Aquamicron®- Filter Elements AM

up to 10 bar, filtration rating 40 µm

1. AQUAMICRON® ELEMENT

1.1 DESCRIPTION

The presence of water in hydraulic media is a frequent cause of malfunctions, for example, blinding of very fine filters or jamming of valves and these problems are often incorrectly attributed to excessive levels of solid contamination. In addition, the formation of rust and the reduction in lubricity on bearings and slide bars can result in significant deterioration in the functioning of the system. In other words, water is a serious "contaminant" of the hydraulic medium.

Since the conventional methods of dewatering are in most cases uneconomical in relation to the purchase price of the system, HYDAC Aquamicron® technology provides an economically acceptable, yet effective method of separating water from hydraulic media.

Aquamicron® filter elements are specifically designed to separate water from mineral oils, HFD-R oils and biodegradable oils. They are only available in the dimensions to suit HYDAC return line filter elements, size 330 and above. They can therefore be installed in all HYDAC filter housings, size 330 and above, which are equipped with return line filter elements.

The increasing pressure drop across the filter element which is rapidly becoming "clogged" with water indicates, by means of standard clogging indicators that it is time to change the element. As an added bonus when using the Aquamicron® technology, solid contamination is also filtered out of the hydraulic medium. This means the Aquamicron® element also doubles as a safety filter. The filtration rating is 40 µm absolute. To guarantee maximum efficiency it is recommended that they are installed offline.

1.2 GENERAL DATA

Max. permitted operating pressure	25 bar
Max. permitted Δp across element	10 bar
Temperature range	0 °C to +100 °C
Flow direction	From outside to inside
Filtration rating	40 µm
Bypass cracking pressure	Return line filter element ("R"): standard 3 bar (others on request)
Category of filter element	Single use element

1.3 PRINCIPLES OF AQUAMICRON® TECHNOLOGY

The separation of water from hydraulic fluids with the aid of the superabsorber embedded in the filter material is based on a physical-chemical reaction. The superabsorber reacts with the water present in the medium and expands to form a gel, from which the water cannot be extracted again even by increasing the pressure. The Aquamicron® technology is capable of absorbing circulating water, be it emulsified or free. These filter elements cannot remove dissolved water from the system, i.e. water below the saturation level of the hydraulic medium.

1.4 COMPATIBILITY WITH HYDRAULIC FLUIDS ISO 2943

- Hydraulic oils H to HLPD DIN 51524
- Lubrication oils DIN 51517, API, ACEA, DIN 51515, ISO 6743
- Compressor oils DIN 51506
- Biodegradable operating fluids VDMA 24568 HETG, HEES, HEPG
- Fire-resistant fluids HFA, HFB, HFC and HFD
- Operating fluids with high water content (>50% water content) on request

The following principles apply to Aquamicron® technology:

High water content	→	High absorption rate	
Low water content	→	Low absorption rate	
Unsaturated filter element	→	High absorption rate	
Saturated filter element	→	Low absorption rate	
Hydraulic filter area load (l/min/cm²)	↘	Absorption rate Water absorption capacity Residual water content	↗ ↗ ↘
Static pressure	↘	Absorption rate Water absorption capacity Residual water content	= = ↘
Pressure and flow rate fluctuations present		Absorption rate Water absorption capacity Residual water content	↘ ↘ ↗
Dispersant/detergent additives present		Absorption rate Water absorption capacity Residual water content	↘ = ↗

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2. MODEL CODE

(also order example)

0660 R 040 AM /-V

Size
0330, 0500, 0660, 0750, 0850, 0950, 1300, 1700, 2600, 2700

Type
R Return line filter element

Filtration rating in µm
040

Filter material of element
AM Aquamicron®

Supplementary details
V FPM (Viton) seal

3. DETERMINATION OF THE WATER CONTENT G_W PRESENT IN THE SYSTEM

Two methods can be employed to determine the water content G_W present in the system:

- Hydrogen gas method
- Karl-Fischer method to DIN 51777

The hydrogen gas method can be carried out using portable test equipment, e. g. the HYDAC Water Test Kit WTK, however, reading accuracy at water contents below 500 ppm is limited.

The Karl Fischer method on the other hand can only be conducted in the laboratory. It is available from HYDAC Filtration Technology as a laboratory service.

The water content GW is usually given in ppm (parts per million) or in percent (100 ppm corresponds to 0.01%).

3.1 DETERMINATION OF THE WATER RETENTION CAPACITY C_W (CM³)

$q = Q/A$
(recommendation: $q_{max} \leq 0.04$ l/min cm²)

q = specific filtration area load of a filter element in l/min cm²

Q = flow rate in l/min

A = filtration area in cm² (see Point 4.2)

$C_W = K_W \times A$ (cm³)

C_W = Water retention capacity of a filter element in cm³

K_W = specific water retention capacity dependent on the specific filtration area load in q (10^{-3} cm³ H_2O/cm²)

A = filtration area in cm² (see Pt. 4.2)

3.2 WHEN SIZING ELEMENTS WITH THE WATER ABSORBING FILTER MATERIAL AQUAMICRON, WE RECOMMEND USING THE QUICK SIZING TABLES:

Size	Recommended filter flow rate [l/min]	Water absorption capacity [cm³] at Δp = 2.5 bar and a viscosity of 30 mm²/s
330	13 ideal 100 maximum	260 180
500	19 ideal 155 maximum	400 280
660	28 ideal 255 maximum	570 400
750	48 ideal 390 maximum	982 691
850	35 ideal 286 maximum	730 520
950	39 ideal 314 maximum	800 570
1300	54 ideal 437 maximum	1120 790
1700	73 ideal 599 maximum	1505 1059
2600	109 ideal 870 maximum	2230 1570
2700	98 ideal 803 maximum	2020 1422

3.3 CALCULATION OF THE WATER QUANTITY M_W TO BE ABSORBED BY THE FILTER ELEMENT

$m_w = \Delta G_w \times 10^{-3} \times V_T$ (cm³)

m_w = water quantity to be absorbed by filter element in cm³

ΔG_w = Difference between the initial and required final water content in ppm

Please note:
It is impossible to achieve a final water content which is below the saturation level of the hydraulic medium!

V_T = Tank volume in l x 100

4. ELEMENT CHARACTERISTICS

4.1 GRADIENT COEFFICIENTS FOR FILTER ELEMENTS

The gradient coefficients in mbar/(l/min) apply to mineral oils with a kinematic viscosity of 30 mm²/s. The pressure drop changes proportionally to the change in viscosity.

Size	40 µm
330	2.10
500	1.38
660	0.93
750	0.55
850	0.72
950	0.66
1300	0.47
1700	0.36
2600	0.23
2700	0.26

4.2 FILTRATION AREA

Size	cm²
330	2785
500	4259
660	6174
750	9961
850	7949
950	8667
1300	12111
1700	15271
2600	20499
2700	20499

For information on bypass valve curves, please see Filter Element (Quick Selection) brochure no.: E 7.221../..

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.

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