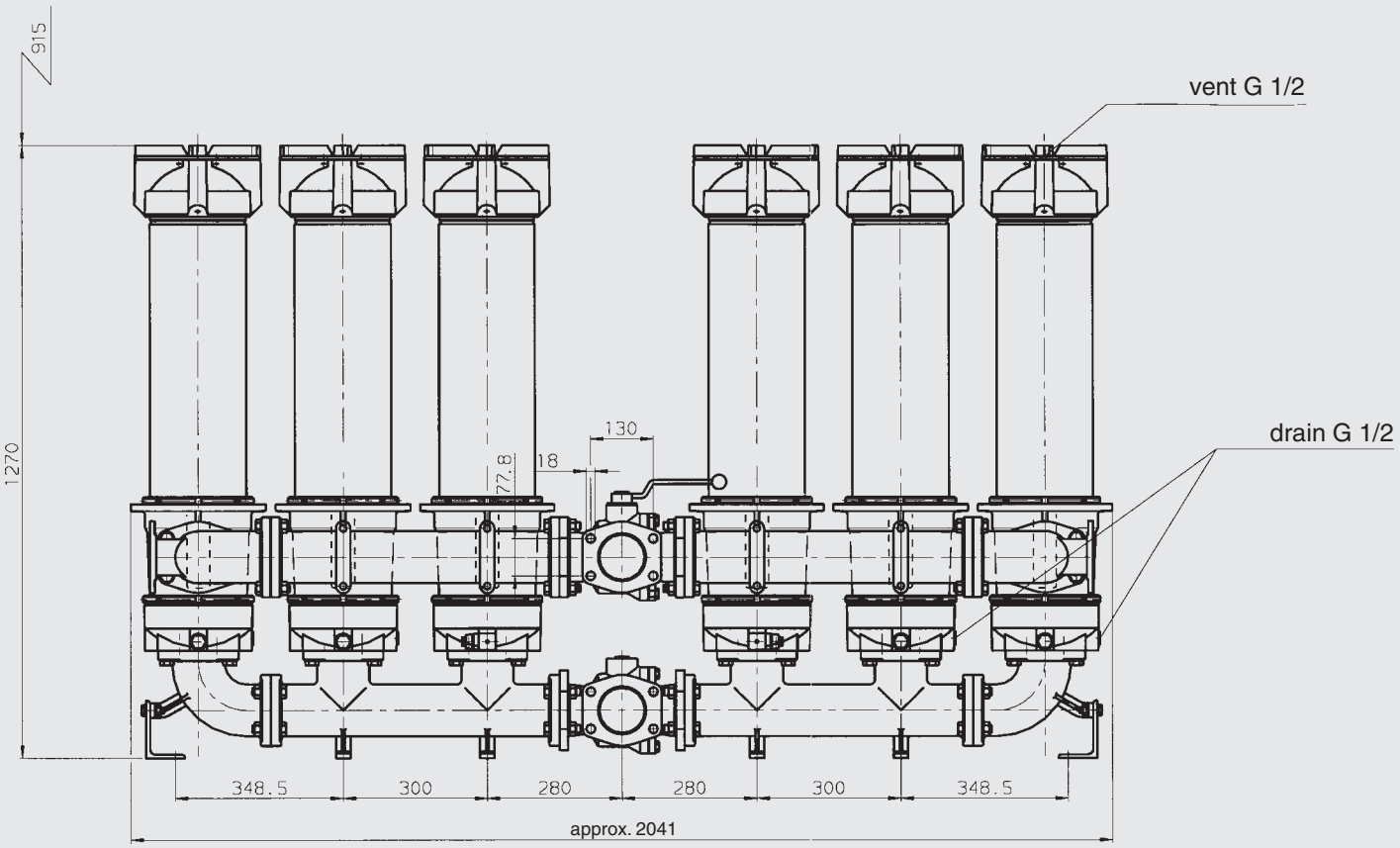
6.5. NFD 5210...2.0 / -1+2

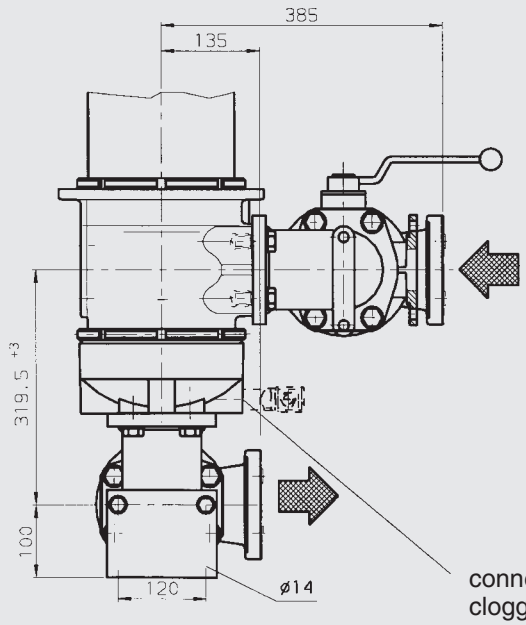


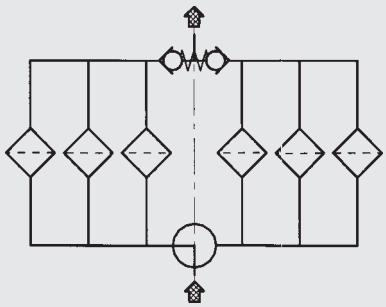




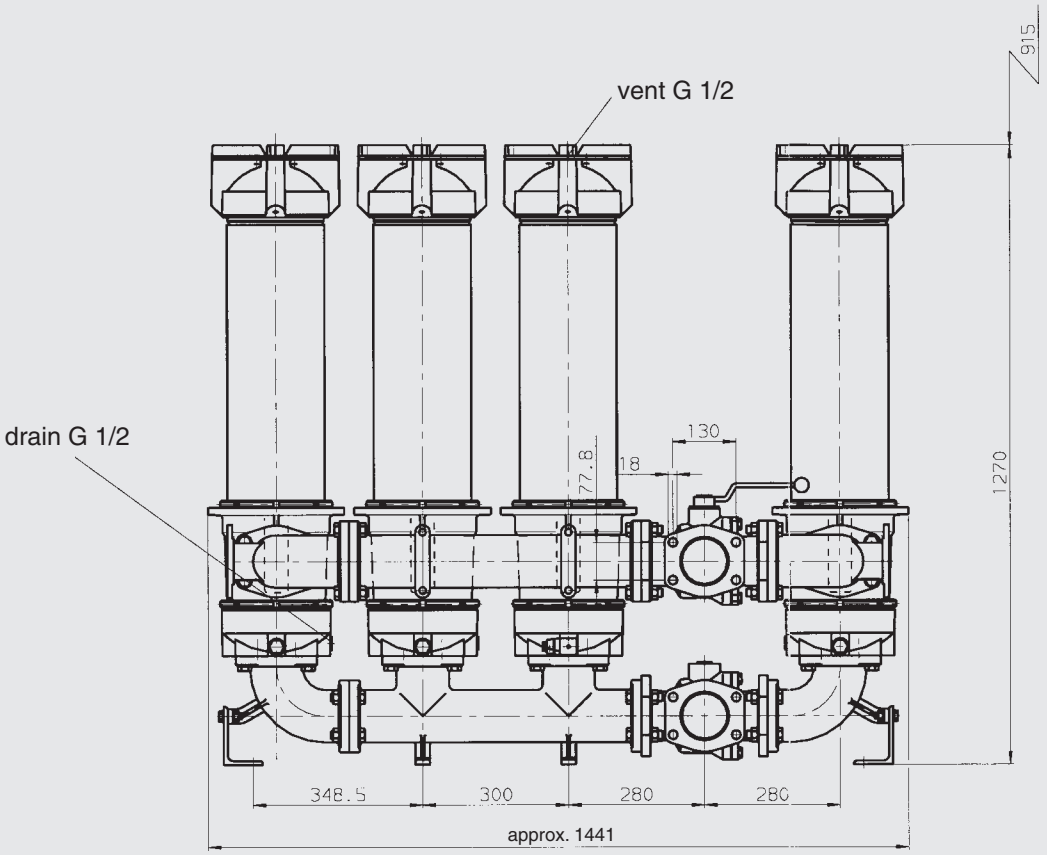
6.6. NFD 7810...2.0

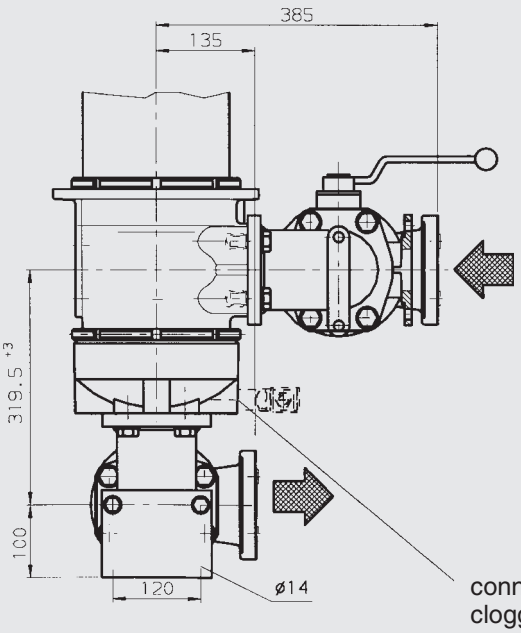


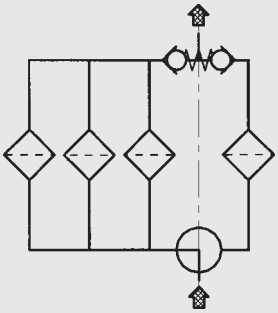




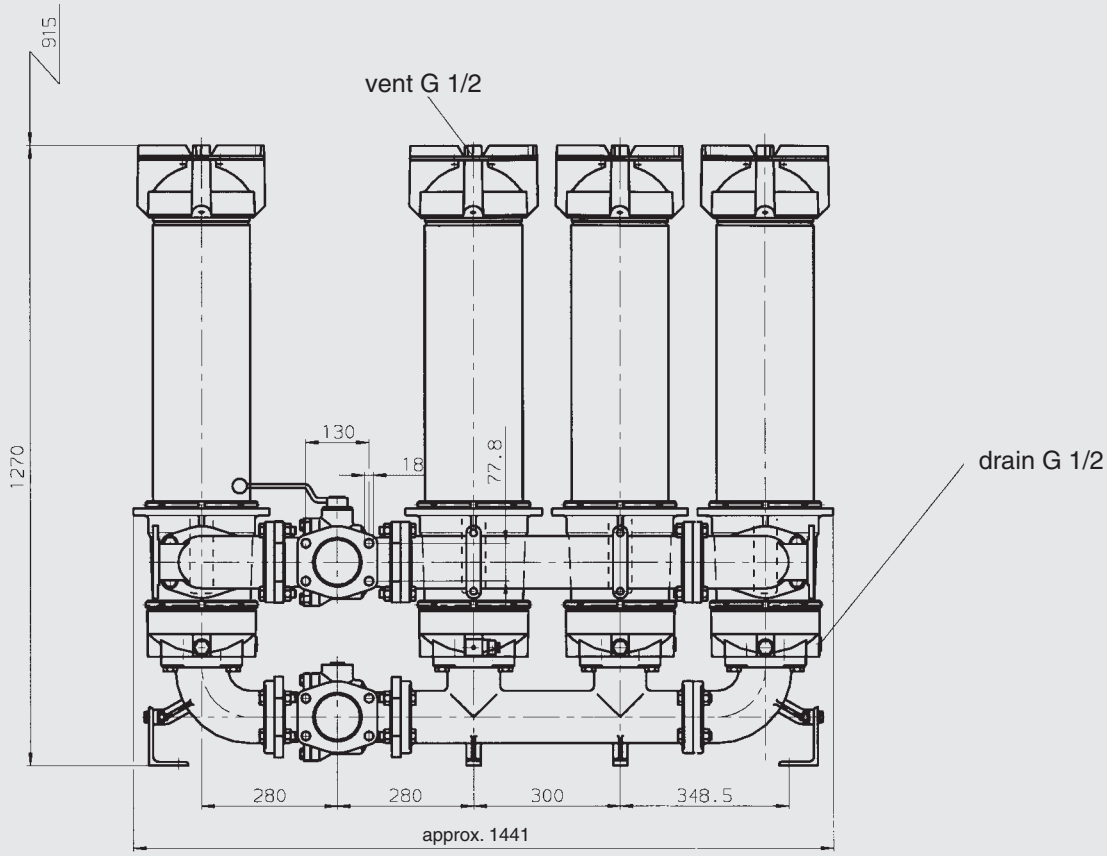
6.7. NFD 7810...2.0 / -3+1

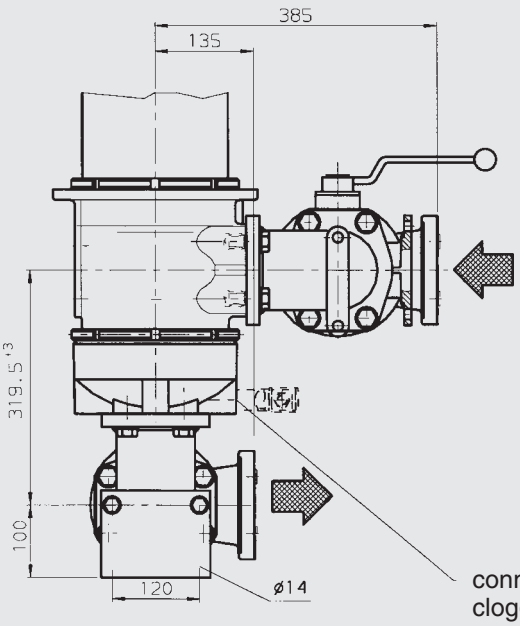


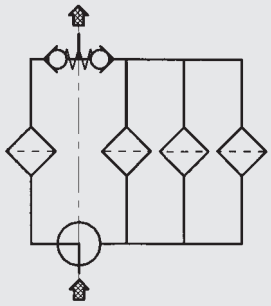




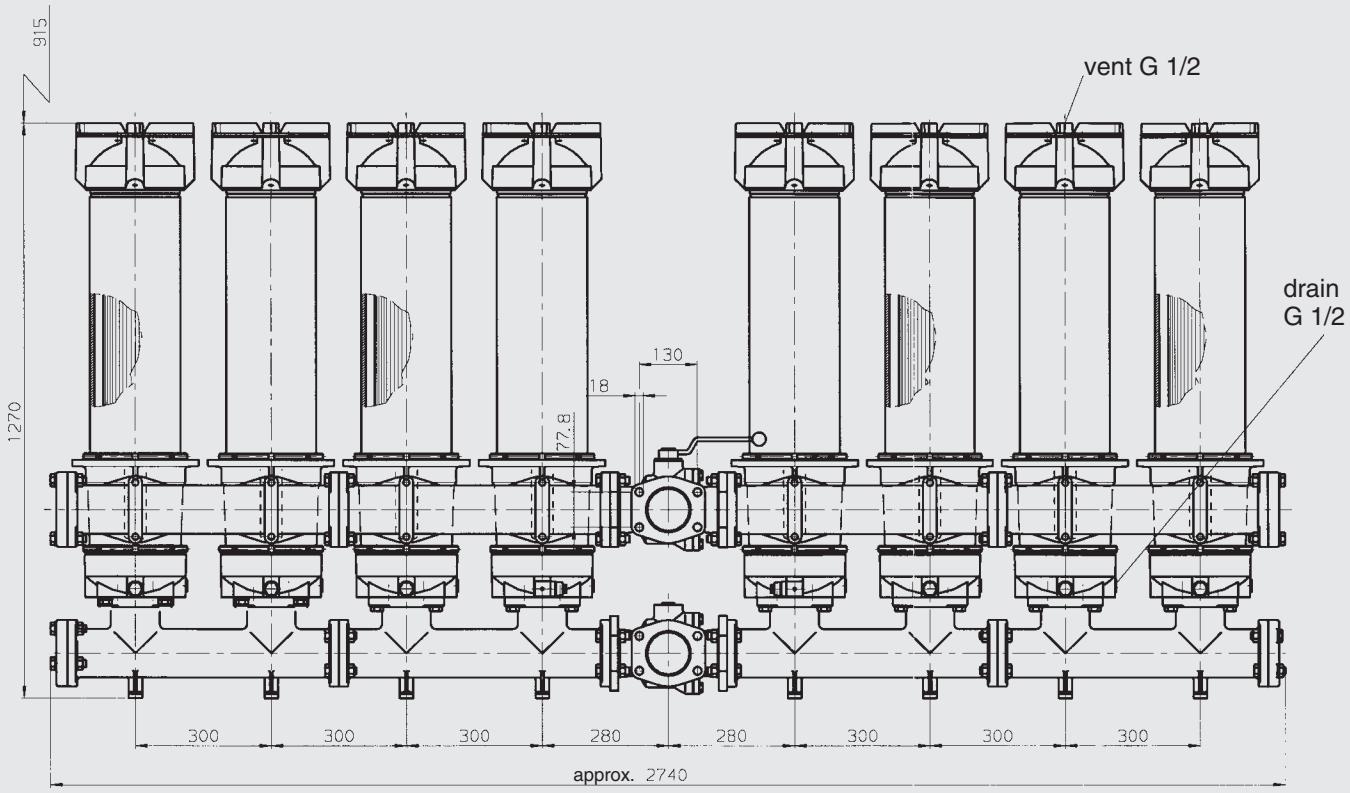
6.8. NFD 7810...2.0 / -1+3

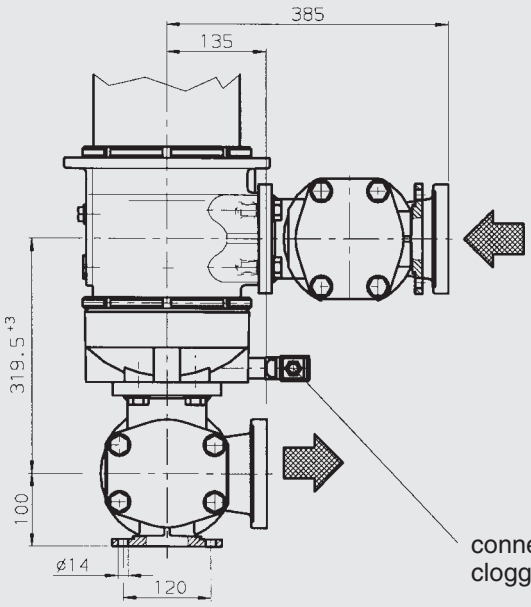


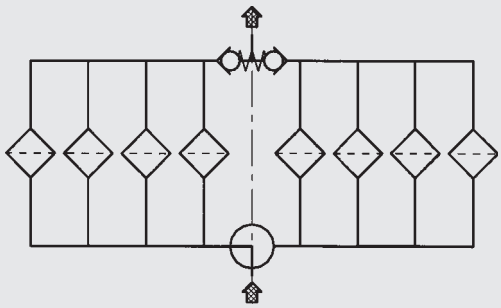




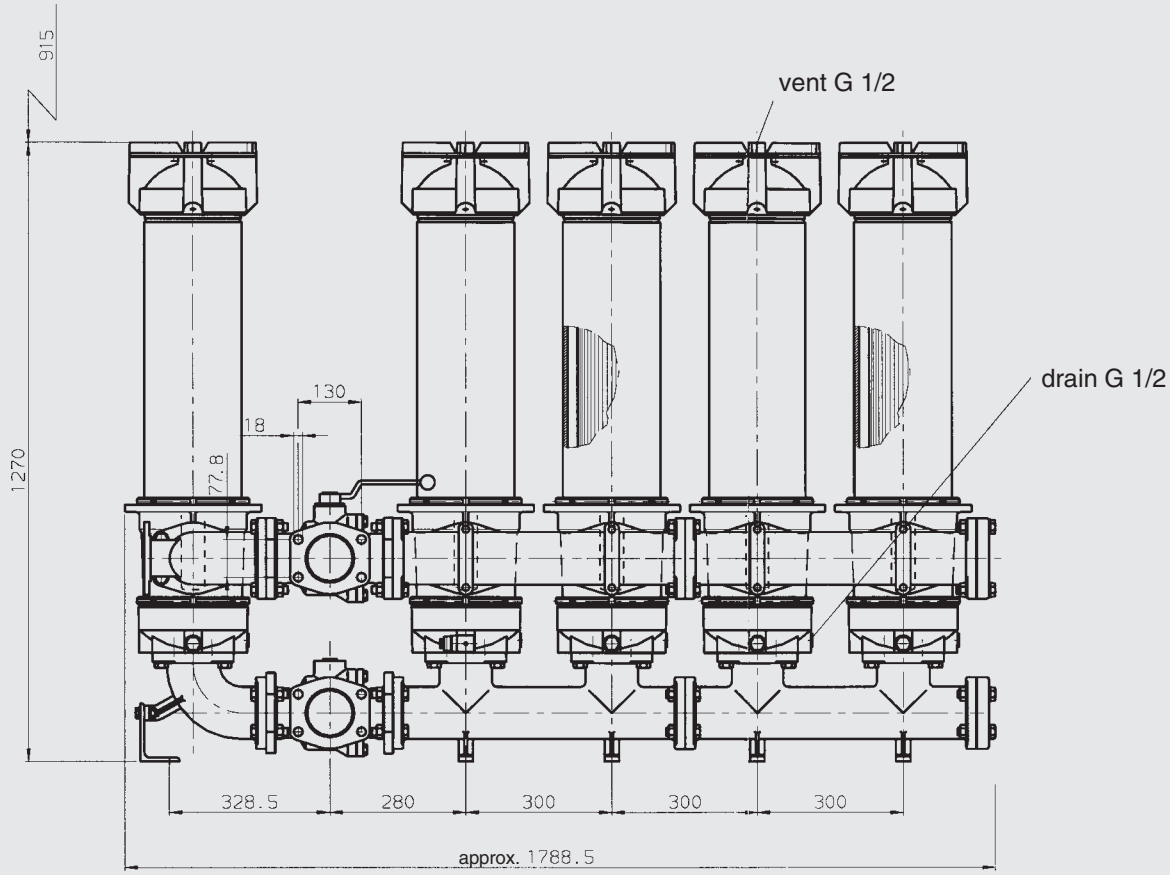
6.9. NFD 10410...2.0

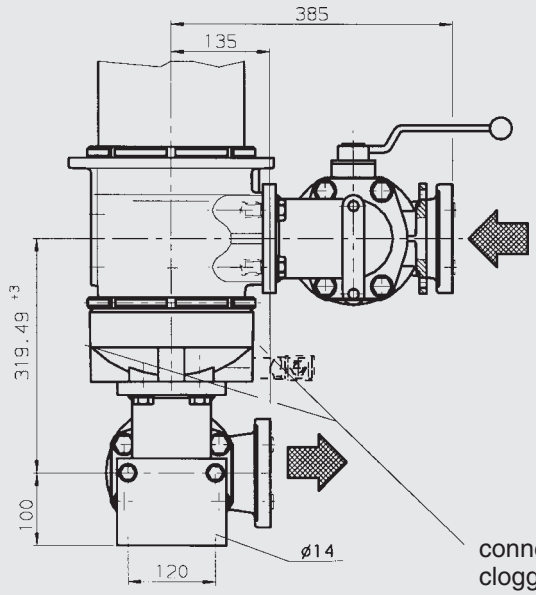


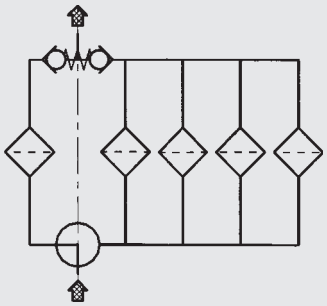




6.10. NFD 10410...2.0 / -1+4







7. 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.

NOTES