# Volute Pumps

**for heat carrier oils up to bis 350 °C**

## ZTI 40-160 . . . 100-160

### TECHNICAL DATA

| | |
|---|---|
| Output: | max. 200 m³/h |
| Delivery head: | max. 60 m |
| Speed: | max. 3600 rpm |
| Temperature: | max. 350 °C |
| Casing pressure: | PN 16 |
| Shaft sealing: | mechanical seal,<br>radial shaft seal ring |
| Flange connections: | DIN 2501 PN 16 |
| Sence of rotation: | clockwise, when seen from drive on the pump |

### APPLICATION

Volute pumps of the series ZTI in inline design have been developed as space saving and easy-to-install pumping units, especially for the circulation of mineral and synthetic heat carriers in

primary
secondary and
tertiary

circuits.

In compact design they are also applicable successfully in heat transfer plants as main circulation pumps; for reasons of their constructional features they offer the plant manufacturer absolutely new possibilities for his plant conception.

### DESIGN

Single-stage pump units in compact design with nominal performances as per DIN 24255 / EN 733. Suction and discharge orifices are arranged in line with each other for direct installation in the pipe work.

Electric motor and pump do not have a common shaft; standard motors as per list are applied.

The back pull out construction permits the dismounting of the complete pull-out unit without removing the pump casing out of the pipe work. The separate pump shaft and motor shaft connected by a plug-in coupling make possible to dismount resp. replace the motor without touching the pump.

The DIN 4754 specifications are complied with.

At present, the programme comprises 9 pump sizes.

### CONSTRUCTION

**Casing pressure:**

Max. 16 bar from 0 °C to 120 °C
Max. 13 bar from 120 °C to 300 °C
Max. 10 bar from 300 °C to 350 °C
Intermediate values can be interpolated
**Please note:**
Technical rules and safety regulations.
Casing pressure = inlet pressure + zero delivery head
Permissible inlet pressure (system pressure) 5 bar.
Permissible inlet pressure = permissible casing pressure at shaft sealing CDC

**Position of branches:**

Suction and discharge orifice arranged radially in line.

**Flanges:**

The flanges correspond to DIN 2533/PN 16. Flange design drilled as per ANSI 150 is possible

**Hydraulic:**

Code of this construction: A·

**Bearing:**

A groove ball bearing acc. to DIN 625, grease lubricated for service life, a liquid surrounded step bearing in the pump. Code of this construction: ·A

**Sense of rotation:**

Clockwise when seen from drive on the pump.

**Shaft sealing:**

| | |
|---|---|
| Code 002: | several radial shaft seal rings arranged in series, uncooled<br>temperature range: 0 °C to 350 °C |
| Code CDC: | unbalanced mechanical seal<br>temperature range: 0 °C to 350 °C |

**Material design:**

| Item | COMPONENT PARTS | MATERIAL DESIGN 1B |
|---|---|---|
| 10.10 | volute casing | GGG 40.3 |
| 16.10 | casing cover | |
| 21.00 | shaft | X 20 Cr 13 |
| 23.00 | impeller | GG 25 |
| 34.00 | bearing bracket | |
| 42.13 | shaft seal radial shaft seal ring 002 | viton |
| 43.30 | mechanical seal CDC | chrome cast |
| 44.10, 44.11 | casing shaft seal | CK 45 |
| 54.51 | bush | carbon |

**Casing seal:**

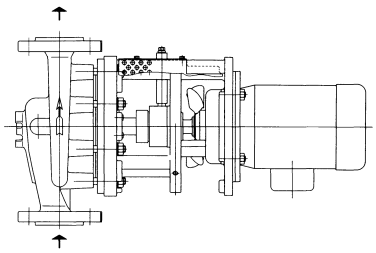
The casing is sealed by a flat type seal of special paper. Code of this construction: 2

**Drive / Speed:**

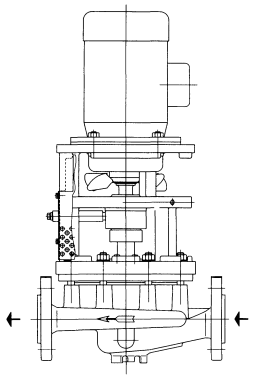
By commercial electric motors, type IM B 5 resp. IM V 1.
The max. admissible speed n = 3600 rpm, out of pump size 100-160 (max. speed n = 3000 rpm).

**Mounting position:**

ZTI pumps can be mounted either horizontally or vertically into pipe systems with sufficient carrying capacity, with this the drive power has to be taken into consideration:



Horizontal installation up to 7,5 kW



Vertical installation up to 7,5 kW possible, from 11 kW necessary.
For this particular purpose a taphole is provided in the pump casing (see dimensions table).

**Please note:**
The installation of the motor below the pump is, for reasons of operating safety, not allowed.
The installation of compensators is **not** necessary. **Saving of costs!**

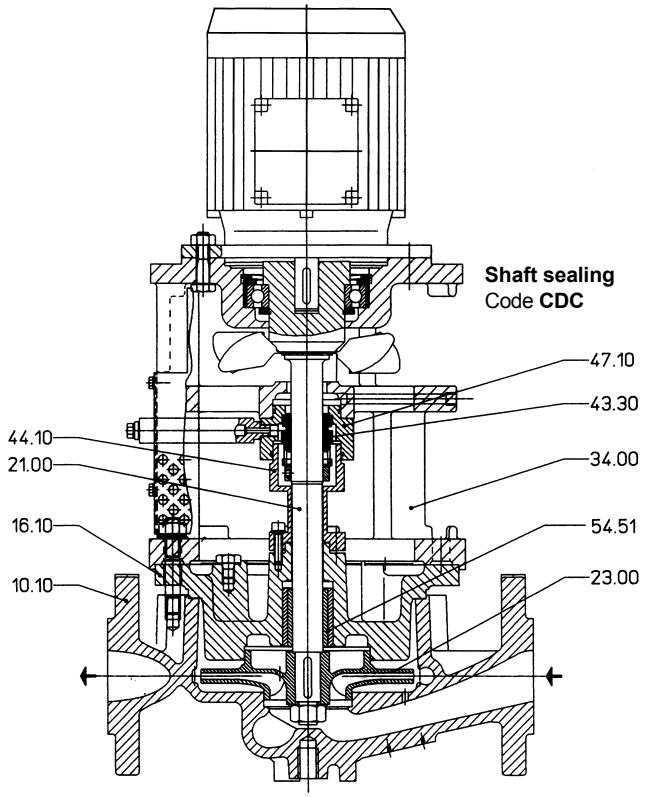
**General comments:**

For the equipment of heat carrier plants, a complete programme is available for a flow range between 1 - 1000 m³/h including the following additional series:

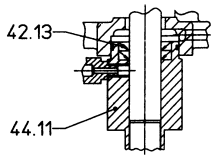
Series **ZTN** standard heat carrier pump; dimensions and nominal performances acc. to DIN 24255/EN 733, additionally pump sizes exceeding the standard
Series **ZTK** close coupled construction, magnetic coupling up to 400 °C
Series **AEH** self-priming special side channel pump, inline design

Technical documentation regarding these programmes will readily be supplied on request.

## Sectional drawing and Nomenclature

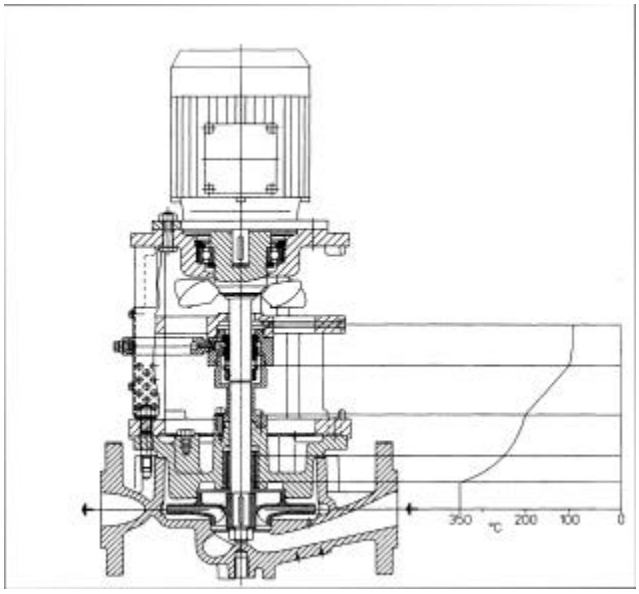



**Shaft sealing**
Code **002**

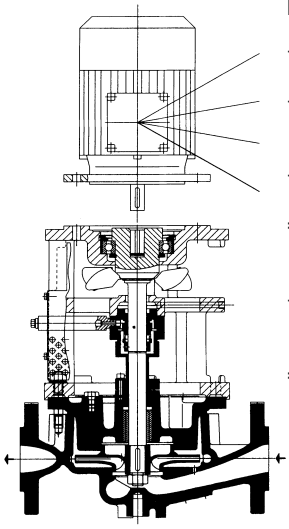



| | |
|---|---|
| 10.10 | Volute casing |
| 16.10 | casing cover |
| 21.00 | shaft |
| 23.00 | impeller |
| 34.00 | bearing bracket |
| 42.13 | radial shaft seal ring |
| 43.30 | mechanical seal |
| 44.10,44.11 | casing shaft seal |
| 54.51 | bush |

**Heat blocking / shaft sealing / bearings**




Heat transfer plants have reached a high state of technical development. Therefore pumps handling heat carriers are facing, with regard to safety of operation, environmental neutrality, maintenance facility, and operating costs, much severer requirements now than in former times. The type ZTI based on many years of experience and on the most up-to-date know-how, fully complies with these requirements.
By the heat blocking, behind the cover, with integrate throttling clearance a favourable temperature lowering towards the drive end is reached (see above figure). Heat losses of the product handled are effectively prevented (energy saving). The temperature lowering makes possible the safe use of a single, uncooled type of shaft sealing. As the lubricating qualities of heat carrier oils are not very good for antifriction bearings, at impeller side a liquid surrounded step bearing is installed. The external antifriction bearing in the bearing bracket is not in contact with the heat carrier and causes no problems. Noiseless operation and long durability are attained.



**Motor combination**

+ type IM B 5
  or IM V 1
+ protection IP type up to
  e II (Ex)

+ speed 50 and 60 cycles

= motor at your choice

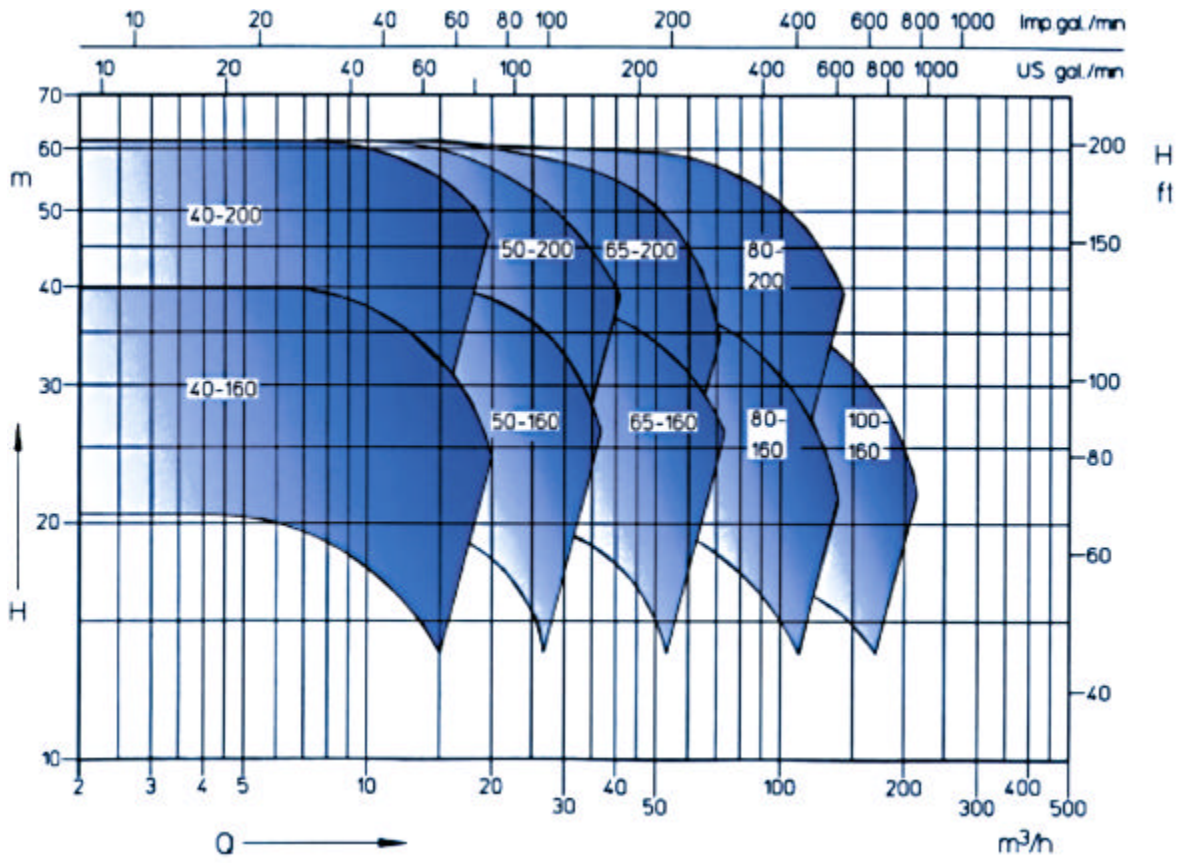
+ shaft sealing
  pumping unit

= readiness for operation

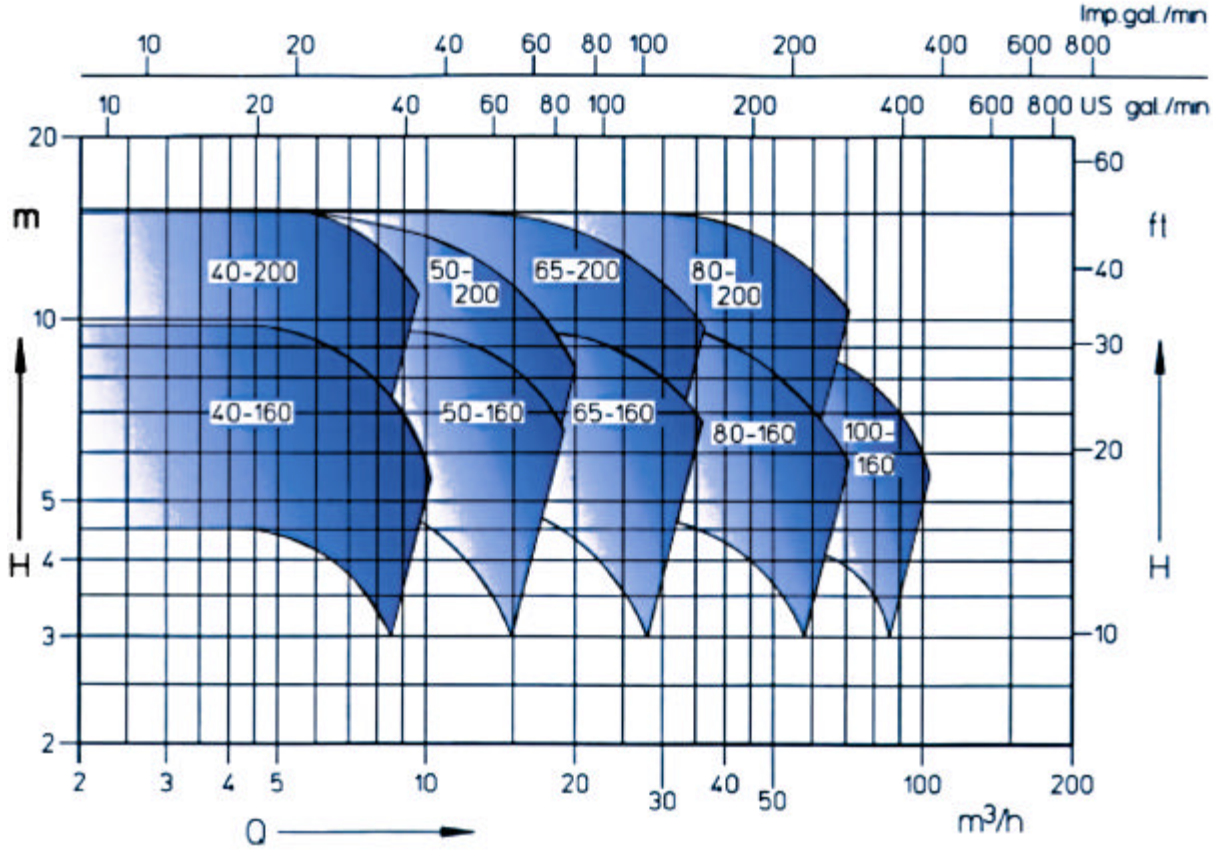
*shaft end as per DIN 748 T 3
key as per DIN 6885 T 1
flanges as per DIN 42677

In case of necessity the motor can be changed in the unit without draining the pipe work. The pump unit remains as **„shaft tight armature“** in the pipe work and so the readiness for operation in increased.

**Performance graph** **n = 2900 rpm**

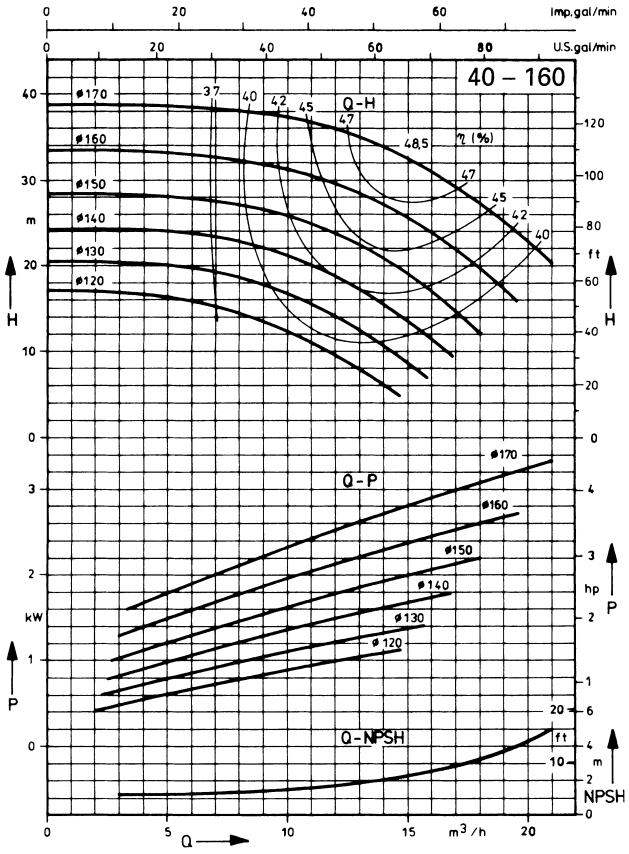


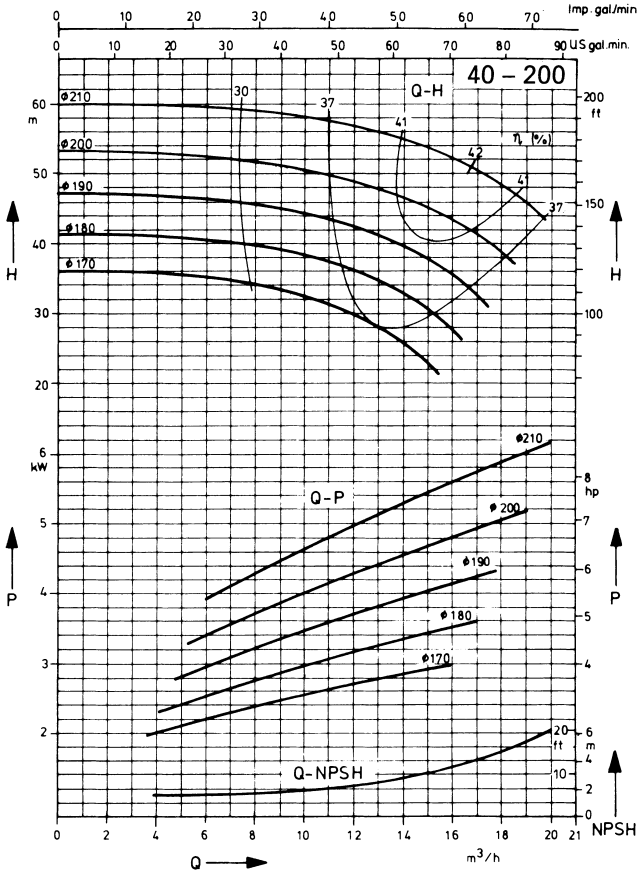

**Performance graph** **n = 1450 rpm**

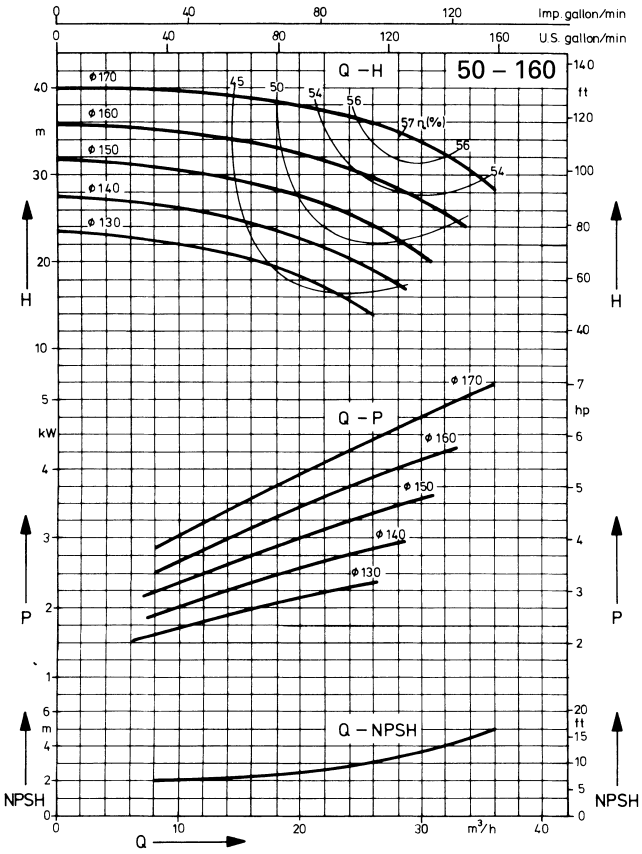


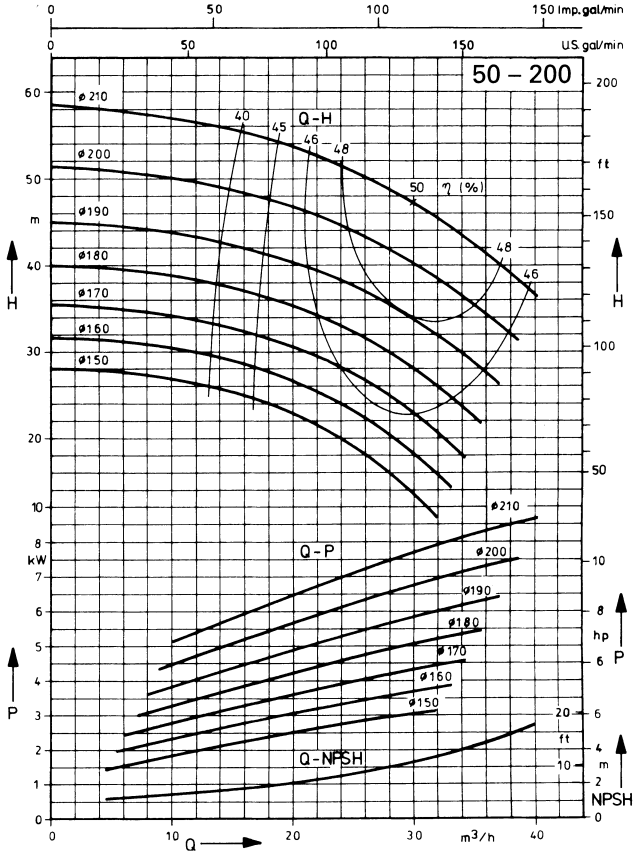
## Characteristic curves

**n = 2900 rpm**



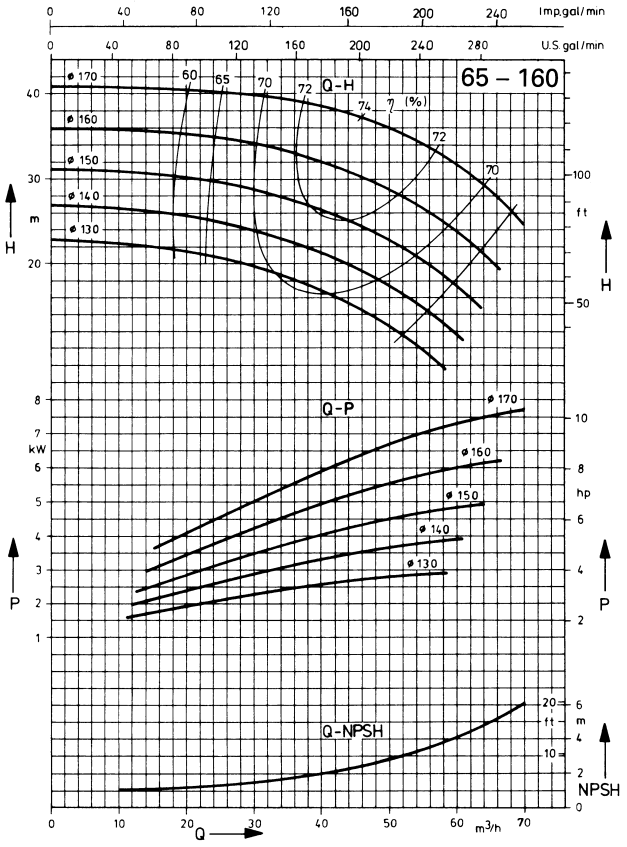



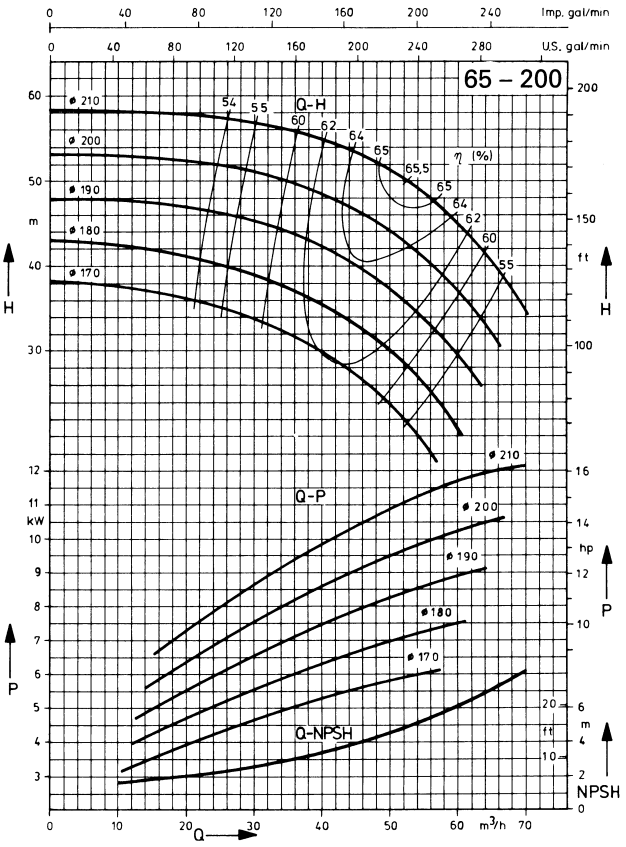



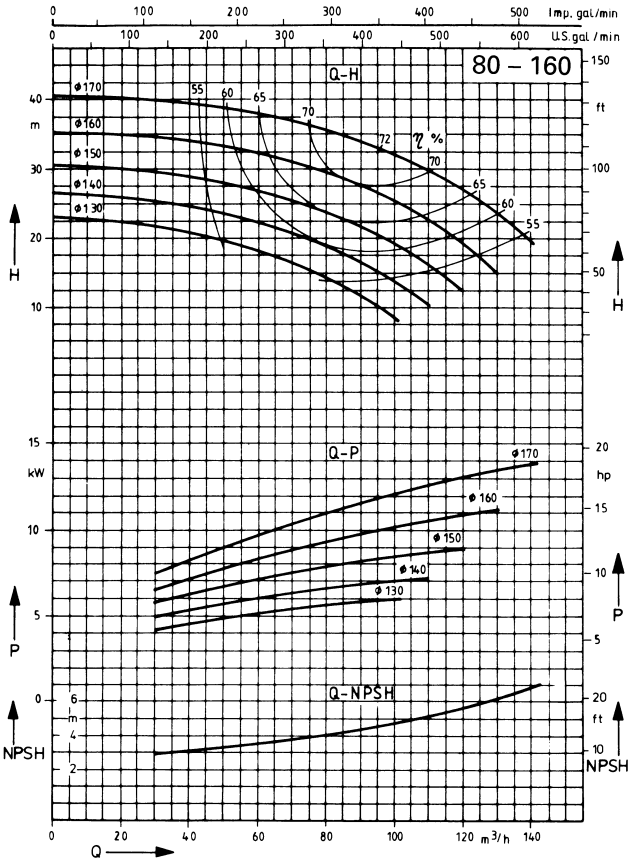



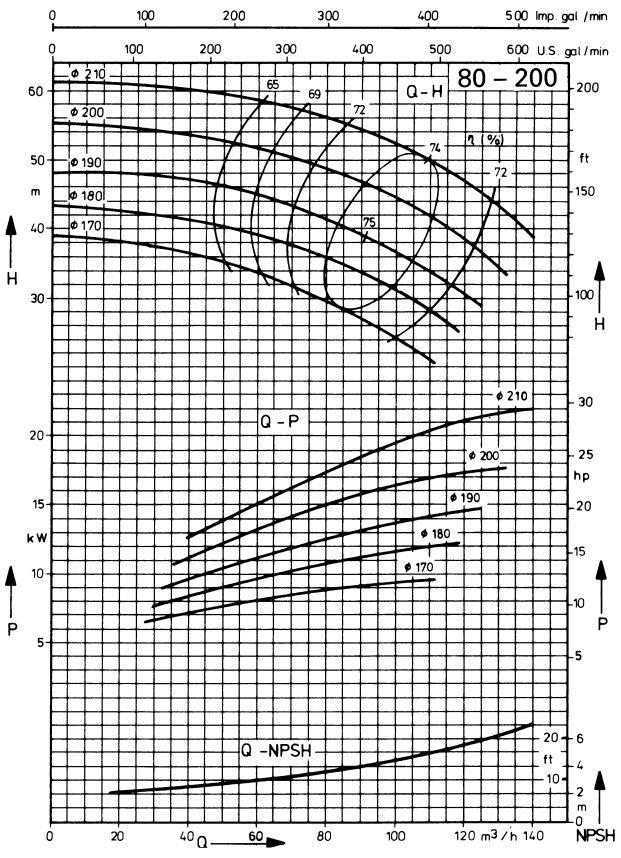
## Characteristic curves

**n = 2900 rpm**



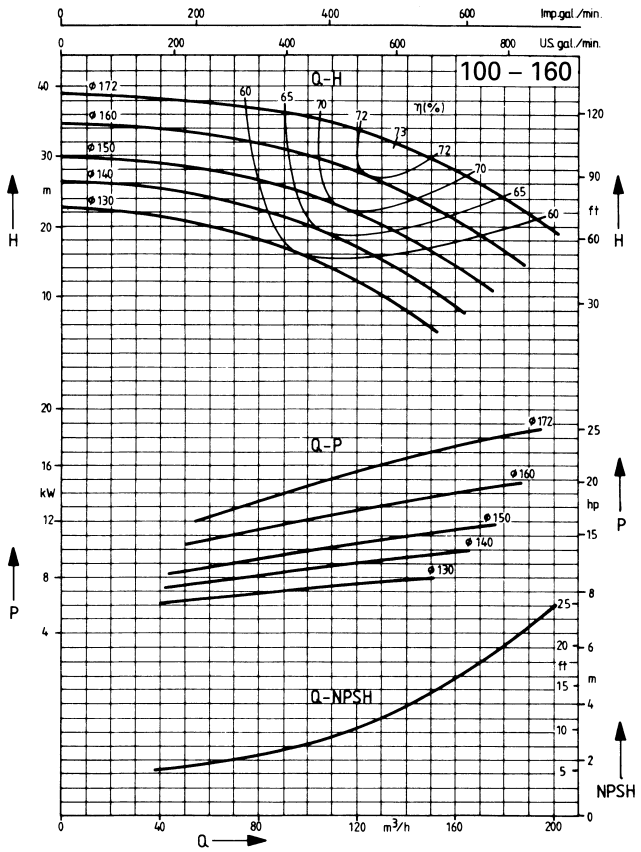



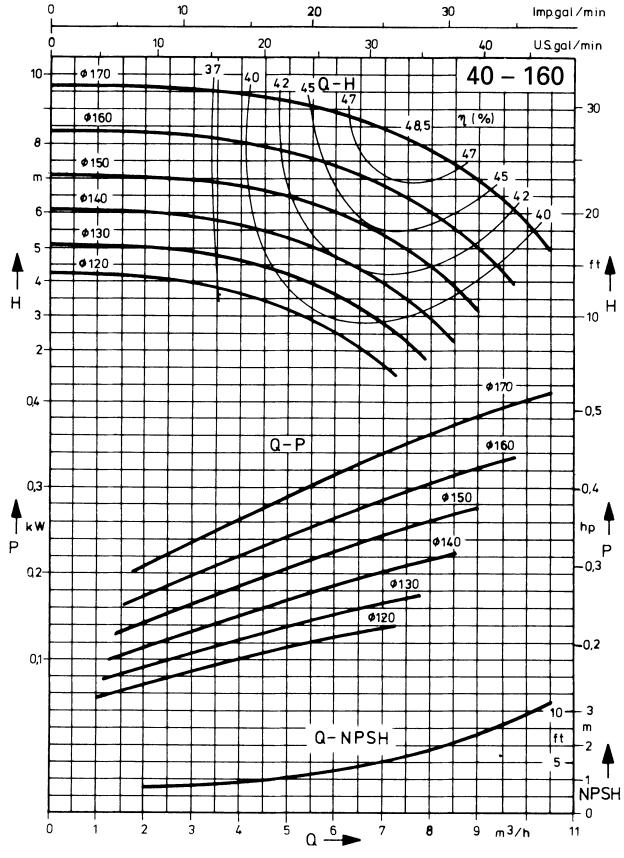
## Characteristic curves

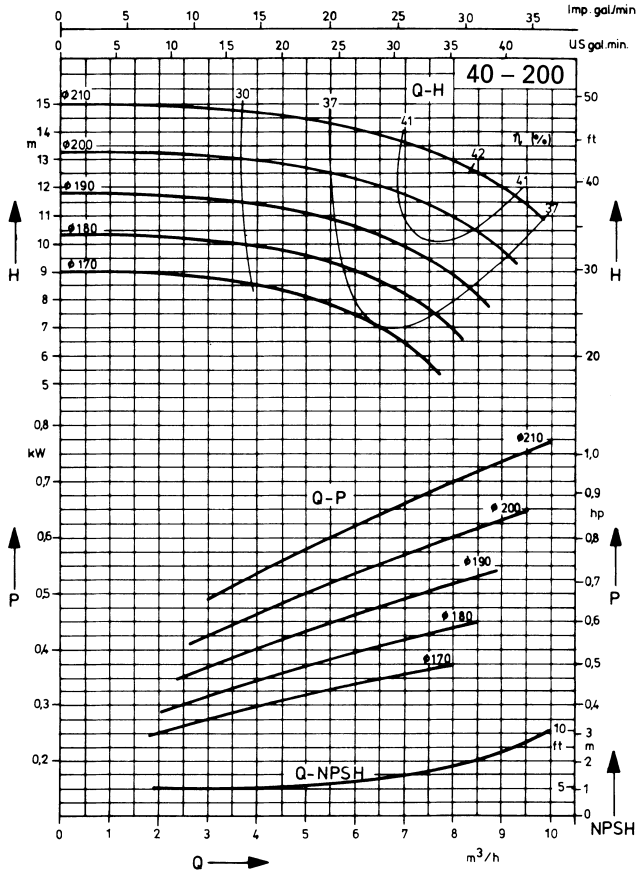
**n = 2900 rpm**



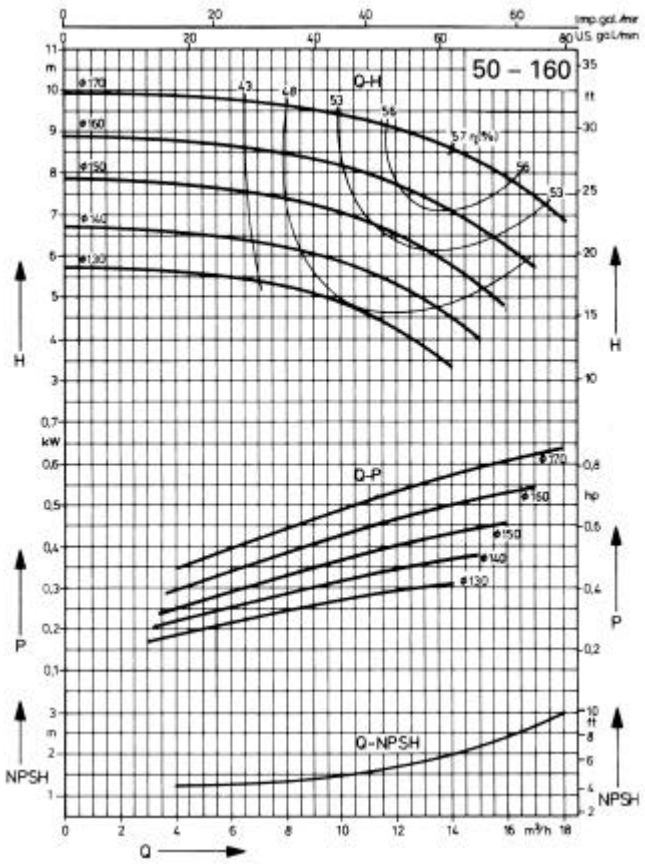

## Characteristic curves

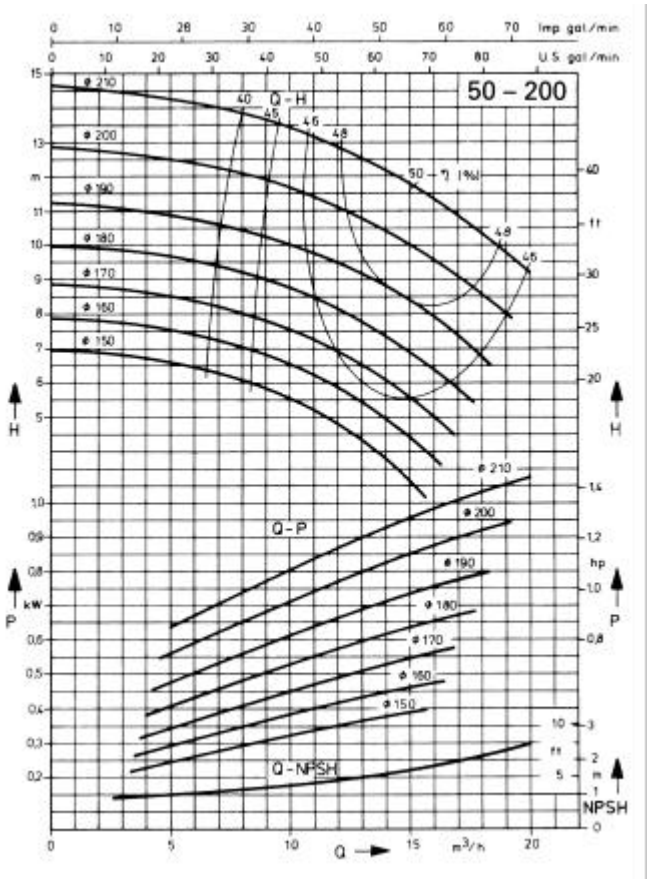
**n = 1450 rpm**

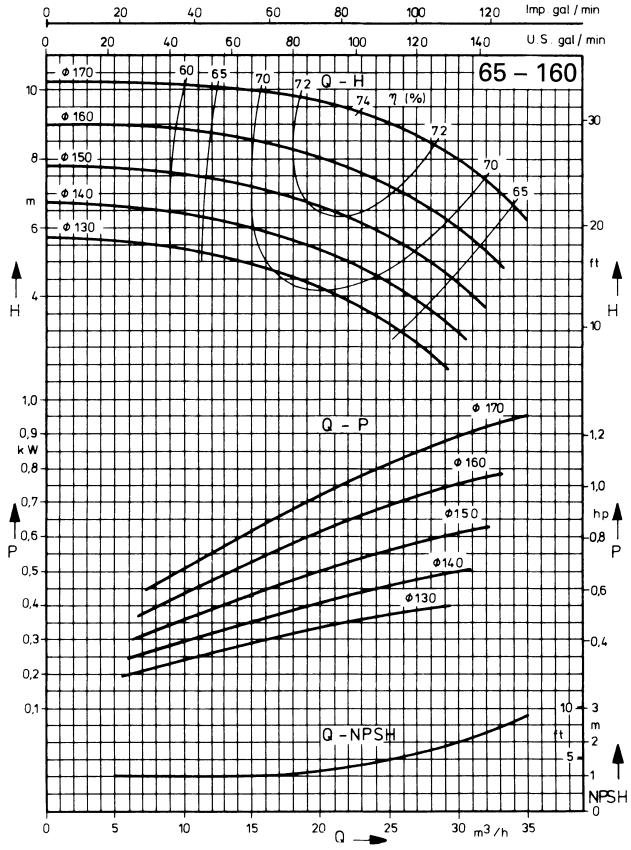


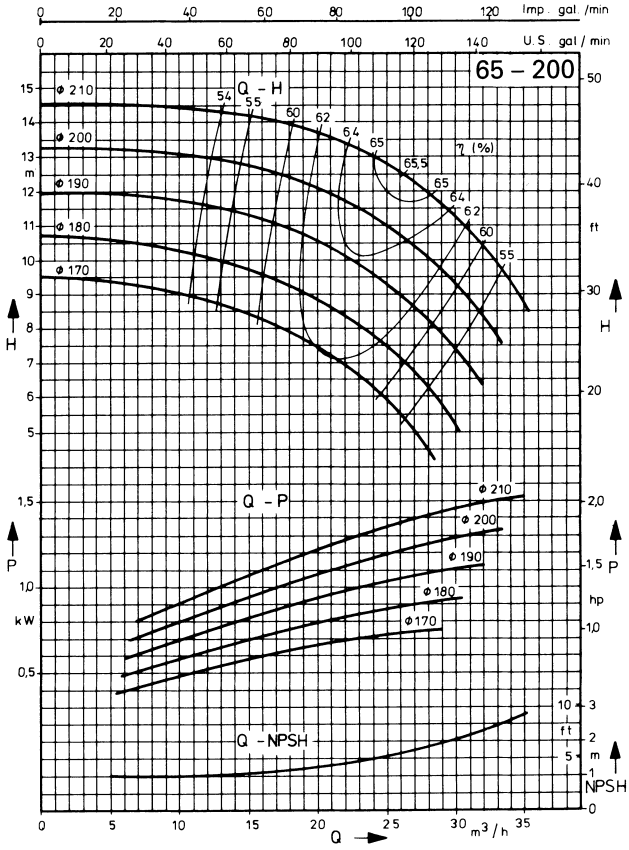



**Characteristic curves** **n = 1450 rpm**



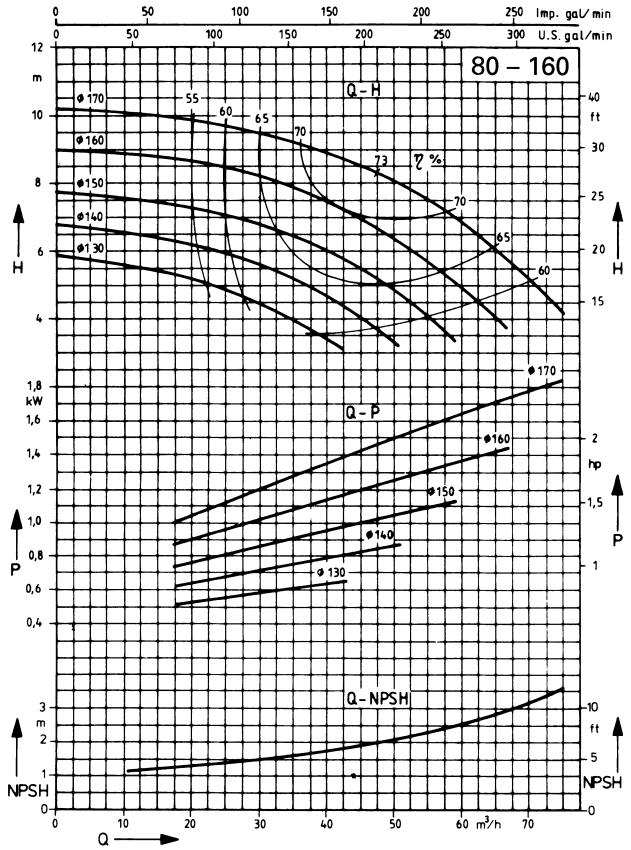



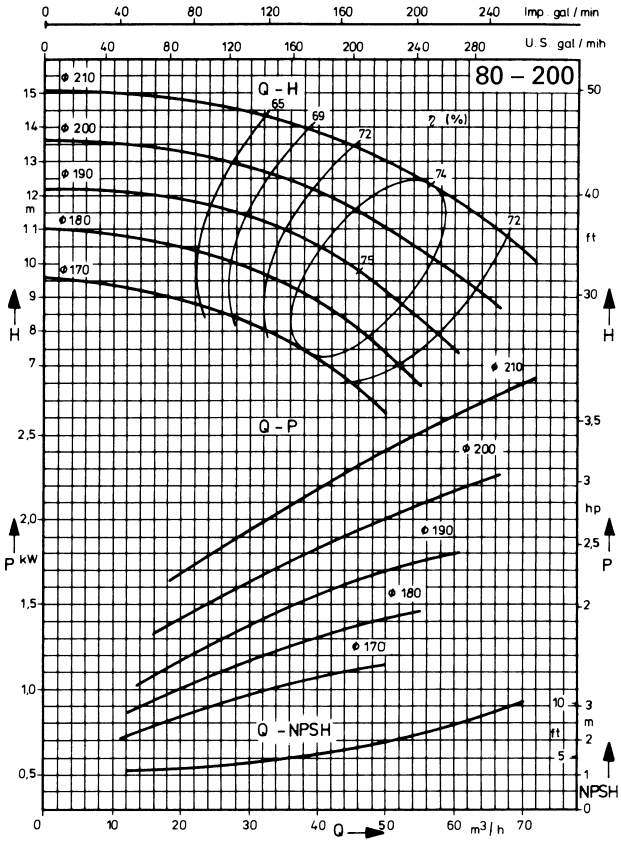



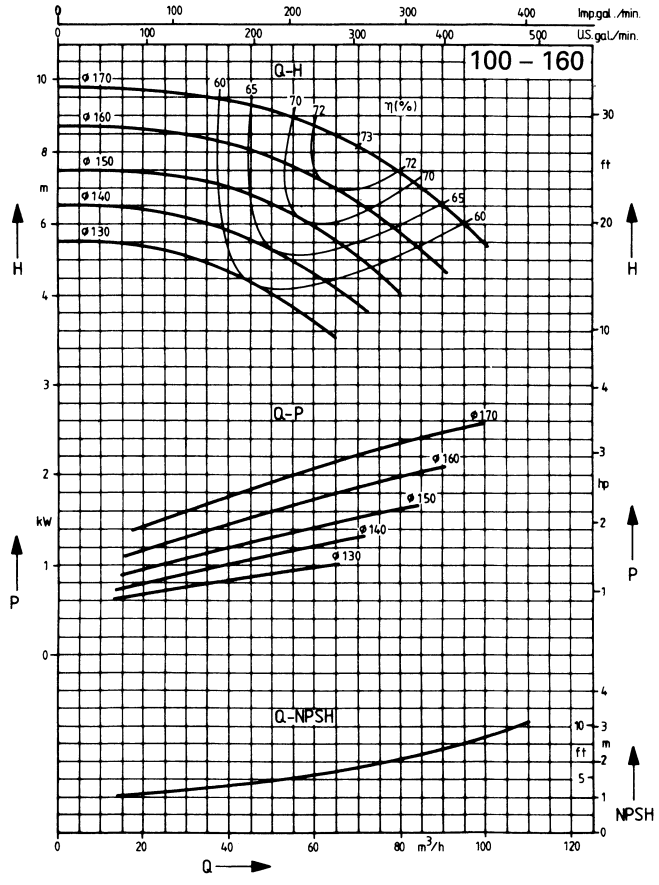



## Characteristic curves

**n = 1450 rpm**

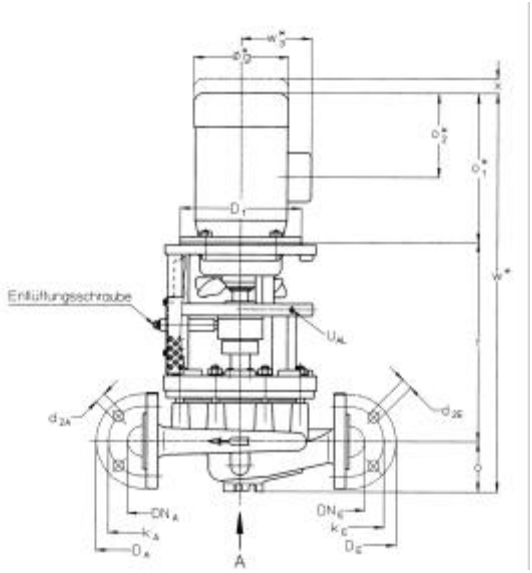


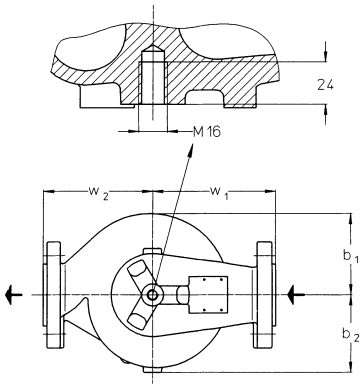




values are valid for water ρ = 1 kg/l

**Dimension table** **n = 2900 rpm**




$U_{AL}$ = connection for leak liquid G ¼

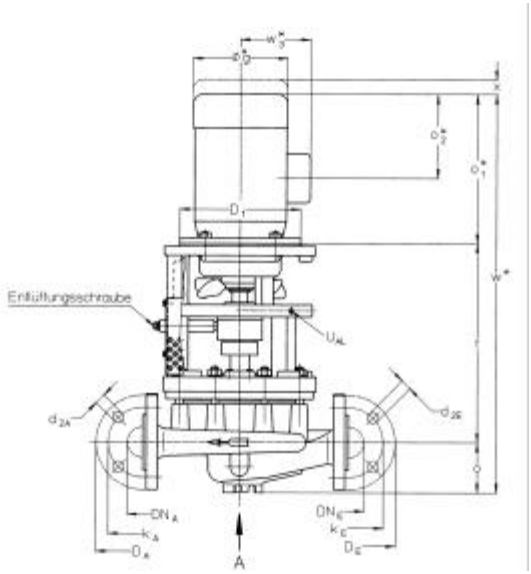
| size | motor size | motor kW | $DN_{A,E}$ | $b_1$ | $b_2$ | $D_1$ | f | g* | o | $o_1$* | $o_2$* | w* | $w_1$ | $w_2$ | $w_3$* | x | weight kg pump | weight kg motor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 80 a | 0,75 | | | | 200 | | 157 | | 204 | 108 | 613 | | | 126 | | | 9 |
| | 80 b | 1,1 | | | | | | | | 219 | 115 | 628 | | | | | | 10 |
| 40-160 | 90 S | 1,5 | | 115 | 115 | | | 186 | 82 | 249 | 161 | 658 | 180 | 160 | 125 | | 49 | 14 |
| | 90 L | 2,2 | | | | | 327 | | | 274 | 185 | 683 | | | | | | 18 |
| | 100 L | 3,0 | 40 | | | 250 | | 206 | | 323 | 234 | 732 | | | 133 | | | 24 |
| | 90 L | 2,2 | | | | 200 | | 186 | | 274 | 185 | 691 | | | 125 | | | 18 |
| | 100 L | 3,0 | | | | 250 | | 206 | | 323 | 234 | 740 | | | 133 | | 55 | 24 |
| 40-200 | 112 M | 4,0 | | 138 | 138 | | | 220 | | | 183 | | 200 | 180 | 186 | | | 41 |
| | 132 S1 | 5,5 | | | | 300 | 352 | 260 | | 386 | 227 | 828 | | | 213 | | 61 | 56 |
| | 132 S2 | 7,5 | | | | | | | | | | | | | | | | 59 |
| | 90 L | 2,2 | | | | 200 | | 186 | | 274 | 185 | 666 | | | 125 | | | 18 |
| 50-160 | 100 L | 3,0 | | 120 | 120 | 250 | 327 | 206 | 90 | 323 | 234 | 691 | 190 | 160 | 133 | | 50 | 24 |
| | 112 M | 4,0 | | | | | | 220 | | | 283 | | | | 186 | | | 41 |
| | 132 S1 | 5,5 | | | | 300 | 352 | 260 | | 386 | 227 | 828 | | | 213 | | 58 | 56 |
| | 90 L | 2,2 | 50 | | | 200 | | 186 | | 274 | 185 | 691 | | | 125 | 80 | 53 | 18 |
| | 100 L | 3,0 | | | | 250 | 327 | 206 | | 323 | 234 | 740 | | | 133 | | 54 | 24 |
| 50-200 | 112 M | 4,0 | | 138 | 138 | | | 220 | | | 183 | | | | 186 | | | 41 |
| | 132 S1 | 5,5 | | | | 300 | 352 | 260 | | 386 | 227 | 828 | | | 213 | | 60 | 56 |
| | 132 S2 | 7,5 | | | | | | | | | | | 200 | 180 | | | | 59 |
| | 90 L | 2,2 | | | | 200 | | 186 | | 274 | 185 | 707 | | | 125 | | | 18 |
| | 100 L | 3,0 | | | | 250 | 327 | 206 | | 323 | 234 | 756 | | | 133 | | 54 | 24 |
| 65-160 | 112 M | 4,0 | | 132 | 126 | | | 220 | | | 183 | | | | 186 | | | 41 |
| | 132 S1 | 5,5 | 65 | | | | | | 106 | | | | | | | | 63 | 56 |
| | 132 S2 | 7,5 | | | | 300 | 352 | 260 | | 386 | 227 | 844 | | | 213 | | | 59 |
| | 132 S1 | 5,5 | | | | | | | | | | | | | | | 64 | 56 |
| 65-200 | 132 S2 | 7,5 | | | 143 | | | | | | | | 215 | | | | | 59 |
| | 160 M1 | 11,0 | | | | 350 | 377 | 310 | | 521 | 308 | 1004 | | | 245 | | 71 | 110 |
| | 132 S1 | 5,5 | | 150 | | 300 | 352 | 260 | | 386 | 227 | 858 | | 200 | 213 | | 69 | 56 |
| 80-160 | 132 S2 | 7,5 | | | 135 | | | | | | | | 240 | | | | | 59 |
| | 160 M1 | 11,0 | | | | | | | | | | | | | | | 73 | 110 |
| | 160 M2 | 15,0 | 80 | | | | | | 120 | 521 | 308 | 1018 | | | | | | 112 |
| | 160 M1 | 11,0 | | | | | | 310 | | | | | | | 245 | | | 110 |
| 80-200 | 160 M2 | 15,0 | | | 155 | | | | | | | | 255 | | | | 79 | 112 |
| | 160 L | 18,5 | | | | 350 | 377 | | | 565 | 330 | 1062 | | | | | | 135 |
| | 180 M | 22,0 | | 165 | | | | 341 | | 592 | 350 | 1089 | | 225 | 279 | 100 | | 155 |
| | 160 M1 | 11,0 | | | | | | | | 521 | 308 | 1048 | | | | | | 110 |
| 100-160 | 160 M2 | 15,0 | 100 | | 145 | | | 310 | 150 | | | | 275 | | 245 | | 82 | 112 |
| | 160 L | 18,5 | | | | | | | | 565 | 330 | 1092 | | | | | | 135 |

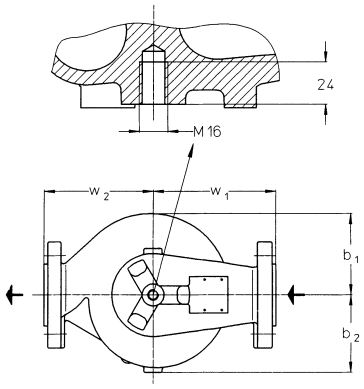
| Flange connections according to DIN 2501 PN 16 | | | | | |
|---|---|---|---|---|---|
| $DN_A/DN_E$ | 40 | 50 | 65 | 80 | 100 |
| D | 150 | 165 | 185 | 200 | 220 |
| k | 110 | 125 | 145 | 160 | 180 |
| $d_2$ x numberl | 18x4 | 18x4 | 18x4 | 18x8 | 18x8 |

Standard motors DIN 42677.
Truth of rotation, centricty and right angle of shaft ends and mounting flanges to DIN 42955, normal precision.

*protection type of the motors IP 54, dimensions depending on motor make.

**Dimension table** **n = 1450 rpm**




$U_{AL}$ = connection for leak liquid G ¼

| size | motor | | $DN_{A, E}$ | $b_1$ | $b_2$ | $D_1$ | f | g* | o | $o_1$* | $o_2$* | w* | $w_1$ | $w_2$ | $w_3$* | x | weight kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | size | kW | | | | | | | | | | | | | | | pump | motor |
| 40-160 | 80 a | 0,55 | 40 | 115 | 115 | 200 | 327 | 160 | 82 | 227 | 131 | 636 | 180 | 160 | 143 | 80 | 49 | 9 |
| 40-200 | 80 a | 0,55 | | 138 | 138 | | | | 90 | | | 644 | 200 | 180 | | | 54 | 9 |
| | 80 b | 0,75 | | | | | | | | | 123 | | | | | | | 10 |
| | 90 S | 1,1 | | | | | | 178 | | 243 | 154 | 660 | | | 150 | | | 14 |
| 50-160 | 80 a | 0,55 | 50 | 120 | 120 | | | 160 | | 227 | 131 | 644 | 190 | 160 | 143 | | 51 | 9 |
| | 80 b | 0,75 | | | | | | | | | 123 | | | | | | | 10 |
| 50-200 | 80 a | 0,55 | | 138 | 138 | | | | | | 131 | | 200 | 180 | | | 54 | 9 |
| | 80 b | 0,75 | | | | | | | | | 123 | | | | | | | 10 |
| | 90 S | 1,1 | | | | | | 178 | | 243 | 154 | | | | 150 | | | 14 |
| 65-160 | 80 a | 0,55 | 65 | 132 | 126 | | | 160 | | 227 | 131 | 660 | | | 143 | | 55 | 9 |
| | 80 b | 0,75 | | | | | | | | | 123 | | | | | | | 10 |
| | 90 S | 1,1 | | | | | | 178 | | 243 | 154 | 676 | | | 150 | | | 14 |
| 65-200 | 80 b | 0,75 | | 150 | 143 | | | 160 | 106 | 227 | 123 | 660 | 215 | 200 | 143 | | 61 | 10 |
| | 90 S | 1,1 | | | | | | 178 | | 243 | 154 | 676 | | | 150 | | | 14 |
| | 90 L | 1,5 | | | | | | | | 268 | 179 | 701 | | | | | | 18 |
| | 100 L1 | 2,2 | | | | 250 | | 198 | | 305 | 215 | 738 | | | 188 | | | 24 |
| 80-160 | 80 b | 0,75 | 80 | | 135 | 200 | | 160 | 120 | 227 | 123 | 674 | 240 | | 143 | | 59 | 10 |
| | 90 S | 1,1 | | | | | | 178 | | 243 | 154 | 690 | | | 150 | | | 14 |
| | 90 L | 1,5 | | | | | | | | 268 | 179 | 715 | | | | | | 18 |
| | 100 L1 | 2,2 | | | | 250 | | 198 | | 305 | 215 | 752 | | | 188 | | | 24 |
| 80-200 | 90 S | 1,1 | | 165 | 155 | 200 | | 178 | | 243 | 154 | 690 | 255 | 225 | 150 | 100 | 66 | 14 |
| | 90 L | 1,5 | | | | | | | | 268 | 179 | 715 | | | | | | 18 |
| | 100 L1 | 2,2 | | | | 250 | | 198 | | 305 | 215 | 752 | | | 188 | | | 24 |
| | 100 L2 | 3,0 | | | | | | | | | | | | | | | | 25 |
| 100-160 | 90S | 1,1 | 100 | | 145 | 200 | | 178 | 150 | 243 | 154 | 720 | 275 | | 150 | | 69 | 14 |
| | 90 L | 1,5 | | | | | | | | 268 | 179 | 745 | | | | | | 18 |
| | 100 L1 | 2,2 | | | | 250 | | 198 | | 305 | 215 | 782 | | | 188 | | | 24 |
| | 100 L2 | 3,0 | | | | | | | | | | | | | | | | 25 |

| Flange connections according to DIN 2501 PN 16 | | | | | |
|---|---|---|---|---|---|
| $DN_A/DN_E$ | 40 | 50 | 65 | 80 | 100 |
| D | 150 | 165 | 185 | 200 | 220 |
| k | 110 | 125 | 145 | 160 | 180 |
| $d_2$ x number | 18x4 | 18x4 | 18x4 | 18x8 | 18x8 |

Standard motors DIN 42677.
Truth of rotation, centricty and right angle of shaft ends and mounting flanges to DIN 42955, normal precision.

*protection type of the motors IP 54, dimensions depending on motor make.

## Data regarding the pump size - Instructions for placing orders

| series + size | hydraulic + bearing | shaft sealing | material design | casing seal |
|---|---|---|---|---|
| | A· hydraulic A<br>·A one grease-lubricated groove ball bearing and one liquid surrounded step bearing | 002 radial shaft seal rings<br>CDC unbalanced mechanical seal | 1B main parts of spheroidal graphite iron | 2 flat seal |
| ZTI 40-160<br>40-200<br>50-160<br>50-200<br>65-160<br>65-200<br>80-160<br>80-200<br>100-160 | AA | alternatively<br>002<br>CDC | 1B | 2 |

**Motor selection table**

| motor n = 2900 rpm | | | motor n = 1450 rpm | | |
|---|---|---|---|---|---|
| kW | size | code | kW | size | code |
| 0,75 | 80 a | FA | | | |
| 1,1 | 80 b | GA | 0,55 | 80 a | FB |
| 1,5 | 90 S | HA | 0,75 | 80 b | GB |
| 2,2 | 90 L | JA | 1,1 | 90 S | HB |
| 3,0 | 100 L | KA | 1,5 | 90 L | JB |
| 4,0 | 112 M | MA | 2,2 | 100 L1 | KB |
| 5,5 | 132 S1 | NA | 3,0 | 100 L2 | LB |
| 7,5 | 132 S2 | OA | | | |
| 11 | 160 M1 | SA | | | |
| 15 | 160 M2 | TA | | | |
| 18,5 | 160 L | UA | | | |
| 22 | 180 M | VA | | | |

**Example for ordering:**
The pump size ZTI 40-160 AA 002 1B 2 with 11 kW 3-phase a.c. motor of (50 cs, 380 VΔ) 2900 rpm
has the complete order No.: **ZTI ·40-160 AA 002 1B 2 GA**

If type of construction IM V 1 (vertical installation) is concerned, please indicate expressly.

On delivery, the point ( · ) in the fourth place of the type designation will be replaced by a letter in our works..

Any changes in the interest of the technical development are reserved.

**Sterling SIHI GmbH**
Lindenstraße 170, D-25524 Itzehoe, Germany, Telephone +49 (0) 48 21 / 7 71 - 01, Telefax +49 (0) 48 21 / 7 71-274