



# ICM/ICMB

ISO Dimensional Metallic Magnetic Drive  
Chemical Process Pump



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**ITT**

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# ICM/ICMB

## Model ICM

The model ICM/ICMB is a metallic magnetic drive chemical process pump made of Ductile Iron, 316 Stainless Steel, Duplex SS, Alloy 20, Hastelloy and Titanium designed for normal and demanding chemical process applications.

## ISO Dimensional Metallic Magnetic Drive Chemical Process Pump

- Capacities to 340 m<sup>3</sup>/h (1,490 USgpm) at 2,900 rpm and 400 m<sup>3</sup>/h (1,760 USgpm) at 3,500 rpm
- Heads to 160 m (525 feet) at 2,900 rpm and 210 m (685 feet) at 3,500 rpm
- Temperature Range -40°C to 180°C (-40°F to 360°F), optional as ICMP up to 280°C (530°F)
- Pressures to 16 bar (235 PSIG), optionally 25 bar (360 psi); sizes 65-40-315 and 80-50-315: 25 bar (360 psi) standard

## Design Features

- Single-stage, magnetic drive centrifugal pump
- Dimensions and technical design in accordance with EN 22858/ISO 2858/ISO 5199, ISO 15783
- Standard frame-mounted design, alternatively close coupled
- Sealless design eliminates the need for shaft sealing
- Flanges drilled to DIN/ISO, ANSI, BS, JS

## Ease of Maintenance

- Modular design for maximum interchangeability between all 18 pump sizes
- Back pull-out design makes maintenance safe and simple
- Complies with ISO 2858/EN 22858 for retrofit capability

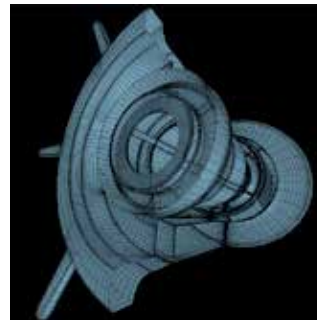
## Applications

- Chemical Process
- Pharmaceutical and Petrochemical Industry
- Food Technology
- Pulp Preparation
- Metal Processing
- General Industry
- Nuclear Power Plants
- Waste Disposal/Recycling Industries
- OEM

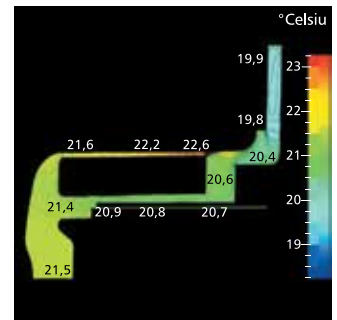
## Design principles: Maximum Customer Value, Safety and Reliability

Special emphasis was paid to:

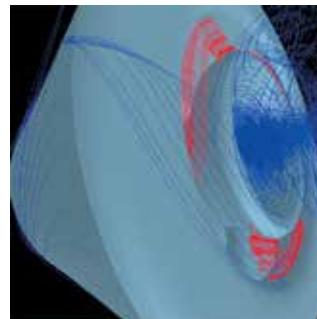
- Reducing customer Life Cycle Cost (LCC) by minimizing maintenance, operating and installation cost
- A comprehensive range of materials and accessories are offered to meet customer needs for a wide range of applications
- Integrated possibilities to connect safety and monitoring devices
- Design standardization and simplification to provide for easy maintenance and to minimize spare parts inventory requirements



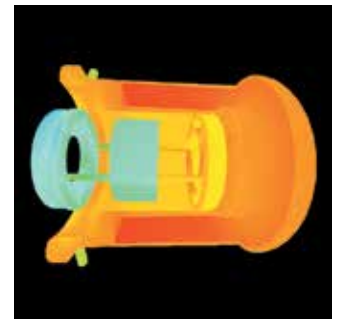
Networking of the body geometries of the ICM



Temperature profile in the can/magnetic drive area during medium conveyance



Flow patterns in the rear can area



Temperature profile in the can/plain bearing area during operation

## Reliable Bearing Cartridge

Plain bearings must run reliably. If, however, pump maintenance is required, it must be performed correctly and often as quickly as possible. The cartridge plain bearing system of the ICM is designed accordingly:



- Fast and simple installation and replacement of the plain bearings, no need for installation settings
- Cartridge design can be rebuilt/refurbished with individual components to minimize spare parts and repair costs
- Radial and thrust plain bearings made of highly abrasion-resistant pure silicon carbide (SSiC) with universal chemical resistance
- In case of a plain bearing failure the encapsulated cartridge design both will act to contain possible silicon carbide (SSiC) fragments and to prevent the inner magnet assembly from contacting the can
- Optionally the Dryguard™ PLUS bearing system can be supplied to provide an optimized dry-running capability. Dryguard™ PLUS has proven its worth in thousands of operating chemical process pumps

## Hastelloy Containment Shell

The can is the most important sealing element against the atmosphere. This component was thus carefully examined during the development phase. The pressure and flow conditions inside the can were illustrated, simulated and analyzed using a computer.



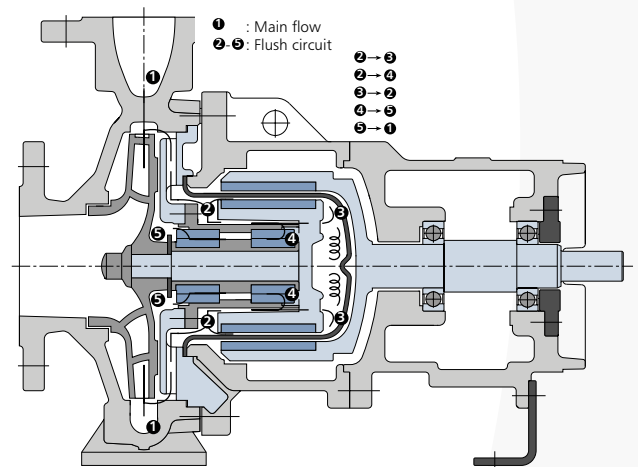
The can is therefore optimally designed.

- Hastelloy C4 (2.4610) as standard, deep-drawn non-welded design for reliable corrosion resistance
- Vortex breaking bead at the bottom of the can prevents against erosion of the can
- Burst pressure > 150 bar (> 2,175 psi)
- Large clearances (1.5 mm/ 1/16") between the can and the inner magnet assembly allow for greater reliability in solid laden services or with higher viscous media

## Engineered Flush Circuit

A reliable flush circuit is important for heat dissipation, lubrication of the plain bearings and solids handling without clogging. The heat produced in the metallic can by eddy currents must be controlled to prevent against flashing because dry-running/inadequate lubrication and overheating are the most important causes of sealless pump downtimes and failures.

Coupling years of ITT's sealless pump experience and using modern CFD (computational fluid dynamics) methods, an effective and reliable flush circuit has been designed during the development stages of the ICM. The flush circuit is enhanced by special design features in the inner magnet assembly, can and plain bearing cartridge to guarantee reliable pumping even under the most demanding applications. Rigorous testing has been completed to confirm its reliability.



## Solids Handling Capability

Based on extensive testing the ICM has shown to be capable of pumping liquids which contain highly abrasive powders without any breakdowns or detectable signs of wear. Admissible solids contents need to be checked case by case.

# ICM/ICMB

## Design Features for a Wide Range of Applications in the Chemical Process Industry

### IMPELLER

- Precision-cast stainless steel, optionally Hastelloy and other material
- Back vanes or balance holes reduce axial thrust
- Optional suction inducer:
  - reduces the NPSHr by 35-50%
  - permits smaller pumps at higher speeds = lower costs
  - is advantageous for media with gas content

### INNER MAGNET ASSEMBLY

- Inner magnet assembly with encapsulated magnets
- Integral axial vanes assure positive pressurized flushing flow to both lubricate and cool the plain bearings

### CASING

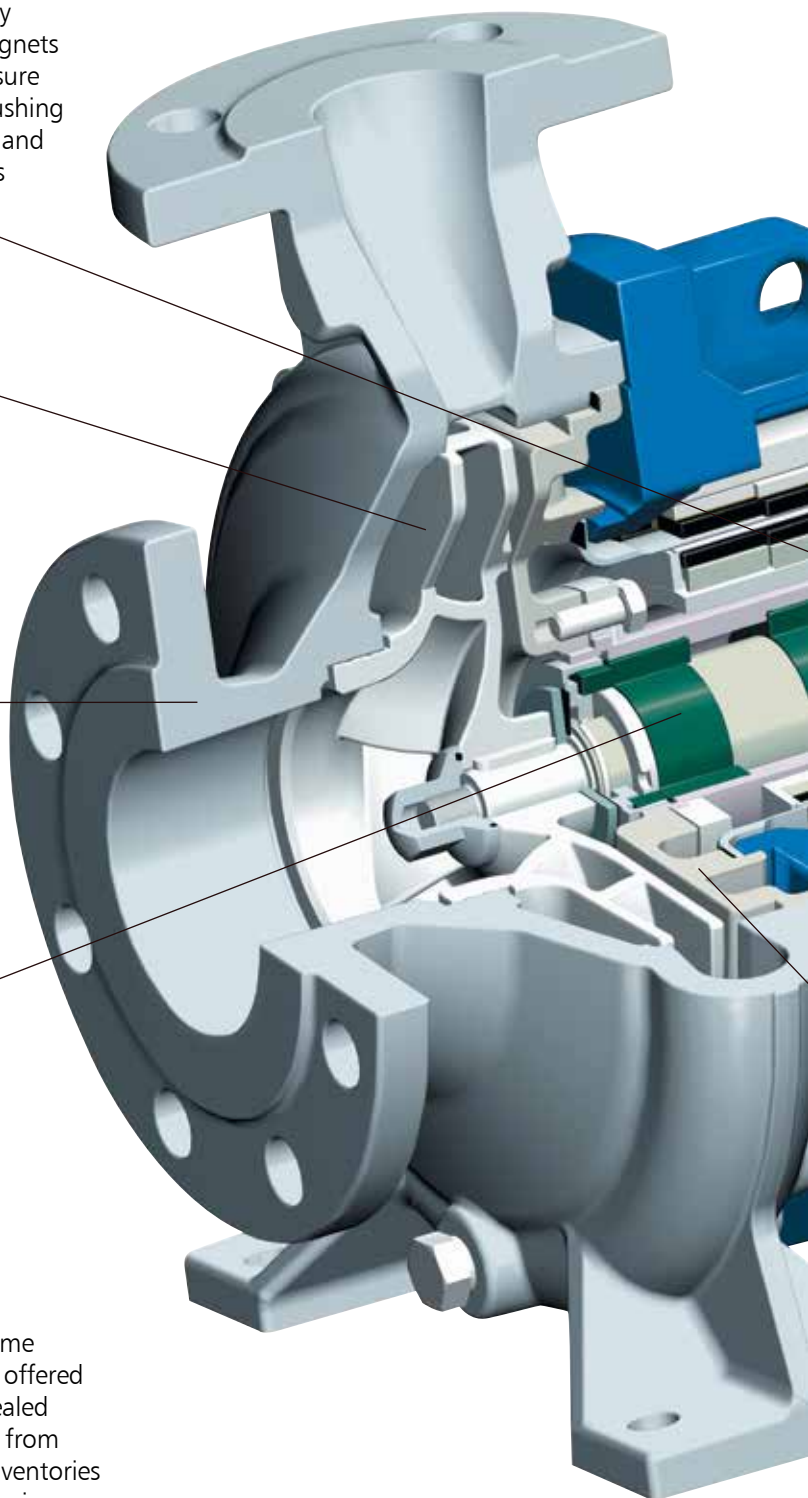
- Minimum corrosion allowance: 3mm
- Standard 3/8" housing drain connection
- Replaceable housing wear ring (optional)
- Integrated connections for pressure and temperature monitors
- Jacketed housing for media heating or cooling on request

### BEARING CARTRIDGE

- Standard Pure Silicon Carbide SiC (SSiC), highly abrasion-resistant, with universal chemical resistance
- Cartridge design eliminates measurements and fitting for simplified maintenance
- Optional Dryguard PLUS dry-running bearing system provide added safety during upset conditions
- High level of safety even in the event of plain bearing failure

### EXCELLENT PUMP HYDRAULICS

The ICM utilizes the same hydraulic components offered on the mechanically sealed IC series. Users benefit from reduced repair parts inventories due to this hydraulic design standardization



### PUMP CONDITION MONITORING

The ICM is prepared for the attachment of a variety of monitoring and control devices.

### CAN

- Hastelloy C4 (2.4610) as standard
- Non-welded, deep-drawn one-piece construction
- Rated for an operating pressure of 25 bar (360 psi), burst pressure > 150 bar (2175 psi)

### DRIVE MAGNET ASSEMBLY WITH HIGH-PERFORMANCE PERMANENT MAGNETS

- Coupling ratings of up to 330 Nm (100 kW at 2900 rpm), variable through modular design
- Integral outer thrust ring prevents against contact with the can in the event of a roller bearing failure, Spark-free as an option

### STURDY FRAME

- Standard grease-for-life bearings
- Options: flood oil lubrication with extra large oil volume, oil sump cooling, labyrinth oil seals

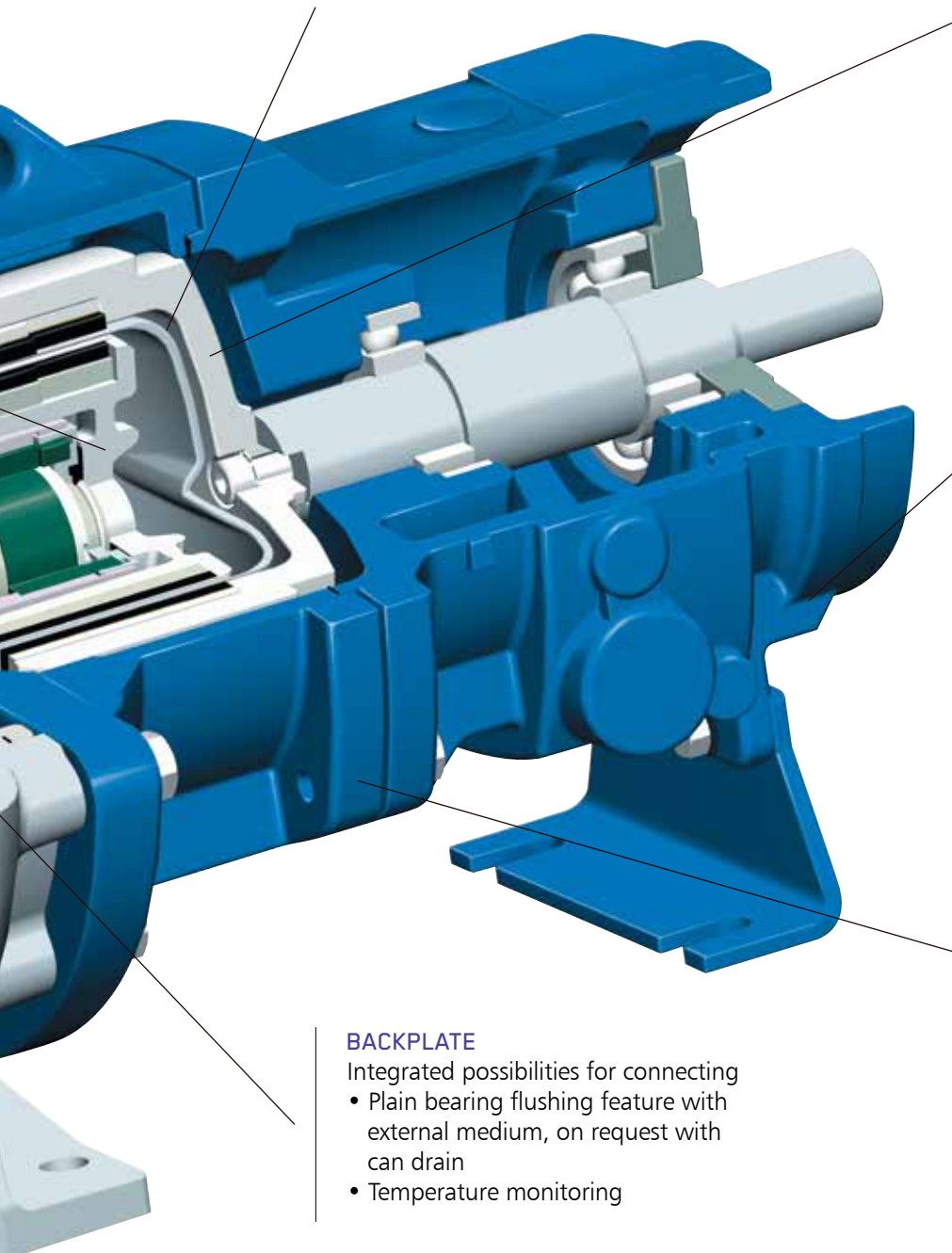
### SIMPLIFIED ASSEMBLY AND DISASSEMBLY

- The number of "loose" components has been minimized due to its modular design concept
- High component interchangeability within the frame size groups
- No special tools required
- No fitting measurements
- Split lantern/bearing pedestal design: Allows for maintenance of the drive side while keeping the liquid end assembled and pressurized ("back pull out design")

### BACKPLATE

Integrated possibilities for connecting

- Plain bearing flushing feature with external medium, on request with can drain
- Temperature monitoring



# Pump Control and Monitoring

When a sealless pump is specified the Number One user concern is safe and leak free operation, especially when noxious, toxic, carcinogenic and other hazardous materials are conveyed.

The ICM has been designed such that most condition monitoring and speed control devices can be easily and economically installed and retrofitted. The following condition monitoring options are available:

1. Pump speed control (PumpSmart®, etc)
2. Temperature monitor
3. Flow and filling level monitor
4. Pressure monitor
5. Motor load monitor
6. Can temperature monitor
7. Can leakage sensor in the lantern
8. Rolling bearing monitor
9. Connection for external flush supply
10. Secondary sealing: The space around the can can be sealed against the rolling bearings by means of special shaft or labyrinth seals.

Customized solutions on request.

If the can is damaged, the drive side and atmosphere would be protected against the medium for a certain time. Therefore, in conjunction with one of the can monitors, this results in an effective preventive environmental protection in the case of critical media.

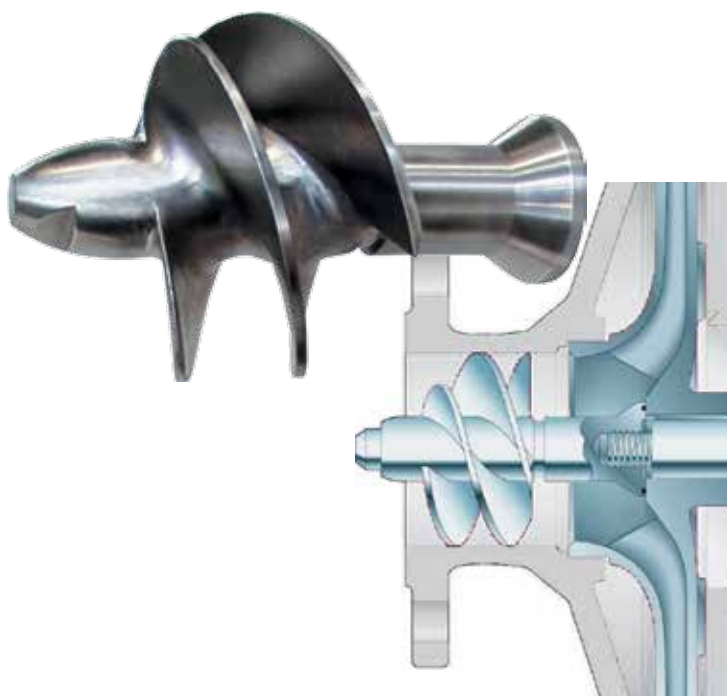
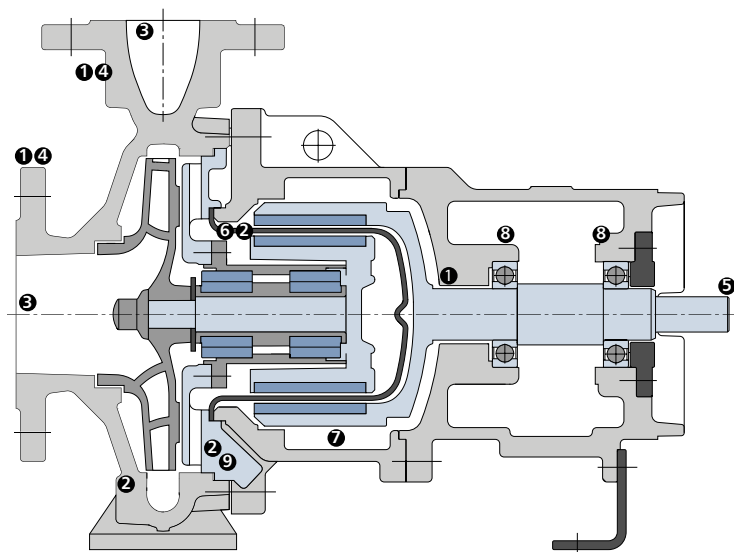
## Inducer

As an option all ICM pumps can be fitted with a suciton inducer.

The inducer

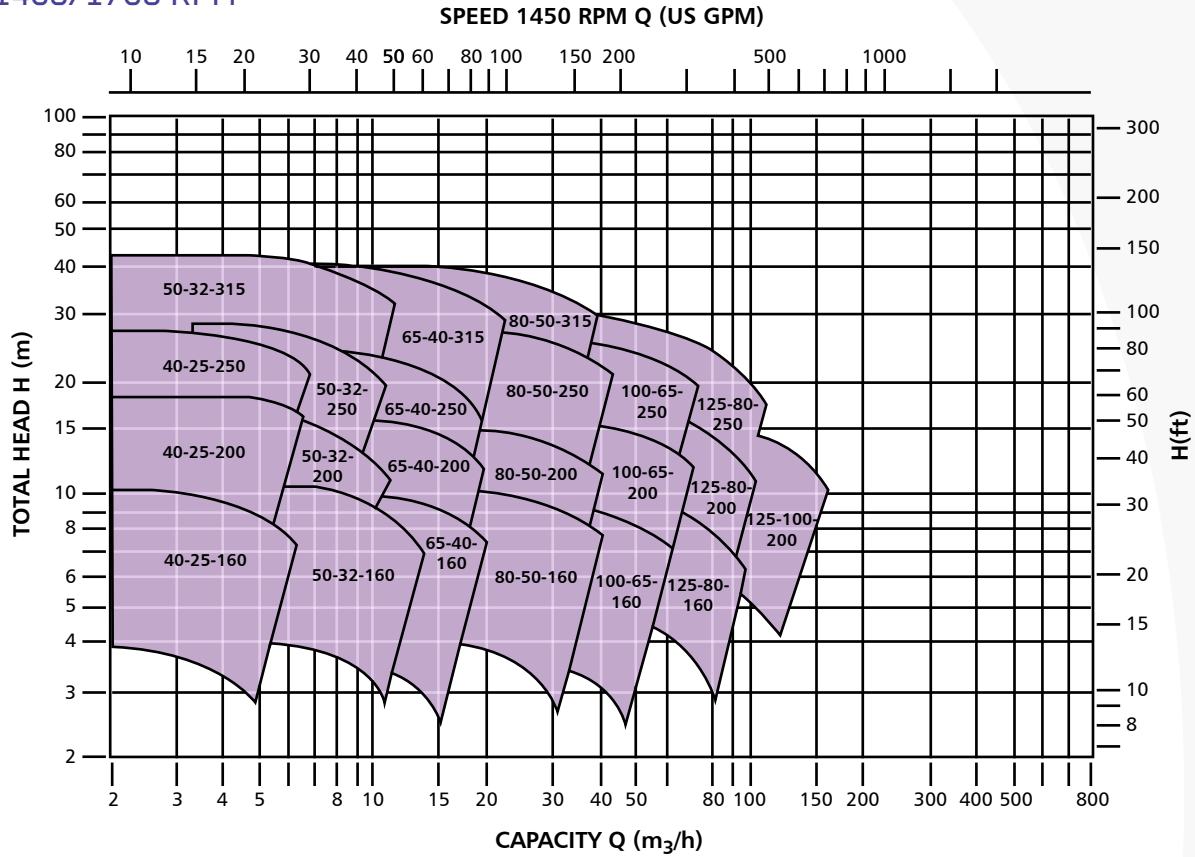
- reduces the NPSHr by 35-50%
- permits smaller pumps at higher speeds for lower installation costs
- is advantageous for media with entrained gas, high vapor pressures or specific heats

ITT's inducer technology has been proven practice for over thirty years.

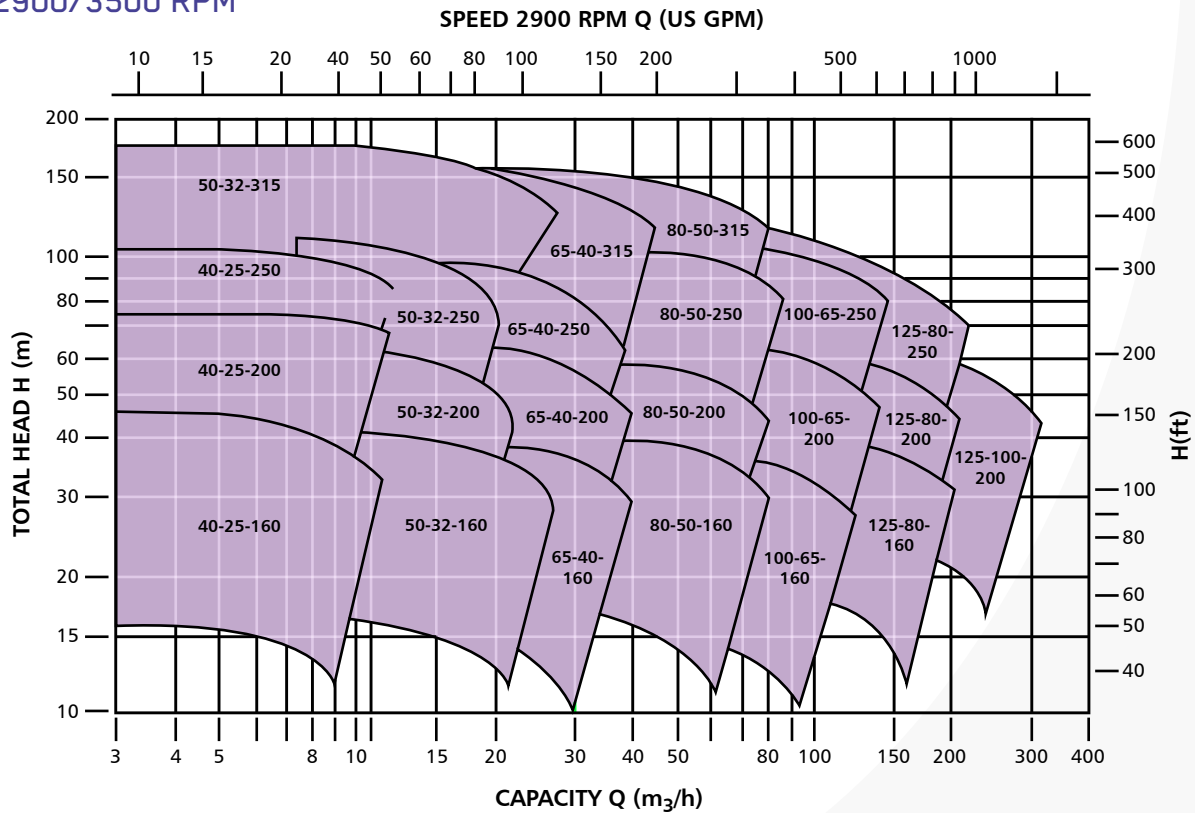


# Hydraulic Coverage

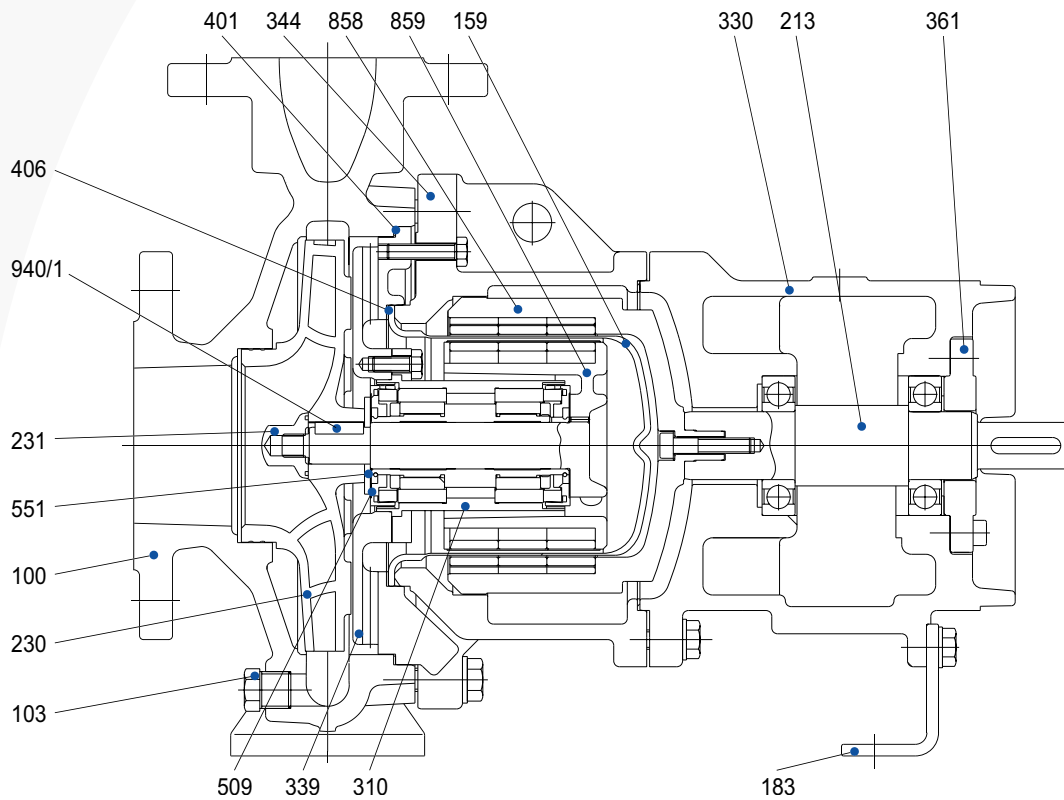
1450/1750 RPM



2900/3500 RPM



# Parts List and Materials of Construction



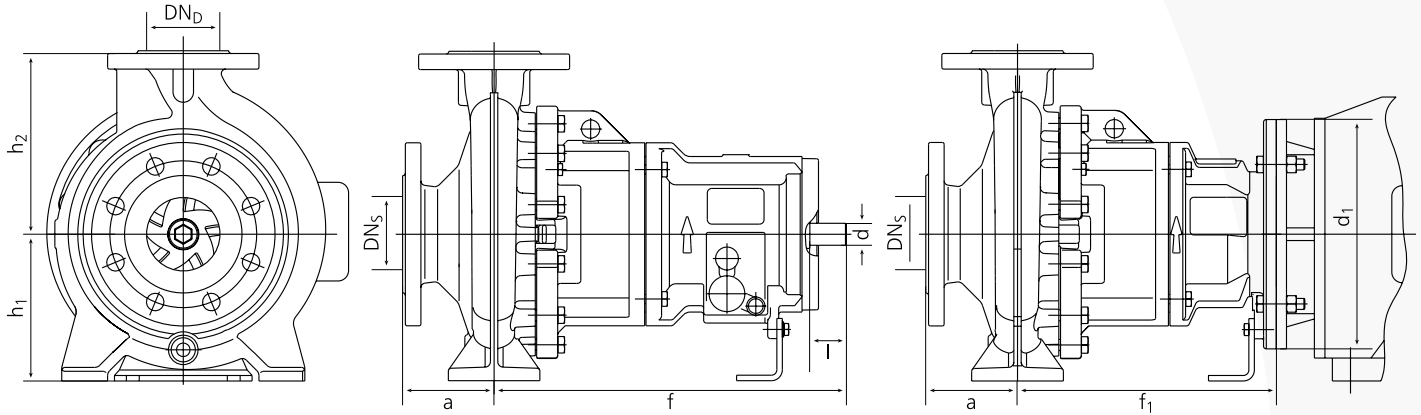
| Item No | Part Designation        | Stainless steel (W)         | Duplex (WW) | Ductile cast iron (NL) | Ductile cast iron/stainl. steel | Hastelloy (CC)     | Alloy 20 (AA) |
|---------|-------------------------|-----------------------------|-------------|------------------------|---------------------------------|--------------------|---------------|
| 100     | Housing                 | 1.4408                      | 1.4517      | .07043                 |                                 | Hastelloy          | Details       |
| 230     | Impeller                | 1.4408                      | 1.4517      | 0.6025                 | 1.4408                          | Hastelloy          | on request    |
| 339     | Plain bearing pedestal  | 1.4408                      | 1.4517      | 1.4408                 |                                 | Hastelloy          |               |
| 310     | Plain bearing cartridge | Duplex 1.4462/SSiC          |             |                        |                                 | Hastelloy          |               |
| 859     | Inner mag. ass./Magnets | Duplex 1.4517/NdFeB         |             |                        |                                 | Hastelloy          |               |
| 159     | Can                     | Hastelloy C4 2.4610         |             |                        |                                 |                    |               |
| 231     | Impeller nut            | Duplex 1.4517               |             |                        |                                 | Details on         |               |
| 551     | Distance washer         | 1.4571                      |             |                        |                                 | request            |               |
| 940/1   | Key (impeller)          | 1.4571                      |             |                        |                                 |                    |               |
| 401     | Housing gasket          | Asbestos-free aramide fibre |             |                        |                                 |                    |               |
| 406     | Can gasket              | Asbestos-free aramide fibre |             |                        |                                 |                    |               |
| 509     | Intermediate ring       | Graphite                    |             |                        |                                 |                    |               |
| 344     | Lantern                 | 0.7043                      |             |                        |                                 |                    |               |
| 858     | Drive mag. ass./Magnets | 0.6020/NdFeb                |             |                        |                                 |                    |               |
| 330     | Bearing pedestal        | 0.6025                      |             |                        |                                 |                    |               |
| 213     | Drive shaft             | 1.4021                      |             |                        |                                 |                    |               |
| 361     | Rear bearing cover      | 1.0601                      |             |                        |                                 |                    |               |
| 183     | Support bracket         | 1.0037                      |             |                        |                                 |                    |               |
| 103     | Housing drain plug      | Stainless steel             |             |                        |                                 | Details on request |               |
|         | Screws, nuts etc.       | Stainless steel             |             |                        |                                 |                    |               |

## Options not shown:

|     |                       |               |               |        |           |            |
|-----|-----------------------|---------------|---------------|--------|-----------|------------|
| 236 | Inducer               | Duplex 1.4462 |               |        | Hastelloy | Details on |
| 502 | Housing wear ring     | 1.4410        | Duplex 1.4439 | 1.4410 | Hastelloy | on request |
| 642 | Oil level sight glass | Plastic/glass |               |        |           |            |

# Pump Dimensions

## Material Comparison Tables



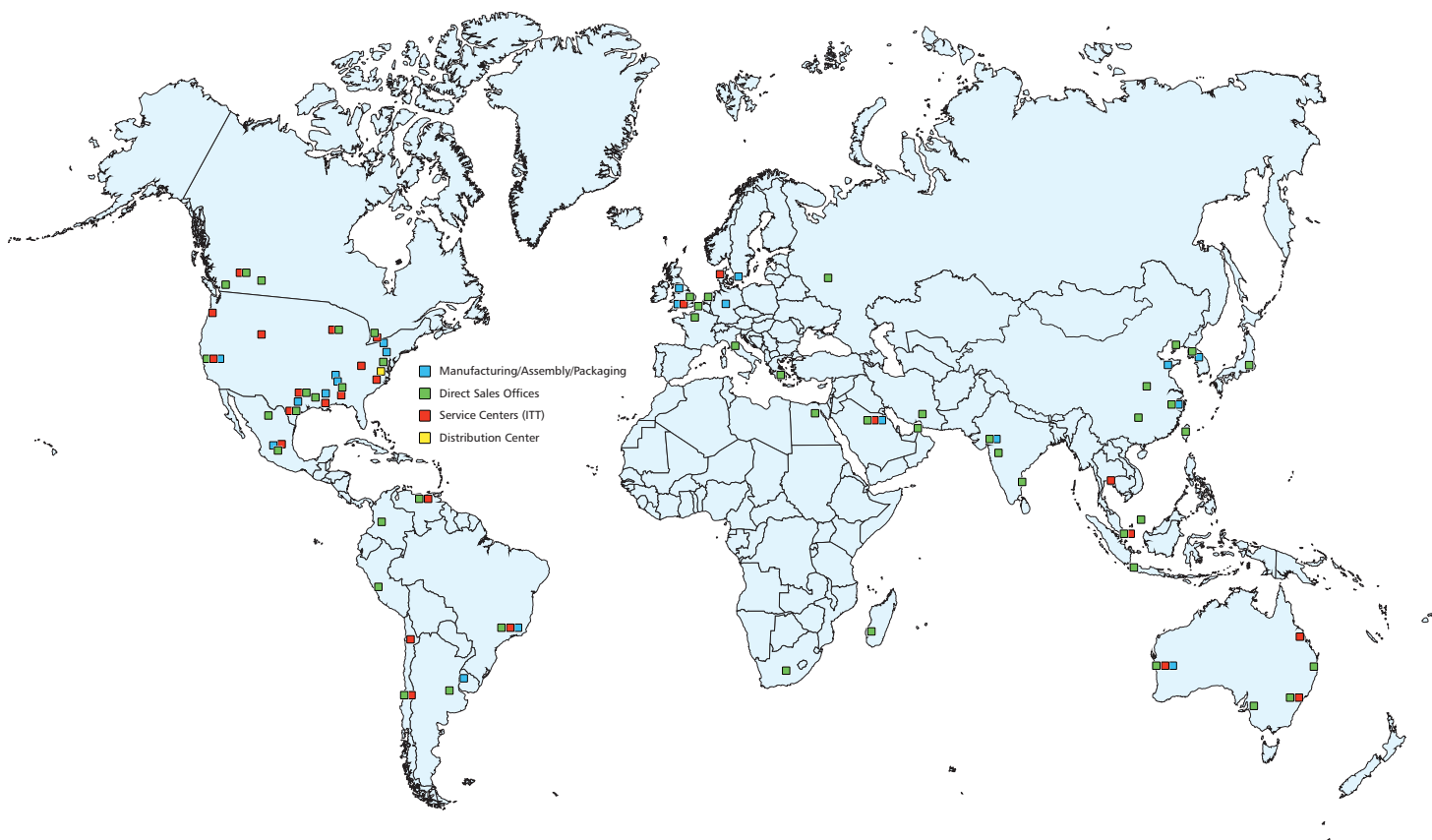
All dimensions in mm

| Pump Size   | Flanges         |                 | Pump |     |                |                | Shaft end |    | Weight<br>min<br>(kg) |
|-------------|-----------------|-----------------|------|-----|----------------|----------------|-----------|----|-----------------------|
|             | DN <sub>S</sub> | DN <sub>D</sub> | a    | f   | h <sub>1</sub> | h <sub>2</sub> | d         | l  |                       |
| 40-25-160   | 40              | 25              | 80   | 385 | 132            | 160            | 24        | 50 | 58                    |
| 40-25-200   | 50              | 32              | 80   | 385 | 132            | 160            | 24        | 50 | 59                    |
| 40-25-250   | 50              | 32              | 80   | 385 | 160            | 180            | 24        | 50 | 67                    |
| 50-32-160   | 50              | 32              | 100  | 500 | 180            | 225            | 32        | 80 | 119                   |
| 50-32-200   | 40              | 25              | 80   | 385 | 160            | 180            | 24        | 50 | 64                    |
| 50-32-250   | 40              | 25              | 100  | 500 | 180            | 225            | 32        | 80 | 115                   |
| 50-32-315   | 50              | 32              | 125  | 500 | 200            | 250            | 32        | 80 | 145                   |
| 65-40-160   | 65              | 40              | 80   | 385 | 132            | 160            | 24        | 50 | 60                    |
| 65-40-200   | 65              | 40              | 100  | 385 | 160            | 180            | 24        | 50 | 69                    |
| 65-40-250   | 65              | 40              | 100  | 500 | 180            | 225            | 32        | 80 | 119                   |
| 65-40-315   | 65              | 40              | 125  | 500 | 200            | 250            | 32        | 80 | 155                   |
| 80-50-160   | 80              | 50              | 100  | 385 | 160            | 180            | 24        | 50 | 63                    |
| 80-50-200   | 80              | 50              | 100  | 385 | 160            | 200            | 24        | 50 | 70                    |
| 80-50-250   | 80              | 50              | 125  | 500 | 180            | 225            | 32        | 80 | 121                   |
| 80-50-315   | 80              | 50              | 125  | 500 | 225            | 280            | 32        | 80 | 160                   |
| 100-65-160  | 100             | 65              | 100  | 500 | 160            | 200            | 32        | 80 | 107                   |
| 100-65-200  | 100             | 65              | 100  | 500 | 180            | 225            | 32        | 80 | 112                   |
| 100-65-250  | 100             | 65              | 125  | 500 | 200            | 250            | 32        | 80 | 132                   |
| 125-80-160  | 125             | 80              | 125  | 500 | 180            | 225            | 32        | 80 | 114                   |
| 125-80-200  | 125             | 80              | 125  | 500 | 180            | 250            | 32        | 80 | 120                   |
| 125-80-250  | 125             | 80              | 125  | 500 | 225            | 280            | 32        | 80 | 143                   |
| 125-100-200 | 125             | 100             | 125  | 500 | 200            | 280            | 32        | 80 | 126                   |

| Motor-dependent pump dimensions for close-coupled version |            |                |                |
|-----------------------------------------------------------|------------|----------------|----------------|
| Pump size                                                 | Motor size | f <sub>1</sub> | d <sub>1</sub> |
| 40-25-160                                                 | 80         | 275.5          | 200            |
| 50-32-160                                                 | 90         | 275.5          | 200            |
| 65-40-160                                                 | 100        | 275.5          | 250            |
| 80-50-160                                                 | 112        | 275.5          | 250            |
| 40-25-200                                                 | 132        | 295.5          | 300            |
| 50-32-200                                                 | 160        | 325.5          | 350            |
| 65-40-200                                                 | 180        | 325.5          | 350            |
| 80-50-200                                                 | 200        | 325.5          | 400            |

| Material comparison table |                            |                      |                      |
|---------------------------|----------------------------|----------------------|----------------------|
| Cast materials            | ICM standard               | Equivalent standards |                      |
|                           |                            | DIN                  | ASTM                 |
| Cast iron                 | EN-GJL-250 (JL040)         | 0.6025               | A48, Class 35 B      |
| Duct. cast iron           | (JS1025) 400-18-LT EN-GJS- | 0.7043               | A395, grade 60-40-18 |
| Stainless steel           | 1.4408                     | 1.4408               | A743, CF-8M          |
| Duplex                    | 1.4517                     | 1.4517               | A744 CD4-MCu         |
| Alloy 20                  | 1.4536                     | 1.4536               | A743 CN-7M           |
| Hastelloy C               | V2.4811                    | 2.4811               | A494N-12MV           |
| Hastelloy B               | V2.4810                    | 2.4810               | A494CX 2MV           |

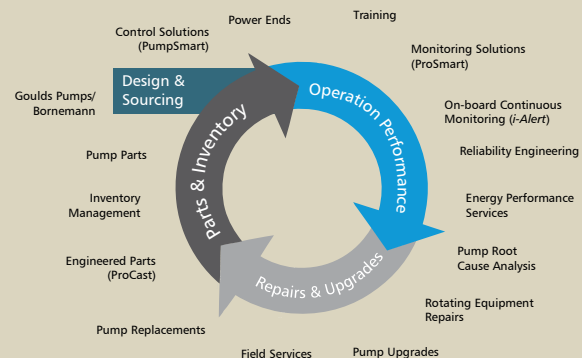
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