# Intermot IAM and NHM Radial Piston Hydraulic Motor



The Intermot IAM and NHM is single displacement radial piston hydraulic motor with low speed high torque. And that hydraulic motor has such characteristics: perfect reliability, high efficiency, long life, low noise and wide rotation speed range, it has widely applied in the hydraulic and transmission system of construction engineering machinery, lifting, transportation equipment, coal mining, marine industries, plastic machinery, etc.

Technical Performance data

| Model | Displacement cc/rev | Rated Torque N.m | Theoretical Unit Torque N.m/MPa | Rated Pressure MPa / Bar | Max Pressure MPa | Max Speed r/min | Weight KG |
|---|---|---|---|---|---|---|---|
| IAM 150 H1 | 151 | 480 | 24 | 20/ 200 | 28 | 650 | 26 |
| IAM 200 H1 | 207 | 523 | 33 | 16/160 | 25 | 550 | |
| IAM 250 H1 | 235 | 689 | 38 | 16/160 | 25 | 500 | |
| IAM 300 H1 | 318 | 809 | 51 | 16/160 | 25 | 400 | |
| IAM 250 H2 | 254 | 810 | 40 | 20/ 200 | 28 | 600 | 42 |
| IAM 300 H2 | 289 | 920 | 46 | 16/160 | 25 | 500 | |
| IAM 350 H2 | 339 | 864 | 54 | 16/160 | 25 | 420 | |
| IAM 400 H2 | 403 | 1027 | 64 | 16/160 | 25 | 350 | |
| IAM 450 H2 | 451 | 1148 | 72 | 16/160 | 25 | 300 | |
| IAM 400 H3 | 397 | 1265 | 63 | 20/ 200 | 28 | 500 | 68 |
| IAM 450 H3 | 452 | 1440 | 72 | 20/ 200 | 28 | 480 | |
| IAM 500 H3 | 452 | 1562 | 78 | 20/ 200 | 28 | 450 | |
| IAM 600 H3 | 593 | 1890 | 95 | 20/ 200 | 28 | 420 | |
| IAM 650 H3 | 660 | 1680 | 105 | 16/160 | 25 | 400 | |
| IAM 700 H3 | 706 | 1800 | 112 | 16/160 | 25 | 380 | |
| IAM 750 H3 | 754 | 1921 | 120 | 16/160 | 25 | 350 | |
| IAM 700 H4 | 714 | 2260 | 113 | 20/ 200 | 28 | 400 | 92 |
| IAM 800 H4 | 792 | 2520 | 126 | 20/ 200 | 28 | 400 | |
| IAM 900 H4 | 904 | 2860 | 143 | 20/ 200 | 28 | 380 | |
| IAM 1000 H4 | 992 | 3140 | 157 | 20/ 200 | 28 | 320 | |
| IAM 1100 H4 | 1116 | 3540 | 177 | 20/ 200 | 28 | 300 | |
| IAM 1250 H4 | 1247 | 3740 | 187 | 20/ 200 | 28 | 280 | |
| IAM 1400 H4 | 1315 | 3344 | 209 | 16/160 | 25 | 250 | |
| IAM 1400 H5 | 1413 | 4500 | 225 | 20/ 200 | 28 | 300 | 173 |
| IAM 1600 H5 | 1648 | 5248 | 262 | 20/ 200 | 28 | 250 | |
| IAM 1800 H5 | 1815 | 5184 | 288 | 18/180 | 28 | 220 | |
| IAM 2000 H5 | 2035 | 5168 | 323 | 16/160 | 25 | 200 | |
| IAM 2200 H5 | 2267 | 5763 | 360 | 16/160 | 25 | 160 | |
| IAM 3000 H5 | 3041 | 7326 | 483 | 16/160 | 25 | 120 | |
| IAM 2500 H6 | 2553 | 9523 | 405 | 25/ 250 | 32 | 120 | 308 |
| IAM 2800 H6 | 2683 | 10559 | 443 | 25/ 250 | 32 | 120 | |
| IAM 3000 H6 | 3063 | 9135 | 485 | 20/ 200 | 28 | 120 | |
| IAM 3200 H6 | 3218 | 9392 | 500 | 20/ 200 | 28 | 120 | |
| IAM 3500 H6 | 3462 | 10220 | 544 | 20/ 200 | 28 | 120 | |
| IAM 4000 H6 | 4155 | 12481 | 665 | 20/ 200 | 28 | 110 | |
| IAM 3900 H7 | 4155 | 12481 | 665 | 20/ 200 | 28 | 120 | 410 |
| IAM 4600 H7 | 4524 | 13508 | 720 | 20/ 200 | 28 | 120 | |
| IAM 5000 H7 | 4988 | 15900 | 795 | 20/ 200 | 28 | 100 | |
| IAM 5400 H7 | 5499 | 17490 | 875 | 20/ 200 | 28 | 100 | |
| IAM 6300 H8 | 6765 | 18330 | 975 | 20/ 200 | 28 | 125 | 600 ~700 |
| IAM 8000 H8 | 8298 | 23000 | 1223 | 20/ 200 | 28 | 125 | |
| IAM 10000 H8 | 9982 | 25550 | 1669 | 20/ 200 | 28 | 100 | |

# General Information:

# Intermot IAM and NHM Hydraulic Motor

## *HYDRAULIC FLUIDS RECOMMENDATIONS*

## HYDRAULIC FLUIDS

We recommend the use of hydraulic oils with anti-wear additives (ISO HM or HV) and minimum viscosity index of 95.
Once normal working temperature is reached, oil viscosity must be at least 12 cSt, preferably in the range from 20 to 60 cSt.
Hydraulic oils meeting Denison MF-O, Vickers M-2952-S I -286-S performance requirements and DIN 51524 specifications, are preferred.

Mineral hydraulic oils are divided into four main types, designated by the International Standards Organization (ISO) as HH, HL, HM and HV. We advise to use only products with HM or HV specifications.

HM type

These are the most widely employed hydraulic oils. They include small quantities of anti-wear additives to provide significant improvement in wear reduction. "Superior" quality HM type oils can be used for all equipment, with the added assurance that they will be suitable for the highest temperature.

HV type

HV hydraulic oils show minimal change in viscosity with temperature variations.

## OIL VISCOSITY RECOMMENDATION

Room temperature HM type ISO-VG

- -20°C / 0°C BP ENERGOL HLP - HM 22
- -15°C /+5°C BP ENERGOL HLP - HM 32
- -8°C /+15°C BP BNERGOL HLP - HM 46
- 0°C /+22°C BP ENERGOL HLP - HM 68
- +8°C /+30°C BP ENERGOL HLP - HM100
- -20°C /+5°C BP BARTRAN HV 32
- -15°C /+22°C BP BARTRAN HV 46
- 0°C /+30°C BP BARTRAN HV 68

Our motors have been designed to work also with:

- oils type ATF (Automatic Transmission Fluid)
- oils with viscosity SAE 10W - 20 -30
- Multigame motor oils SAE 10 W/40 or 15 W/40
- Universal oils

During cold start-up, avoid high-speed operation until the system is warmed up to provide adequate lubrication.
Continuous working temperature must not exceed 70°C.
When the working conditions cause the oil viscosity decrease under the minimum recommended value, to guarantee a sufficient motor lubrication it is necessary an adequate motor flushing (see flushing page for more details).

## FIRE RESISTANT OIL LIMITATIONS

| | Max cont. pressure | Max int. pressure | Max speed |
|---|---|---|---|
| HFA, 5-95% oil-water | 103 | 138 | 50% |
| HFB, 60-40% oil-water | 138 | 172 | 100% |
| HFC, water-glycol | 103 | 138 | 50% |
| HFD, ester phosphate | 250 | 293 | 100% |

## FILTRATION

Hydraulic systems oil must always be filtered.
The choice of filtration grade derives from needs of service life and money spent. In order to obtain stated service life it is important to follow our recommendations concerning filtration grade.
When choosing the filter it is important to consider the amount of dirt particles that filter can absorb and still operate satisfactorily. For that reason we recommend filters showing when you need to substitute filtering cartridge.

- 25 µm filtration required in most applications
- 10 µm filtration in closed circuit applications

## OXIDATION

Hydraulic oil oxidizes with time of use and temperature. Oxidation causes changes in color and smell, acidity increase or sludge formation in the tank. Oxidation rate increases rapidly at surface temperatures above 60°C, in these situations oil should be checked more often.
The oxidation process increases the acidity of the fluid; the acidity is stated in terms of the "neutralization number". Oxidation is usually slow at the beginning and then it increases rapidly.
A sharp increase (by a factor of 2 to 3) in neutralization number between inspections shows that oil has oxidized too much and should be replaced immediately.

## WATER CONTENT

Oil contamination by water can be detected by sampling from the bottom of the tank. Most hydraulic oils repel the water, which then collects at the bottom of the tank. This water must be drained off at regular intervals. Certain types of transmission oils and engine oils emulsify the water; this can be detected by coatings on filter cartridges or a change in the color of the oil. In such cases, obtain your oil supplier advice.

## DEGREE OF CONTAMINATION

Heavy contamination of the oil causes wear rising in hydraulic system components. Contamination causes must be immediately investigated and remedied.

## ANALYSIS

It is recommended oil being analyzed every 6 months. The analysis should cover viscosity, oxidation, water content, additives and contamination. Most oil suppliers are equipped to analyze oil state and to recommend appropriate action. Oil must be immediately replaced if the analysis shows that it is exhausted.

# Intermot IAM and NHM Hydraulic Motor

## *INSTRUCTIONS AND ADVICES*

### INSTALLATION
Hoses and piping must be clean and free from contamination. No other special requirements are necessary.
- Motor can be mounted in any position
- In run-away conditions you must use counterbalance valves
- Consult factory for intermittent applications

Splined adaptors (sleeves) are available upon request.

### INSTALLATION CIRCUIT
The choice of open or closed loop circuit will be determined by the application.
Open loop circuits are cheaper and simpler to install.
Closed loop circuit is a superior circuit and usually takes up less space. It also offers better control features.

### START UP
Motor case and pistons must be completely filled with oil before starting.
Do not load motor to maximum working pressure. Increase load gradually at start-up.

### CASE DRAIN – CASE PRESSURE
Connect the case drain directly to tank.
The case drain port on the motor must be located on the highest point of the installation to ensure that the motor will always be full of oil. The case drain pressure must not exceed 6 bar continuous pressure.

### IMPORTANT
When the motor is installed vertically with shaft pointing upwards, consult our Technical Department. If the motor is connected to high inertial loads, the hydraulic system must be designed to prevent peaks of pressure and capitation.

### TEMPERATURE
Maximum oil temperature must not exceed 70°C. Heath exchangers must be used with higher temperatures.

### VISCOSITY
The motor works satisfactory in a range of 3°E to 10°E oil viscosity. Best performance is obtained at the highest viscosity.

### BACK PRESSURE
Don't exceed 70 bar back pressure.

### HIGH PEAKS APPLICATIONS
In case of high pressure peaks applications, a Nitemper treatment on cylinders is suggested to increase wear and tear resistance.

### CONTINUOUS HIGH SPEED DUTY
In case of continuous high speed duty, it is suggested to mount a central reinforced bearing on motor shaft, please contact our Technical Department.

### MINIMUM SPEED
Standard minimum speed is about 0.5 to 3 rpm (depending on motor displacement). If you need less speed, it is possible to modify some parts of the distributor.

### FLUSHING
In the need of Flushing, a 2nd drain hole is available upon request. When flushing is not available, it is possible to create an inner motor drain to help cooling.

### COOLING FLOW
If the motor operates in the Intermittent Power zone, it may require a cooling flow of 20 l/min (5 gpm) to keep a drain flow viscosity of 40 cSt minimum.

**FOR MORE DETAILS ON THE ABOVE MENTIONED ARGUMENTS AND FOR ANY FURTHER INFORMATION PLEASE CONTACT OUR TECHNICAL DEPARTMENT.**

## *BEARINGS*

Bearings lifetime depends on the type of bearing, on motor speed and on working loads.
Lifetime is measured by $L_{10}$ which is called "theoretic lifetime". It represents the number of cycles that 90% of identical bearings can effort at the same load without showing wear and tear. It is calculated by the following equation:

$$L_{10} = \left(\frac{C}{P}\right)^p$$

where: C = theoretical dynamic coefficient (depending on the bearing size)
P = radial load
p = exponent (p=3 for ball bearings, p=10/3 for roller bearings)

When you work at constant speed, you can calculate the lifetime in hours with the following equation:

$$L_{10h} = \frac{10^6 \cdot L_{10}}{60 \cdot rpm} = \frac{10^6}{60 \cdot rpm}\left(\frac{C}{P}\right)^p \ [h]$$

When you don't have only radial or axial loads, you have to calculate an equivalent load:

$$P = X \cdot F_R + Y \cdot F_A$$

Where $F_R$ = radial load,
$X$ = radial coefficient,
$F_A$ = axial load,
$Y$ = axial coefficient

While $F_R$ and $F_A$ come from working conditions (i.e. torque), X and Y depend on the type of bearing and on the ratio $\frac{F_A}{F_R}$.

To help you in the expected lifetime calculation, Intermot provides you with an EXCEL calculation sheet. With this instrument you can easily calculate lifetime: you only need to choose the motor model, put speed, pressure and loads.

**For further information or to have the calculation sheet, please contact our Technical Department.**

# Intermot IAM and NHM Hydraulic Motor

## *SHAFT SEAL FEATURES*

Type: BABSL
Form: AS DIN 3760
Material: SIMRIT® 72 NBR 902
SIMRIT® 75 FKM 595

**1. Features**

SIMMERRING® radial shaft seal with rubber covered O.D., short, flexibility suspensed, spring loaded sealing lip and additional dust lip: see Part B/ SIMMERRING®, sections 1.1 and 2.

**2. Material**

Sealing lip and O.D.:

- Acrylonitrile-butadiene rubber with 72 Shore A hardness (designation: SIMRIT® 72 NBR 902)
- Fluoro rubber with 75 Shore A hardness (designation: SIMRIT®75 FKM 595)

Metal insert:

- Plain steel DIN 1624

Spring:

- Spring steel DIN 17223

**3. Application**

For sealing pressurised media without additional backup ring, e. g. for rotational pressure sealing in hydraulic pumps, hydraulic motors, hydrodynamic clutches. Rubber covered O.D. assures sealing in the housing bore even in case of considerable surface roughness, thermal expansion or split housing.

Particularly suitable for sealing low viscosity and gaseous media.

Where high thermal stability and chemical resistance are required, SIMRIT® 75 FKM 595 material should be used.

Additional dust lip to avoid the entry of light and medium dust and dirt.

**4. Operating conditions**

See Part B/ SIMMERRING®, sections 2. 4.

| | | |
|---|---|---|
| Media: | mineral oils, synthetic oils | |
| Temperature: | -40°C to +100°C | (SIMRIT® 72 NBR 902) |
| | -40°C to +160°C | (SIMRIT® 75 FKM 595) |
| Surface speed: | up to 5 m/s | |
| Working pressure: | see diagram 1 | |

Maximum permitted values, depending on other operating conditions.

**5. Housing and Machining Criteria**

See Part B/ SIMMERRING®, sections 2.

| | | |
|---|---|---|
| Shaft: | Tolerance: | ISO h11 |
| | Concentricity: | IT 8 |
| | Roughness: | Ra=0.2-0.8 µm |
| | | Rz=1-4 µm |
| | | Rmax=6 µm |
| | Hardness: | 45-60 HRc Roughness: |
| | | non oriented; |
| | preferably by | plunge grinding |
| Housing: | Tolerance: | ISO H8 |
| | Roughness: | Rmax<25 µm |

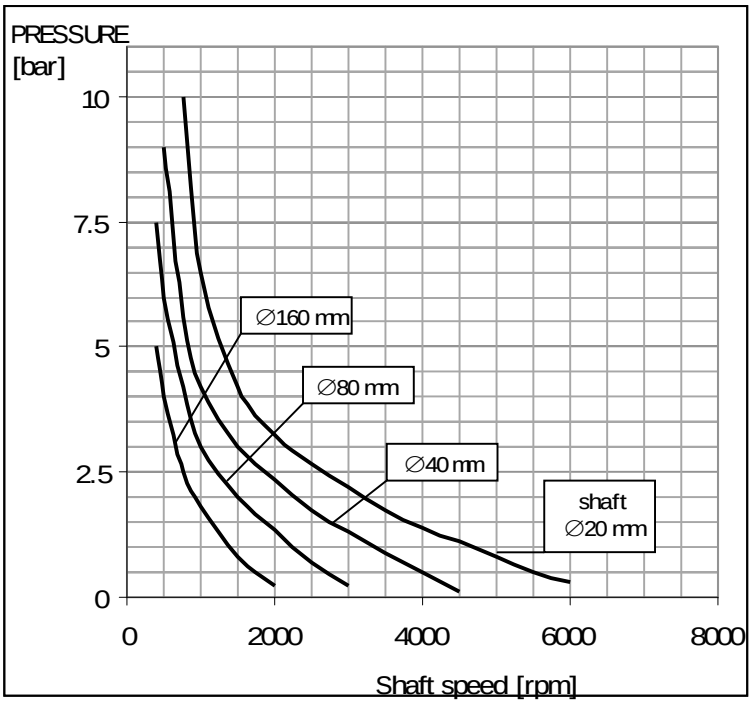


Diagram : Pressure Loading Limits