# KV 3-6-10

## MULTISTAGE VERTICAL CENTRIFUGAL ELECTRIC PUMPS WITH COUPLING

## TECHNICAL DATA

**Operating range:**
from 1,8 to 13,5 m³/h with head up to 139 metres.
**Pumped liquid:** clean, free of solids and abrasives, non-viscous, non-aggressive, non-crystallised and chemically neutral, with properties similar to water.

**Pumped liquid temperature range:** from 0 °C to +35 °C for domestic use (EN 60335-2-41).
from -15°C to +110°C for other uses.
**Maximum ambient temperature:** +40 °C.
**Maximum operating pressure:** 18 bar (1800 kPa).
**Protection class:** IP 55
**Insulation class:** F
**Standard voltage:** single-phase 220-240 V / 50 Hz.
three-phase 230-400 V / 50 Hz
IE2 ≥ 0,75 kW
**Installation:** fixed, vertical position.
**Special executions on requests:** alternative voltages and frequencies.

### APPLICATIONS

Vertical multistage centrifugal pump suitable for small to medium user water systems. Suitable for pressurisation units, boiler supply, hot water circulation, channelling of condensate and cooling water, fire fighting and washing systems, drinking water supply and filling of pressure vessels, sprinkler and watering systems.

### CONSTRUCTION FEATURES OF THE PUMP

Cast iron delivery and suction bodies treated against corrosion. Impellers, diffuser bodies and diffusers in technopolymer. AISI 304 stainless steel pump liner and adjustment rings. Pump shaft in AISI 416 stainless steel. AISI 316 stainless steel sliding bushing.
Bronze sliding bushing guide, self-lubricated using the pumped liquid itself. Carbon/ceramic mechanical seal. Rigid coupling motor shaft to pump shaft connection. Threaded counter-flanges supplied as standard.

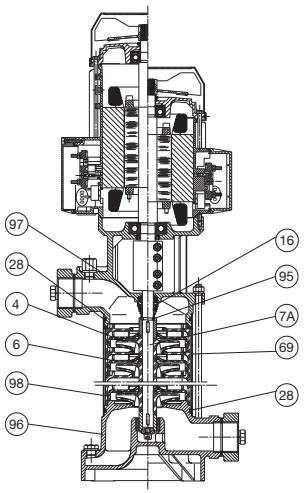
### CONSTRUCTION FEATURES OF THE MOTOR

Closed asynchronous type, external ventilation cooling. Rotor running on permanently lubricated ball bearings, oversized to ensure low noise and durability. Standard built-in thermo-amperometric protection. Capacitor permanently fitted on single phase versions. Overload protection to be provided by the user for the three-phase version. Construction according to CEI 2-3 / CEI 61-69 (EN 60335-2-41).

## MATERIALS

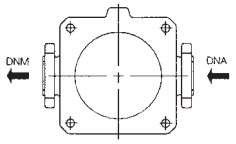
| No. | PARTS* | MATERIALS |
|---|---|---|
| 4 | IMPELLER | TECHNOPOLYMER B |
| 6 | DIFFUSER | TECHNOPOLYMER B |
| 7A | PUMP SHAFT | AISI 416 STAINLESS STEEL<br>X12 CrS 13 UNI 6900/71 |
| 16 | MECHANICAL SEAL | CARBON / CERAMIC |
| 28 | OR RING | EPDM RUBBER |
| 69 | LINER | AISI 304 STAINLESS STEEL<br>X5 CrNi 1810 UNI 6900/71 |
| 95 | OR RING | EPDM RUBBER |
| 96 | SUCTION BODY | CAST IRON 200 UNI ISO 185 |
| 97 | DELIVERY BODY | CAST IRON 200 UNI ISO 185 |
| 98 | DIFFUSER BODY | TECHNOPOLYMER B |

* In contact with the liquid.



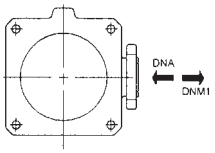

### ORIENTATION OF THE SUCTION AND DELIVERY CONNECTORS:

Standard execution:

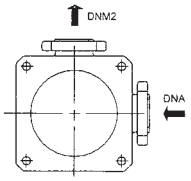



DNA-DNM

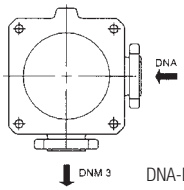
Special execution:




DNA-DNM1




DNA-DNM2




DNA-DNM3

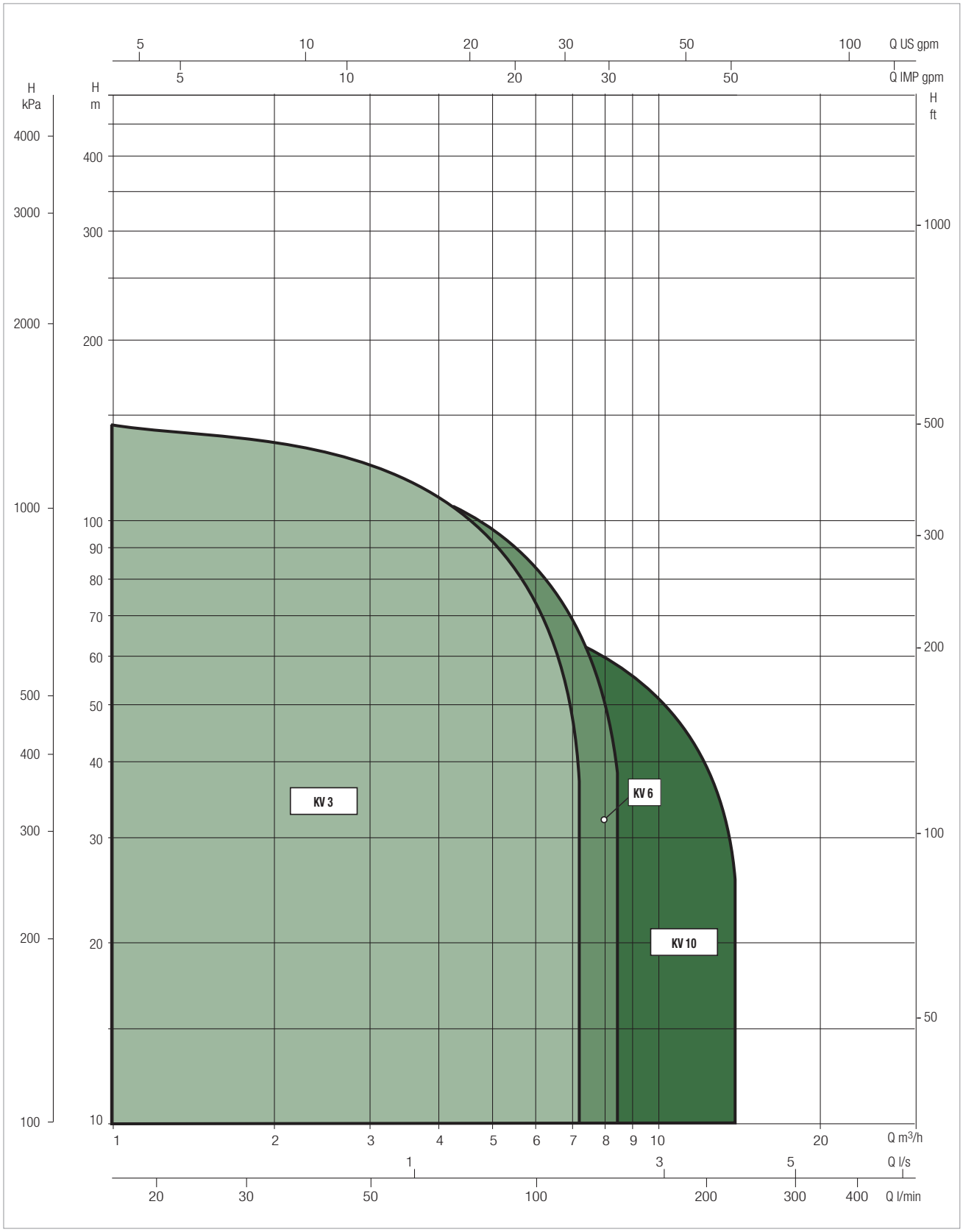
# KV 3-6-10 RANGE

## MULTISTAGE VERTICAL CENTRIFUGAL ELECTRIC PUMPS WITH COUPLING

## PERFORMANCE RANGE

The performance curves are based on kinematic viscosity values = 1 mm2/s and density equal to 1000 kg/m3. Curve tolerance according to ISO 9906.

### GRAPHIC SELECTION TABLE



# KV 3-6-10

MULTISTAGE VERTICAL CENTRIFUGAL ELECTRIC PUMPS WITH COUPLING

## SELECTION TABLE - KV 3

| MODEL | | P2 NOMINAL | | Q=m³/h | 0 | 1.8 | 3.6 | 5.4 | 7.2 |
|---|---|---|---|---|---|---|---|---|---|
| SINGLE-PHASE | THREE-PHASE | kW | HP | Q=l/min | 0 | 30 | 60 | 90 | 120 |
| KV 3/10 M | KV 3/10 T | 1.1 | 1.5 | H (m) | 88 | 77 | 63.5 | 45.7 | 21 |
| KV 3/12 M | KV 3/12 T | 1.5 | 2 | | 105.6 | 92.4 | 76.2 | 54.8 | 25.2 |
| KV 3/15 M | KV 3/15 T | 1.85 | 2.5 | | 132 | 115.5 | 95.3 | 68.6 | 31.5 |
| – | KV 3/18 T | 2.2 | 3 | | 158.4 | 138.6 | 114.3 | 82.3 | 37.8 |

## SELECTION TABLE - KV 6

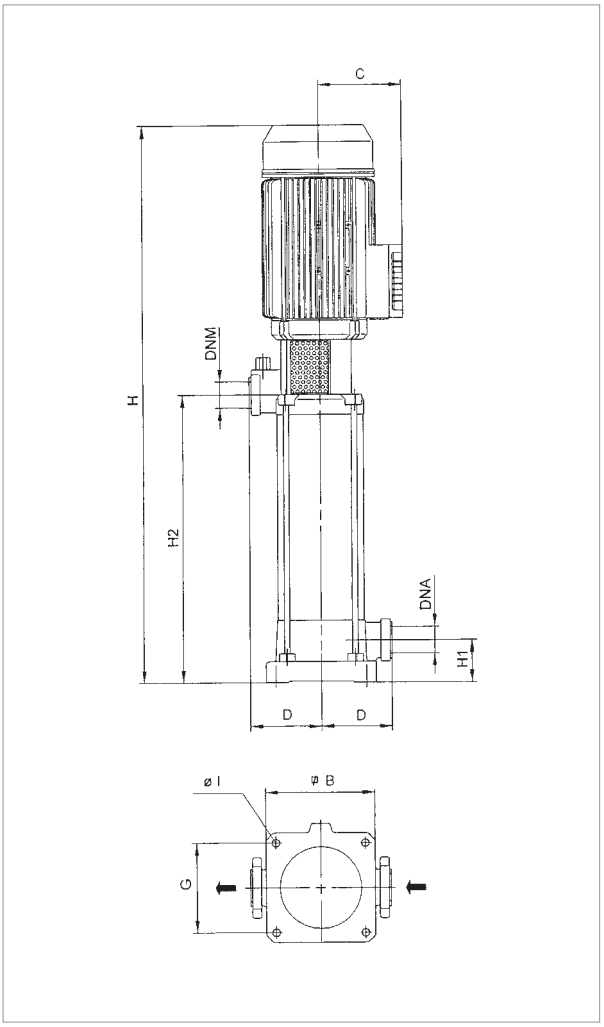
| MODEL | | P2 NOMINAL | | Q=m³/h | 0 | 1.8 | 3.6 | 5.4 | 7.2 | 8.4 |
|---|---|---|---|---|---|---|---|---|---|---|
| SINGLE-PHASE | THREE-PHASE | kW | HP | Q=l/min | 0 | 30 | 60 | 90 | 120 | 140 |
| KV 6/7 M | KV 6/7 T | 1.1 | 1.5 | H (m) | 62.3 | 57.8 | 51.5 | 42.5 | 29.5 | 18.6 |
| KV 6/9 M | KV 6/9 T | 1.5 | 2 | | 80.1 | 74.3 | 66.2 | 54.6 | 38 | 23.9 |
| KV 6/11 M | KV 6/11 T | 1.85 | 2.5 | | 97.9 | 90.8 | 81 | 66.8 | 46.4 | 29.2 |
| – | KV 6/15 T | 2.2 | 3 | | 133.5 | 123.8 | 110.4 | 91.1 | 63.3 | 39.8 |

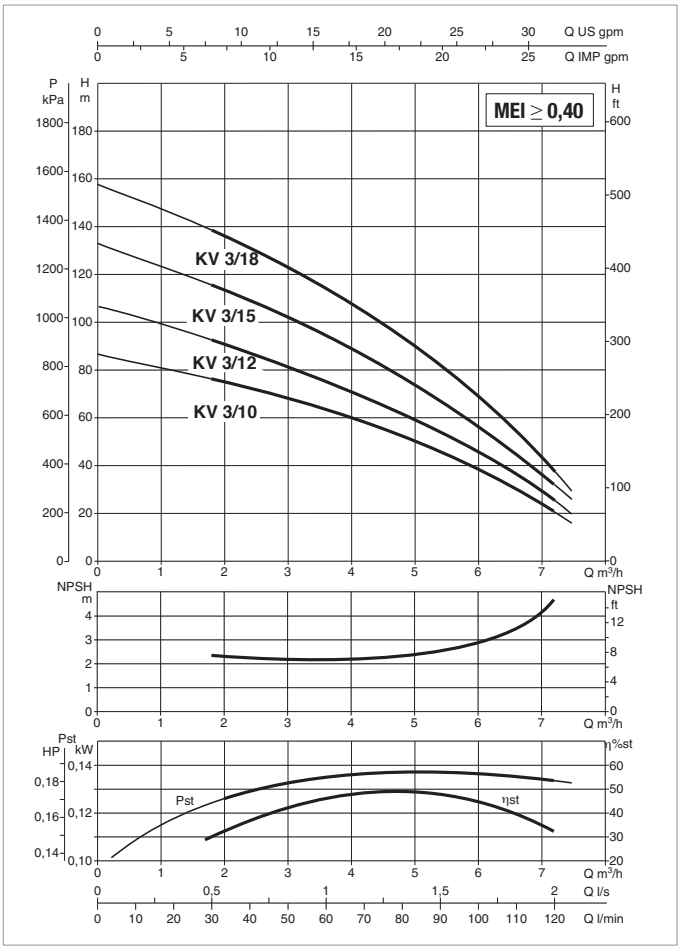
## SELECTION TABLE - KV 10

| MODEL | | P2 NOMINAL | | Q=m³/h | 0 | 1.8 | 3.6 | 5.4 | 7.2 | 8.4 | 10.2 | 12 | 13.8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SINGLE-PHASE | THREE-PHASE | kW | HP | Q=l/min | 0 | 30 | 60 | 90 | 120 | 140 | 170 | 200 | 230 |
| KV 10/4 M | KV 10/4 T | 1.1 | 1.5 | H (m) | 38.2 | 37.4 | 36.2 | 34.4 | 32 | 29.7 | 25.5 | 20 | 12.6 |
| KV 10/5 M | KV 10/5 T | 1.5 | 2 | | 47.8 | 46.8 | 45.2 | 43 | 40 | 37.2 | 31.9 | 25 | 15.8 |
| – | KV 10/6 T | 1.85 | 2.5 | | 57.3 | 56.1 | 54.2 | 51.6 | 48 | 44.6 | 38.2 | 30 | 18.9 |
| – | KV 10/8 T | 2.2 | 3 | | 76.4 | 74.8 | 72.3 | 68.8 | 64 | 59.4 | 51 | 40 | 25.2 |

# **KV 3** - MULTISTAGE VERTICAL CENTRIFUGAL ELECTRIC PUMPS WITH COUPLING FOR CIVIL AND INDUSTRIAL PRESSURISATION SYSTEMS, PRESSURE UNITS

**Pumped liquid temperature range:** from 0 °C to +35 °C for domestic use (EN 60335-2-41). From -15°C to +110°C for other uses.
**Maximum ambient temperature:** +40°C




**See hydraulic efficiency details on page 291.**

The performance curves are based on kinematic viscosity values = 1 mm²/s and density equal to 1000 kg/m³. Curve tolerance according to ISO 9906.

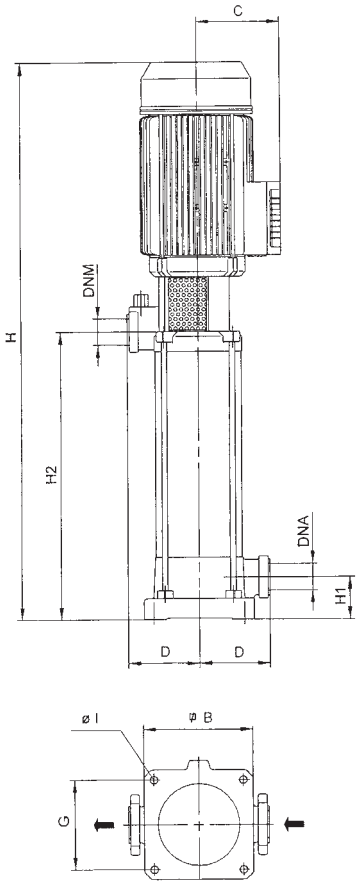
| MODEL | POWER INPUT 50 Hz | P1 MAX kW | P2 NOMINAL | | In A | MOTOR TYPE | I st. A | 1/min. | CAPACITOR | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | kW | HP | | | | | µF | Vc |
| **KV 3/10 M** | 1x220-240 V ~ | 1.77 | 1.1 | 1.5 | 7.8 | – | 29 | 2800 | 31.5 | 450 |
| **KV 3/10 T** | 3x230-400 V ~ | 1.8 | 1.1 | 1.5 | 7-4 | IE2 | 21 | 2850 | – | – |
| **KV 3/12 M** | 1x220-240 V ~ | 2.34 | 1.5 | 2 | 9.6 | – | 38 | 2750 | 40 | 450 |
| **KV 3/12 T** | 3x230-400 V ~ | 2.06 | 1.5 | 2 | 7.5-4 | IE2 | 22 | 2750 | – | – |
| **KV 3/15 M** | 1x220-240 V ~ | 2.5 | 1.85 | 2.5 | 11.3 | – | 48 | 2850 | 40 | 450 |
| **KV 3/15 T** | 3x230-400 V ~ | 2.6 | 1.85 | 2.5 | 7.5-4.3 | IE2 | 57-33 | 2850 | – | – |
| **KV 3/18 T** | 3x230-400 V ~ | 3.3 | 2.2 | 3 | 10-5.8 | IE2 | 78-45 | 2850 | – | – |

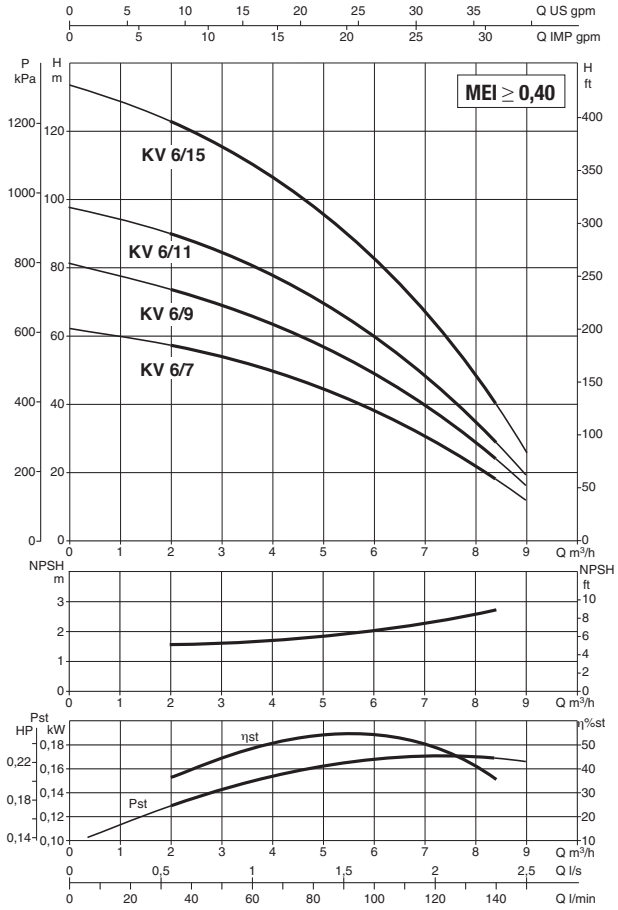
| MODEL | B | C | D | G | I | H | H1 | H2 | DNA | DNM | PACKING DIMENSIONS | | | VOLUME ($m^3$) | WEIGHT kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | L/A | L/B | H | | |
| **KV 3/10 M** | 155 | 111 | 100 | 127 | 11 | 782 | 60 | 472 | 1" 1/4 | 1" 1/4 | 972 | 232 | 232 | 0.052 | 27.2 |
| **KV 3/10 T** | 155 | 111 | 100 | 127 | 11 | 782 | 60 | 472 | 1" 1/4 | 1" 1/4 | 972 | 232 | 232 | 0.052 | 26.3 |
| **KV 3/12 M** | 155 | 116 | 100 | 127 | 11 | 846 | 60 | 536 | 1" 1/4 | 1" 1/4 | 972 | 232 | 232 | 0.052 | 30.6 |
| **KV 3/12 T** | 155 | 111 | 100 | 127 | 11 | 846 | 60 | 536 | 1" 1/4 | 1" 1/4 | 972 | 232 | 232 | 0.052 | 28 |
| **KV 3/15 M** | 155 | 116 | 100 | 127 | 11 | 942 | 60 | 632 | 1" 1/4 | 1" 1/4 | 1212 | 232 | 232 | 0.065 | 33 |
| **KV 3/15 T** | 155 | 116 | 100 | 127 | 11 | 942 | 60 | 632 | 1" 1/4 | 1" 1/4 | 1212 | 232 | 232 | 0.065 | 31.9 |
| **KV 3/18 T** | 155 | 116 | 100 | 127 | 11 | 1116 | 60 | 728 | 1" 1/4 | 1" 1/4 | 1212 | 232 | 232 | 0.065 | 35.8 |

DAB PUMPS reserves the right to make modifications without notice.

# **KV 6** - MULTISTAGE VERTICAL CENTRIFUGAL ELECTRIC PUMPS WITH COUPLING FOR CIVIL AND INDUSTRIAL PRESSURISATION SYSTEMS, PRESSURE UNITS

**Pumped liquid temperature range:** from 0 °C to +35 °C for domestic use (EN 60335-2-41). From -15°C to +110°C for other uses.
**Maximum ambient temperature:** +40°C



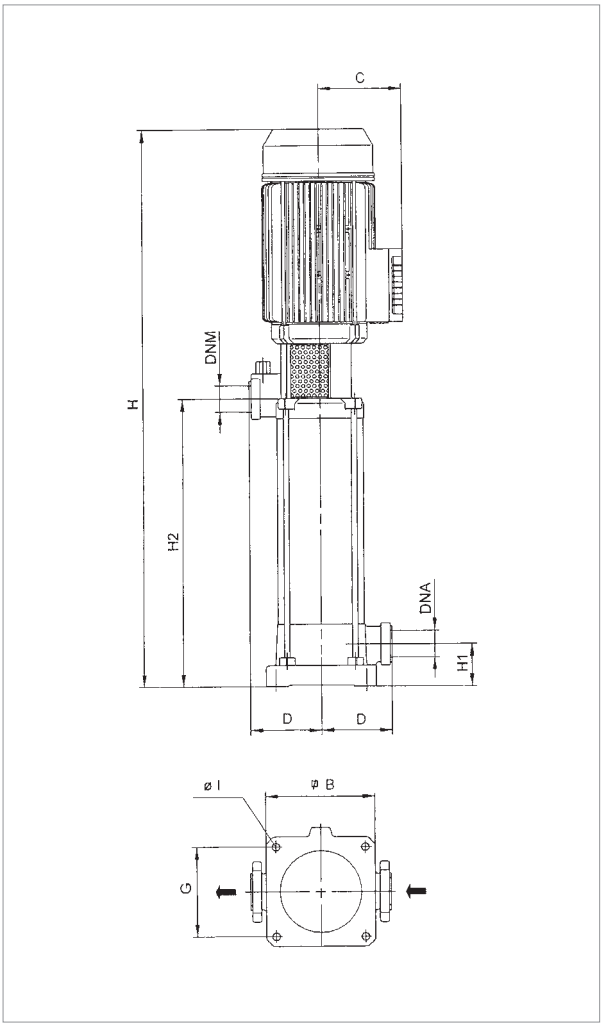

**See hydraulic efficiency details on page 291.**
The performance curves are based on kinematic viscosity values = 1 mm²/s and density equal to 1000 kg/m³. Curve tolerance according to ISO 9906.

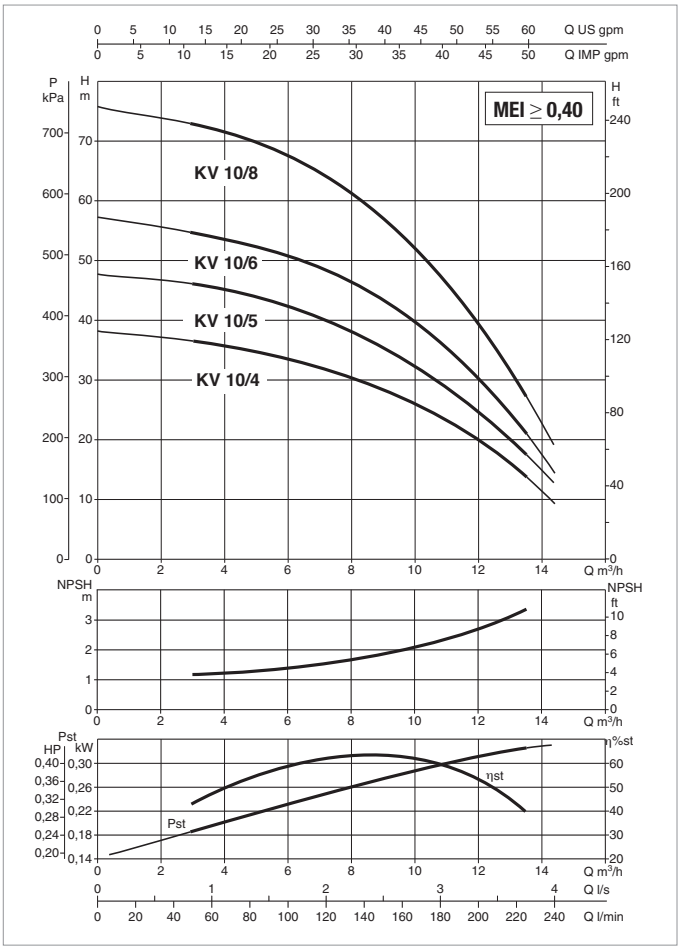
| MODEL | POWER INPUT 50 Hz | P1 MAX kW | P2 NOMINAL | | In A | MOTOR TYPE | I st. A | 1/min. | CAPACITOR | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | kW | HP | | | | | µF | Vc |
| **KV 6/7 M** | 1x220-240 V ~ | 1.68 | 1.1 | 1.5 | 7.5 | – | 29 | 2800 | 31.5 | 450 |
| **KV 6/7 T** | 3x230-400 V ~ | 1.6 | 1.1 | 1.5 | 5-2.9 | IE2 | 38-22 | 2850 | – | – |
| **KV 6/9 M** | 1x220-240 V ~ | 2.1 | 1.5 | 2 | 9.4 | – | 38 | 2850 | 40 | 450 |
| **KV 6/9 T** | 3x230-400 V ~ | 2 | 1.5 | 2 | 7.5-4.2 | IE2 | 22 | 2850 | – | – |
| **KV 6/11 M** | 1x220-240 V ~ | 2.5 | 1.85 | 2.5 | 11.1 | – | 48 | 2850 | 40 | 450 |
| **KV 6/11 T** | 3x230-400 V ~ | 2.3 | 1.85 | 2.5 | 7.3-4.2 | IE2 | 43-25 | 2850 | – | – |
| **KV 6/15 T** | 3x230-400 V ~ | 3.3 | 2.2 | 3 | 11-6.3 | IE2 | 78-45 | 2850 | – | – |

| MODEL | B | C | D | G | I | H | H1 | H2 | DNA | DNM | PACKING DIMENSIONS | | | VOLUME ($m^3$) | WEIGHT kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | L/A | L/B | H | | |
| **KV 6/7 M** | 155 | 111 | 100 | 127 | 11 | 685 | 60 | 376 | 1" 1/4 | 1" 1/4 | 972 | 232 | 232 | 0.052 | 26.1 |
| **KV 6/7 T** | 155 | 111 | 100 | 127 | 11 | 685 | 60 | 376 | 1" 1/4 | 1" 1/4 | 972 | 232 | 232 | 0.052 | 25.2 |
| **KV 6/9 M** | 155 | 116 | 100 | 127 | 11 | 750 | 60 | 440 | 1" 1/4 | 1" 1/4 | 972 | 232 | 232 | 0.052 | 29 |
| **KV 6/9 T** | 155 | 111 | 100 | 127 | 11 | 750 | 60 | 440 | 1" 1/4 | 1" 1/4 | 972 | 232 | 232 | 0.052 | 26.8 |
| **KV 6/11 M** | 155 | 116 | 100 | 127 | 11 | 815 | 60 | 504 | 1" 1/4 | 1" 1/4 | 972 | 232 | 232 | 0.052 | 31.3 |
| **KV 6/11 T** | 155 | 116 | 100 | 127 | 11 | 815 | 60 | 504 | 1" 1/4 | 1" 1/4 | 972 | 232 | 232 | 0.052 | 27.7 |
| **KV 6/15 T** | 155 | 116 | 100 | 127 | 11 | 1020 | 60 | 632 | 1" 1/4 | 1" 1/4 | 1212 | 232 | 232 | 0.065 | 34.5 |

# **KV 10** - MULTISTAGE VERTICAL CENTRIFUGAL ELECTRIC PUMPS WITH COUPLING FOR CIVIL AND INDUSTRIAL PRESSURISATION SYSTEMS, PRESSURE UNITS

**Pumped liquid temperature range:** from 0 °C to +35 °C for domestic use (EN 60335-2-41). From -15°C to +110°C for other uses.
**Maximum ambient temperature:** +40°C




**See hydraulic efficiency details on page 291.**

The performance curves are based on kinematic viscosity values = 1 mm²/s and density equal to 1000 kg/m³. Curve tolerance according to ISO 9906.

| MODEL | POWER INPUT 50 Hz | P1 MAX kW | P2 NOMINAL | | In A | MOTOR TYPE | I st. A | 1/min. | CAPACITOR | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | kW | HP | | | | | µF | Vc |
| **KV 10/4 M** | 1x220-240 V ~ | 1.9 | 1.1 | 1.5 | 8.3 | – | 29 | 2850 | 31.5 | 450 |
| **KV 10/4 T** | 3x230-400 V ~ | 1.9 | 1.1 | 1.5 | 6.1-3.5 | IE2 | 38-22 | 2850 | – | – |
| **KV 10/5 M** | 1x220-240 V ~ | 2.4 | 1.5 | 2 | 10.4 | – | 45 | 2850 | 40 | 450 |
| **KV 10/5 T** | 3x230-400 V ~ | 2.3 | 1.5 | 2 | 8-4.5 | IE2 | 22 | 2850 | – | – |
| **KV 10/6 M** | 1x220-240 V ~ | 2.6 | 1.85 | 2.5 | 12.5 | – | 54 | 2850 | 40 | 450 |
| **KV 10/6 T** | 3x230-400 V ~ | 2.8 | 1.85 | 2.5 | 8.7-5 | IE2 | 57-33 | 2850 | – | – |
| **KV 10/8 T** | 3x230-400 V ~ | 3.7 | 2.2 | 3 | 11.8-6.8 | IE2 | 78-45 | 2850 | – | – |

| MODEL | B | C | D | G | I | H | H1 | H2 | DNA | DNM | PACKING DIMENSIONS | | | VOLUME (m³) | WEIGHT kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | L/A | L/B | H | | |
| **KV 10/4 M** | 155 | 111 | 100 | 127 | 11 | 590 | 60 | 280 | 1" 1/4 | 1" 1/4 | 712 | 232 | 232 | 0.038 | 27.2 |
| **KV 10/4 T** | 155 | 111 | 100 | 127 | 11 | 590 | 60 | 280 | 1" 1/4 | 1" 1/4 | 712 | 232 | 232 | 0.038 | 26.3 |
| **KV 10/5 M** | 155 | 116 | 100 | 127 | 11 | 625 | 60 | 312 | 1" 1/4 | 1" 1/4 | 712 | 232 | 232 | 0.038 | 30.6 |
| **KV 10/5 T** | 155 | 111 | 100 | 127 | 11 | 625 | 60 | 312 | 1" 1/4 | 1" 1/4 | 972 | 232 | 232 | 0.052 | 28 |
| **KV 10/6 M** | 155 | 116 | 100 | 127 | 11 | 738 | 60 | 344 | 1" 1/4 | 1" 1/4 | 972 | 232 | 232 | 0.052 | 33 |
| **KV 10/6 T** | 155 | 111 | 100 | 127 | 11 | 738 | 60 | 344 | 1" 1/4 | 1" 1/4 | 972 | 232 | 232 | 0.052 | 31.9 |
| **KV 10/8 T** | 155 | 116 | 100 | 127 | 11 | 798 | 60 | 408 | 1" 1/4 | 1" 1/4 | 972 | 232 | 232 | 0.052 | 35.8 |

DAB PUMPS reserves the right to make modifications without notice.

# NKV 10-15-20-32-45-65-95

## VERTICAL MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS WITH COUPLING

## TECHNICAL DATA

**Operating range:**
from 4 to 118 m³/h with head up to 319 meters.
**Pumped liquid:** clean, without solids or abrasives, non-viscous, non-aggressive, non-crystallized and chemically neutral, with properties similar to water.
**Liquid temperature range:** from -15°C to +120°C.
**Maximum ambient temperature:** +40°C.
**Maximum working pressure:** 25 bar (2500kPa) NKV 10-15-20-65-95
32 bar (3200kPa) NKV 32-45
**Protection level:** IP 55.
**Insulation class:** F.
**Standard voltage:** single-phase 230/400 V / 50 Hz
three-phase 400 V Δ / 50 Hz starting from 3.
**Installation:** fixed, vertical mounting.
**Special version on request:**
other voltages and / or power supply frequencies.
60 Hz version.

## APPLICATIONS

Vertical multistage centrifugal pump suitable for medium to large user water systems. Recommended for pressurisation units, boiler supply, hot water and cooling water circulation, fire fighting and washing systems, drinking water supply and filling of pressure vessels, sprinkler and watering systems and water purification systems.

## PUMP FEATURES
## NKV 10-15-20

All the parts in contact with liquid are made of stainless steel.
AISI 304 microcast stainless steel internal pump body, ULTEM diffusers, AISI 431 pump shaft, impellers and pump sleeve in stainless steel AISI 304. External pump body and support in cast iron with cataphoresis paint coating. The cartridge mechanical seal is made of silicon carbide/silicon carbide, maintenance-free, and can be dismantled without removing the motor starting from 5.5 kW. Rigid motor-pump coupling.

## NKV 32-45-65-95

Impellers, diffusers and sleeve in AISI 304 stainless steel to ensure durability, high efficiency and performance. Pump shaft in stainless steel AISI 431.
Pump body and seal holding disc in cast iron with cataphoresis paint coating. Carbon stage body bushing, to ensure durability in case of dry operation. Oversized ball bearings, fitted on the motor support to ensure duration and eliminate axial adjustments. PTFE WRAS approved floating wear ring for consistent performance. Silicon carbide / carbon mechanical seal that can be dismantled without removing the motor starting from 5.5 kW.
Rigid motor-pump coupling. Special full stainless steel version on request.

## CONSTRUCTION FEATURES OF THE MOTOR

Closed with external ventilation cooling.
Rotor running on permanently lubricated ball bearings, oversized to ensure low noise and durability.
Motor protection is the responsibility of the user
Manufactured according to CEI 2-3.
Motor frame: NKV 10 -15 - 20 : B5 -V1
NKV 32 - 45 - 65 - 95: B14 for 4kW and B5 from 5,5kW included.

**DENOMINATION INDEX:**
**(Example)**

**NKV 32 / 3 - 2**

- Range name
- Approximate flow in m³/h at the best efficiency point
- Number of stages
- Number of reduced impellers

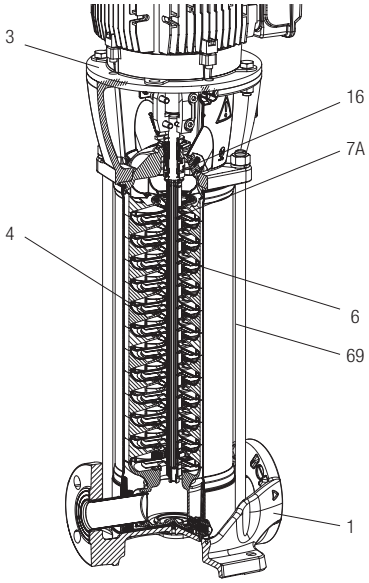
# NKV 10-15-20-32-45-65-95

VERTICAL MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS WITH COUPLING

## MATERIALS NKV 10-15-20

| N° | PARTS | MATERIALS * |
|---|---|---|
| 1 | EXTERNAL PUMP BODY | CAST IRON WITH CATAPHORESIS |
| | INTERNAL PUMP BODY* | STAINLESS STEEL AISI 304 |
| 3 | SUPPORT | CAST IRON WITH CATAPHORESIS |
| 4 | IMPELLER* | STAINLESS STEEL AISI 304 |
| 6 | DIFUSSER* | TECHNOPOLYMER "ULTEM" |
| 7A | PUMP SHAFT* | STAINLESS STEEL AISI 431 |
| 16 | MECHANICAL SEAL* | CARTRIDGE SiC/SiC/EPDM |
| 69 | EXTERNAL CASING* | STAINLESS STEEL AISI 304 |

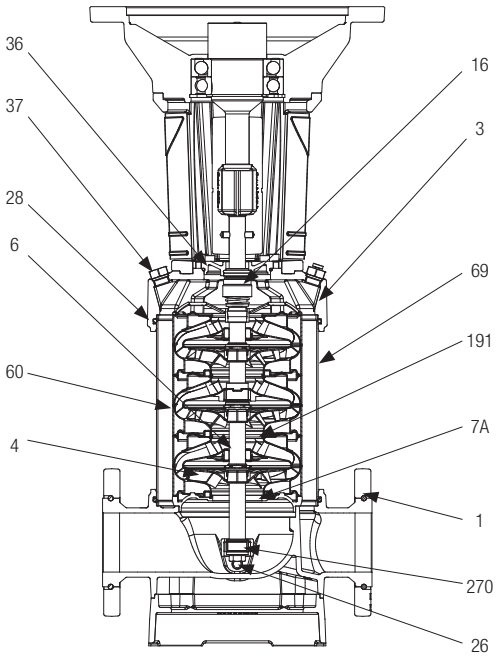
* In contact with the liquid.




## MATERIALS NKV 32-45-65-95

| N° | PARTS | MATERIALS * |
|---|---|---|
| 1 | PUMP BODY | CAST IRON WITH CATAPHORESIS |
| 3 | FLANGE | CAST IRON WITH CATAPHORESIS |
| 4 | IMPELLER | STAINLESS STEEL AISI 304 |
| 6 | STAGE BODY AND DIFUSSER | STAINLESS STEEL AISI 304 |
| 7A | PUMP SHAFT | STAINLESS STEEL AISI 431 |
| 16 | MECHANICAL SEAL | SiC, CARBON, EPDM |
| 26 | DARIN PLUG | STAINLESS STEEL AISI 304 |
| 28 | O-RING | EPDM |
| 36 | SEAL DISK | STAINLESS STEEL AISI 316 |
| 37 | LOADING CAP | STAINLESS STEEL AISI 304 |
| 60 | INTERMEDIATE BEARING | GRAPHITE |
| 69 | EXTERNAL CASING | STAINLESS STEEL AISI 304 |
| 191 | FLOATING ADJUSTMENT RING | PTFE |
| 270 | GUIDE BUSHING | TUNGSTEN CARBIDE |

* In contact with the liquid.

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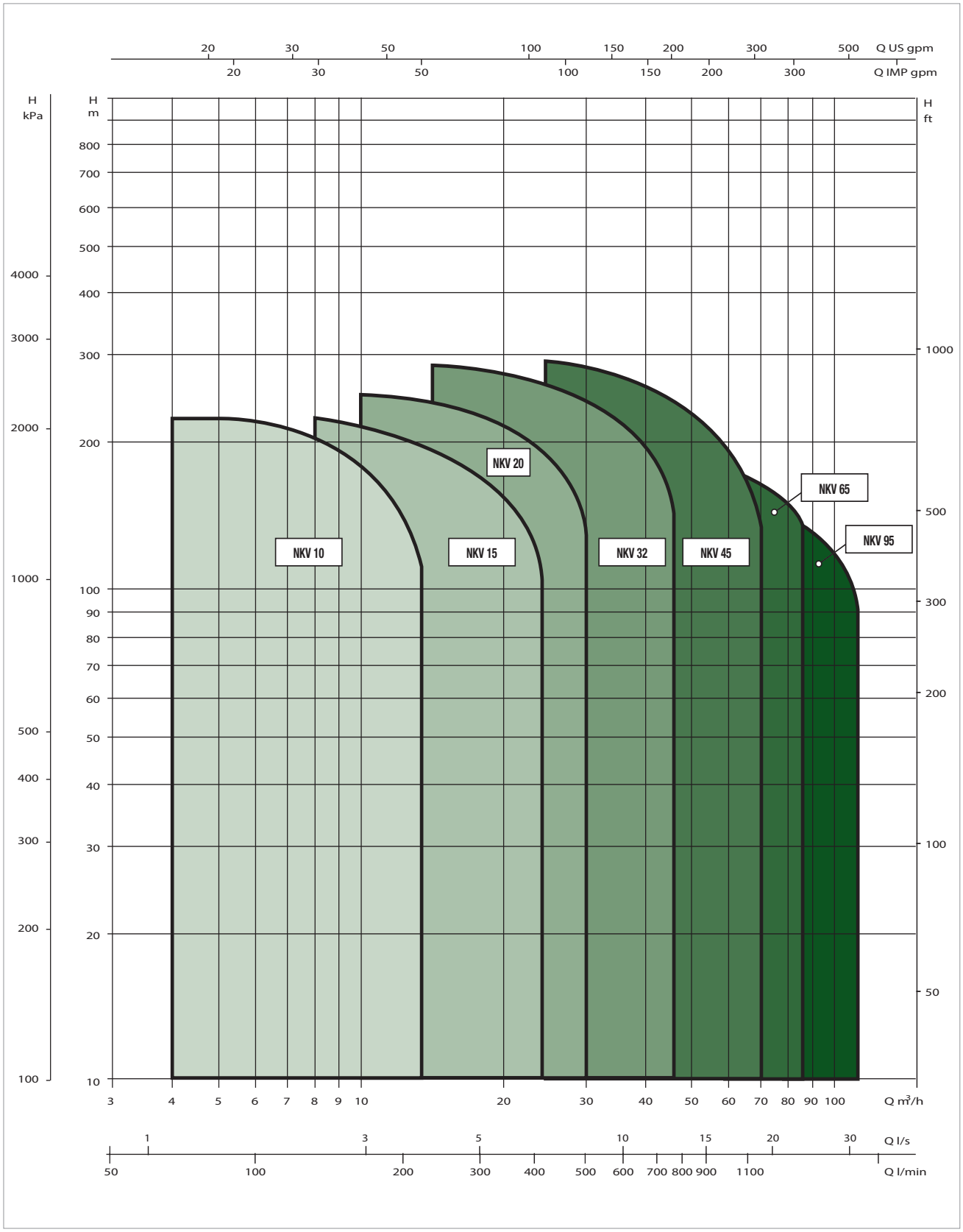
# NKV RANGE

## VERTICAL MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS WITH COUPLING

## PERFORMANCE RANGE

The performance curves are based on the kinematic viscosity values = 1 $mm^2/s$ and density equal to 1000 $kg/m^3$. Curve tolerance according to ISO 9906.

### GRAPHIC SELECTION TABLE



# NKV 10-15-20-32-45-65-95

## VERTICAL MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS WITH COUPLING

## SELECTION TABLE - NKV 10

| MODEL | Q=m³/h | 0 | 4 | 8 | 10 | 12 |
|---|---|---|---|---|---|---|
| | Q=l/min | 0 | 66 | 132 | 167 | 200 |
| NKV 10/2 T | H (m) | 20,2 | 20 | 18,3 | 15,8 | 12,5 |
| NKV 10/3 T | | 30,3 | 31 | 27,5 | 23,6 | 18,8 |
| NKV 10/4 T | | 40,4 | 41 | 36,7 | 31,5 | 25,1 |
| NKV 10/5 T | | 50,5 | 51 | 45,8 | 39,4 | 31,3 |
| NKV 10/6 T | | 60,5 | 61 | 55,0 | 47,3 | 37,6 |
| NKV 10/7 T | | 70,6 | 72 | 64,2 | 55,1 | 43,8 |
| NKV 10/8 T | | 80,7 | 82 | 73,3 | 63,0 | 50,1 |
| NKV 10/9 T | | 90,8 | 92 | 82,5 | 70,9 | 56,4 |
| NKV 10/10 T | | 100,9 | 102 | 91,7 | 78,8 | 62,6 |
| NKV 10/12 T | | 121,1 | 123 | 110,0 | 94,5 | 75,2 |
| NKV 10/14 T | | 141,3 | 143 | 128,3 | 110,3 | 87,7 |
| NKV 10/16 T | | 161,5 | 164 | 146,7 | 126,0 | 100,2 |
| NKV 10/18 T | | 181,6 | 184 | 165,0 | 141,8 | 112,7 |
| NKV 10/20 T | | 201,8 | 205 | 183,3 | 157,5 | 125,3 |
| NKV 10/22 T | | 222 | 225 | 202 | 173,3 | 137,8 |

## SELECTION TABLE - NKV 15

| MODEL | Q=m³/h | 0 | 4 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q=l/min | 0 | 66 | 132 | 167 | 200 | 233 | 264 | 300 | 334 | 367 | 400 |
| NKV 15/2 T | H (m) | 27,2 | 26,7 | 26 | 26,1 | 25,5 | 24,5 | 23,2 | 21,6 | 19,8 | 17,4 | 14,6 |
| NKV 15/3 T | | 40,8 | 40,0 | 40 | 39,1 | 38,3 | 36,8 | 34,8 | 32,5 | 29,7 | 26,1 | 21,9 |
| NKV 15/4 T | | 54,4 | 53,4 | 53 | 52,1 | 51,0 | 49,0 | 46,4 | 43,3 | 39,6 | 34,8 | 29,2 |
| NKV 15/5 T | | 68,0 | 66,7 | 66 | 65,2 | 63,8 | 61,3 | 58,1 | 54,1 | 49,5 | 43,5 | 36,5 |
| NKV 15/6 T | | 81,6 | 80,1 | 79 | 78,2 | 76,5 | 73,6 | 69,7 | 64,9 | 59,4 | 52,2 | 43,8 |
| NKV 15/7 T | | 95,2 | 93,4 | 92 | 91,2 | 89,3 | 85,8 | 81,3 | 75,8 | 69,3 | 60,9 | 51,1 |
| NKV 15/8 T | | 108,8 | 106,8 | 106 | 104,3 | 102,0 | 98,1 | 92,9 | 86,6 | 79,2 | 69,6 | 58,4 |
| NKV 15/9 T | | 122,4 | 120,1 | 119 | 117,3 | 114,8 | 110,3 | 104,5 | 97,4 | 89,1 | 78,4 | 65,7 |
| NKV 15/10 T | | 136,0 | 133,5 | 132 | 130,4 | 127,5 | 122,6 | 116,1 | 108,2 | 99,0 | 87,1 | 73,0 |
| NKV 15/12 T | | 163,2 | 160,2 | 158 | 156,4 | 153,0 | 147,1 | 139,3 | 129,9 | 118,8 | 104,5 | 87,6 |
| NKV 15/14 T | | 190,4 | 186,9 | 185 | 182,5 | 178,5 | 171,6 | 162,6 | 151,5 | 138,6 | 121,9 | 102,2 |
| NKV 15/16 T | | 217,6 | 213,6 | 211 | 208,6 | 204,0 | 196,1 | 185,8 | 173,2 | 158,4 | 139,3 | 116,8 |
| NKV 15/17 T | | 231,2 | 226,9 | 225 | 221,6 | 216,75 | 208,4 | 197,4 | 184 | 168,3 | 148 | 124,1 |

## SELECTION TABLE - NKV 20

| MODEL | Q=m³/h | 0 | 4 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 29 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q=l/min | 0 | 66 | 132 | 167 | 200 | 233 | 264 | 300 | 334 | 367 | 400 | 433 | 483 |
| NKV 20/2 T | H (m) | 29,3 | 28,8 | 28,8 | 28,6 | 28 | 27,6 | 26,9 | 25,9 | 24,6 | 22,9 | 21,2 | 19,1 | 15,8 |
| NKV 20/3 T | | 43,9 | 43,2 | 43,1 | 42,9 | 42 | 41,5 | 40,4 | 38,8 | 36,9 | 34,4 | 31,8 | 28,7 | 23,6 |
| NKV 20/4 T | | 58,6 | 57,6 | 57,5 | 57,2 | 56 | 55,3 | 53,8 | 51,8 | 49,2 | 45,9 | 42,4 | 38,2 | 31,5 |
| NKV 20/5 T | | 73,2 | 71,9 | 71,9 | 71,5 | 71 | 69,1 | 67,3 | 64,7 | 61,5 | 57,4 | 52,9 | 47,8 | 39,4 |
| NKV 20/6 T | | 87,9 | 86,3 | 86,3 | 85,8 | 85 | 82,9 | 80,7 | 77,7 | 73,8 | 68,8 | 63,5 | 57,4 | 47,3 |
| NKV 20/7 T | | 102,5 | 100,7 | 100,6 | 100,1 | 99 | 96,8 | 94,2 | 90,6 | 86,1 | 80,3 | 74,1 | 66,9 | 55,2 |
| NKV 20/8 T | | 117,2 | 115,1 | 115,0 | 114,4 | 113 | 110,6 | 107,6 | 103,6 | 98,4 | 91,8 | 84,7 | 76,5 | 63,1 |
| NKV 20/9 T | | 131,8 | 129,5 | 129,4 | 128,8 | 127 | 124,4 | 121,1 | 116,5 | 110,8 | 103,2 | 95,3 | 86,0 | 70,9 |
| NKV 20/10 T | | 146,5 | 143,9 | 143,8 | 143,1 | 141 | 138,2 | 134,5 | 129,5 | 123,1 | 114,7 | 105,9 | 95,6 | 78,8 |
| NKV 20/12 T | | 175,8 | 172,7 | 172,5 | 171,7 | 169 | 165,9 | 161,4 | 155,4 | 147,7 | 137,6 | 127,1 | 114,7 | 94,6 |
| NKV 20/14 T | | 205,1 | 201,4 | 201,3 | 200,3 | 198 | 193,5 | 188,3 | 181,3 | 172,3 | 160,6 | 148,2 | 133,8 | 110,4 |
| NKV 20/16 T | | 234,4 | 230,2 | 230,0 | 228,9 | 226 | 221,2 | 215,2 | 207,2 | 196,9 | 183,5 | 169,4 | 152,9 | 126,1 |
| NKV 20/17 T | | 249 | 244,6 | 244,4 | 243,2 | 240 | 235 | 228,7 | 220,1 | 209,2 | 195 | 180 | 162,5 | 134 |

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# NKV 10-15-20-32-45-65-95

VERTICAL MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS WITH COUPLING

## SELECTION TABLE - NKV 32

| MODEL | Q=m³/h | 0 | 15 | 18 | 22 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Q=l/min | 0 | 250 | 300 | 367 | 417 | 500 | 583 | 667 | 750 |
| NKV 32/2-2 T | | 36 | 33,5 | 32,5 | 30,5 | 29,5 | 26,5 | 22,5 | 18 | 12,5 |
| NKV 32/2 T | | 48,5 | 43,5 | 42,5 | 41 | 39,5 | 36,5 | 33,5 | 29 | 23,5 |
| NKV 32/3-2 T | | 60 | 54,5 | 53 | 50,5 | 48 | 44 | 38 | 31,5 | 23,5 |
| NKV 32/3 T | | 73 | 65 | 63,5 | 61 | 59 | 55 | 50 | 43,5 | 35,5 |
| NKV 32/4-2 T | | 84,5 | 76,5 | 74 | 70,5 | 68 | 62 | 55 | 46 | 35 |
| NKV 32/4 T | | 98 | 88 | 86 | 83 | 80,5 | 75 | 69 | 60 | 49,5 |
| NKV 32/5-2 T | | 109,5 | 99,5 | 97 | 93 | 89,5 | 83 | 74 | 63 | 49,5 |
| NKV 32/5 T | | 122,5 | 109,5 | 107 | 103,5 | 100 | 93,5 | 85,5 | 75 | 61,5 |
| NKV 32/6-2 T | | 134 | 121,5 | 118,5 | 113,5 | 109,5 | 101,5 | 91 | 78 | 61,5 |
| NKV 32/6 T | | 146,5 | 131 | 128 | 123,5 | 119,5 | 111,5 | 102 | 89 | 73 |
| NKV 32/7-2 T | | 158 | 142,5 | 139 | 133,5 | 128,5 | 119 | 107 | 91,5 | 72,5 |
| NKV 32/7 T | H | 171 | 152,5 | 149 | 144 | 139,5 | 130 | 119 | 103,5 | 85 |
| NKV 32/8-2 T | (m) | 182,5 | 164,5 | 160 | 154 | 148,5 | 137,5 | 124 | 106 | 84,5 |
| NKV 32/8 T | | 194,5 | 174 | 169,5 | 164 | 158,5 | 147,5 | 134,5 | 117 | 95,5 |
| NKV 32/9-2 T | | 208,5 | 188,5 | 184 | 177 | 171 | 159 | 144 | 124,5 | 100,5 |
| NKV 32/9 T | | 221 | 198 | 194 | 187,5 | 181,5 | 169,5 | 155,5 | 136 | 112 |
| NKV 32/10-2 T | | 233 | 210 | 205 | 197,5 | 191 | 177,5 | 161 | 139 | 112 |
| NKV 32/10 T | | 246,5 | 221,5 | 217 | 210 | 203,5 | 190,5 | 175 | 153,5 | 126,5 |
| NKV 32/11-2 T | | 258 | 233,5 | 228,5 | 220,5 | 213 | 198,5 | 180,5 | 156,5 | 127 |
| NKV 32/11 T | | 271 | 243,5 | 238 | 230,5 | 223,5 | 209 | 192 | 168 | 138,5 |
| NKV 32/12-2 T | | 282,5 | 255,5 | 249,5 | 241 | 233 | 217 | 197,5 | 171 | 139 |
| NKV 32/12 T | | 295 | 265,5 | 259,5 | 251 | 243 | 227,5 | 208,5 | 182,5 | 150,5 |
| NKV 32/13-2 T | | 307 | 277,5 | 271 | 261,5 | 252,5 | 235,5 | 214 | 185,5 | 151 |
| NKV 32/13 T | | 319,5 | 287 | 280,5 | 271,5 | 263 | 246 | 225,5 | 197 | 162,5 |

## SELECTION TABLE - NKV 45

| MODEL | Q=m³/h | 0 | 15 | 18 | 22 | 25 | 30 | 35 | 40 | 45 | 54 | 60 | 65 | 70 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q=l/min | 0 | 250 | 300 | 367 | 417 | 500 | 583 | 667 | 750 | 900 | 1000 | 1083 | 1166 |
| NKV 45/2-2 T | | 38,5 | 37,5 | 37 | 36,5 | 35,5 | 34,5 | 33 | 31 | 28,5 | 23 | 18,5 | 14,5 | 10 |
| NKV 45/2 T | | 48,5 | 47,5 | 47 | 46 | 45,5 | 44 | 43 | 41,5 | 39 | 34 | 30,5 | 26,5 | 23 |
| NKV 45/3-2 T | | 63 | 62 | 61,5 | 60,5 | 59,5 | 58 | 56 | 53,5 | 50 | 42 | 36 | 30 | 24 |
| NKV 45/3 T | | 73,5 | 72 | 71 | 70 | 69 | 67 | 65,5 | 63 | 60 | 52,5 | 47 | 41 | 34 |
| NKV 45/4-2 T | | 87,5 | 86 | 85 | 83,5 | 82 | 80 | 77,5 | 74 | 69,5 | 59,5 | 51 | 43 | 34 |
| NKV 45/4 T | | 97,5 | 96 | 94,5 | 93 | 91,5 | 89 | 86,5 | 84 | 79,5 | 69,5 | 62 | 54,5 | 45 |
| NKV 45/5-2 T | | 112 | 109,5 | 108,5 | 106,5 | 105 | 102 | 99 | 94,5 | 89 | 76,5 | 66 | 56 | 45 |
| NKV 45/5 T | | 122 | 119,5 | 118 | 115,5 | 114 | 111 | 108 | 104,5 | 99 | 86,5 | 77 | 67,5 | 56 |
| NKV 45/6-2 T | | 137,5 | 135 | 133,5 | 131 | 129 | 126 | 122 | 117,5 | 110,5 | 95,5 | 83,5 | 72 | 58 |
| NKV 45/6 T | | 147,5 | 145 | 143,5 | 140,5 | 138,5 | 135 | 131,5 | 127 | 121 | 106 | 95 | 83,5 | 71 |
| NKV 45/7-2 T | | 162,5 | 160 | 158 | 155,5 | 153 | 149,5 | 145 | 139,5 | 132 | 115 | 101 | 87,5 | 73 |
| NKV 45/7 T | H | 172,5 | 170 | 168 | 165 | 162,5 | 158,5 | 154,5 | 149,5 | 142,5 | 125,5 | 112 | 99 | 83 |
| NKV 45/8-2 T | (m) | 187 | 184 | 182 | 178,5 | 176 | 171,5 | 167 | 160,5 | 152 | 132 | 116,5 | 101 | 83 |
| NKV 45/8 T | | 197 | 194 | 191,5 | 188 | 185,5 | 181 | 176,5 | 170,5 | 162,5 | 142,5 | 127,5 | 112,5 | 94 |
| NKV 45/9-2 T | | 211,5 | 208 | 205,5 | 202 | 199 | 194 | 188,5 | 181,5 | 172 | 149,5 | 132 | 114,5 | 94 |
| NKV 45/9 T | | 221,5 | 218 | 215,5 | 211,5 | 208 | 203 | 198 | 191,5 | 182 | 160 | 143 | 126 | 106 |
| NKV 45/10-2 T | | 235,5 | 231,5 | 229 | 225 | 221,5 | 216 | 210 | 202 | 191,5 | 166,5 | 147 | 127,5 | 106 |
| NKV 45/10 T | | 246 | 242 | 239 | 234 | 230,5 | 225 | 219 | 212 | 201,5 | 177 | 158 | 139 | 117 |
| NKV 45/11-2 T | | 261 | 256,5 | 254 | 249 | 245,5 | 239,5 | 233 | 224,5 | 213 | 186 | 164,5 | 143,5 | 119 |
| NKV 45/11 T | | 271 | 267 | 263,5 | 258,5 | 255 | 249 | 242,5 | 234,5 | 223,5 | 196,5 | 175,5 | 155 | 130 |
| NKV 45/12-2 T | | 285,5 | 280,5 | 277,5 | 272,5 | 268,5 | 261,5 | 254,5 | 245,5 | 232,5 | 203 | 179,5 | 156,5 | 130 |
| NKV 45/12 T | | 295,5 | 290,5 | 287,5 | 282 | 277,5 | 271 | 264 | 255,5 | 243 | 213,5 | 191 | 168,5 | 142 |
| NKV 45/13-2 T | | 309,5 | 304,5 | 301 | 295,5 | 291 | 284 | 276 | 266 | 252,5 | 220,5 | 195 | 170 | 142 |

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# NKV 10-15-20-32-45-65-95

VERTICAL MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS WITH COUPLING

## SELECTION TABLE - NKV 65

| MODEL | Q=m³/h | 0 | 30 | 36 | 42 | 45 | 54 | 60 | 72 | 78 | 85 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q=l/min | 0 | 500 | 600 | 700 | 750 | 900 | 1000 | 1200 | 1300 | 1417 |
| NKV 65/2-2 T | | 39 | 37,5 | 36,5 | 35,5 | 35 | 33 | 31 | 25 | 22 | 17,5 |
| NKV 65/2 T | | 56,5 | 51 | 49,5 | 48,5 | 48 | 46 | 45 | 41 | 38,5 | 34,5 |
| NKV 65/3-2 T | | 67,5 | 63,5 | 62 | 60,5 | 59,5 | 56,5 | 54 | 46,5 | 42 | 35,5 |
| NKV 65/3 T | | 84,5 | 76 | 74 | 72,5 | 71,5 | 69 | 67 | 61,5 | 57,5 | 51,5 |
| NKV 65/4-2 T | | 95,5 | 88,5 | 86 | 84 | 83 | 79 | 75,5 | 66 | 60,5 | 52 |
| NKV 65/4 T | | 113,5 | 102,5 | 100 | 97,5 | 96,5 | 92,5 | 90,5 | 83 | 78 | 70 |
| NKV 65/5-2 T | H | 125 | 116 | 113 | 110,5 | 109 | 104,5 | 101 | 90 | 83 | 72,5 |
| NKV 65/5 T | (m) | 142 | 129 | 125,5 | 122,5 | 121 | 116,5 | 114 | 105 | 98,5 | 88,5 |
| NKV 65/6-2 T | | 153 | 141,5 | 137,5 | 134,5 | 133 | 127,5 | 123 | 110 | 102 | 89,5 |
| NKV 65/6 T | | 170 | 154 | 150 | 147 | 145 | 139,5 | 136 | 125 | 117,5 | 105,5 |
| NKV 65/7-2 T | | 181,5 | 166,5 | 162,5 | 158,5 | 156,5 | 150 | 145 | 130,5 | 120,5 | 106,5 |
| NKV 65/7 T | | 199 | 180,5 | 175,5 | 172 | 169,5 | 163,5 | 159,5 | 147 | 138 | 124 |
| NKV 65/8-2 T | | 210 | 193 | 188 | 184 | 181,5 | 174 | 168,5 | 152 | 141,5 | 125 |
| NKV 65/8 T | | 227 | 206 | 200 | 196 | 193,5 | 186 | 181,5 | 167 | 157 | 141 |

## SELECTION TABLE - NKV 95

| MODEL | Q=m³/h | 0 | 45 | 54 | 60 | 72 | 78 | 85 | 96 | 108 | 118 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q=l/min | 0 | 750 | 900 | 1000 | 1200 | 1300 | 1417 | 1600 | 1800 | 1967 |
| NKV 95/2-2 T | | 44,5 | 43 | 42 | 41 | 38,5 | 36,5 | 34 | 28,5 | 21,5 | 15 |
| NKV 95/2 T | | 62 | 55,5 | 53 | 51,5 | 49 | 47,5 | 45 | 41 | 35 | 28,5 |
| NKV 95/3-2 T | | 75,5 | 70,5 | 68 | 66,5 | 62,5 | 59,5 | 56 | 48,5 | 38,5 | 28,5 |
| NKV 95/3 T | | 93,5 | 84 | 80,5 | 78 | 74 | 72 | 69 | 62,5 | 53,5 | 44 |
| NKV 95/4-2 T | H | 108 | 100 | 97 | 94,5 | 89 | 85,5 | 81 | 71,5 | 59 | 46 |
| NKV 95/4 T | (m) | 125,5 | 112,5 | 108 | 105 | 99,5 | 96,5 | 92,5 | 84 | 72 | 60 |
| NKV 95/5-2 T | | 139 | 127,5 | 123,5 | 120 | 113,5 | 109 | 103,5 | 92 | 76 | 60 |
| NKV 95/5 T | | 156 | 140 | 134,5 | 130,5 | 123,5 | 120 | 114,5 | 104,5 | 89 | 74 |
| NKV 95/6-2 T | | 170,5 | 156 | 150,5 | 146,5 | 138,5 | 134 | 127 | 113,5 | 94,5 | 75,5 |
| NKV 95/6 T | | 188 | 169 | 161,5 | 157 | 149 | 144,5 | 138,5 | 126 | 108 | 89,5 |

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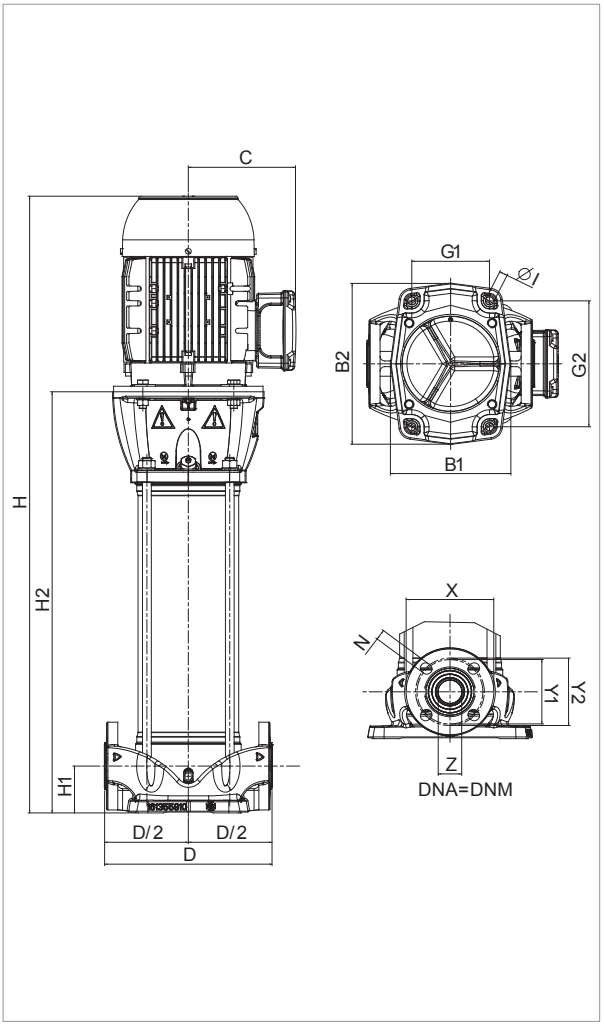
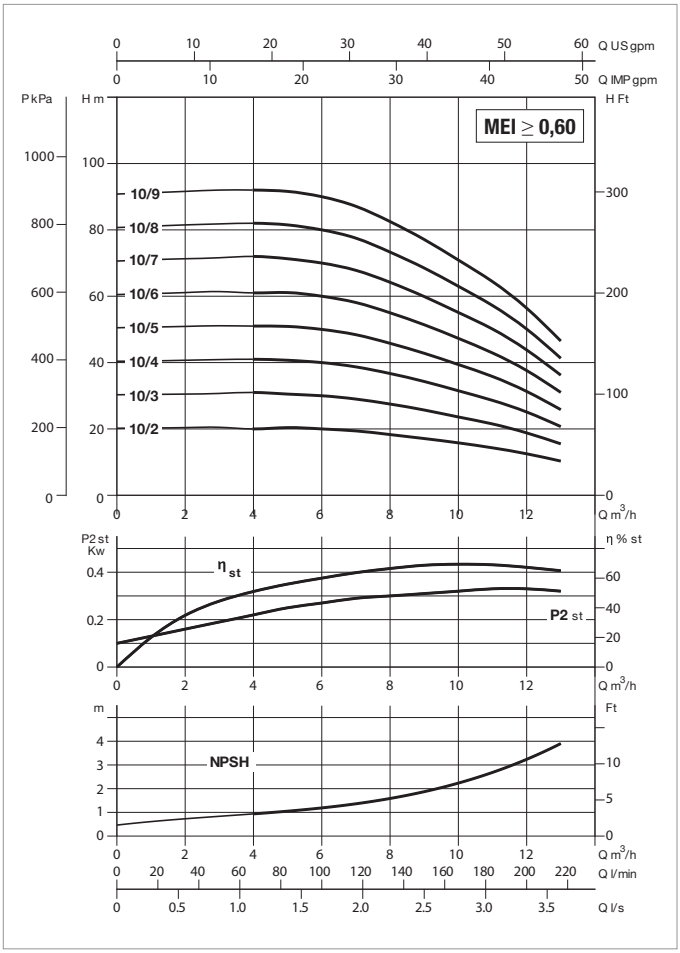
# **NKV 10** - VERTICAL AXIS MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS FOR CIVIL AND INDUSTRIAL PRESSURIZATION UNITS

**Liquid temperature range:** da - 15°C a +120°C - **Maximum working pressure:** 25 bar (2500 kPa)




**For hydraulic efficiency see pag. 291**

The performance curves are based on kinematic viscosity values = 1 mm²/s and density equivalent to 1000 kg/m³. Tolerance of curves to ISO 9906.

| MODEL | VOLTAGE 50 Hz | P1 MAX kW | P2 NOMINAL | | In A | | MOTOR TYPE | Ist A | | RPM |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | kW | HP | IE2 | IE3 | | IE2 | IE3 | |
| **NKV 10/2 T** | 3 x 230 - 400 V ~ | 0,8 | 0,75 | 1,02 | 2,81/1,62 | - | IE2 | 22,25/12,85 | - | 2880 |
| **NKV 10/3 T** | 3 x 230 - 400 V ~ | 1,2 | 1,10 | 1,496 | 4,07/2,36 | - | IE2 | 32,23/18,69 | - | 2870 |
| **NKV 10/4 T** | 3 x 230 - 400 V ~ | 1,6 | 1,50 | 2,04 | 5,8/3,35 | - | IE2 | 51,35/29,65 | - | 2880 |
| **NKV 10/5 T** | 3 x 230 - 400 V ~ | 2,0 | 2,2 | 2,992 | 8,23/4,75 | - | IE2 | 68,37/39,47 | - | 2870 |
| **NKV 10/6 T** | 3 x 230 - 400 V ~ | 2,4 | 2,2 | 2,992 | 8,23/4,75 | - | IE2 | 68,37/39,47 | - | 2870 |
| **NKV 10/7 T** | 3 x 400 V ~ | 2,7 | 3,0 | 4,08 | 5,85 | - | IE2 | 52,24 | - | 2880 |
| **NKV 10/8 T** | 3 x 400 V ~ | 3,1 | 3,0 | 4,08 | 5,85 | - | IE2 | 52,24 | - | 2880 |
| **NKV 10/9 T** | 3 x 400 V ~ | 3,4 | 3,0 | 4,08 | 5,85 | - | IE2 | 52,24 | - | 2880 |

| MODEL | STAGE N° | B1 | B2 | G1 | G2 | I | C | | D | D/2 | H | | H1 | H2 | DNA = DNM (DN 40) | | | | | PACK. DIMENSIONS | | | VOL. mc | WEIGHT Kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | IE2 | IE3 | | | IE2 | IE3 | | | X | Y1 | Y2 | Z | N | L/A | L/B | H | | IE2 | IE3 |
| **NKV 10/2 T** | 2 | 201 | 274 | 130 | 215 | 13,5 | 145 | - | 280 | 140 | 611,4 | - | 80 | 356,4 | 150 | 110 | 115 | 40 | 17,5 | 800 | 400 | 400 | 0,128 | 43,41 | - |
| **NKV 10/3 T** | 3 | 201 | 274 | 130 | 215 | 13,5 | 145 | - | 280 | 140 | 644,4 | - | 80 | 389,4 | 150 | 110 | 115 | 40 | 17,5 | 800 | 400 | 400 | 0,128 | 44,94 | - |
| **NKV 10/4 T** | 4 | 201 | 274 | 130 | 215 | 13,5 | 155 | - | 280 | 140 | 692,4 | - | 80 | 422,4 | 150 | 110 | 115 | 40 | 17,5 | 800 | 400 | 400 | 0,128 | 49,81 | - |
| **NKV 10/5 T** | 5 | 201 | 274 | 130 | 215 | 13,5 | 155 | - | 280 | 140 | 750,4 | - | 80 | 455,4 | 150 | 110 | 115 | 40 | 17,5 | 800 | 400 | 400 | 0,128 | 54,62 | - |
| **NKV 10/6 T** | 6 | 201 | 274 | 130 | 215 | 13,5 | 155 | - | 280 | 140 | 783,4 | - | 80 | 488,4 | 150 | 110 | 115 | 40 | 17,5 | 800 | 400 | 400 | 0,128 | 55,46 | - |
| **NKV 10/7 T** | 7 | 201 | 274 | 130 | 215 | 13,5 | 180 | - | 280 | 140 | 863,4 | - | 80 | 538,4 | 150 | 110 | 115 | 40 | 17,5 | 960 | 400 | 370 | 0,142 | 65,54 | - |
| **NKV 10/8 T** | 8 | 201 | 274 | 130 | 215 | 13,5 | 180 | - | 280 | 140 | 896,4 | - | 80 | 571,4 | 150 | 110 | 115 | 40 | 17,5 | 960 | 400 | 370 | 0,142 | 66,36 | - |
| **NKV 10/9 T** | 9 | 201 | 274 | 130 | 215 | 13,5 | 180 | - | 280 | 140 | 929,4 | - | 80 | 604,4 | 150 | 110 | 115 | 40 | 17,5 | 960 | 400 | 370 | 0,142 | 67,25 | - |

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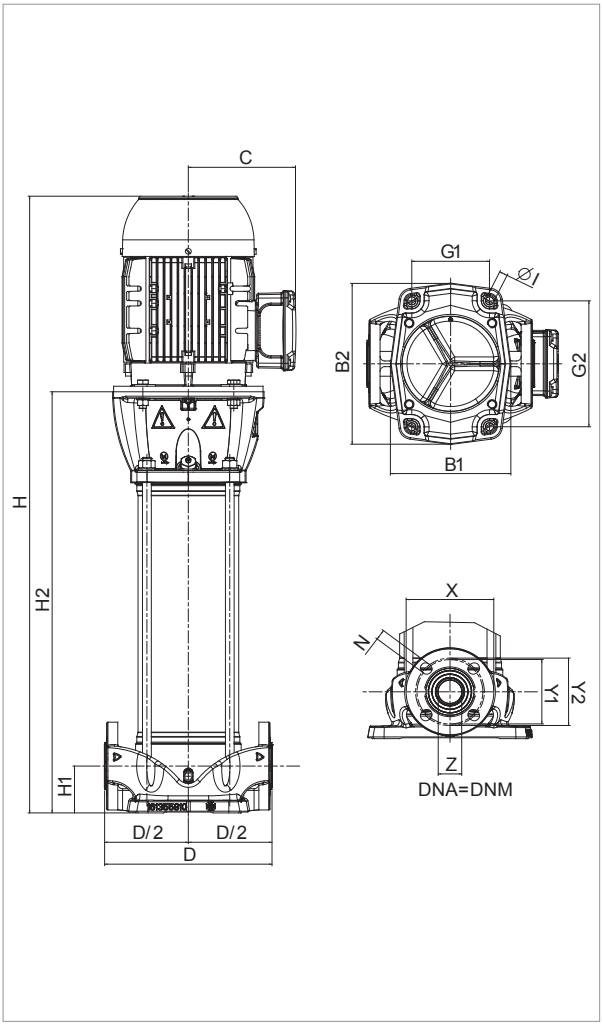
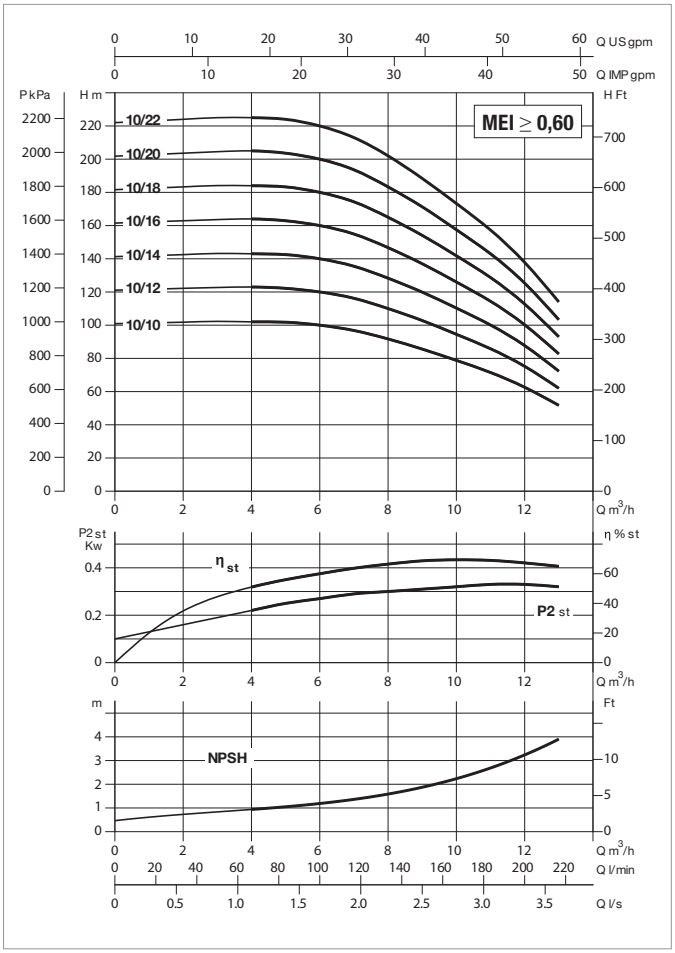
# **NKV 10** - VERTICAL AXIS MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS FOR CIVIL AND INDUSTRIAL PRESSURIZATION UNITS

**Liquid temperature range:** da - 15°C a +120°C - **Maximum working pressure:** 25 bar (2500 kPa)




**For hydraulic efficiency see pag. 291**

The performance curves are based on kinematic viscosity values = 1 mm²/s and density equivalent to 1000 kg/m³. Tolerance of curves to ISO 9906.

| MODEL | VOLTAGE 50 Hz | P1 MAX kW | P2 NOMINAL | | In A | | MOTOR TYPE | Ist A | | RPM |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | kW | HP | IE2 | IE3 | | IE2 | IE3 | |
| **NKV 10/10 T** | 3 x 400 V ~ | 3,8 | 4,0 | 5,44 | 8,05 | - | IE2 | 73,58 | - | 2910 |
| **NKV 10/12 T** | 3 x 400 V ~ | 4,5 | 4,0 | 5,44 | 8,05 | - | IE2 | 73,58 | - | 2910 |
| **NKV 10/14 T** | 3 x 400 V ~ | 5,2 | 5,5 | 7,48 | 10,4 | - | IE2 | 80,81 | - | 2910 |
| **NKV 10/16 T** | 3 x 400 V ~ | 6,0 | 5,5 | 7,48 | 10,4 | - | IE2 | 80,81 | - | 2910 |
| **NKV 10/18 T** | 3 x 400 V ~ | 6,7 | 7,5 | 10,2 | 14,8 | 13,4 | IE2 / IE3 | 106,68 | 114 | 2900 |
| **NKV 10/20 T** | 3 x 400 V ~ | 7,5 | 7,5 | 10,2 | 14,8 | 13,4 | IE2 / IE3 | 106,68 | 114 | 2900 |
| **NKV 10/22 T** | 3 x 400 V ~ | 8,2 | 7,5 | 10,2 | 14,8 | 13,4 | IE2 / IE3 | 106,68 | 114 | 2900 |

| MODEL | STAGE N° | B1 | B2 | G1 | G2 | I | C | | D | D/2 | H | | H1 | H2 | DNA = DNM (DN 40) | | | | | PACK. DIMENSIONS | | | VOL. mc | WEIGHT Kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | IE2 | IE3 | | | IE2 | IE3 | | | X | Y1 | Y2 | Z | N | L/A | L/B | H | | IE2 | IE3 |
| **NKV 10/10 T** | 10 | 201 | 274 | 130 | 215 | 13,5 | 190 | - | 280 | 140 | 977,4 | - | 80 | 637,4 | 150 | 110 | 115 | 40 | 17,5 | 1150 | 500 | 400 | 0,230 | 77,05 | - |
| **NKV 10/12 T** | 12 | 201 | 274 | 130 | 215 | 13,5 | 190 | - | 280 | 140 | 1043,4 | - | 80 | 703,4 | 150 | 110 | 115 | 40 | 17,5 | 1150 | 500 | 400 | 0,230 | 78,70 | - |
| **NKV 10/14 T** | 14 | 201 | 274 | 130 | 215 | 13,5 | 210 | - | 280 | 140 | 1238,8 | - | 80 | 848,8 | 150 | 110 | 115 | 40 | 17,5 | 1360 | 500 | 530 | 0,360 | 107,32 | - |
| **NKV 10/16 T** | 16 | 201 | 274 | 130 | 215 | 13,5 | 210 | - | 280 | 140 | 1304,8 | - | 80 | 914,8 | 150 | 110 | 115 | 40 | 17,5 | 1360 | 500 | 530 | 0,360 | 109 | - |
| **NKV 10/18 T** | 18 | 201 | 274 | 130 | 215 | 13,5 | 210 | 188 | 280 | 140 | 1370,8 | 1239,8 | 80 | 980,8 | 150 | 110 | 115 | 40 | 17,5 | 1650 | 500 | 580 | 0,479 | 116,66 | 116 |
| **NKV 10/20 T** | 20 | 201 | 274 | 130 | 215 | 13,5 | 210 | 188 | 280 | 140 | 1436,8 | 1305,8 | 80 | 1046,8 | 150 | 110 | 115 | 40 | 17,5 | 1650 | 500 | 580 | 0,479 | 118,34 | 98 |
| **NKV 10/22 T** | 22 | 201 | 274 | 130 | 215 | 13,5 | 210 | 188 | 280 | 140 | 1502,8 | 1371,8 | 80 | 1112,8 | 150 | 110 | 115 | 40 | 17,5 | 1650 | 500 | 580 | 0,479 | 120,02 | 108 |

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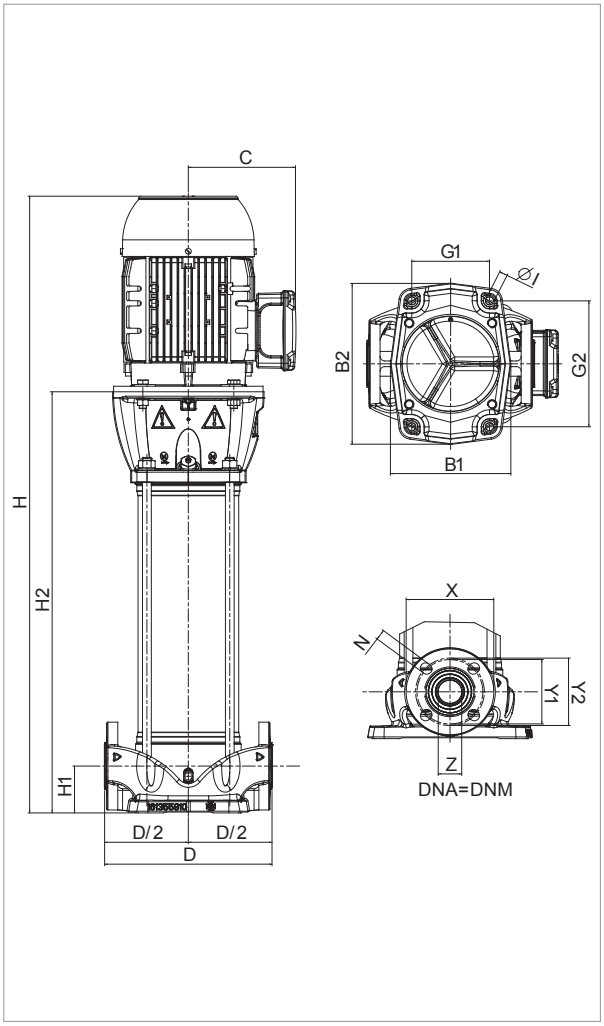
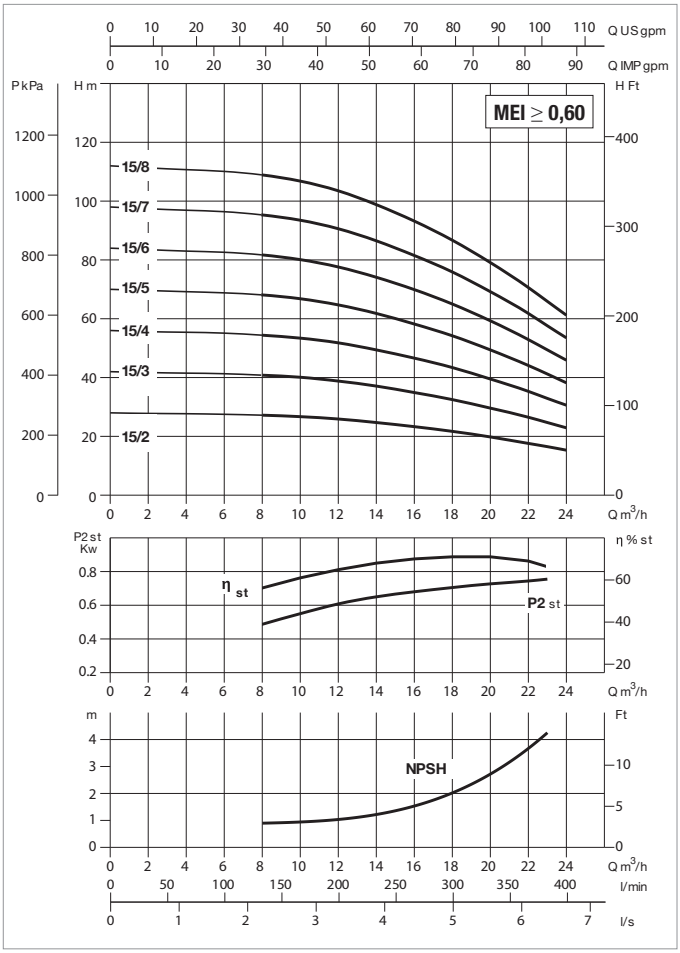
# **NKV 15** - VERTICAL AXIS MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS FOR CIVIL AND INDUSTRIAL PRESSURIZATION UNITS

**Liquid temperature range:** from – 15 °C to +120 °C - **Maximum working pressure:** 25 bar (2500 kPa)




**For hydraulic efficiency see pag. 291**

The performance curves are based on kinematic viscosity values = 1 mm²/s and density equivalent to 1000 kg/m³. Tolerance of curves to ISO 9906.

| MODEL | VOLTAGE 50 Hz | P1 MAX kW | P2 NOMINAL | | In A | | MOTOR TYPE | Ist A | | RPM |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | kW | HP | IE2 | IE3 | | IE2 | IE3 | |
| **NKV 15/2 T** | 3 x 230 - 400 V ~ | 1,8 | 2,20 | 2,992 | 8,23/4,75 | - | IE2 | 68,37/39,47 | - | 2870 |
| **NKV 15/3 T** | 3 x 400 V ~ | 2,6 | 3 | 4,08 | 5,85 | - | IE2 | 52,24 | - | 2880 |
| **NKV 15/4 T** | 3 x 400 V ~ | 3,5 | 4 | 5,44 | 8,05 | - | IE2 | 73,58 | - | 2910 |
| **NKV 15/5 T** | 3 x 400 V ~ | 4,4 | 4 | 5,44 | 8,05 | - | IE2 | 73,58 | - | 2910 |
| **NKV 15/6 T** | 3 x 400 V ~ | 5,2 | 5,5 | 7,48 | 10,4 | - | IE2 | 80,81 | - | 2910 |
| **NKV 15/7 T** | 3 x 400 V ~ | 6,0 | 5,5 | 7,48 | 10,4 | - | IE2 | 80,81 | - | 2910 |
| **NKV 15/8 T** | 3 x 400 V ~ | 6,9 | 7,5 | 10,2 | 14,8 | 13,4 | IE2 / IE3 | 106,68 | 114 | 2900 |

| MODEL | STAGE N° | B1 | B2 | G1 | G2 | I | C | | D | D/2 | H | | H1 | H2 | DNA = DNM (DN 50) | | | | PACK. DIMENSIONS | | | VOL. mc | WEIGHT Kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | IE2 | IE3 | | | IE2 | IE3 | | | X | Y | Z | N | L/A | L/B | H | | IE2 | IE3 |
| **NKV 15/2 T** | 2 | 201 | 274 | 130 | 215 | 13,5 | 155 | - | 300 | 150 | 651,4 | - | 90 | 356,4 | 165 | 125 | 67 | 18 | 800 | 400 | 400 | 0,128 | 54,68 | - |
| **NKV 15/3 T** | 3 | 201 | 274 | 130 | 215 | 13,5 | 180 | - | 300 | 150 | 731,4 | - | 90 | 406,4 | 165 | 125 | 67 | 18 | 800 | 400 | 400 | 0,128 | 64,67 | - |
| **NKV 15/4 T** | 4 | 201 | 274 | 130 | 215 | 13,5 | 190 | - | 300 | 150 | 779,4 | - | 90 | 439,4 | 165 | 125 | 67 | 18 | 800 | 400 | 400 | 0,128 | 74,93 | - |
| **NKV 15/5 T** | 5 | 201 | 274 | 130 | 215 | 13,5 | 190 | - | 300 | 150 | 812,4 | - | 90 | 472,4 | 165 | 125 | 67 | 18 | 960 | 400 | 370 | 0,142 | 76,19 | - |
| **NKV 15/6 T** | 6 | 201 | 274 | 130 | 215 | 13,5 | 210 | - | 300 | 150 | 974,8 | - | 90 | 584,8 | 165 | 125 | 67 | 18 | 1150 | 500 | 400 | 0,230 | 104,31 | - |
| **NKV 15/7 T** | 7 | 201 | 274 | 130 | 215 | 13,5 | 210 | - | 300 | 150 | 1007,8 | - | 90 | 617,8 | 165 | 125 | 67 | 18 | 1150 | 500 | 400 | 0,230 | 105,62 | - |
| **NKV 15/8 T** | 8 | 201 | 274 | 130 | 215 | 13,5 | 210 | 188 | 300 | 150 | 1040,8 | 1063,5 | 90 | 650,8 | 165 | 125 | 67 | 18 | 1360 | 500 | 400 | 0,230 | 112,83 | 106 |

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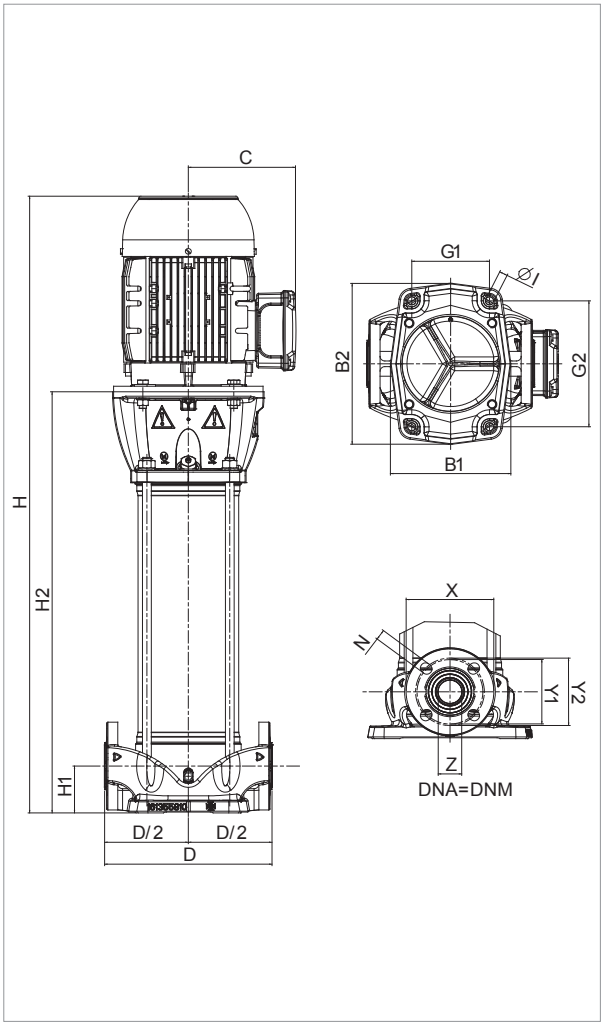
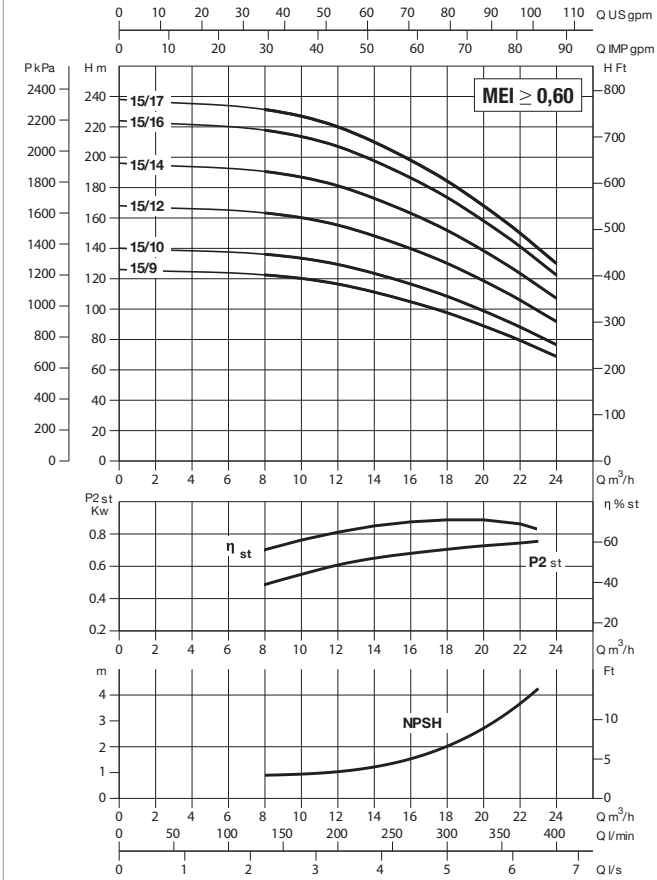
# **NKV 15** - VERTICAL AXIS MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS FOR CIVIL AND INDUSTRIAL PRESSURIZATION UNITS

**Liquid temperature range:** da - 15°C TO +120°C - **Maximum working pressure:** 25 bar (2500 kPa)




**For hydraulic efficiency see pag. 291**

The performance curves are based on kinematic viscosity values = 1 $mm^2/s$ and density equivalent to 1000 $kg/m^3$. Tolerance of curves to ISO 9906.

| MODEL | VOLTAGE 50 Hz | P1 MAX kW | P2 NOMINAL | | In A | | MOTOR TYPE | Ist A | | RPM |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | kW | HP | IE2 | IE3 | | IE2 | IE3 | |
| **NKV 15/9 T** | 3 x 400 V ~ | 7,7 | 7,5 | 10,2 | 14,8 | 13,4 | IE2 / IE3 | 106,68 | 114 | 2900 |
| **NKV 15/10 T** | 3 x 400 V ~ | 8,5 | 11 | 14,96 | 22,4 | 19,4 | IE2 / IE3 | 126,05 | 147 | 2930 |
| **NKV 15/12 T** | 3 x 400 V ~ | 10,2 | 11 | 14,96 | 22,4 | 19,4 | IE2 / IE3 | 126,05 | 147 | 2930 |
| **NKV 15/14 T** | 3 x 400 V ~ | 11,8 | 11 | 14,96 | 22,4 | 19,4 | IE2 / IE3 | 126,05 | 147 | 2930 |
| **NKV 15/16 T** | 3 x 400 V ~ | 13,4 | 15 | 20,4 | 29,5 | 26,5 | IE2 / IE3 | 189,81 | 204 | 2940 |
| **NKV 15/17 T** | 3 x 400 V ~ | 14,3 | 15 | 20,4 | 29,5 | 26,5 | IE2 / IE3 | 189,81 | 204 | 2940 |

| MODEL | STAGE N° | B1 | B2 | G1 | G2 | I | C | | D | D/2 | H | | H1 | H2 | DNA = DNM (DN 50) | | | | PACK. DIMENSIONS | | | VOL. mc | WEIGHT Kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | IE2 | IE3 | | | IE2 | IE3 | | | X | Y | Z | N | L/A | L/B | H | | IE2 | IE3 |
| **NKV 15/9 T** | 9 | 201 | 274 | 130 | 215 | 13,5 | 210 | 188 | 300 | 150 | 1073,8 | 1113 | 90 | 683,8 | 165 | 125 | 67 | 18 | 1150 | 500 | 400 | 0,230 | 114,07 | 103 |
| **NKV 15/10 T** | 10 | 201 | 274 | 130 | 215 | 13,5 | 255 | 242 | 300 | 150 | 1251 | 1297,5 | 90 | 746 | 165 | 125 | 67 | 18 | 1360 | 500 | 530 | 0,360 | 170,30 | 194 |
| **NKV 15/12 T** | 12 | 201 | 274 | 130 | 215 | 13,5 | 255 | 242 | 300 | 150 | 1317 | 1396,5 | 90 | 812 | 165 | 125 | 67 | 18 | 1360 | 500 | 530 | 0,360 | 172,77 | 185 |
| **NKV 15/14 T** | 14 | 201 | 274 | 130 | 215 | 13,5 | 255 | 242 | 300 | 150 | 1383 | 1495,5 | 90 | 878 | 165 | 125 | 67 | 18 | 1650 | 500 | 580 | 0,479 | 175,31 | 195 |
| **NKV 15/16 T** | 16 | 201 | 274 | 130 | 215 | 13,5 | 255 | 242 | 300 | 150 | 1449 | 1594,5 | 90 | 944 | 165 | 125 | 67 | 18 | 1650 | 500 | 580 | 0,479 | 185,78 | 162 |
| **NKV 15/17 T** | 17 | 201 | 274 | 130 | 215 | 13,5 | 255 | 242 | 300 | 150 | 1762,5 | 1644 | 90 | 1257,5 | 165 | 125 | 67 | 18 | 1850 | 500 | 580 | 0,537 | 187,02 | 193 |

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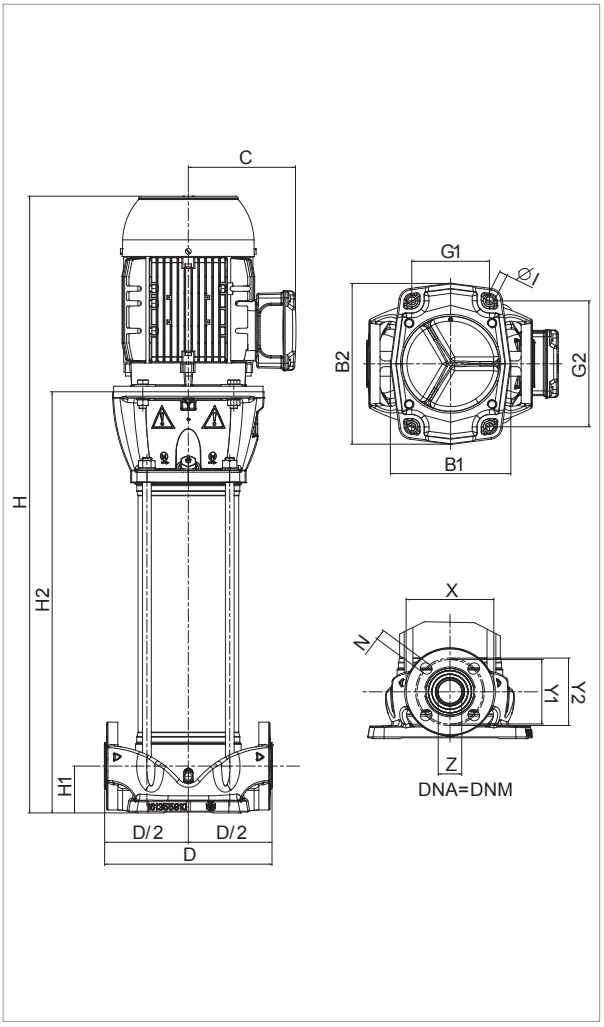
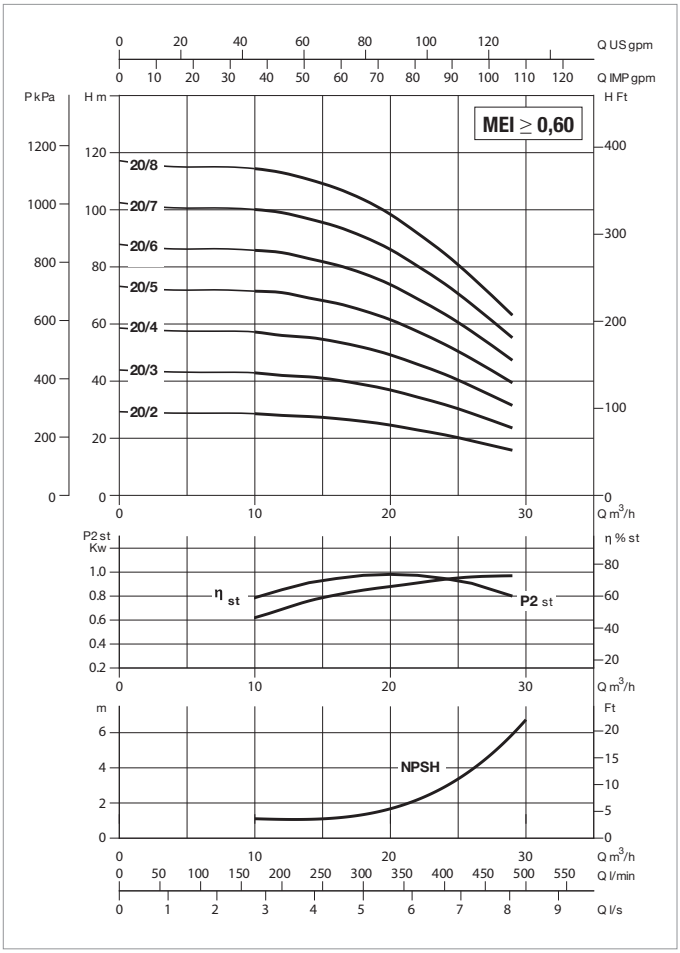
# **NKV 20** - VERTICAL AXIS MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS FOR CIVIL AND INDUSTRIAL PRESSURIZATION UNITS

**Liquid temperature range:** from - 15 °C to +120 °C - **Maximum working pressure:** 25 bar (2500 kPa)




**For hydraulic efficiency see pag. 291**

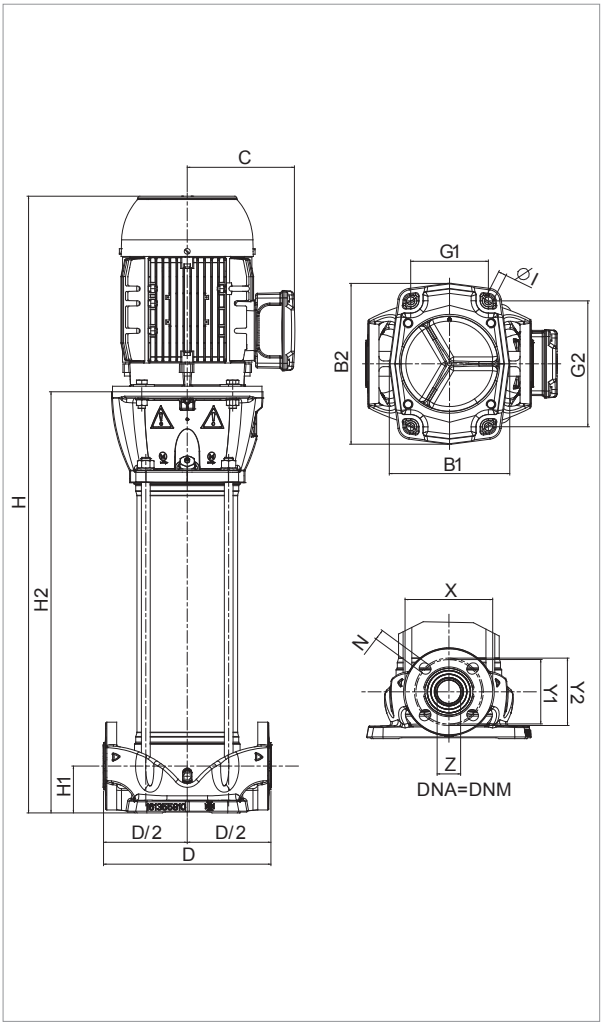
The performance curves are based on kinematic viscosity values = 1 mm²/s and density equivalent to 1000 kg/m³. Tolerance of curves to ISO 9906.

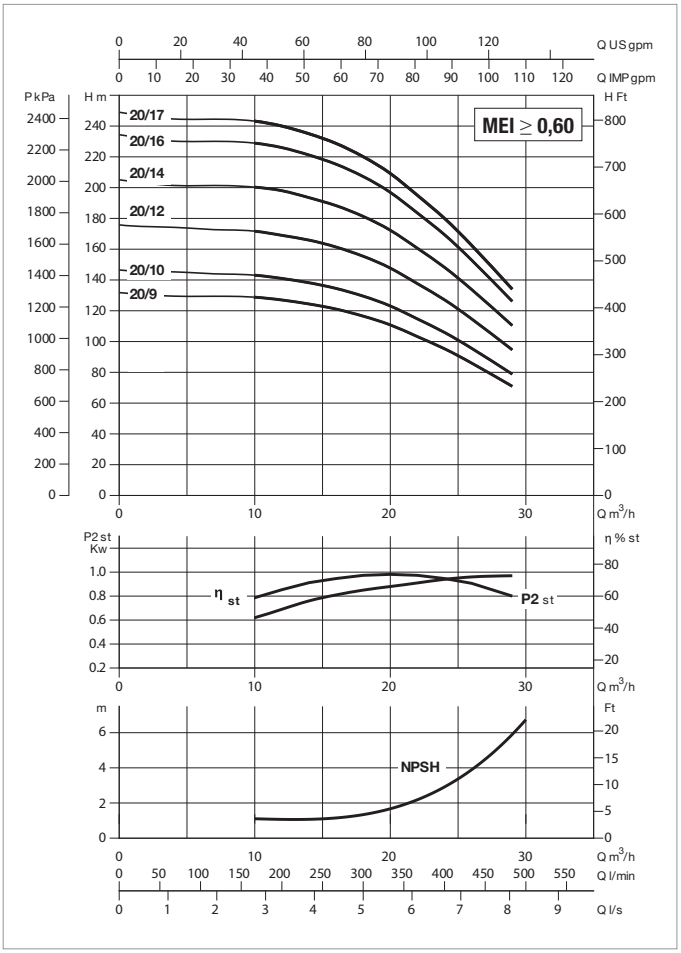
| MODEL | VOLTAGE 50 Hz | P1 MAX kW | P2 NOMINAL | | In A | | MOTOR TYPE | Ist A | | RPM |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | kW | HP | IE2 | IE3 | | IE2 | IE3 | |
| **NKV 20/2 T** | 3 x 230 - 400 V ~ | 2,3 | 2,2 | 2,99 | 8,23/4,75 | - | IE2 | 68,37/39,47 | - | 2870 |
| **NKV 20/3 T** | 3 x 400 V ~ | 3,4 | 4 | 5,44 | 8,05 | - | IE2 | 73,58 | - | 2910 |
| **NKV 20/4 T** | 3 x 400 V ~ | 4,4 | 5,5 | 7,48 | 10,4 | - | IE2 | 80,81 | - | 2910 |
| **NKV 20/5 T** | 3 x 400 V ~ | 5,5 | 5,5 | 7,48 | 10,4 | - | IE2 | 80,81 | - | 2910 |
| **NKV 20/6 T** | 3 x 400 V ~ | 6,7 | 7,5 | 10,2 | 14,8 | 13,4 | IE2 / IE3 | 106,68 | 114 | 2900 |
| **NKV 20/7 T** | 3 x 400 V ~ | 7,8 | 7,5 | 10,2 | 14,8 | 13,4 | IE2 / IE3 | 106,68 | 114 | 2900 |
| **NKV 20/8 T** | 3 x 400 V ~ | 8,7 | 11 | 14,96 | 22,4 | 19,4 | IE2 / IE3 | 126,05 | 147 | 2930 |

| MODEL | STAGE N° | B1 | B2 | G1 | G2 | I | C | | D | D/2 | H | | H1 | H2 | DNA = DNM (DN 50) | | | | PACK. DIMENSIONS | | | VOL. mc | WEIGHT Kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | IE2 | IE3 | | | IE2 | IE3 | | | X | Y | Z | N | L/A | L/B | H | | IE2 | IE3 |
| **NKV 20/2 T** | 2 | 201 | 274 | 130 | 215 | 13,5 | 155 | - | 300 | 150 | 651,4 | - | 90 | 356,4 | 165 | 125 | 67 | 18 | 800 | 400 | 400 | 0,128 | 45 | - |
| **NKV 20/3 T** | 3 | 201 | 274 | 130 | 215 | 13,5 | 190 | - | 300 | 150 | 746,4 | - | 90 | 406,4 | 165 | 125 | 67 | 18 | 800 | 400 | 400 | 0,128 | 60 | - |
| **NKV 20/4 T** | 4 | 201 | 274 | 130 | 215 | 13,5 | 210 | - | 300 | 150 | 908,8 | - | 90 | 518,8 | 165 | 125 | 67 | 18 | 960 | 400 | 370 | 0,142 | 74 | - |
| **NKV 20/5 T** | 5 | 201 | 274 | 130 | 215 | 13,5 | 210 | - | 300 | 150 | 941,8 | - | 90 | 551,8 | 165 | 125 | 67 | 18 | 960 | 400 | 370 | 0,142 | 76 | - |
| **NKV 20/6 T** | 6 | 201 | 274 | 130 | 215 | 13,5 | 210 | 188 | 300 | 150 | 974,8 | 964,5 | 90 | 584,8 | 165 | 125 | 67 | 18 | 1150 | 500 | 400 | 0,230 | 83 | 95 |
| **NKV 20/7 T** | 7 | 201 | 274 | 130 | 215 | 13,5 | 210 | 188 | 300 | 150 | 1007,8 | 1014 | 90 | 617,8 | 165 | 125 | 67 | 18 | 1150 | 500 | 400 | 0,230 | 84 | 103 |
| **NKV 20/8 T** | 8 | 201 | 274 | 130 | 215 | 13,5 | 255 | 242 | 300 | 150 | 1185 | 1198,5 | 90 | 680 | 165 | 125 | 67 | 18 | 1360 | 500 | 530 | 0,360 | 116 | 191 |

# **NKV 20 -** VERTICAL AXIS MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS FOR CIVIL AND INDUSTRIAL PRESSURIZATION UNITS

Liquid temperature range: da - 15°C TO +120°C - **Maximum working pressure**: 25 bar (2500 kPa)




**For hydraulic efficiency see pag. 291**

The performance curves are based on kinematic viscosity values = 1 $mm^2/s$ and density equivalent to 1000 $kg/m^3$. Tolerance of curves to ISO 9906.

| MODEL | VOLTAGE 50 Hz | P1 MAX kW | P2 NOMINAL | | In A | | MOTOR TYPE | Ist A | | RPM |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | kW | HP | IE2 | IE3 | | IE2 | IE3 | |
| **NKV 20/9 T** | 3 x 400 V ~ | 9,8 | 11 | 14,96 | 22,4 | 19,4 | IE2 / IE3 | 126,05 | 147 | 2930 |
| **NKV 20/10 T** | 3 x 400 V ~ | 10,9 | 11 | 14,96 | 22,4 | 19,4 | IE2 / IE3 | 126,05 | 147 | 2930 |
| **NKV 20/12 T** | 3 x 400 V ~ | 13,0 | 15 | 20,4 | 29,5 | 26,5 | IE2 / IE3 | 189,81 | 204 | 2940 |
| **NKV 20/14 T** | 3 x 400 V ~ | 15,2 | 15 | 20,4 | 29,5 | 26,5 | IE2 / IE3 | 189,81 | 204 | 2940 |
| **NKV 20/16 T** | 3 x 400 V ~ | 17,1 | 18,5 | 25,16 | 35,5 | 32 | IE2 / IE3 | 239,91 | 262 | 2940 |
| **NKV 20/17 T** | 3 x 400 V ~ | 18,2 | 18,5 | 25,16 | 35,5 | 32 | IE2 / IE3 | 239,91 | 262 | 2940 |

| MODEL | STAGE N° | B1 | B2 | G1 | G2 | I | C | | D | D/2 | H | | H1 | H2 | DNA = DNM (DN 50) | | | | PACK. DIMENSIONS | | | VOL. mc | WEIGHT Kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | IE2 | IE3 | | | IE2 | IE3 | | | X | Y | Z | N | L/A | L/B | H | | IE2 | IE3 |
| **NKV 20/9 T** | 9 | 201 | 274 | 130 | 215 | 13,5 | 255 | 242 | 300 | 150 | 1218 | 1248 | 90 | 713 | 165 | 125 | 67 | 18 | 1360 | 500 | 530 | 0,360 | 117 | 137 |
| **NKV 20/10 T** | 10 | 201 | 274 | 130 | 215 | 13,5 | 255 | 242 | 300 | 150 | 1251 | 1297,5 | 90 | 746 | 165 | 125 | 67 | 18 | 1360 | 500 | 530 | 0,360 | 128 | 177 |
| **NKV 20/12 T** | 12 | 201 | 274 | 130 | 215 | 13,5 | 255 | 242 | 300 | 150 | 1317 | 1396,5 | 90 | 812 | 165 | 125 | 67 | 18 | 1360 | 500 | 530 | 0,360 | 141 | 187 |
| **NKV 20/14 T** | 14 | 201 | 274 | 130 | 215 | 13,5 | 255 | 242 | 300 | 150 | 1383 | 1495,5 | 90 | 878 | 165 | 125 | 67 | 18 | 1650 | 500 | 580 | 0,479 | 143 | 194 |
| **NKV 20/16 T** | 16 | 201 | 274 | 130 | 215 | 13,5 | 255 | 242 | 300 | 150 | 1504 | 1638,5 | 90 | 944 | 165 | 125 | 67 | 18 | 1850 | 500 | 580 | 0,479 | 161 | 185 |
| **NKV 20/17 T** | 17 | 201 | 274 | 130 | 215 | 13,5 | 255 | 242 | 300 | 150 | 1817,5 | 1688 | 90 | 1257,5 | 165 | 125 | 67 | 18 | 1850 | 500 | 580 | 0,537 | 162 | 220 |

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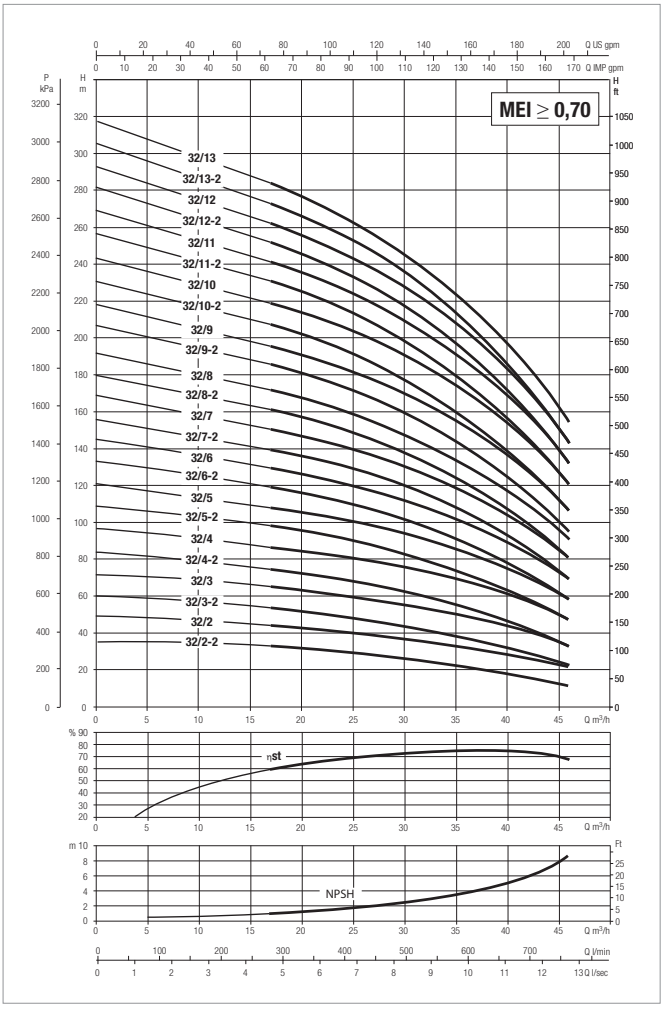
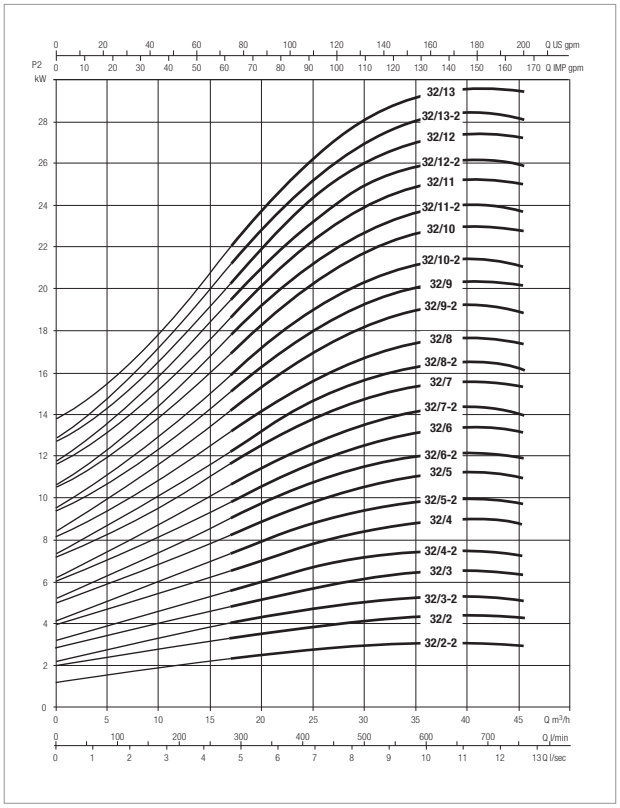
# **NKV 32** - VERTICAL AXIS MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS FOR CIVIL AND INDUSTRIAL PRESSURIZATION UNITS

**Liquid temperature range:** da - 15°C to +120°C - **Maximum working pressure:** 32 bar (3200 kPa)




**For hydraulic efficiency see pag. 291**

The performance curves are based on kinematic viscosity values = 1 mm²/s and density equivalent to 1000 kg/m³. Tolerance of curves to ISO 9906.

| MODEL | VOLTAGE 50 Hz | P2 NOMINAL | | MOTOR TYPE | In A | | Ist A | | 1/min | RPM | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | kW | HP | | IE2 | IE3 | IE2 | IE3 | | max | min |
| **NKV 32/2-2 T** | 3 x 400 V Δ | 4 | 5,5 | MEC 112M | 8,1 | - | 74 | - | 2910 | 2980 | 2910 |
| **NKV 32/2 T** | 3 x 400 V Δ | 5,5 | 7,5 | MEC 132S | 10,4 | - | 81 | - | 2910 | 2980 | 2910 |
| **NKV 32/3-2 T** | 3 x 400 V Δ | 5,5 | 7,5 | MEC 132S | 10,4 | - | 81 | - | 2910 | 2980 | 2910 |
| **NKV 32/3 T** | 3 x 400 V Δ | 7,5 | 10 | MEC 132S | 14 | 13,4 | 107 | 114 | 2900 | 2980 | 2900 |
| **NKV 32/4-2 T** | 3 x 400 V Δ | 7,5 | 10 | MEC 132S | 14 | 13,4 | 107 | 114 | 2900 | 2980 | 2900 |
| **NKV 32/4 T** | 3 x 400 V Δ | 11 | 15 | MEC 160M | 20,2 | 19,4 | 126 | 147 | 2930 | 2980 | 2930 |
| **NKV 32/5-2 T** | 3 x 400 V Δ | 11 | 15 | MEC 160M | 20,2 | 19,4 | 126 | 147 | 2930 | 2980 | 2930 |
| **NKV 32/5 T** | 3 x 400 V Δ | 15 | 20 | MEC 160M | 27 | 26,5 | 190 | 204 | 2940 | 2980 | 2940 |
| **NKV 32/6-2 T** | 3 x 400 V Δ | 15 | 20 | MEC 160M | 27 | 26,5 | 190 | 204 | 2940 | 2980 | 2940 |
| **NKV 32/6 T** | 3 x 400 V Δ | 15 | 20 | MEC 160M | 27 | 26,5 | 190 | 204 | 2940 | 2980 | 2940 |
| **NKV 32/7-2 T** | 3 x 400 V Δ | 15 | 20 | MEC 160M | 27 | 26,5 | 190 | 204 | 2940 | 2980 | 2940 |
| **NKV 32/7 T** | 3 x 400 V Δ | 18,5 | 25 | MEC 160L | 33 | 32 | 240 | 262 | 2940 | 2990 | 2940 |
| **NKV 32/8-2 T** | 3 x 400 V Δ | 18,5 | 25 | MEC 160L | 33 | 32 | 240 | 262 | 2940 | 2990 | 2940 |
| **NKV 32/8 T** | 3 x 400 V Δ | 18,5 | 25 | MEC 160L | 33 | 32 | 240 | 262 | 2940 | 2990 | 2940 |
| **NKV 32/9-2 T** | 3 x 400 V Δ | 22 | 30 | MEC 180M | 39,5 | 38 | 329 | 331 | 2960 | 2990 | 2960 |
| **NKV 32/9 T** | 3 x 400 V Δ | 22 | 30 | MEC 180M | 39,5 | 38 | 329 | 331 | 2960 | 2990 | 2960 |
| **NKV 32/10-2 T** | 3 x 400 V Δ | 22 | 30 | MEC 180M | 39,5 | 38 | 329 | 331 | 2960 | 2990 | 2960 |
| **NKV 32/10 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 32/11-2 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 32/11 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 32/12-2 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 32/12 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 32/13-2 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 32/13 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |

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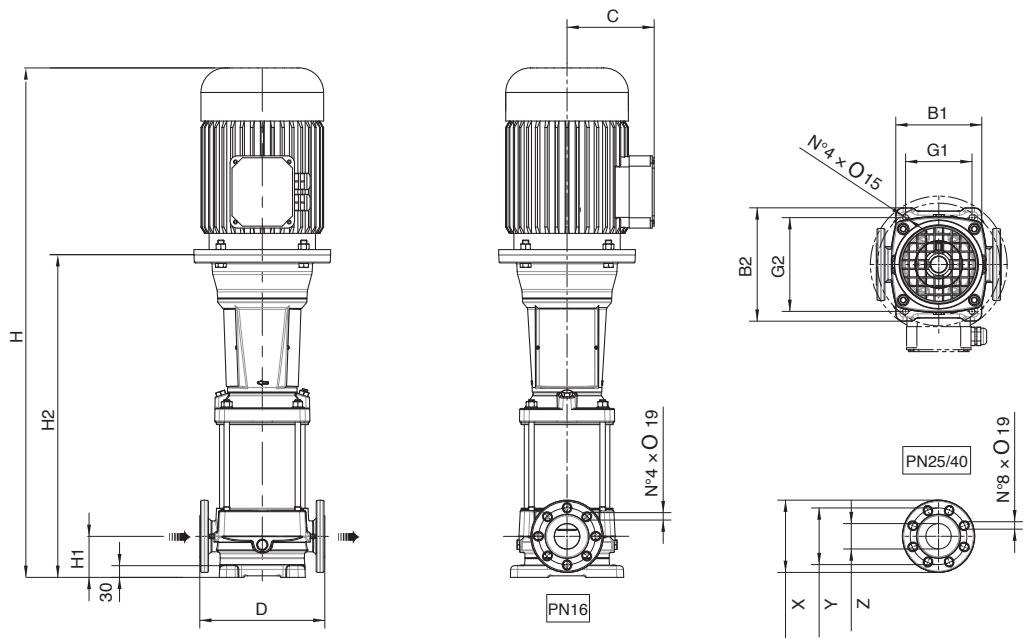
# **NKV 32** - EVERTICAL AXIS MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS FOR CIVIL AND INDUSTRIAL PRESSURIZATION UNITS

**Liquid temperature range:** da - 15°C to +120°C - **Maximum working pressure:** 32 bar (3200 kPa)




Version F: The pump is supplied without counter flanges (optional accessories, including joints and bolts).

| MODEL | STAGE N° | B1 | B2 | G1 | G2 | C | | D | H | | H1 | H2 | DNA = DNM (DN 65) | | | WEIGHT Kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | IE2 | IE3 | | IE2 | IE3 | | | X | Y | Z | IE2 | IE3 |
| **NKV 32/2-2 T** | 2 | 220 | 290 | 170 | 240 | 145 | - | 320 | 887 | - | 105 | 537 | 185 | 145 | 65 | 93 | - |
| **NKV 32/2 T** | 2 | 220 | 290 | 170 | 240 | 161 | - | 320 | 1115 | - | 105 | 724 | 185 | 145 | 65 | 140 | - |
| **NKV 32/3-2 T** | 3 | 220 | 290 | 170 | 240 | 161 | - | 320 | 1196 | - | 105 | 806 | 185 | 145 | 65 | 144 | - |
| **NKV 32/3 T** | 3 | 220 | 290 | 170 | 240 | 161 | 188 | 320 | 1196 | 1243 | 105 | 806 | 185 | 145 | 65 | 151 | 125 |
| **NKV 32/4-2 T** | 4 | 220 | 290 | 170 | 240 | 161 | 188 | 320 | 1298 | 1325 | 105 | 888 | 185 | 145 | 65 | 158 | 132 |
| **NKV 32/4 T** | 4 | 220 | 290 | 170 | 240 | 198 | 242 | 320 | 1413 | 1345 | 105 | 908 | 185 | 145 | 65 | 206 | 203 |
| **NKV 32/5-2 T** | 5 | 220 | 290 | 170 | 240 | 198 | 242 | 320 | 1495 | 1427 | 105 | 990 | 185 | 145 | 65 | 210 | 207 |
| **NKV 32/5 T** | 5 | 220 | 290 | 170 | 240 | 198 | 242 | 320 | 1495 | 1495 | 105 | 990 | 185 | 145 | 65 | 224 | 214 |
| **NKV 32/6-2 T** | 6 | 220 | 290 | 170 | 240 | 198 | 242 | 320 | 1577 | 1577 | 105 | 1072 | 185 | 145 | 65 | 228 | 218 |
| **NKV 32/6 T** | 6 | 220 | 290 | 170 | 240 | 198 | 242 | 320 | 1577 | 1577 | 105 | 1072 | 185 | 145 | 65 | 228 | 218 |
| **NKV 32/7-2 T** | 7 | 220 | 290 | 170 | 240 | 198 | 242 | 320 | 1659 | 1659 | 105 | 1154 | 185 | 145 | 65 | 232 | 222 |
| **NKV 32/7 T** | 7 | 220 | 290 | 170 | 240 | 238 | 242 | 320 | 1714 | 1703 | 105 | 1154 | 185 | 145 | 65 | 253 | 243 |
| **NKV 32/8-2 T** | 8 | 220 | 290 | 170 | 240 | 238 | 242 | 320 | 1796 | 1785 | 105 | 1236 | 185 | 145 | 65 | 257 | 247 |
| **NKV 32/8 T** | 8 | 220 | 290 | 170 | 240 | 238 | 242 | 320 | 1796 | 1785 | 105 | 1236 | 185 | 145 | 65 | 257 | 247 |
| **NKV 32/9-2 T** | 9 | 220 | 290 | 170 | 240 | 238 | 260 | 320 | 1898 | 1898 | 105 | 1318 | 185 | 145 | 65 | 291 | 283 |
| **NKV 32/9 T** | 9 | 220 | 290 | 170 | 240 | 238 | 260 | 320 | 1898 | 1898 | 105 | 1318 | 185 | 145 | 65 | 291 | 283 |
| **NKV 32/10-2 T** | 10 | 220 | 290 | 170 | 240 | 238 | 260 | 320 | 1985 | 1980 | 105 | 1400 | 185 | 145 | 65 | 298 | 290 |
| **NKV 32/10 T** | 10 | 220 | 290 | 170 | 240 | 297 | 292 | 320 | 2065 | 2075 | 105 | 1405 | 185 | 145 | 65 | 357 | 363 |
| **NKV 32/11-2 T** | 11 | 220 | 290 | 170 | 240 | 297 | 292 | 320 | 2147 | 2157 | 105 | 1487 | 185 | 145 | 65 | 361 | 367 |
| **NKV 32/11 T** | 11 | 220 | 290 | 170 | 240 | 297 | 292 | 320 | 2147 | 2157 | 105 | 1487 | 185 | 145 | 65 | 361 | 367 |
| **NKV 32/12-2 T** | 12 | 220 | 290 | 170 | 240 | 297 | 292 | 320 | 2229 | 2239 | 105 | 1569 | 185 | 145 | 65 | 365 | 371 |
| **NKV 32/12 T** | 12 | 220 | 290 | 170 | 240 | 297 | 292 | 320 | 2229 | 2239 | 105 | 1569 | 185 | 145 | 65 | 365 | 371 |
| **NKV 32/13-2 T** | 13 | 220 | 290 | 170 | 240 | 297 | 292 | 320 | 2311 | 2321 | 105 | 1651 | 185 | 145 | 65 | 369 | 375 |
| **NKV 32/13 T** | 13 | 220 | 290 | 170 | 240 | 297 | 292 | 320 | 2311 | 2321 | 105 | 1651 | 185 | 145 | 65 | 369 | 375 |

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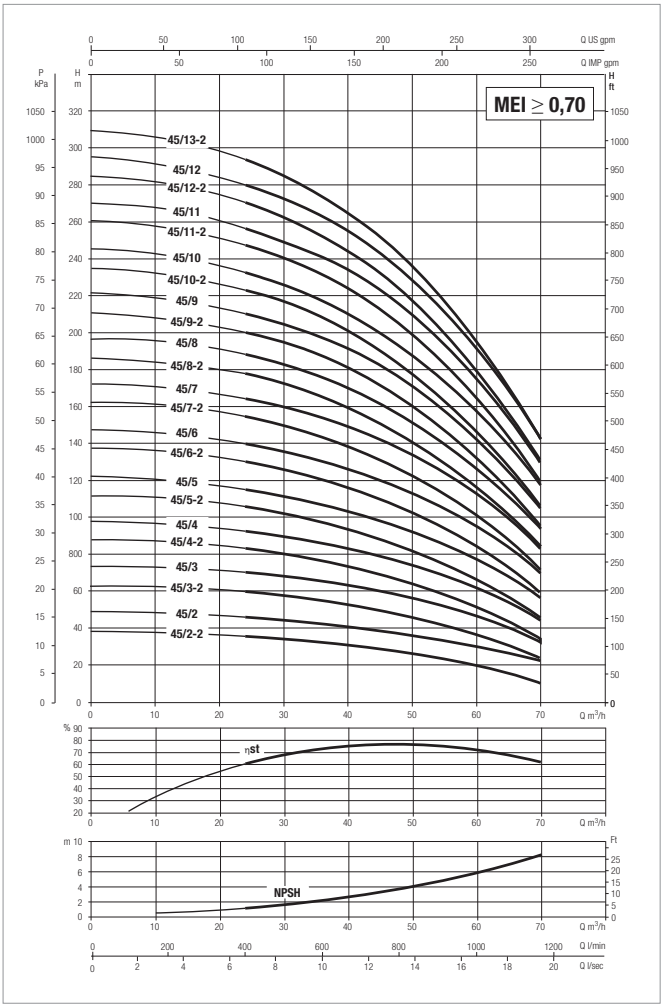
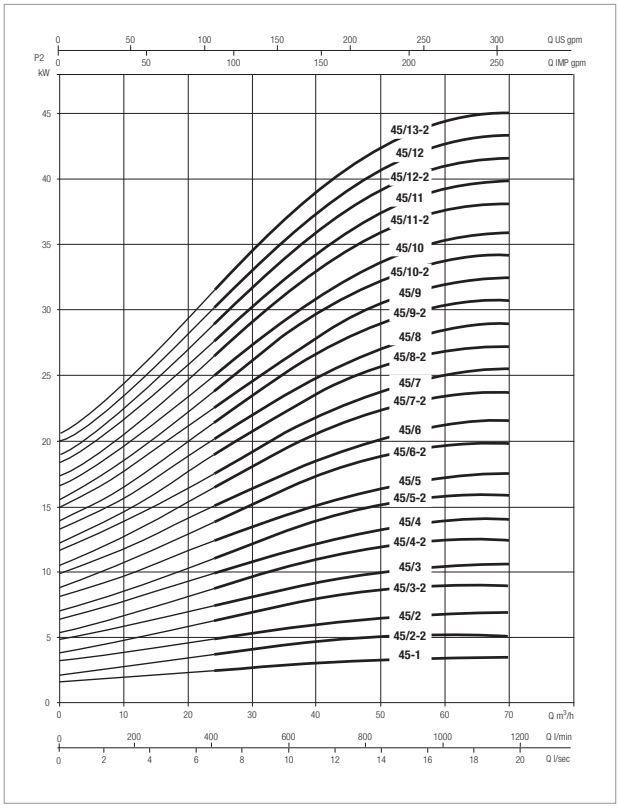
# **NKV 45** - VERTICAL AXIS MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS FOR CIVIL AND INDUSTRIAL PRESSURIZATION UNITS

**Liquid temperature range:** da - 15°C to +120°C - **Maximum working pressure:** 32 bar (3200 kPa)



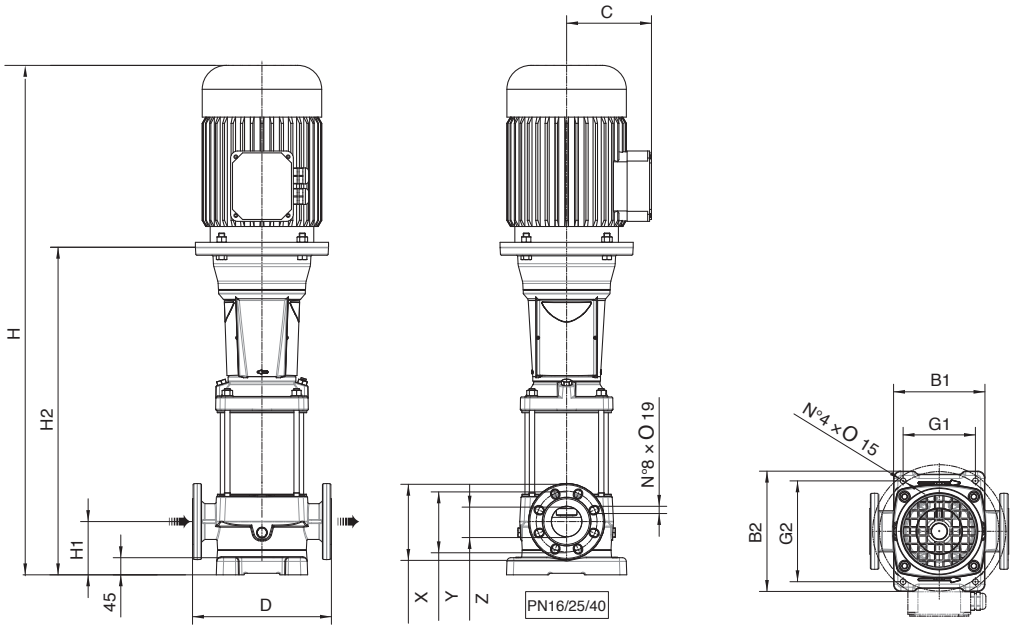

**For hydraulic efficiency see pag. 291**

The performance curves are based on kinematic viscosity values = 1 mm²/s and density equivalent to 1000 kg/m³. Tolerance of curves to ISO 9906.

| MODEL | VOLTAGE 50 Hz | P2 NOMINAL | | MOTOR TYPE | In A | | Ist A | | 1/min | RPM | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | kW | HP | | IE2 | IE3 | IE2 | IE3 | | max | min |
| **NKV 45/2-2 T** | 3 x 400 V Δ | 5,5 | 7,5 | MEC 132S | 10,4 | - | 81 | - | 2910 | 2980 | 2910 |
| **NKV 45/2 T** | 3 x 400 V Δ | 7,5 | 10 | MEC 132S | 14 | 13,4 | 107 | 114 | 2900 | 2980 | 2900 |
| **NKV 45/3-2 T** | 3 x 400 V Δ | 11 | 15 | MEC 160M | 20,2 | 19,4 | 126 | 147 | 2930 | 2980 | 2930 |
| **NKV 45/3 T** | 3 x 400 V Δ | 11 | 15 | MEC 160M | 20,2 | 19,4 | 126 | 147 | 2930 | 2980 | 2930 |
| **NKV 45/4-2 T** | 3 x 400 V Δ | 15 | 20 | MEC 160M | 27 | 26,5 | 190 | 204 | 2940 | 2980 | 2940 |
| **NKV 45/4 T** | 3 x 400 V Δ | 15 | 20 | MEC 160M | 27 | 26,5 | 190 | 204 | 2940 | 2980 | 2940 |
| **NKV 45/5-2 T** | 3 x 400 V Δ | 18,5 | 25 | MEC 160L | 33 | 32 | 240 | 262 | 2940 | 2990 | 2940 |
| **NKV 45/5 T** | 3 x 400 V Δ | 18,5 | 25 | MEC 160L | 33 | 32 | 240 | 262 | 2940 | 2990 | 2940 |
| **NKV 45/6-2 T** | 3 x 400 V Δ | 22 | 30 | MEC 180M | 39,5 | 38 | 329 | 331 | 2960 | 2990 | 2960 |
| **NKV 45/6 T** | 3 x 400 V Δ | 22 | 30 | MEC 180M | 39,5 | 38 | 329 | 331 | 2960 | 2990 | 2960 |
| **NKV 45/7-2 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 64 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 45/7 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 45/8-2 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 45/8 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 45/9-2 T** | 3 x 400 V Δ | 37 | 50 | MEC 200L | 64 | 63 | 488 | 567 | 2960 | 2990 | 2960 |
| **NKV 45/9 T** | 3 x 400 V Δ | 37 | 50 | MEC 200L | 64 | 63 | 488 | 567 | 2960 | 2990 | 2960 |
| **NKV 45/10-2 T** | 3 x 400 V Δ | 37 | 50 | MEC 200L | 64 | 63 | 488 | 567 | 2960 | 2990 | 2960 |
| **NKV 45/10 T** | 3 x 400 V Δ | 37 | 50 | MEC 200L | 64 | 63 | 488 | 567 | 2960 | 2990 | 2960 |
| **NKV 45/11-2 T** | 3 x 400 V Δ | 45 | 60 | MEC 225M | 64 | 76 | 528 | 631 | 2960 | 2990 | 2960 |
| **NKV 45/11 T** | 3 x 400 V Δ | 45 | 60 | MEC 225M | 78,5 | 76 | 528 | 631 | 2960 | 2990 | 2960 |
| **NKV 45/12-2 T** | 3 x 400 V Δ | 45 | 60 | MEC 225M | 78,5 | 76 | 528 | 631 | 2960 | 2990 | 2960 |
| **NKV 45/12 T** | 3 x 400 V Δ | 45 | 60 | MEC 225M | 78,5 | 76 | 528 | 631 | 2960 | 2990 | 2960 |
| **NKV 45/13-2 T** | 3 x 400 V Δ | 45 | 60 | MEC 225M | 78,5 | 76 | 528 | 631 | 2960 | 2990 | 2960 |

# **NKV 45** - VERTICAL AXIS MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS FOR CIVIL AND INDUSTRIAL PRESSURIZATION UNITS

**Liquid temperature range:** da - 15°C a +120°C - **Maximum working pressure:** 32 bar (3200 kPa)




Version F: The pump is supplied without counter flanges (optional accessories, including joints and bolts).

| MODEL | STAGE N° | B1 | B2 | G1 | G2 | C | | D | H | | H1 | H2 | DNA = DNM (DN 80) | | | WEIGHT Kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | IE2 | IE3 | | IE2 | IE3 | | | X | Y | Z | IE2 | IE3 |
| **NKV 45/2-2 T** | 2 | 240 | 316 | 190 | 265 | 161 | - | 365 | 1149 | - | 140 | 759 | 200 | 160 | 80 | 146 | - |
| **NKV 45/2 T** | 2 | 240 | 316 | 190 | 265 | 161 | 188 | 365 | 1149 | 1196 | 140 | 759 | 200 | 160 | 80 | 153 | 127 |
| **NKV 45/3-2 T** | 3 | 240 | 316 | 190 | 265 | 198 | 242 | 365 | 1366 | 1298 | 140 | 861 | 200 | 160 | 80 | 208 | 205 |
| **NKV 45/3 T** | 3 | 240 | 316 | 190 | 265 | 198 | 242 | 365 | 1366 | 1298 | 140 | 861 | 200 | 160 | 80 | 208 | 205 |
| **NKV 45/4-2 T** | 4 | 240 | 316 | 190 | 265 | 198 | 242 | 365 | 1448 | 1448 | 140 | 943 | 200 | 160 | 80 | 226 | 216 |
| **NKV 45/4 T** | 4 | 240 | 316 | 190 | 265 | 198 | 242 | 365 | 1448 | 1448 | 140 | 943 | 200 | 160 | 80 | 226 | 216 |
| **NKV 45/5-2 T** | 5 | 240 | 316 | 190 | 265 | 238 | 242 | 365 | 1585 | 1574 | 140 | 1025 | 200 | 160 | 80 | 251 | 241 |
| **NKV 45/5 T** | 5 | 240 | 316 | 190 | 265 | 238 | 242 | 365 | 1585 | 1574 | 140 | 1025 | 200 | 160 | 80 | 251 | 241 |
| **NKV 45/6-2 T** | 6 | 240 | 316 | 190 | 265 | 238 | 260 | 365 | 1687 | 1687 | 140 | 1107 | 200 | 160 | 80 | 284 | 276 |
| **NKV 45/6 T** | 6 | 240 | 316 | 190 | 265 | 238 | 260 | 365 | 1687 | 1687 | 140 | 1107 | 200 | 160 | 80 | 284 | 276 |
| **NKV 45/7-2 T** | 7 | 240 | 316 | 190 | 265 | 297 | 292 | 365 | 1854 | 1864 | 140 | 1194 | 200 | 160 | 80 | 350 | 356 |
| **NKV 45/7 T** | 7 | 240 | 316 | 190 | 265 | 297 | 292 | 365 | 1854 | 1864 | 140 | 1194 | 200 | 160 | 80 | 350 | 356 |
| **NKV 45/8-2 T** | 8 | 240 | 316 | 190 | 265 | 297 | 292 | 365 | 1936 | 1946 | 140 | 1276 | 200 | 160 | 80 | 354 | 360 |
| **NKV 45/8 T** | 8 | 240 | 316 | 190 | 265 | 297 | 292 | 365 | 1936 | 1946 | 140 | 1276 | 200 | 160 | 80 | 354 | 360 |
| **NKV 45/9-2 T** | 9 | 240 | 316 | 190 | 265 | 297 | 292 | 365 | 2018 | 2028 | 140 | 1358 | 200 | 160 | 80 | 375 | 384 |
| **NKV 45/9 T** | 9 | 240 | 316 | 190 | 265 | 297 | 292 | 365 | 2018 | 2028 | 140 | 1358 | 200 | 160 | 80 | 375 | 384 |
| **NKV 45/10-2 T** | 10 | 240 | 316 | 190 | 265 | 297 | 292 | 365 | 2100 | 2110 | 140 | 1440 | 200 | 160 | 80 | 379 | 388 |
| **NKV 45/10 T** | 10 | 240 | 316 | 190 | 265 | 297 | 292 | 365 | 2100 | 2110 | 140 | 1440 | 200 | 160 | 80 | 379 | 388 |
| **NKV 45/11-2 T** | 11 | 240 | 316 | 190 | 265 | 333 | 315 | 365 | 2227 | 2232 | 140 | 1522 | 200 | 160 | 80 | 441 | 449 |
| **NKV 45/11 T** | 11 | 240 | 316 | 190 | 265 | 333 | 315 | 365 | 2227 | 2232 | 140 | 1522 | 200 | 160 | 80 | 441 | 449 |
| **NKV 45/12-2 T** | 12 | 240 | 316 | 190 | 265 | 333 | 315 | 365 | 2309 | 2314 | 140 | 1604 | 200 | 160 | 80 | 445 | 453 |
| **NKV 45/12 T** | 12 | 240 | 316 | 190 | 265 | 333 | 315 | 365 | 2309 | 2314 | 140 | 1604 | 200 | 160 | 80 | 445 | 453 |
| **NKV 45/13-2 T** | 13 | 240 | 316 | 190 | 265 | 333 | 315 | 365 | 2391 | 2396 | 140 | 1686 | 200 | 160 | 80 | 449 | 457 |

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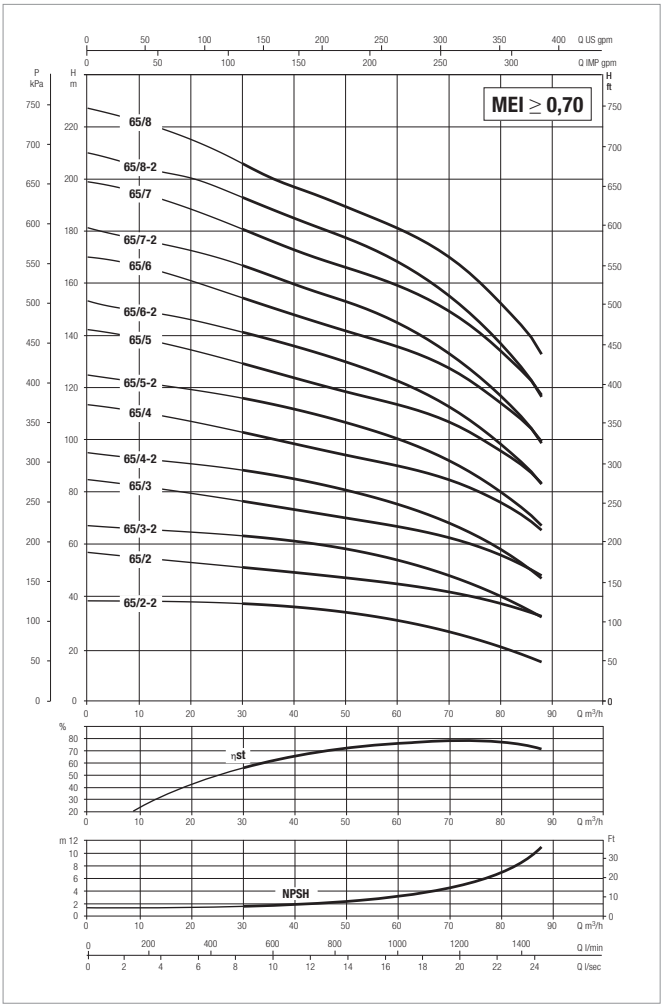
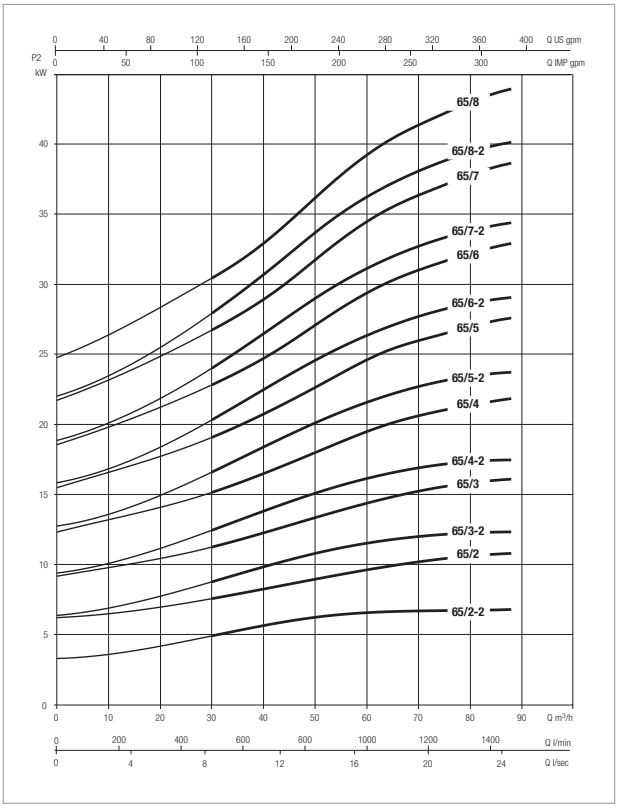
# **NKV 65** - VERTICAL AXIS MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS FOR CIVIL AND INDUSTRIAL PRESSURIZATION UNITS

**Liquid temperature range:** da - 15°C a +120°C - **Maximum working pressure:** 25 bar (2500 kPa)



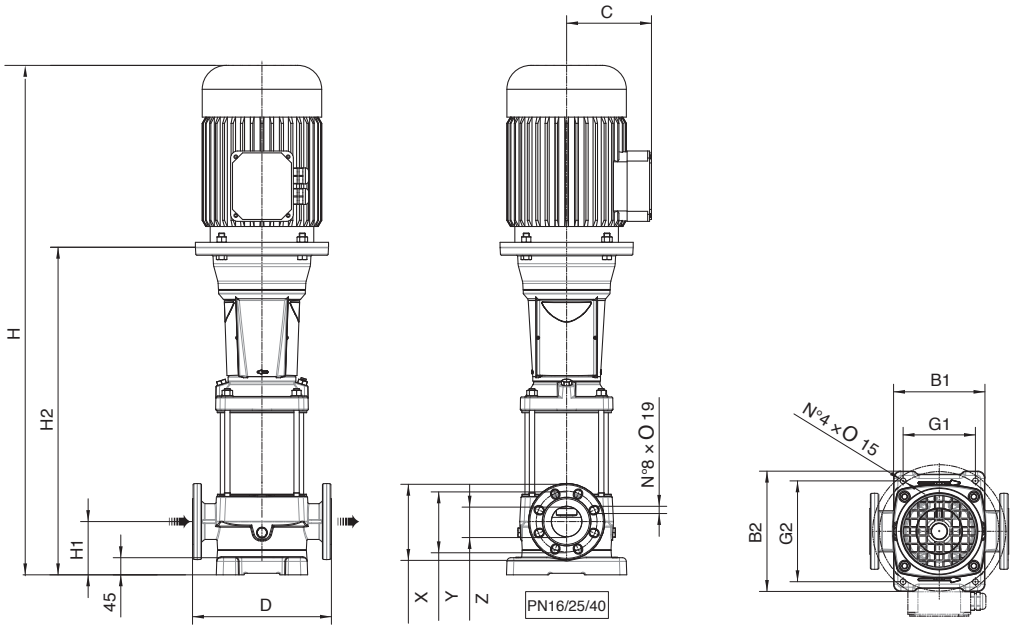

**For hydraulic efficiency see pag. 291**

The performance curves are based on kinematic viscosity values = 1 mm²/s and density equivalent to 1000 kg/m³. Tolerance of curves to ISO 9906.

| MODEL | VOLTAGE 50 Hz | P2 NOMINAL | | MOTOR TYPE | In A | | Ist A | | 1/min | RPM | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | kW | HP | | IE2 | IE3 | IE2 | IE3 | | max | min |
| **NKV 65/2-2 T** | 3 x 400 V Δ | 7,5 | 10 | MEC 132S | 14 | 13,4 | 107 | 114 | 2900 | 2980 | 2900 |
| **NKV 65/2 T** | 3 x 400 V Δ | 11 | 15 | MEC 160M | 20,2 | 19,4 | 126 | 147 | 2930 | 2980 | 2930 |
| **NKV 65/3-2 T** | 3 x 400 V Δ | 15 | 20 | MEC 160M | 27 | 26,5 | 190 | 204 | 2940 | 2980 | 2940 |
| **NKV 65/3 T** | 3 x 400 V Δ | 18,5 | 25 | MEC 160L | 33 | 32 | 240 | 262 | 2940 | 2990 | 2940 |
| **NKV 65/4-2 T** | 3 x 400 V Δ | 18,5 | 25 | MEC 160L | 33 | 32 | 240 | 262 | 2940 | 2990 | 2940 |
| **NKV 65/4 T** | 3 x 400 V Δ | 22 | 30 | MEC 180M | 39,5 | 38 | 329 | 331 | 2960 | 2990 | 2960 |
| **NKV 65/5-2 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 65/5 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 65/6-2 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 65/6 T** | 3 x 400 V Δ | 37 | 50 | MEC 200L | 64 | 63 | 488 | 567 | 2960 | 2990 | 2960 |
| **NKV 65/7-2 T** | 3 x 400 V Δ | 37 | 50 | MEC 200L | 64 | 63 | 488 | 567 | 2960 | 2990 | 2960 |
| **NKV 65/7 T** | 3 x 400 V Δ | 45 | 60 | MEC 225M | 78,5 | 76 | 528 | 631 | 2960 | 2990 | 2960 |
| **NKV 65/8-2 T** | 3 x 400 V Δ | 45 | 60 | MEC 225M | 78,5 | 76 | 528 | 631 | 2960 | 2990 | 2960 |
| **NKV 65/8 T** | 3 x 400 V Δ | 45 | 60 | MEC 225M | 78,5 | 76 | 528 | 631 | 2960 | 2990 | 2960 |

# **NKV 65** - VERTICAL AXIS MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS FOR CIVIL AND INDUSTRIAL PRESSURIZATION UNITS

**Liquid temperature range:** da - 15°C a +120°C - **Maximum working pressure:** 25 bar (2500 kPa)




Version F: The pump is supplied without counter flanges (optional accessories, including joints and bolts).

| MODEL | STAGE N° | B1 | B2 | G1 | G2 | C | | D | H | | H1 | H2 | DNA = DNM (DN 100) | | | WEIGHT Kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | IE2 | IE3 | | IE2 | IE3 | | | X | Y | Z | IE2 | IE3 |
| **NKV 65/2-2 T** | 2 | 240 | 316 | 190 | 265 | 161 | 161 | 365 | 1219,2 | 1266,2 | 140 | 829,2 | 230 | 180 | 100 | 108 | 84 |
| **NKV 65/2 T** | 2 | 240 | 316 | 190 | 265 | 198 | 198 | 365 | 1354,2 | 1354,2 | 140 | 849,2 | 230 | 180 | 100 | 178 | 155 |
| **NKV 65/3-2 T** | 3 | 240 | 316 | 190 | 265 | 198 | 198 | 365 | 1446,3 | 1446,3 | 140 | 941,3 | 230 | 180 | 100 | 198 | 171 |
| **NKV 65/3 T** | 3 | 240 | 316 | 190 | 265 | 238 | 235 | 365 | 1501,3 | 1490,3 | 140 | 941,3 | 230 | 180 | 100 | 243,9 | 213 |
| **NKV 65/4-2 T** | 4 | 240 | 316 | 190 | 265 | 238 | 235 | 365 | 1593,4 | 1582,4 | 140 | 1033,4 | 230 | 180 | 100 | 243,9 | 213 |
| **NKV 65/4 T** | 4 | 240 | 316 | 190 | 265 | 238 | 238 | 365 | 1613,4 | 1613,4 | 140 | 1033,4 | 230 | 180 | 100 | 293,7 | 255 |
| **NKV 65/5-2 T** | 5 | 240 | 316 | 190 | 265 | 297 | 300 | 365 | 1790,5 | 1800,5 | 140 | 1130,5 | 230 | 180 | 100 | 472 | 471 |
| **NKV 65/5 T** | 5 | 240 | 316 | 190 | 265 | 297 | 300 | 365 | 1790,5 | 1800,5 | 140 | 1130,5 | 230 | 180 | 100 | 472 | 471 |
| **NKV 65/6-2 T** | 6 | 240 | 316 | 190 | 265 | 297 | 300 | 365 | 1882,6 | 1892,6 | 140 | 1222,6 | 230 | 180 | 100 | 472 | 471 |
| **NKV 65/6 T** | 6 | 240 | 316 | 190 | 265 | 297 | 300 | 365 | 1882,6 | 1892,6 | 140 | 1222,6 | 230 | 180 | 100 | 503 | 517 |
| **NKV 65/7-2 T** | 7 | 240 | 316 | 190 | 265 | 297 | 300 | 365 | 1974,7 | 1984,7 | 140 | 1314,7 | 230 | 180 | 100 | 503 | 517 |
| **NKV 65/7 T** | 7 | 240 | 316 | 190 | 265 | 333 | 335 | 365 | 2019,7 | 2024,7 | 140 | 1314,7 | 230 | 180 | 100 | 624 | 653 |
| **NKV 65/8-2 T** | 8 | 240 | 316 | 190 | 265 | 333 | 335 | 365 | 2111,8 | 2116,8 | 140 | 1406,8 | 230 | 180 | 100 | 624 | 653 |
| **NKV 65/8 T** | 8 | 240 | 316 | 190 | 265 | 333 | 335 | 365 | 2111,8 | 2116,8 | 140 | 1406,8 | 230 | 180 | 100 | 624 | 653 |

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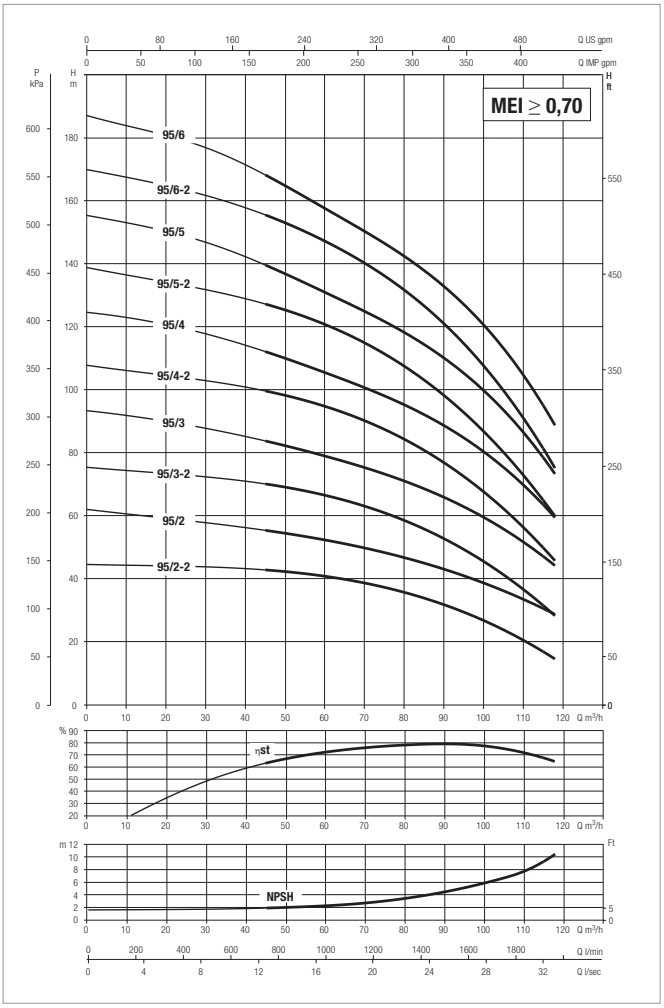
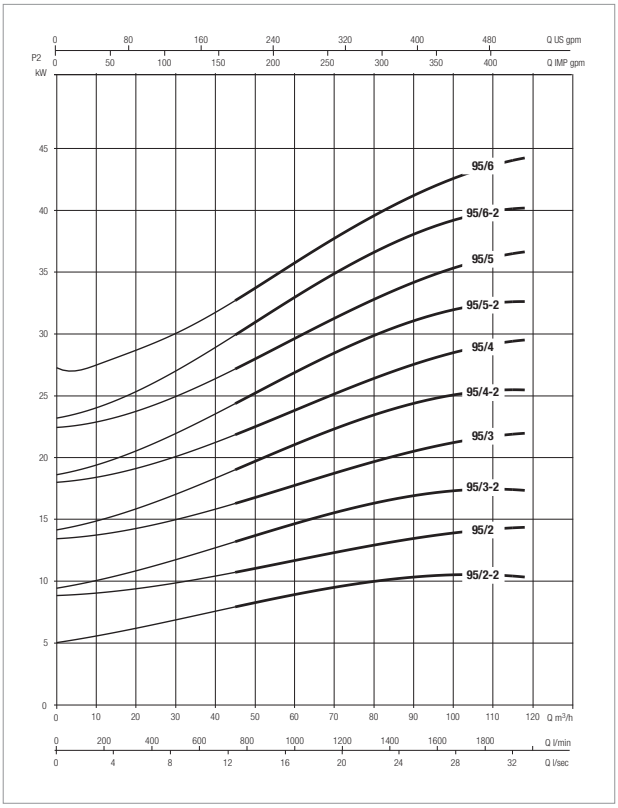
# **NKV 95** - VERTICAL AXIS MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS FOR CIVIL AND INDUSTRIAL PRESSURIZATION UNITS

Liquid temperature range: da - 15°C a +120°C - **Maximum working pressure:** 25 bar (2500 kPa)



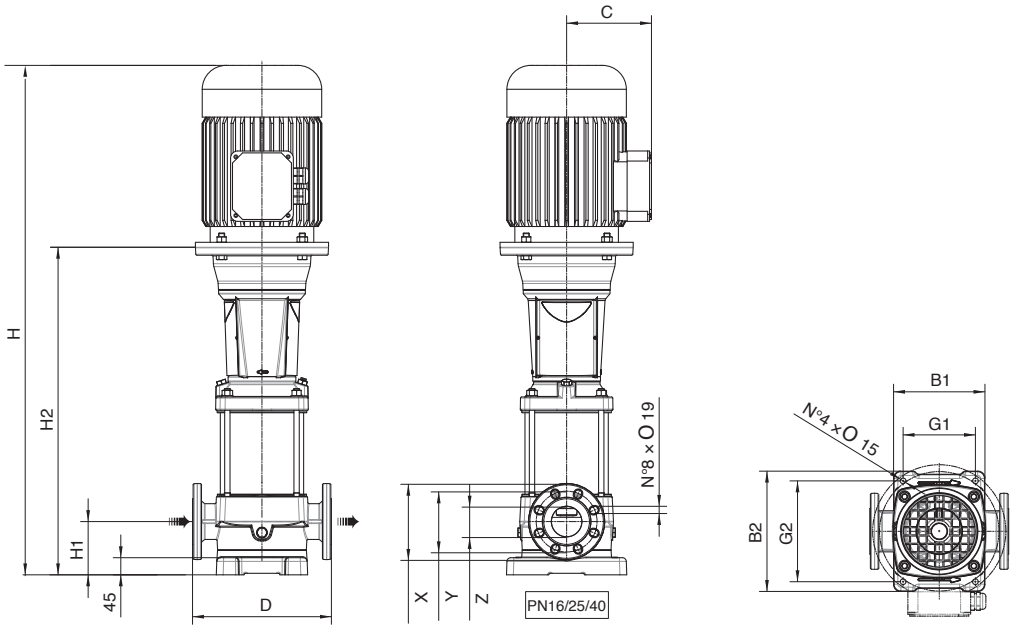

**For hydraulic efficiency see pag. 291**

The performance curves are based on kinematic viscosity values = 1 mm²/s and density equivalent to 1000 kg/m³. Tolerance of curves to ISO 9906.

| MODEL | VOLTAGE 50 Hz | P2 NOMINAL | | MOTOR TYPE | In A | | Ist A | | 1/min | RPM | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | kW | HP | | IE2 | IE3 | IE2 | IE3 | | max | min |
| **NKV 95/2-2 T** | 3 x 400 V Δ | 11 | 15 | MEC 160M | 20,2 | 19,4 | 126 | 147 | 2930 | 2980 | 2930 |
| **NKV 95/2 T** | 3 x 400 V Δ | 15 | 20 | MEC 160M | 27 | 26,5 | 190 | 204 | 2940 | 2980 | 2940 |
| **NKV 95/3-2 T** | 3 x 400 V Δ | 18,5 | 25 | MEC 160L | 33 | 32 | 240 | 262 | 2940 | 2990 | 2940 |
| **NKV 95/3 T** | 3 x 400 V Δ | 22 | 30 | MEC 180M | 39,5 | 38 | 329 | 331 | 2960 | 2990 | 2960 |
| **NKV 95/4-2 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 95/4 T** | 3 x 400 V Δ | 30 | 40 | MEC 200L | 52 | 52 | 405 | 468 | 2950 | 2990 | 2950 |
| **NKV 95/5-2 T** | 3 x 400 V Δ | 37 | 50 | MEC 200L | 64 | 63 | 488 | 567 | 2960 | 2990 | 2960 |
| **NKV 95/5 T** | 3 x 400 V Δ | 37 | 50 | MEC 200L | 64 | 63 | 488 | 567 | 2960 | 2990 | 2960 |
| **NKV 95/6-2 T** | 3 x 400 V Δ | 45 | 60 | MEC 225M | 78,5 | 76 | 528 | 631 | 2960 | 2990 | 2960 |
| **NKV 95/6 T** | 3 x 400 V Δ | 45 | 60 | MEC 225M | 78,5 | 76 | 528 | 631 | 2960 | 2990 | 2960 |

# **NKV 95** - VERTICAL AXIS MULTISTAGE CENTRIFUGAL ELECTRIC PUMPS FOR CIVIL AND INDUSTRIAL PRESSURIZATION UNITS

**Liquid temperature range:** da - 15°C a +120°C - **Maximum working pressure:** 25 bar (2500 kPa)




Version F: The pump is supplied without counter flanges (optional accessories, including joints and bolts).

| MODEL | STAGE N° | B1 | B2 | G1 | G2 | C | | D | H | | H1 | H2 | DNA = DNM (DN 100) | | | WEIGHT Kg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | IE2 | IE3 | | IE2 | IE3 | | | X | Y | Z | IE2 | IE3 |
| **NKV 95/2-2 T** | 2 | 260 | 341 | 199 | 280 | 198 | 198 | 380 | 1354,2 | 1354,2 | 140 | 849,2 | 230 | 180 | 100 | 20,2 | 186 |
| **NKV 95/2 T** | 2 | 260 | 341 | 199 | 280 | 198 | 198 | 380 | 1354,2 | 1354,2 | 140 | 849,2 | 230 | 180 | 100 | 27 | 196 |
| **NKV 95/3-2 T** | 3 | 260 | 341 | 199 | 280 | 238 | 235 | 380 | 1501,3 | 1490,3 | 140 | 941,3 | 230 | 180 | 100 | 33 | 217 |
| **NKV 95/3 T** | 3 | 260 | 341 | 199 | 280 | 238 | 238 | 380 | 1521,3 | 1521,3 | 140 | 941,3 | 230 | 180 | 100 | 39,5 | 238 |
| **NKV 95/4-2 T** | 4 | 260 | 341 | 199 | 280 | 297 | 300 | 380 | 1698,4 | 1708,4 | 140 | 1038,4 | 230 | 180 | 100 | 52 | 343 |
| **NKV 95/4 T** | 4 | 260 | 341 | 199 | 280 | 297 | 300 | 380 | 1698,4 | 1708,4 | 140 | 1038,4 | 230 | 180 | 100 | 52 | 343 |
| **NKV 95/5-2 T** | 5 | 260 | 341 | 199 | 280 | 297 | 300 | 380 | 1790,5 | 1800,5 | 140 | 1130,5 | 230 | 180 | 100 | 64 | 379 |
| **NKV 95/5 T** | 5 | 260 | 341 | 199 | 280 | 297 | 300 | 380 | 1790,5 | 1800,5 | 140 | 1130,5 | 230 | 180 | 100 | 64 | 379 |
| **NKV 95/6-2 T** | 6 | 260 | 341 | 199 | 280 | 333 | 335 | 380 | 1927,6 | 1932,6 | 140 | 1222,6 | 230 | 180 | 100 | 78,5 | 455 |
| **NKV 95/6 T** | 6 | 260 | 341 | 199 | 280 | 333 | 335 | 380 | 1927,6 | 1932,6 | 140 | 1222,6 | 230 | 180 | 100 | 78,5 | 455 |

DAB PUMPS si riserva il diritto di apportare modifiche senza obbligo di preavviso

# NOTE

# HYDRAULIC EFFICIENCY

## EU 547/2012 REGULATION - MEI

## GENERAL INFORMATION

The MEI index (Minimum Efficiency Index) was issued with the objective of defining a performance threshold value applicable to all the water pumps found on the market. The MEI index takes into account the size of the pump, its specific speed, and its speed of rotation.
The regulation applies to centrifugal pumps used for pumping clean waters included in the following categories:
- Axial suction pumps with support (ESOB)
- Horizontal monobloc axial suction pumps (ESCC)
- In-line monobloc axial suction pumps (ESCCI)
- Multistage vertical pumps (MS-V)
- Multistage submerged pumps (MSS)

MEI is a dimensionless indicator for hydraulic performance, and a measure of the quality of the sizing of the pump in relation to the performance.
The higher the MEI value, the better is the sizing of the pump in relation to the performance, and the lower is the annual energy consumption due to the use of the pump. In theory, the upper limit of the MEI values is open, and only depends on physical and technological limitations.

**The minimum efficiency index (MEI) is based on the maximum diameter of the impeller. Multistage vertical water pumps must be tested in the 3-stage version.**

The value of reference for the more efficient water pumps is MEI ≥ 0,70.

The efficiency of a pump with turned impeller is generally lower to that of a pump with full impeller diameter. The turning of the impeller adapts the pump to a fixed point of operation, resulting in lower energy consumption.

The operation of this water pump with variable operating points can be more efficient and economical if controlled, for example, by means of a variable speed motor adapting the operation of the pump to the system.

The information on the efficiency of reference can be found at the address: **www.dabpumps.com**. In alternative contact your local sales representatives.

The MEI=0,7 and MEI=0,4 efficiency charts for the different types of pumps can be found at the website: **www.europump.org/efficiencycharts**

| PUMP MODEL | IMPELLER | MEI |
|---|---|---|
| **K 20/41** | – | not applicable |
| **K 30/70** | – | |
| **K 36/100** | Full | ≥ 0,70 |
| **K 30/100** | Turned | |
| **K 12/200** | Full | ≥ 0,70 |
| **K 55/200 T** | Full | ≥ 0,70 |
| **K 36/200 T** | Turned | |
| **K 40/200 T** | Turned | |
| **K 14/400** | Full | ≥ 0,40 |
| **K 28/500** | Full | ≥ 0,70 |
| **K 11/500 T** | Turned | |
| **K 18/500 T** | Turned | |
| **K 50/400 T** | Full | ≥ 0,50 |
| **K 40/400 T** | Turned | |
| **K 50/800 T** | Full | ≥ 0,60 |
| **K 30/800 T** | Turned | |
| **K 40/800 T** | Turned | |
| **K 35/1200 T** | Full | ≥ 0,60 |
| **K 20/1200 T** | Turned | |
| **K 25/1200 T** | Turned | |

# HYDRAULIC EFFICIENCY

## EU 547/2012 REGULATION - MEI

| PUMP MODEL | IMPELLER | MEI |
|---|---|---|
| NKM-G 32-125.1/140 T 0,25 | Full | ≥ 0,40 |
| NKP-G 32-125.1/140 T 2,2 | Full | ≥ 0,40 |
| NKP-G 32-125.1/102 T 0,75 | Turned | |
| NKP-G 32-125.1/115 T 1,1 | Turned | |
| NKP-G 32-125.1/125 T 1,5 | Turned | |
| NKM-G 32-160.1/169 T 0,37 | Full | ≥ 0,40 |
| NKP-G 32-160.1/177 | Full | ≥ 0,40 |
| NKP-G 32-160.1/155 T 2,2 | Turned | |
| NKP-G 32-160.1/166 T 3 | Turned | |
| NKM-G 32-200.1/200 T 0,55 | Full | ≥ 0,40 |
| NKP-G 32-200.1/205 T 5,5 | Full | ≥ 0,40 |
| NKP-G 32-200.1/188 T 4 | Turned | |
| NKM-G 32-125/142 T 0,37 | Full | ≥ 0,40 |
| NKP-G 32-125/142 T 3 | Full | ≥ 0,40 |
| NKP-G 32-125/110 T 1,1 | Turned | |
| NKP-G 32-125/120 T 1,5 | Turned | |
| NKP-G 32-125/130 T 2,2 | Turned | |
| NKM-G 32-160/169 T 0,55 | Full | ≥ 0,40 |
| NKP-G 32-160/177 T 5,5 | Full | ≥ 0,40 |
| NKP-G 32-160/151 T 3 | Turned | |
| NKP-G 32-160/163 T 4 | Turned | |
| NKM-G 32-200/219 T 1,1 | Full | ≥ 0,60 |
| NKM-G 32-200/200 T 0,75 | Turned | |
| NKP-G 32-200/210 T 7,5 | Full | ≥ 0,50 |
| NKP-G 32-200/190 T 5,5 | Turned | |
| NKM-G 40-125/142 T 0,55 | Full | ≥ 0,40 |
| NKM-G 40-125/115 T 0,25 | Turned | |
| NKM-G 40-125/130 T 0,37 | Turned | |
| NKP-G 40-125/139 1 A T 4 | Full | ≥ 0,40 |
| NKP-G 40-125/107 7 A T 1,5 | Turned | |
| NKP-G 40-125/120 5 A T 2,2 | Turned | |
| NKP-G 40-125/130 3 A T 3 | Turned | |
| NKM-G 40-160/166 T 0,75 | Full | ≥ 0,40 |
| NKM-G 40-160/153 T 0,55 | Turned | |
| NKP-G 40-160/172 T 7,5 | Full | ≥ 0,50 |
| NKP-G 40-160/158 T 5,5 | Turned | |
| NKM-G 40-200/219 T 1,5 | Full | ≥ 0,60 |
| NKM-G 40-200/200 T 1,1 | Turned | |
| NKP-G 40-200/210 T 11 | Full | ≥ 0,40 |

| PUMP MODEL | IMPELLER | MEI |
|---|---|---|
| NKM-G 40-250/260 T 3 | Full | ≥ 0,60 |
| NKM-G 40-250/245 T 2,2 | Turned | |
| NKP-G 40-250/260 T 22 | Full | ≥ 0,50 |
| NKP-G 40-250/230 T 15 | Turned | |
| NKP-G 40-250/245 T 18,5 | Turned | |
| NKM-G 50-125/141 T 0,75 | Full | ≥ 0,40 |
| NKM-G 50-125/130 T 0,55 | Turned | |
| NKP-G 50-125/144 T 6,9 | Full | ≥ 0,40 |
| NKP-G 50-125/115 T 3 | Turned | |
| NKP-G 50-125/125 T 4 | Turned | |
| NKP-G 50-125/135 T 5,5 | Turned | |
| NKM-G 50-160/177 T 1,5 | Full | ≥ 0,60 |
| NKM-G 50-160/161 T 1,1 | Turned | |
| NKP-G 50-160/169 T 11 | Full | ≥ 0,40 |
| NKP-G 50-160/153 T 7,5 | Turned | |
| NKM-G 50-200/219 T 3 | Full | ≥ 0,60 |
| NKM-G 50-200/210 T 2,2 | Turned | |
| NKP-G 50-200/219 T 22 | Full | ≥ 0,50 |
| NKP-G 50-200/200 T 15 | Turned | |
| NKP-G 50-200/210 T 18,5 | Turned | |
| NKM-G 50-250/263 T 4 | Full | ≥ 0,60 |
| NKP-G 50-250/257 T 30 | Full | ≥ 0,40 |
| NKP-G 50-250/230 T 22 | Turned | |
| NKM-G 65-125/144 T 1,1 | Full | ≥ 0,40 |
| NKM-G 65-125/130 T 0,75 | Turned | |
| NKP-G 65-125/137 T 7,5 | Full | ≥ 0,40 |
| NKP-G 65-125/120 T 4 | Turned | |
| NKP-G 65-125/127 T 5,5 | Turned | |
| NKM-G 65-160/177 T 2,2 | Full | ≥ 0,60 |
| NKM-G 65-160/153 T 1,1 | Turned | |
| NKM-G 65-160/165 T 1,5 | Turned | |
| NKP-G 65-160/173 T 15 | Full | ≥ 0,50 |
| NKP-G 65-160/157 T 11 | Turned | |
| NKM-G 65-200/219 T 4 | Full | ≥ 0,60 |
| NKM-G 65-200/210 T 3 | Turned | |
| NKP-G 65-200/219 T 30 | Full | ≥ 0,70 |
| NKP-G 65-200/190 T 18,5 | Turned | |
| NKP-G 65-200/200 T 22 | Turned | |
| NKM-G 65-250/263 T 5,5 | Full | ≥ 0,50 |
| NKM-G 65-315/309 T 11 | Full | ≥ 0,40 |
| NKM-G 65-315/279 T 7,5 | Turned | |



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# HYDRAULIC EFFICIENCY

## EU 547/2012 REGULATION - MEI

| PUMP MODEL | IMPELLER | MEI |
|---|---|---|
| NKM-G 80-160/177 T 3 | Full | ≥ 0,40 |
| NKM-G 80-160/153-136 T 1,5 | Turned | |
| NKM-G 80-160/163 T 2,2 | Turned | |
| NKP-G 80-160/169 T 22 | Full | ≥ 0,40 |
| NKP-G 80-160/147-127 T 11 | Turned | |
| NKP-G 80-160/153 T 15 | Turned | |
| NKP-G 80-160/163 T 18,5 | Turned | |
| NKM-G 80-200/222 T 5,5 | Full | ≥ 0,40 |
| NKM-G 80-200/200 T 4 | Turned | |
| NKP-G 80-200/190 T 30 | Full | ≥ 0,40 |
| NKM-G 80-250/270 T 11 | Full | ≥ 0,40 |
| NKM-G 80-250/240 T 7,5 | Turned | |
| NKM-G 80-315/334 T 22 | Full | ≥ 0,50 |
| NKM-G 80-315/305 T 15 | Turned | |
| NKM-G 80-315/320 T 18,5 | Turned | |
| NKM-G 100-200/214 T 7,5 | Full | ≥ 0,40 |
| NKM-G 100-200/200 T 5,5 | Turned | |
| NKM-G 100-250/270 T 15 | Full | ≥ 0,40 |
| NKM-G 100-250/250 T 11 | Turned | |
| NKM-G 100-315/316 T 22 | Full | ≥ 0,40 |
| NKM-G 100-315/300 T 18,5 | Turned | |
| NKM-G 125-250/266 T 22 | Full | ≥ 0,40 |
| NKM-G 125-250/243 T 15 | Turned | |
| NKM-G 125-250/256 T 18,5 | Turned | |
| NKM-G 150-200/218 T 11 | – | not applicable |

| PUMP MODEL | IMPELLER | MEI |
|---|---|---|
| KDN 32-125.1/140 4P | Full | ≥ 0,40 |
| KDN 32-125.1/105 4P | Turned | |
| KDN 32-125.1/110 4P | Turned | |
| KDN 32-125.1/115 4P | Turned | |
| KDN 32-125.1/120 4P | Turned | |
| KDN 32-125.1/125 4P | Turned | |
| KDN 32-125.1/130 4P | Turned | |
| KDN 32-125.1/135 4P | Turned | |
| KDN 32-125.1/140 2P | Full | ≥ 0,40 |
| KDN 32-125.1/105 2P | Turned | |
| KDN 32-125.1/110 2P | Turned | |
| KDN 32-125.1/115 2P | Turned | |
| KDN 32-125.1/120 2P | Turned | |
| KDN 32-125.1/125 2P | Turned | |
| KDN 32-125.1/130 2P | Turned | |
| KDN 32-125.1/135 2P | Turned | |
| KDN 32-160.1/177 4P | Full | ≥ 0,40 |
| KDN 32-160.1/137 4P | Turned | |
| KDN 32-160.1/145 4P | Turned | |
| KDN 32-160.1/153 4P | Turned | |
| KDN 32-160.1/161 4P | Turned | |
| KDN 32-160.1/169 4P | Turned | |
| KDN 32-160.1/177 2P | Full | ≥ 0,40 |
| KDN 32-160.1/137 2P | Turned | |
| KDN 32-160.1/145 2P | Turned | |
| KDN 32-160.1/153 2P | Turned | |
| KDN 32-160.1/161 2P | Turned | |
| KDN 32-160.1/169 2P | Turned | |
| KDN 32-200.1/207 4P | Full | ≥ 0,50 |
| KDN 32-200.1/170 4P | Turned | |
| KDN 32-200.1/180 4P | Turned | |
| KDN 32-200.1/190 4P | Turned | |
| KDN 32-200.1/200 4P | Turned | |
| KDN 32-200.1/207 2P | Full | ≥ 0,40 |
| KDN 32-200.1/170 2P | Turned | |
| KDN 32-200.1/180 2P | Turned | |
| KDN 32-200.1/190 2P | Turned | |
| KDN 32-200.1/200 2P | Turned | |

# HYDRAULIC EFFICIENCY

## EU 547/2012 REGULATION - MEI

| PUMP MODEL | IMPELLER | MEI |
|---|---|---|
| KDN 32-125/142 4P | Full | ≥ 0,50 |
| KDN 32-125/115 4P | Turned | |
| KDN 32-125/120 4P | Turned | |
| KDN 32-125/125 4P | Turned | |
| KDN 32-125/130 4P | Turned | |
| KDN 32-125/135 4P | Turned | |
| KDN 32-125/142 2P | Full | ≥ 0,40 |
| KDN 32-125/115 2P | Turned | |
| KDN 32-125/120 2P | Turned | |
| KDN 32-125/125 2P | Turned | |
| KDN 32-125/130 2P | Turned | |
| KDN 32-125/135 2P | Turned | |
| KDN 32-160/177 4P | Full | ≥ 0,40 |
| KDN 32-160/137 4P | Turned | |
| KDN 32-160/145 4P | Turned | |
| KDN 32-160/153 4P | Turned | |
| KDN 32-160/161 4P | Turned | |
| KDN 32-160/169 4P | Turned | |
| KDN 32-160/177 2P | Full | ≥ 0,40 |
| KDN 32-160/137 2P | Turned | |
| KDN 32-160/145 2P | Turned | |
| KDN 32-160/153 2P | Turned | |
| KDN 32-160/161 2P | Turned | |
| KDN 32-160/169 2P | Turned | |
| KDN 32-200/219 4P | Full | ≥ 0,60 |
| KDN 32-200/170 4P | Turned | |
| KDN 32-200/180 4P | Turned | |
| KDN 32-200/190 4P | Turned | |
| KDN 32-200/200 4P | Turned | |
| KDN 32-200/210 4P | Turned | |
| KDN 32-200/219 2P | Full | ≥ 0,60 |
| KDN 32-200/170 2P | Turned | |
| KDN 32-200/180 2P | Turned | |
| KDN 32-200/190 2P | Turned | |
| KDN 32-200/200 2P | Turned | |
| KDN 32-200/210 2P | Turned | |

| PUMP MODEL | IMPELLER | MEI |
|---|---|---|
| KDN 40-125/142 4P | Full | ≥ 0,40 |
| KDN 40-125/115 4P | Turned | |
| KDN 40-125/120 4P | Turned | |
| KDN 40-125/125 4P | Turned | |
| KDN 40-125/130 4P | Turned | |
| KDN 40-125/135 4P | Turned | |
| KDN 40-125/142 2P | Full | ≥ 0,40 |
| KDN 40-125/115 2P | Turned | |
| KDN 40-125/120 2P | Turned | |
| KDN 40-125/125 2P | Turned | |
| KDN 40-125/130 2P | Turned | |
| KDN 40-125/135 2P | Turned | |
| KDN 40-160/177 4P | Full | ≥ 0,40 |
| KDN 40-160/137 4P | Turned | |
| KDN 40-160/145 4P | Turned | |
| KDN 40-160/153 4P | Turned | |
| KDN 40-160/161 4P | Turned | |
| KDN 40-160/169 4P | Turned | |
| KDN 40-160/177 2P | Full | ≥ 0,50 |
| KDN 40-160/137 2P | Turned | |
| KDN 40-160/145 2P | Turned | |
| KDN 40-160/153 2P | Turned | |
| KDN 40-160/161 2P | Turned | |
| KDN 40-160/169 2P | Turned | |
| KDN 40-200/219 4P | Full | ≥ 0,60 |
| KDN 40-200/170 4P | Turned | |
| KDN 40-200/180 4P | Turned | |
| KDN 40-200/190 4P | Turned | |
| KDN 40-200/200 4P | Turned | |
| KDN 40-200/210 4P | Turned | |
| KDN 40-200/219 2P | Full | ≥ 0,50 |
| KDN 40-200/170 2P | Turned | |
| KDN 40-200/180 2P | Turned | |
| KDN 40-200/190 2P | Turned | |
| KDN 40-200/200 2P | Turned | |
| KDN 40-200/210 2P | Turned | |



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# HYDRAULIC EFFICIENCY

## EU 547/2012 REGULATION - MEI

| PUMP MODEL | IMPELLER | MEI |
|---|---|---|
| KDN 40-250/260 4P | Full | ≥ 0,40 |
| KDN 40-250/220 4P | Turned | |
| KDN 40-250/230 4P | Turned | |
| KDN 40-250/240 4P | Turned | |
| KDN 40-250/250 4P | Turned | |
| KDN 40-250/260 2P | Full | ≥ 0,40 |
| KDN 40-250/220 2P | Turned | |
| KDN 40-250/230 2P | Turned | |
| KDN 40-250/240 2P | Turned | |
| KDN 40-250/250 2P | Turned | |
| KDN 50-125/144 4P | Full | ≥ 0,40 |
| KDN 50-125/115 4P | Turned | |
| KDN 50-125/120 4P | Turned | |
| KDN 50-125/125 4P | Turned | |
| KDN 50-125/130 4P | Turned | |
| KDN 50-125/135 4P | Turned | |
| KDN 50-125/139 4P | Turned | |
| KDN 50-125/144 2P | Full | ≥ 0,40 |
| KDN 50-125/115 2P | Turned | |
| KDN 50-125/120 2P | Turned | |
| KDN 50-125/125 2P | Turned | |
| KDN 50-125/130 2P | Turned | |
| KDN 50-125/135 2P | Turned | |
| KDN 50-125/139 2P | Turned | |
| KDN 50-160/177 4P | Full | ≥ 0,60 |
| KDN 50-160/137 4P | Turned | |
| KDN 50-160/145 4P | Turned | |
| KDN 50-160/153 4P | Turned | |
| KDN 50-160/161 4P | Turned | |
| KDN 50-160/169 4P | Turned | |
| KDN 50-160/177 2P | Full | ≥ 0,50 |
| KDN 50-160/137 2P | Turned | |
| KDN 50-160/145 2P | Turned | |
| KDN 50-160/153 2P | Turned | |
| KDN 50-160/161 2P | Turned | |
| KDN 50-160/169 2P | Turned | |

| PUMP MODEL | IMPELLER | MEI |
|---|---|---|
| KDN 50-200/219 4P | Full | ≥ 0,60 |
| KDN 50-200/170 4P | Turned | |
| KDN 50-200/180 4P | Turned | |
| KDN 50-200/190 4P | Turned | |
| KDN 50-200/200 4P | Turned | |
| KDN 50-200/210 4P | Turned | |
| KDN 50-200/219 2P | Full | ≥ 0,40 |
| KDN 50-200/170 2P | Turned | |
| KDN 50-200/180 2P | Turned | |
| KDN 50-200/190 2P | Turned | |
| KDN 50-200/200 2P | Turned | |
| KDN 50-200/210 2P | Turned | |
| KDN 50-250/263 4P | Full | ≥ 0,60 |
| KDN 50-250/220 4P | Turned | |
| KDN 50-250/230 4P | Turned | |
| KDN 50-250/240 4P | Turned | |
| KDN 50-250/250 4P | Turned | |
| KDN 50-250/263 2P | Full | ≥ 0,50 |
| KDN 50-250/220 2P | Turned | |
| KDN 50-250/230 2P | Turned | |
| KDN 50-250/240 2P | Turned | |
| KDN 50-250/250 2P | Turned | |
| KDN 65-125/144 4P | Full | ≥ 0,40 |
| KDN 65-125/120-110 4P | Turned | |
| KDN 65-125/120 4P | Turned | |
| KDN 65-125/125 4P | Turned | |
| KDN 65-125/130 4P | Turned | |
| KDN 65-125/135 4P | Turned | |
| KDN 65-125/140 4P | Turned | |
| KDN 65-125/144 2P | Full | ≥ 0,40 |
| KDN 65-125/120-110 2P | Turned | |
| KDN 65-125/120 2P | Turned | |
| KDN 65-125/125 2P | Turned | |
| KDN 65-125/130 2P | Turned | |
| KDN 65-125/135 2P | Turned | |
| KDN 65-125/140 2P | Turned | |

# HYDRAULIC EFFICIENCY

## EU 547/2012 REGULATION - MEI

| PUMP MODEL | IMPELLER | MEI |
|---|---|---|
| KDN 65-160/177 4P | Full | ≥ 0,60 |
| KDN 65-160/137 4P | Turned | |
| KDN 65-160/145 4P | Turned | |
| KDN 65-160/153 4P | Turned | |
| KDN 65-160/161 4P | Turned | |
| KDN 65-160/169 4P | Turned | |
| KDN 65-160/177 2P | Full | ≥ 0,50 |
| KDN 65-160/137 2P | Turned | |
| KDN 65-160/145 2P | Turned | |
| KDN 65-160/153 2P | Turned | |
| KDN 65-160/161 2P | Turned | |
| KDN 65-160/169 2P | Turned | |
| KDN 65-200/219 4P | Full | ≥ 0,60 |
| KDN 65-200/170 4P | Turned | |
| KDN 65-200/180 4P | Turned | |
| KDN 65-200/190 4P | Turned | |
| KDN 65-200/200 4P | Turned | |
| KDN 65-200/210 4P | Turned | |
| KDN 65-200/219 2P | Full | ≥ 0,60 |
| KDN 65-200/170 2P | Turned | |
| KDN 65-200/180 2P | Turned | |
| KDN 65-200/190 2P | Turned | |
| KDN 65-200/200 2P | Turned | |
| KDN 65-200/210 2P | Turned | |
| KDN 65-250/263 4P | Full | ≥ 0,50 |
| KDN 65-250/220 4P | Turned | |
| KDN 65-250/230 4P | Turned | |
| KDN 65-250/240 4P | Turned | |
| KDN 65-250/250 4P | Turned | |
| KDN 65-250/263 2P | Full | ≥ 0,50 |
| KDN 65-250/220 2P | Turned | |
| KDN 65-250/230 2P | Turned | |
| KDN 65-250/240 2P | Turned | |
| KDN 65-250/250 2P | Turned | |

| PUMP MODEL | IMPELLER | MEI |
|---|---|---|
| KDN 65-315/320 4P | Full | ≥ 0,50 |
| KDN 65-315/260 4P | Turned | |
| KDN 65-315/275 4P | Turned | |
| KDN 65-315/290 4P | Turned | |
| KDN 65-315/305 4P | Turned | |
| KDN 65-315/320 2P | Full | ≥ 0,50 |
| KDN 65-315/260 2P | Turned | |
| KDN 65-315/275 2P | Turned | |
| KDN 65-315/290 2P | Turned | |
| KDN 65-315/305 2P | Turned | |
| KDN 80-160/177 4P | Full | ≥ 0,50 |
| KDN 80-160/147-127 4P | Turned | |
| KDN 80-160/153-136 4P | Turned | |
| KDN 80-160/153 4P | Turned | |
| KDN 80-160/161 4P | Turned | |
| KDN 80-160/169 4P | Turned | |
| KDN 80-160/177 2P | Full | ≥ 0,40 |
| KDN 80-160/147-127 2P | Turned | |
| KDN 80-160/153-136 2P | Turned | |
| KDN 80-160/153 2P | Turned | |
| KDN 80-160/161 2P | Turned | |
| KDN 80-160/169 2P | Turned | |
| KDN 80-200/222 4P | Full | ≥ 0,50 |
| KDN 80-200/170 4P | Turned | |
| KDN 80-200/180 4P | Turned | |
| KDN 80-200/190 4P | Turned | |
| KDN 80-200/200 4P | Turned | |
| KDN 80-200/210 4P | Turned | |
| KDN 80-200/222 2P | Full | ≥ 0,40 |
| KDN 80-200/170 2P | Turned | |
| KDN 80-200/180 2P | Turned | |
| KDN 80-200/190 2P | Turned | |
| KDN 80-200/200 2P | Turned | |
| KDN 80-200/210 2P | Turned | |



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# HYDRAULIC EFFICIENCY

## EU 547/2012 REGULATION - MEI

| PUMP MODEL | IMPELLER | MEI |
|---|---|---|
| KDN 80-250/270 4P | Full | ≥ 0,40 |
| KDN 80-250/220 4P | Turned | |
| KDN 80-250/230 4P | Turned | |
| KDN 80-250/240 4P | Turned | |
| KDN 80-250/250 4P | Turned | |
| KDN 80-250/260 4P | Turned | |
| KDN 80-250/270 2P | Full | ≥ 0,40 |
| KDN 80-250/220 2P | Turned | |
| KDN 80-250/230 2P | Turned | |
| KDN 80-250/240 2P | Turned | |
| KDN 80-250/250 2P | Turned | |
| KDN 80-250/260 2P | Turned | |
| KDN 80-315/334 4P | Full | ≥ 0,40 |
| KDN 80-315/275 4P | Turned | |
| KDN 80-315/290 4P | Turned | |
| KDN 80-315/305 4P | Turned | |
| KDN 80-315/320 4P | Turned | |
| KDN 80-315/290 2P | Full | ≥ 0,40 |
| KDN 80-315/275 2P | Turned | |
| KDN 100-200/219 4P | Full | ≥ 0,40 |
| KDN 100-200/180 4P | Turned | |
| KDN 100-200/190 4P | Turned | |
| KDN 100-200/200 4P | Turned | |
| KDN 100-200/210 4P | Turned | |
| KDN 100-200/219 2P | Full | ≥ 0,40 |
| KDN 100-200/180 2P | Turned | |
| KDN 100-200/190 2P | Turned | |
| KDN 100-200/200 2P | Turned | |
| KDN 100-200/210 2P | Turned | |

| PUMP MODEL | IMPELLER | MEI |
|---|---|---|
| KDN 100-250/270 4P | Full | ≥ 0,40 |
| KDN 100-250/220 4P | Turned | |
| KDN 100-250/230 4P | Turned | |
| KDN 100-250/240 4P | Turned | |
| KDN 100-250/250 4P | Turned | |
| KDN 100-250/260 4P | Turned | |
| KDN 100-250/260 2P | Full | ≥ 0,40 |
| KDN 100-250/220 2P | Turned | |
| KDN 100-250/230 2P | Turned | |
| KDN 100-250/240 2P | Turned | |
| KDN 100-250/250 2P | Turned | |
| KDN 100-315/334 4P | Full | ≥ 0,40 |
| KDN 100-315/275 4P | Turned | |
| KDN 100-315/290 4P | Turned | |
| KDN 100-315/305 4P | Turned | |
| KDN 100-315/320 4P | Turned | |
| KDN 125-250/269 4P | Full | ≥ 0,40 |
| KDN 125-250/220 4P | Turned | |
| KDN 125-250/230 4P | Turned | |
| KDN 125-250/240 4P | Turned | |
| KDN 125-250/250 4P | Turned | |
| KDN 125-250/260 4P | Turned | |
| KDN 150-200/218 4P | Full | not applicable |
| KDN 150-200/210-170 4P | Turned | |
| KDN 150-200/218-182 4P | Turned | |
| KDN 150-200/218-200 4P | Turned | |

# HYDRAULIC EFFICIENCY

## EU 547/2012 REGULATION - MEI

| PUMP MODEL | NUMBER OF STAGES | MEI | $\eta$ PL | $\eta$ BEP | $\eta$ OL |
|---|---|---|---|---|---|
| **KVC 25/30 M** | 3 | ≥ 0,40 | 31.30 | 34.00 | 33.56 |
| **KVC 25/30 T** | | | 32.38 | 34.30 | 33.85 |
| **KVC 15/30 M** | 2 | | 35.93 | 38.72 | 38.51 |
| **KVC 15/30 T** | | | 29.86 | 31.50 | 31.20 |
| **KVC 35/30 M** | 4 | | 35.95 | 38.50 | 37.99 |
| **KVC 35/30 T** | | | 34.43 | 37.02 | 36.55 |
| **KVC 45/30 M** | 5 | | 34.29 | 36.35 | 36.08 |
| **KVC 45/30 T** | | | 35.00 | 37.44 | 37.00 |
| **KVC 50/30 M** | 6 | | 29.03 | 30.86 | 30.56 |
| **KVC 50/30 T** | | | 30.67 | 32.77 | 32.21 |
| **KVC 60/30 M** | 7 | | 28.82 | 30.95 | 30.56 |
| **KVC 60/30 T** | | | 30.25 | 32.28 | 31.96 |
| **KVC 70/30 M** | 8 | | 35.16 | 37.89 | 37.32 |
| **KVC 70/30 T** | | | 30.29 | 32.40 | 31.98 |
| **KVC 30/50 M** | 3 | ≥ 0,60 | 40.75 | 43.10 | 42.76 |
| **KVC 30/50 T** | | | 40.19 | 43.10 | 42.60 |
| **KVC 20/50 M** | 2 | | 41.40 | 42.95 | 42.35 |
| **KVC 20/50 T** | | | 38.53 | 41.47 | 41.04 |
| **KVC 40/50 M** | 4 | | 40.73 | 43.34 | 42.91 |
| **KVC 40/50 T** | | | 38.85 | 41.40 | 40.92 |
| **KVC 55/50 M** | 5 | | 38.90 | 41.70 | 41.20 |
| **KVC 55/50 T** | | | 38.97 | 41.61 | 41.15 |
| **KVC 65/50 M** | 6 | | 37.53 | 39.21 | 38.75 |
| **KVC 65/50 T** | | | 36.52 | 40.13 | 39.42 |
| **KVC 75/50 M** | 7 | | 36.39 | 38.91 | 38.35 |
| **KVC 75/50 T** | | | 36.51 | 39.61 | 39.05 |
| **KVC 20/80 M** | 3 | ≥ 0,40 | 45.00 | 47.70 | 47.37 |
| **KVC 20/80 T** | | | 45.45 | 47.80 | 47.29 |
| **KVC 15/80 M** | 2 | | 43.13 | 46.70 | 45.99 |
| **KVC 15/80 T** | | | 41.78 | 44.09 | 43.43 |
| **KVC 30/80 M** | 4 | | 44.06 | 46.30 | 45.84 |
| **KVC 30/80 T** | | | 42.16 | 45.10 | 44.44 |
| **KVC 40/80 M** | 5 | | 43.43 | 46.97 | 46.80 |
| **KVC 40/80 T** | | | 41.94 | 44.40 | 43.89 |
| **KVC 45/80 M** | 6 | | 41.91 | 43.96 | 43.57 |
| **KVC 45/80 T** | | | 41.06 | 43.74 | 43.31 |
| **KVC 55/80 M** | 7 | | 41.05 | 43.00 | 42.63 |
| **KVC 55/80 T** | | | 40.75 | 43.51 | 43.05 |
| **KVC 65/80 T** | 8 | | 41.08 | 44.02 | 43.48 |



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# HYDRAULIC EFFICIENCY

## EU 547/2012 REGULATION - MEI

| PUMP MODEL | NUMBER OF STAGES | MEI | $\eta$ PL | $\eta$ BEP | $\eta$ OL |
|---|---|---|---|---|---|
| **KVC 35/120 M** | 3 | ≥ 0,50 | 49.31 | 51.00 | 50.76 |
| **KVC 35/120 T** | | | 49.83 | 51.80 | 51.38 |
| **KVC 25/120 M** | 2 | | 45.13 | 46.90 | 46.75 |
| **KVC 25/120 T** | | | 42.16 | 44.54 | 44.20 |
| **KVC 45/120 M** | 4 | | 47.59 | 49.50 | 48.96 |
| **KVC 45/120 T** | | | 47.47 | 49.30 | 49.00 |
| **KVC 60/120 T** | 5 | | 47.81 | 49.44 | 48.97 |
| **KVC 70/120 T** | 6 | | 47.58 | 49.00 | 48.61 |
| **KVC 85/120 T** | 7 | | 49.23 | 50.84 | 50.20 |

| PUMP MODEL | NUMBER OF STAGES | MEI | $\eta$ PL | $\eta$ BEP | $\eta$ OL |
|---|---|---|---|---|---|
| **KV 3/10 M** | 10 | ≥ 0,40 | 47.83 | 52.40 | 51.69 |
| **KV 3/10 T** | | | 48.71 | 52.30 | 51.44 |
| **KV 3/12 M** | 12 | | 49.22 | 53.67 | 52.94 |
| **KV 3/12 T** | | | 45.09 | 48.45 | 47.97 |
| **KV 3/15 M** | 15 | | 46.57 | 50.40 | 49.75 |
| **KV 3/15 T** | | | 47.81 | 52.55 | 51.54 |
| **KV 3/18 T** | 18 | | 48.11 | 41.91 | 51.17 |
| **KV 6/7 M** | 7 | ≥ 0,40 | 50.28 | 54.00 | 53.47 |
| **KV 6/7 T** | | | 50.66 | 54.57 | 53.74 |
| **KV 6/9 M** | 9 | | 50.52 | 55.10 | 54.34 |
| **KV 6/9 T** | | | 45.85 | 49.42 | 49.11 |
| **KV 6/11 M** | 11 | | 49.10 | 52.67 | 52.16 |
| **KV 6/11 T** | | | 48.37 | 51.58 | 51.06 |
| **KV 6/15 T** | 15 | | 51.09 | 55.20 | 54.44 |
| **KV 10/4 M** | 4 | ≥ 0,40 | 53.89 | 55.88 | 55.60 |
| **KV 10/4 T** | | | 53.72 | 57.24 | 56.93 |
| **KV 10/5 M** | 5 | | 54.72 | 57.27 | 56.81 |
| **KV 10/5 T** | | | 54.92 | 57.35 | 56.73 |
| **KV 10/6 M** | 6 | | 57.77 | 60.20 | 59.48 |
| **KV 10/6 T** | | | 57.97 | 60.30 | 59.88 |
| **KV 10/8 T** | 8 | | 57.41 | 60.77 | 60.59 |

# HYDRAULIC EFFICIENCY

## EU 547/2012 REGULATION - MEI

| PUMP MODEL | NUMBER OF STAGES | MEI | $\eta$ PL | $\eta$ BEP | $\eta$ OL |
|---|---|---|---|---|---|
| **NKV 10/3** | 3 | ≥ 0,60 | 63.39 | 66.41 | 65.77 |
| **NKV 10/2** | 2 | | 64.88 | 67.70 | 67.39 |
| **NKV 10/4** | 4 | | 63.30 | 65.89 | 65.29 |
| **NKV 10/5** | 5 | | 65.48 | 69.58 | 68.81 |
| **NKV 10/6** | 6 | | 66.55 | 68.40 | 67.76 |
| **NKV 10/7** | 7 | | 66.11 | 68.52 | 67.86 |
| **NKV 10/8** | 8 | | 64.66 | 67.13 | 66.08 |
| **NKV 10/9** | 9 | | 66.77 | 68.94 | 68.26 |
| **NKV 10/10** | 10 | | 66.44 | 69.13 | 68.43 |
| **NKV 10/12** | 12 | | 65.97 | 68.88 | 67.71 |
| **NKV 10/14** | 14 | | 63.80 | 66.29 | 65.51 |
| **NKV 10/16** | 16 | | 62.88 | 65.32 | 64.69 |
| **NKV 10/18** | 18 | | 64.39 | 66.91 | 66.19 |
| **NKV 10/20** | 20 | | 64.45 | 66.82 | 66.19 |
| **NKV 10/22** | 22 | | 65.23 | 67.61 | 66.72 |

| PUMP MODEL | NUMBER OF STAGES | MEI | $\eta$ PL | $\eta$ BEP | $\eta$ OL |
|---|---|---|---|---|---|
| **NKV 15/3** | 3 | ≥ 0,60 | 68.74 | 72.03 | 71.26 |
| **NKV 15/2** | 2 | | 67.43 | 71.35 | 70.68 |
| **NKV 15/4** | 4 | | 70.15 | 72.54 | 71.91 |
| **NKV 15/5** | 5 | | 70.40 | 74.23 | 73.48 |
| **NKV 15/6** | 6 | | 70.19 | 73.29 | 72.46 |
| **NKV 15/7** | 7 | | 69.81 | 73.65 | 72.91 |
| **NKV 15/8** | 8 | | 68.06 | 71.49 | 70.86 |
| **NKV 15/9** | 9 | | 69.77 | 73.07 | 72.30 |
| **NKV 15/10** | 10 | | 66.95 | 70.35 | 69.67 |
| **NKV 15/12** | 12 | | 70.09 | 74.28 | 73.55 |
| **NKV 15/14** | 14 | | 69.44 | 72.75 | 72.00 |
| **NKV 15/16** | 16 | | 70.90 | 74.76 | 74.01 |
| **NKV 15/17** | 17 | | 70.55 | 74.26 | 73.35 |



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# HYDRAULIC EFFICIENCY

## EU 547/2012 REGULATION - MEI

| PUMP MODEL | NUMBER OF STAGES | MEI | $\eta$ PL | $\eta$ BEP | $\eta$ OL |
|---|---|---|---|---|---|
| **NKV 20/3** | 3 | ≥ 0,60 | 70.47 | 71.40 | 70.59 |
| **NKV 20/2** | 2 | | 67.45 | 73.36 | 72.50 |
| **NKV 20/4** | 4 | | 66.24 | 69.74 | 69.33 |
| **NKV 20/5** | 5 | | 72.31 | 74.50 | 73.90 |
| **NKV 20/6** | 6 | | 70.37 | 73.40 | 72.90 |
| **NKV 20/7** | 7 | | 70.13 | 74.04 | 73.38 |
| **NKV 20/8** | 8 | | 69.63 | 72.06 | 71.60 |
| **NKV 20/9** | 9 | | 71.68 | 74.41 | 73.68 |
| **NKV 20/10** | 10 | | 70.44 | 73.42 | 72.96 |
| **NKV 20/12** | 12 | | 71.47 | 74.11 | 73.45 |
| **NKV 20/14** | 14 | | 71.33 | 75.51 | 74.86 |
| **NKV 20/16** | 16 | | 71.04 | 74.50 | 74.00 |
| **NKV 20/17** | 17 | | 71.67 | 74.66 | 74.14 |

| PUMP MODEL | NUMBER OF STAGES | MEI | $\eta$ PL | $\eta$ BEP | $\eta$ OL |
|---|---|---|---|---|---|
| **NKV 32/3** | 3 | ≥ 0,70 | 70.08 | 74.12 | 73.16 |
| **NKV 32/2-2** | 2 | | 65.89 | 69.98 | 69.26 |
| **NKV 32/2** | 2 | | 70.08 | 74.12 | 73.16 |
| **NKV 32/3-2** | 3 | | 67.38 | 71.10 | 70.20 |
| **NKV 32/4-2** | 4 | | 68.05 | 71.78 | 70.92 |
| **NKV 32/4** | 4 | | 70.08 | 74.12 | 73.16 |
| **NKV 32/5-2** | 5 | | 68.40 | 72.20 | 71.44 |
| **NKV 32/5** | 5 | | 70.08 | 74.12 | 73.16 |
| **NKV 32/6-2** | 6 | | 68.62 | 72.49 | 71.81 |
| **NKV 32/6** | 6 | | 70.08 | 74.12 | 73.16 |
| **NKV 32/7-2** | 7 | | 68.82 | 72.70 | 72.04 |
| **NKV 32/7** | 7 | | 70.08 | 74.12 | 73.16 |
| **NKV 32/8-2** | 8 | | 68.96 | 72.86 | 72.22 |
| **NKV 32/8** | 8 | | 70.08 | 74.12 | 73.16 |
| **NKV 32/9-2** | 9 | | 69.06 | 72.98 | 72.37 |
| **NKV 32/9** | 9 | | 70.08 | 74.12 | 73.16 |
| **NKV 32/10-2** | 10 | | 69.15 | 73.09 | 72.47 |
| **NKV 32/10** | 10 | | 70.08 | 74.12 | 73.16 |
| **NKV 32/11-2** | 11 | | 69.24 | 73.17 | 72.55 |
| **NKV 32/11** | 11 | | 70.08 | 74.12 | 73.16 |
| **NKV 32/12-2** | 12 | | 69.29 | 73.25 | 72.63 |
| **NKV 32/12** | 12 | | 70.08 | 74.12 | 73.16 |
| **NKV 32/13-2** | 13 | | 69.37 | 73.31 | 72.66 |
| **NKV 32/13** | 13 | | 70.08 | 74.12 | 73.16 |

# HYDRAULIC EFFICIENCY

## EU 547/2012 REGULATION - MEI

| PUMP MODEL | NUMBER OF STAGES | MEI | $\eta$ PL | $\eta$ BEP | $\eta$ OL |
|---|---|---|---|---|---|
| **NKV 45/3** | 3 | ≥ 0,70 | 73.47 | 76.37 | 75.25 |
| **NKV 45/2-2** | 2 | | 69.13 | 71.65 | 70.46 |
| **NKV 45/2** | 2 | | 73.47 | 76.37 | 75.25 |
| **NKV 45/3-2** | 3 | | 69.79 | 73.42 | 72.55 |
| **NKV 45/4-2** | 4 | | 70.11 | 74.21 | 73.56 |
| **NKV 45/4** | 4 | | 73.47 | 76.37 | 75.25 |
| **NKV 45/5-2** | 5 | | 70.36 | 74.67 | 74.14 |
| **NKV 45/5** | 5 | | 73.47 | 76.37 | 75.25 |
| **NKV 45/6-2** | 6 | | 70.50 | 74.96 | 74.52 |
| **NKV 45/6** | 6 | | 73.47 | 76.37 | 75.25 |
| **NKV 45/7-2** | 7 | | 70.56 | 75.16 | 74.80 |
| **NKV 45/7** | 7 | | 73.47 | 76.37 | 75.25 |
| **NKV 45/8-2** | 8 | | 70.67 | 75.32 | 75.00 |
| **NKV 45/8** | 8 | | 73.47 | 76.37 | 75.25 |
| **NKV 45/9-2** | 9 | | 70.70 | 75.43 | 75.16 |
| **NKV 45/9** | 9 | | 73.47 | 76.37 | 75.25 |
| **NKV 45/10-2** | 10 | | 70.73 | 75.52 | 75.28 |
| **NKV 45/10** | 10 | | 73.47 | 76.37 | 75.25 |
| **NKV 45/11-2** | 11 | | 70.82 | 75.60 | 75.38 |
| **NKV 45/11** | 11 | | 73.47 | 76.37 | 75.25 |
| **NKV 45/12-2** | 12 | | 70.84 | 75.66 | 75.46 |
| **NKV 45/12** | 12 | | 73.47 | 76.37 | 75.25 |
| **NKV 45/13-2** | 13 | | 70.85 | 75.71 | 75.54 |

| PUMP MODEL | NUMBER OF STAGES | MEI | $\eta$ PL | $\eta$ BEP | $\eta$ OL |
|---|---|---|---|---|---|
| **NKV 65/3** | 3 | ≥ 0,70 | 73.71 | 78.96 | 77.11 |
| **NKV 65/2-2** | 2 | | 70.92 | 77.97 | 77.08 |
| **NKV 65/2** | 2 | | 73.71 | 78.96 | 77.11 |
| **NKV 65/3-2** | 3 | | 72.27 | 77.22 | 76.17 |
| **NKV 65/4-2** | 4 | | 72.52 | 77.33 | 76.58 |
| **NKV 65/4** | 4 | | 73.71 | 78.96 | 77.11 |
| **NKV 65/5-2** | 5 | | 73.15 | 77.48 | 76.31 |
| **NKV 65/5** | 5 | | 73.71 | 78.96 | 77.11 |
| **NKV 65/6-2** | 6 | | 73.78 | 77.69 | 75.76 |
| **NKV 65/6** | 6 | | 73.71 | 78.96 | 77.11 |
| **NKV 65/7-2** | 7 | | 73.84 | 77.87 | 75.86 |
| **NKV 65/7** | 7 | | 73.71 | 78.96 | 77.11 |
| **NKV 65/8-2** | 8 | | 73.87 | 78.00 | 75.94 |
| **NKV 65/8** | 8 | | 73.71 | 78.96 | 77.11 |



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# HYDRAULIC EFFICIENCY

## EU 547/2012 REGULATION - MEI

| PUMP MODEL | NUMBER OF STAGES | MEI | $\eta$ PL | $\eta$ BEP | $\eta$ OL |
|---|---|---|---|---|---|
| **NKV 95/3** | 3 | ≥ 0,70 | 74.38 | 79.43 | 77.94 |
| **NKV 95/2-2** | 2 | | 72.37 | 78.87 | 77.79 |
| **NKV 95/2** | 2 | | 74.38 | 79.43 | 77.94 |
| **NKV 95/3-2** | 3 | | 73.03 | 78.58 | 77.65 |
| **NKV 95/4-2** | 4 | | 73.56 | 78.64 | 77.44 |
| **NKV 95/4** | 4 | | 74.38 | 79.43 | 77.94 |
| **NKV 95/5-2** | 5 | | 73.82 | 78.74 | 77.41 |
| **NKV 95/5** | 5 | | 74.38 | 79.43 | 77.94 |
| **NKV 95/6-2** | 6 | | 73.90 | 78.83 | 77.51 |
| **NKV 95/6** | 6 | | 74.38 | 79.43 | 77.94 |

# ACCESSORIES

| COUNTER-FLANGE KIT | MODEL | COUNTER FLANGES AND GASKETS | THREADED | MATERIAL | PN | NKM-GE - NKP-GE NKM-G- NKP-G | KDNE - KDN |
|---|---|---|---|---|---|---|---|
| DN 32 | **DN 32** | 1 x DN 32 + 1 x DN 50 | Threaded | STEEL | 16 | • | • |
| | **DN 40** | 1 x DN 40 + 1 x DN 65 | Threaded | STEEL | 16 | • | • |
| | **DN 50** | 1 x DN 50 + 1 x DN 65 | Threaded | STEEL | 16 | • | • |
| | **DN 65** | 1 x DN 65 + 1 x DN 80 | Threaded | STEEL | 16 | • | • |
| | **DN 32** | 1 x DN 32 + 1 x DN 50 | To be welded | STEEL | 16 | • | • |
| | **DN 40** | 1 x DN 40 + 1 x DN 65 | To be welded | STEEL | 16 | • | • |
| | **DN 50** | 1 x DN 50 + 1 x DN 65 | To be welded | STEEL | 16 | • | • |
| | **DN 50/1** | 1 x DN 50 + 1 x DN 80 | To be welded | STEEL | 16 | | • |
| | **DN 65** | 1 x DN 65 + 1 x DN 80 | To be welded | STEEL | 16 | • | • |
| | **DN 65/1** | 1 x DN 65 + 1 x DN 100 | To be welded | STEEL | 16 | | • |
| | **DN 80** | 1 x DN 80 + 1 x DN 100 | To be welded | STEEL | 16 | • | • |
| | **DN 80/1** | 1 x DN 80 + 1 x DN 125 | To be welded | STEEL | 16 | | • |
| | **DN 100** | 1 x DN 100 + 1 x DN 125 | To be welded | STEEL | 16 | • | • |
| | **DN 125** | 1 x DN 125 + 1 x DN 150 | To be welded | STEEL | 16 | • | • |
| | **DN 150** | 1 x DN 150 + 1 x DN 200 | To be welded | STEEL | 16 (10 x DN 200) | • | • |
| | **DN 200** | 1 x DN 200 + 1 x DN 250 | To be welded | STEEL | 16 (10 x DN 200) | | • |
| | **DN 250/1** | 1 x DN 250 + 1 x DN 300 | To be welded | STEEL | 16 | | • |
| | **DN 300** | 1 x DN 300 + 1 x DN 350 | To be welded | STEEL | 16 | | • |
| | **DN 350** | 1 x DN 350 + 1 x DN 400 | To be welded | STEEL | 16 | | • |

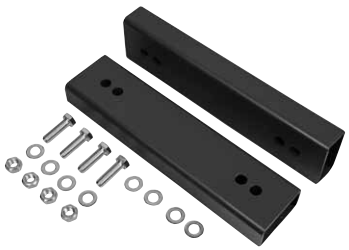
The kit includes the suction and delivery counter-flanges with gaskets, screws and bolts required for the size of the relevant pump.

## ACCESSORIES - VERTICAL CENTRIFUGAL PUMPS

| COUNTER-FLANGE KIT | MODEL | COUNTER FLANGES AND GASKETS | THREADED | MATERIAL | PN | NKV 10-15-20 | NKV 32 - 45 | NKV 65- 95 |
|---|---|---|---|---|---|---|---|---|
| DN 40 | **DN 40** | 2 x DN 40 | Threaded | STEEL | 40 | • | | |
| | **DN 50** | 2 x DN 50 | Threaded | STEEL | 40 | • | | |
| | **DN 65** | 2 x DN 65 | Threaded | STEEL | 40 | | • | |
| | **DN 80** | 2 x DN 80 | Threaded | STEEL | 40 | | • | • |
| | **DN 100** | 2 x DN 100 | Threaded | STEEL | 25 | | | • |

| PORTS | MODEL | KVC | KVCX |
|---|---|---|---|
| | **MT 1" ¼ PORTS** | • | • |

Ports must be ordered separately, one for the suction, and one for the delivery

| SPACER KIT | MODEL | FOR PUMP TYPE | P2 kW | DIMENSIONS A x B x H mm | NKM-G 4 POLES | NKP-G 2 POLES |
|---|---|---|---|---|---|---|
|  SPACER KIT nr 5 | SPACER KIT nr 1 | NKM-G 65-315/309/1¼ | 11 | 90 x 335 x 65 | • | |
| | SPACER KIT nr 5 | NKM-G 80-250/270/1¼ | 11 | 80 x 290 x 40 | • | |
| | SPACER KIT nr 2 | NKM-G 80-315/305/15/4 | 15 | 90 x 335 x 90 | • | |
| | SPACER KIT nr 3 | NKM-G 80-315/320/18,5 /4 | 18.5 | 100 x 320 x 70 | • | |
| | | NKM-G 80-315/334/22/4 | 22 | | | |
| | SPACER KIT nr 1 | NKM-G100-250/250/1¼ | 11 | 90 x 335 x 65 | • | |
| | | NKM-G100-250/270/15/4 | 15 | | | |
| | SPACER KIT nr 3 | NKM-G100-315/300/18.5 /4 | 18.5 | 100 x 320 x 70 | • | |
| | | NKM-G100-315/316/22 /4 | 22 | | | |
| | SPACER KIT nr 2 | NKM-G125-250/243/15/4 | 15 | 90 x 335 x 90 | • | |
| | SPACER KIT nr 3 | NKM-G125-250/256/18,5 /4 | 18.5 | 100 x 320 x 70 | • | |
| | | NKM-G125-250/266/22/4 | 22 | | | |
| | SPACER KIT nr 4 | NKM-G150-200/218/1¼ | 11 | 80 x 290 x 120 | • | |
| | SPACER KIT nr 6 | NKP-G 32-125/142/ 3 /2 | 3 | 50 x 100 x 20 | | • |
| | | NKP-G 32-160/177/5,5/2 | 5.5 | | | |
| | | NKP-G 40-125/130/ 3 /2 | 3 | | | |
| | | NKP-G 40-125/139/ 4 /2 | 4 | | | |
| | | NKP-G 40-160/158/ 5,5 /2 | 5.5 | | | |
| | | NKP-G 40-160/172/ 7,5 /2 | 7.5 | | | |
| | SPACER KIT nr 7 | NKP-G 40-200/210/1½ | 11 | 70 x 332 x 20 | | • |
| | | NKP-G 40-250/230/15/2 | 15 | | | |
| | | NKP-G 40-250/245/18.5 /2 | 18.5 | | | |
| | SPACER KIT nr 6 | NKP-G 50-125/135/ 5,5 /2 | 5.5 | 50 x 100 x 20 | | • |
| | | NKP-G 50-125/144/ 7,5 /2 | 7.5 | | | |
| | SPACER KIT nr 7 | NKP-G 50-160/169/1½ | 11 | 70 x 332 x 20 | | • |
| | | NKP-G 50-200/200/15 /2 | 15 | | | |
| | | NKP-G 50-200/210/18,5 /2 | 18.5 | | | |
| | | NKP-G 65-160/157/1½ | 11 | | | |
| | | NKP-G 65-160/173/15 /2 | 15 | | | |
| | | NKP-G 65-200/190/18,5 /2 | 18.5 | | | |
| | | NKP-G 80-160/147-127/1½ | 11 | | | |
| | | NKP-G 80-160/153/15 /2 | 15 | | | |
| | | NKP-G 80-160/163/18,5 /2 | 18.5 | | | |
| | SPACER KIT nr 8 | NKP-G 80-200/190/30 /2 | 30 | 70 x 125 x 20 | | • |

Available on request, separately from the pump. Used to place the pump in the horizontal position during installation, to compensate for the different pump / motor axis heights.
The kits include two spacers with sizes A (width), B (length), and H (height) as shown in the table.
Spacers with H size exceeding 20 mm are supplied with screws, nuts, and washers to secure the pump/motor to the spacer.



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# NOTES

# TECHNICAL APPENDIX

# CONVERSION TABLE FOR UNITS OF MEASURE

| CHARACTERISTIC | SYSTEM UNIT OF MEASURE | UNIT OF MEASURE | SYMBOL | CONVERSIONS | | |
|---|---|---|---|---|---|---|
| | | | | SYSTEM | INTERNATIONAL SYSTEM (SI) | IMPERIAL SYSTEM |
| **LENGTH** | Technical and International | metre<br>decimetre<br>centimetre<br>millimetre | m<br>dm<br>cm<br>mm | 1 dm = 0,1 m<br>1 cm = 0,01 m<br>1 mm = 0,001 m | | 1 m = 3,28 ft<br>1 dm = 3,937 in<br>1 cm = 0,3937 in |
| | Imperial | inch<br>foot<br>yard | 1", in<br>1", ft<br>yd | 1" = 25,4 mm<br>1" ft = 0,3048 m<br>1 yd = 0,9144 m | | <br>1 ft = 12"<br>1 yd = 3 ft = 26" |
| **AREA** | Technical and International | metres squared<br>centimetres squared<br>millimetres squared | $m^2$<br>$cm^2$<br>$mm^2$ | 1cm2 = 0,0001 $m^2$<br>1 mm2 = 0,01 $cm^2$ | | 1$m^2$ = 1,196 sq.yd<br>1$m^2$ = 10,764 sq.ft<br>1 $cm^2$ = 0,155 sq.in |
| | Imperial | square inch<br>square foot<br>square yard | sq.in<br>sq.ft<br>sq.yd | 1 sq.in = 6,45 $cm^2$<br>1 sq.ft = 0,0929 $m^2$<br>1 sq.yd = 0,836 $m^2$ | | 1 sq.ft = 144 sq.in<br>1 sq.yd = 1,296 sq.in<br>1 sq.yd = 9 sq.ft |
| **VOLUME** | Technical and International | metre cubed<br>decimetre cubed<br>centimetre cubed<br>litre cubed | $m^3$<br>$cm^3$<br>$mm^3$<br>l | 1 $m^3$ = 1.000 $dm^3$<br>1 $cm^3$ = 0.001 m = 1.000 $cm^3$<br>1 $mm^3$ = 0.001 $dm^3$<br>1 l = $dm^3$ | | 1 $dm^3$ = 0,22 Imp.gal<br>1 $dm^3$ = 0,264 US.gal<br>1 $dm^3$ = 61,0 cu.in |
| | Imperial | cubic inch<br>cubic feet<br>Imperial gallons<br>U.S. gallons | cu.in<br>cu.ft<br>Imp.gal<br>USA.gal | 1 cu.in = 16,39 $cm^3$<br>1 cu.ft = 28,34 $m^3$<br>1 Imp.gal = 4,546 $m^3$<br>1 US.gal = 3,785 $dm^3$ | | <br><br>1 Imp.gal = 1,201 US.gal<br>1 US.gal = 0,833 Imp.gal |
| **TEMPERATURE** | Technical and International | degrees Centigrade<br>degrees Kelvin | °C<br>°K | °C = °K-273<br>°K = °C + 273 | | °C = 5/9 x (°F - 32)<br>°K = 5/9 x (°F - 32) + 273 |
| | Imperial | degrees Fahrenheit | °F | °F = 9/5 x °C + 32 | | – |
| | freezing point of water at atmospheric pressure:<br>boiling point of water at atmospheric pressure: | | | 0°C = 273 °K = 032 °F<br>100°C = 373 °K = 212 °F | | |
| **WEIGHT and FORCE** | Technical | kilogram | kg | – | 1 kg = 9,81 N | 1 kg = 2,203 lb |
| | International | Newton | N | 1 N = 0,102 kg | – | 1 N = 0,22546 lb |
| | Imperial | pound | lb | 1 lB = 0,454 kg | 1 lb = 4,452 N | – |
| **SPECIFIC WEIGHT** | Technical | kilogram per decimetre cubed | $kg/dm^3$ | – | 1 $kg/dm^3$ = 9,807 $N/dm^3$ | 1 $kg/dm^3$ = 62,46 lb/cu.ft |
| | International | Newton per decimetre cubed | $N/dm^3$ | 1 $N/dm^3$ = 0,102 $kg/dm^3$ | – | 1 $N/dm^3$ = 6,36 lb/cu.ft |
| | Imperial | pound per cubic foot | $lb/dm^3$ | 1 lb/cu.ft = 0,01600 $kg/dm^3$ | 1 lb/cu.ft = 0,160 $N/dm^3$ | – |
| **PRESSURE** | Technical | atmospheres | $kg/cm^2$ | – | 1 $kg/cm^2$ = 98,067 kPa<br>1 $kg/cm^2$ = 0,9807 bar | 1 $kg/cm^2$ = 14,22 psi |
| | International | Pascal<br>kiloPascal<br>bar | Pa<br>kPa<br>bar | 1 kPa = 0,0102 $kg/cm^2$<br>1 bar = 1,02 $kg/cm^2$ | 1 kPa = 1.000 Pa<br>1 bar = 100.000 Pa | 1 kPa = 0,145 psi<br>1 bar = 14,50 psi |
| | Imperial | pounds per square inch | psi | 1 psi = 0,0703 $kg/cm^2$ | 1 psi = 0,06895 bar<br>1 psi = 6,894 kPa | – |
| **FLOW** | Technical | litres per minute<br>litres per second<br>metres cubed per hour | l/min<br>l/s<br>$m^3/h$ | 1 l/min = 0,0167 l/s<br>1 l/s = 3,6 $m^3/h$<br>1 $m^3/h$ = 16,667 l/min | 1 l/s = 0,001 $m^3/s$ | 1 l/min = 0,22 imp.g.p.m.<br>1 l/min = 0,264 US.g.p.m.<br>1 $m^3/h$ = 3,666 imp.g.p.m.<br>1 $m^3/h$ = 4,403 US.g.p.m. |
| | International | metres cubed per second | $m^3/s$ | 1 $m^3/s$ = 1.000 l/s<br>1 $m^3/s$ = 3.600 $m^3/h$ | – | 1 $m^3/s$ = 13.198 imp.g.p.m.<br>1 $m^3/s$ = 15.852 US.g.p.m. |
| | Imperial | imperial gallons per minute<br>U.S. gallons per minute | Imp.g.p.m.<br>US.g.p.m. | 1 Imp.g.p.m. = 4,546 l/min<br>1 Imp.g.p.m. = 0,273 $m^3/h$<br>1 US.g.p.m. = 3,785 l/min<br>1 US.g.p.m. = 0,227 $m^3/h$ | – | 1 Imp.g.p.m. = 1,201 US.g.p.m.<br>1 US.g.p.m. = 0,833 Imp.g.p.m. |
| **TORQUE** | Technical | kilogram metre | kgm | – | 1 kgm = 9,807 Nm | 1 kgm = 7,233 ft.lb |
| | International | Newton metre | Nm | 1 Nm = 0,102 kgm | – | 1 Nm = 0,7376 ft.lb |
| | Imperial | foot pound | ft.lb | 1 ft.lb = 0,138 kgm | 1 ft.lb = 1,358 Nm | – |
| **WORK and ENERGY** | Technical | kilogram metre<br>vapour-horsepower hour | kgm<br>CVh | | 1 kgm = 9,807 J<br>1 CVh = 0,736 kWh | 1 kgm = 7,233 ft.lb<br>1 Nm = 0,986 HP.hr. |
| | International | Joule<br>kiloWatt hour | J<br>kWhq | 1 J = 0,102 kgm<br>kWh = 1,36 CVh | – | 1 Nm = 0,7376 ft.lb<br>1 Nm = 0,7376 ft.lb |
| | Imperial | foot pound<br>Horsepower hour | ft.lb<br>HP.hr. | 1 ft.lb = 0,138 kgm<br>1 HP.hr. = 1,014 CVh | 1 ft.lb = 0,358 Nm<br>1 HP.hr. = 0,746 kWh | – |
| **POWER** | Technical | Horse power | HP | 1 HP = 0,736 kW | 1 HP = 736 W | – |
| | International | Watt<br>kiloWatt | W<br>kW | 1 W = 0,00136 Hp<br>1 kW = 1,36 Hp | 1 kW = 1.000 W | – |
| **KINETIC VISCOSITY** | Technical | stokes<br>centistokes | 1 St<br>1 cSt | 1 St = 1 $cm^2/s$<br>1 cSt = 0,01 St | 1 St = 0.0001 $m^2/s$ | 1 St = 0.00107 $ft^2/s$ |
| | International | $m^2/s$ | $m^2/s$ | 1 $m^2/s$ = 10.000 St | 1 $m^2/s$ = 10.000 $cm^2/s$ | 1 $m^2/s$ = 10.764 $ft^2/s$ |
| | Imperial | square foot per second | $ft^2/s$ | 1 $ft^2/s$ = 929 St | 1 $ft^2/s$ = 0.0929 $m^2/s$ | – |



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# GENERAL INFORMATION

## FUNDAMENTAL TERMS USED IN PUMPS

The following is a list of fundamental terms used in pumps and an explanation of their meanings. Their knowledge is necessary in order to discuss hydraulic pumps. All measurements are given in Technical units. Reference should be made to the chart for their international and Anglo-Saxon equivalents.

## HEAD

Head means height, difference in level, gradient. For example if a pump has a flow of Q litres per second and a head of 30 metres, it means that it is capable of raising Q litres of liquid by 30 metres every second (therefore achieving a 30 metre gradient). For each given pump, the head is determined by its construction, such as the external diameter of the impeller and the speed of rotation, but it is not affected by the pumped liquid. This means that the pump as such can raise by 30 metres Q litres per second of water, petrol, mercury, etc.; the only difference in the three cases will be the power of the motor required.

## SPECIFIC WEIGHT OF A LIQUID OR FLUID

The specific weight of a liquid or fluid is the weight per unit volume of the liquid/fluid. Specific weight is usually measured in kg/dm$^3$ or kg/l, remembering that 1 dm$^3$ equals 1 litre.

## PRESSURE

Pressure means weight per unit of area (e.g. kg/cm$^2$), and it should not be confused with head. In the case of liquids, the pressure that the liquid exerts on a surface is given by the product of the head (or height) of the liquid, multiplied by its specific weight. For this reason, the column of several km of air on the earth's surface produces at sea level a pressure of about 1kg/cm$^2$ (equal to approx. 1 atmosphere). If the same column were of water rather than air, the pressure would be some 700 to 800 times greater, due to the fact that water has a specific weight approximately 700-800 times greater than that of air.
Bearing in mind that a column of water 10 m high is equivalent to approx. 1 kg/cm$^2$, if we placed a manometer on the delivery of the pump, the following pressure increases would be measured:

a) with petrol (specific weight 0,7 kg/dm$^3$) = 00,7 x 0,001 x 30 x 100 = 2,1 kg/cm$^2$
b) with water (specific weight 1,0 kg/dm$^3$) = 00,1 x 0,001 x 30 x 100 = 3,0 kg/cm$^2$
c) with mercury (specific weight 13,6 kg/dm$^3$) = 13,6 x 0,001 x 30 x 100 = 40,8 kg/cm$^2$

## FLOW

Flow means the quantity of liquid or fluid that passes through a point, such as the delivery outlet of a pump, or a cross section of a pipe, in the set unit of time.
This can be measured in litres per minute (l/min), litres per second (l/s), cubic metres per hour (m$^3$/h) etc.
It should be noted that there is a perfect analogy between the flow of water through a pipe and the flow of electricity through a wire. It is sufficient to remember that hydraulic head is equivalent to electrical potential or voltage, and hydraulic flow is equivalent to electric current or amperes in electrotechnics. Even their behaviour is the same. Just as a thin wire restricts the flow of electricity more than one with a larger section, in the same way, a pipe of a smaller diameter offers a greater resistance to the flow of a liquid than one of a larger one. Just as the passage of electric current through the wire to a cable needs a voltage difference, in the same way, the flow of a liquid or fluid through a pipe needs a certain head.
There will never be a movement of liquid between two points of a perfectly horizontal pipe, and with the liquid at the same head in both points. This is due to the fact that, in the same way as the cable exerts a certain resistance to the passage of the electric current (electric resistance), the pipe also exerts a certain resistance to the passage of the fluid, the extent of which depends on the quality of the pipe (material, shape, presence of scale) and its section, and therefore the speed at which the fluid runs through the pipe. This resistance is called head loss.

## HEAD LOSS

Head loss is that part of the head, possessed by the liquid, which is lost when passing through a pipe, a valve, a filter, etc. This loss cannot be recovered, as it is lost due to friction. Going back to the analogy between electrical and hydraulic phenomena, just as the losses in a cable increase in proportion with the current, so head losses are proportionally greater as the speed of the liquid increases. This means that the more the flow is restricted by scaled pipes, clogged filters, partially closed valves etc. the greater the head loss will be.

## PUMP

A pump is a machine used to give a certain head to a liquid that passes through it. The head can be used to raise the liquid to a higher level, or to make it flow inside a pipe, or even in the open air, so that it covers a certain distance. The characteristics of a pump are:

a) **Flow** (the quantity of liquid that is moved through the pump in a unit of time)
b) **Head** (that is the height at which the pump is capable lifting the flow)

Based on the existing relationship between the flow and the head, it is possible to have:

a) Pumps with small flow and large head (piston pumps, rotary pumps, small centrifugal pumps).
b) Pumps with medium flow and medium head (centrifugal pumps in general).
c) Pumps with large flow and small head (helico-centrifugal pumps, propeller pumps).



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Centrifugal pumps, helico-centrifugal pumps and propeller pumps have a rotary motion and their speed is universally measured in revolutions per minute (rpm). With these machines operating at a given speed, for each given value of flow, there is only one value of head. This means that in order to increase or decrease the performance of these types of pumps, the operating speed must be varied accordingly. Basically, the liquid passing through the pump is supplied with energy that is related to the head and the speed of the liquid itself. This energy supplied within the unit of time is known as delivered power.

## DELIVERED POWER

The delivered power is the power delivered by the pump to the liquid. The value of this delivered power depends on three factors: flow, head, and specific weight of the pumped liquid. The higher these three factors, the higher is the power delivered by the pump. For example, a pump delivering petrol does less work than when delivering sulphuric acid, because the specific weights of the two liquids are different.
In order to pump a liquid, a pump must be driven by a motor. In the vast majority of cases, this is either an electric, or an internal combustion motor. Electric motors use electric power, while internal combustion motors (engines) use oil or oil derivative fuels. The power that the pump needs in order to operate is called absorbed power.

## DELIVERED POWER CALCULATION

Delivered power is normally expressed in kW or HP, indicating with:
Q = the flow
H = the head in metres of the column of liquid (m.c.l.)
$\gamma$ = the specific weight of the liquid

The delivered power (P3) is calculated using one of the following equations:

$$P3 = \frac{\gamma\ (kg/dm^3) \times Q\ (l/s) \times H\ (m.c.l.)}{75}\ \text{in HP}$$

$$P3 = \frac{\gamma\ (kg/dm^3) \times Q\ (m^3/h) \times H\ (m.c.l.)}{270}\ \text{in HP}$$

$$P3 = \frac{\gamma\ (kg/dm^3) \times Q\ (l/s) \times H\ (m.c.l.)}{102}\ \text{in kW}$$

$$P3 = \frac{\gamma\ (kg/dm^3) \times Q\ (l/min) \times H\ (m.c.l.)}{4500}\ \text{in HP}$$

$$P3 = \frac{\gamma\ (kg/dm^3) \times Q\ (m^3/h) \times H\ (m.c.l.)}{367}\ \text{in kW}$$

$$P3 = \frac{\gamma\ (kg/dm^3) \times Q\ (l/min) \times H\ (m.c.l.)}{6120}\ \text{in kW}$$

## ABSORBED POWER

Absorbed power is the power that the pump absorbs from the motor, to give to the liquid the delivered power discussed above.
Not all the absorbed power becomes delivered power, as some power is lost through friction, and even more within the pump itself, due to hydraulic losses. It is therefore clear that the delivered power is always less than the absorbed power, and the relation between the two is a number always lower than 1. This number is known as the efficiency.

## YIELD

The efficiency is obtained by dividing the delivered power by the absorbed power, and is normally expressed as a percentage. For example, an efficiency of 75 % of a pump indicates that only 75 % of the absorbed power is converted into delivered power, with the remaining 25 % being lost due to friction. Therefore, the higher the efficiency of a pump, the smaller the portion of absorbed power being lost. If one then considers that the cost of energy relates to the absorbed power, it immediately becomes apparent just how important efficiency is. If we compare two pumps with the same 1 HP delivered power, but with an efficiency of 50 % for the first, and 60 % for the second, we can assume that the first one will need 2 HP to supply 1, while the second will only need 1,67 HP to achieve the same result. This means that the efficiency of a pump expresses, better than any other parameter, the quality of the pump and the related savings in terms of operating costs.

## CALCULATION OF POWER OUTPUTS

$P_1$: is the power absorbed by the motor in kW (generally indicated by the wattmeter).
$P_2$: the power delivered by the motor in kW. This is measured at the brake (it basically is the power absorbed by the pump).
$P_3$: the power delivered by the pump in kW.

Power output of the motor $\eta = \frac{P_2}{P_1}$

Power output of the motor $\eta = \frac{P_3}{P_2}$

Power output of the motor $\eta = \frac{P_3}{P_1}$


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## THE HEAD OF A PUMP AND ITS MEASUREMENT

The head of a pump is always the differential head, or that given by the pump itself. This is generally expressed in metres. In order to ascertain the head of a surface pump, during its operation it is necessary to measure the value of the head both at the suction and at the delivery of the pump itself, making sure that the readings are taken at the same level, which is called the reference plane. Two cases are possible, depending on installation:

1) the value of the head at the suction is negative (i.e. below zero shown on the manometer): in this case, the level of the liquid collected is lower than the level of the suction inlet.

2) the value of the head at the suction is positive (i.e. above zero shown on the manometer) in this case, the level of the liquid collected is higher than the level of the suction inlet (flooded suction).

In the first case the head of the pump is given by the sum of the two readings, while in the second it is given by subtracting the value of the head at the suction inlet from the value at the delivery outlet.
Finally, it is necessary to make sure that the readings at the suction and the delivery have been taken from apertures of the same diameter, so that they are not distorted by a difference in the speed of the liquid at the point of measurement. Any correction is made by calculating the dynamic head, or that part of the head linked with the speed of the liquid, which means that part of the head that the liquid possesses at the measuring section, due to the fact that it is moving. The dynamic head Hd, expressed in metres, is calculated using the following formula:

$$Hd = \frac{v^2}{2g}$$

where: v = speed of the fluid at the measuring point, given in m/s
g = acceleration of gravity (9,81), expressed in $m/s^2$
2g = 2 x 9,81 = 19,62 m/s2

The correction of the head is given by the difference between the dynamic head at the delivery, and the dynamic head at the suction. It is therefore clear that if the readings upstream and downstream the pump have been taken on pipes of the same diameter, and therefore with the liquid flowing at the same speed, the correction is zero.

To find the head of submersible impeller pumps, it is sufficient, during operation, to measure the head at the delivery port. In this case, the head of the pump is then given by adding the value read to the dynamic head (at the delivery outlet), and to the difference in level between the free surface of the liquid collected and the manometer.

## VARIATION IN PUMP HEAD IN RELATION TO SPEED VARIATION

The performance of a pump is directly connected to its speed in rpm (**n**). Providing that there is no cavitation, the law of similarity may be used, which is expressed as follows:

$$Q_x = Q \times \frac{n_x}{n} \qquad H_x = H \times \left(\frac{n_x}{n}\right)^2 \qquad P_{2\text{-}x} = P_2 \times \left(\frac{n_x}{n}\right)^3$$

For example, when doubling the number of revolutions ($n_x$) one obtains:
$Q_x$ = the value of the flow doubles
$H_x$ = the value of the head is 4 times higher
$P_{2\text{-}x}$ = the value of the absorbed power is 8 times higher

Q - H - P2 are the values at speed **n**
$Q_x$ - $H_x$ - $P_{2\text{-}x}$ are the values at speed $n_x$.

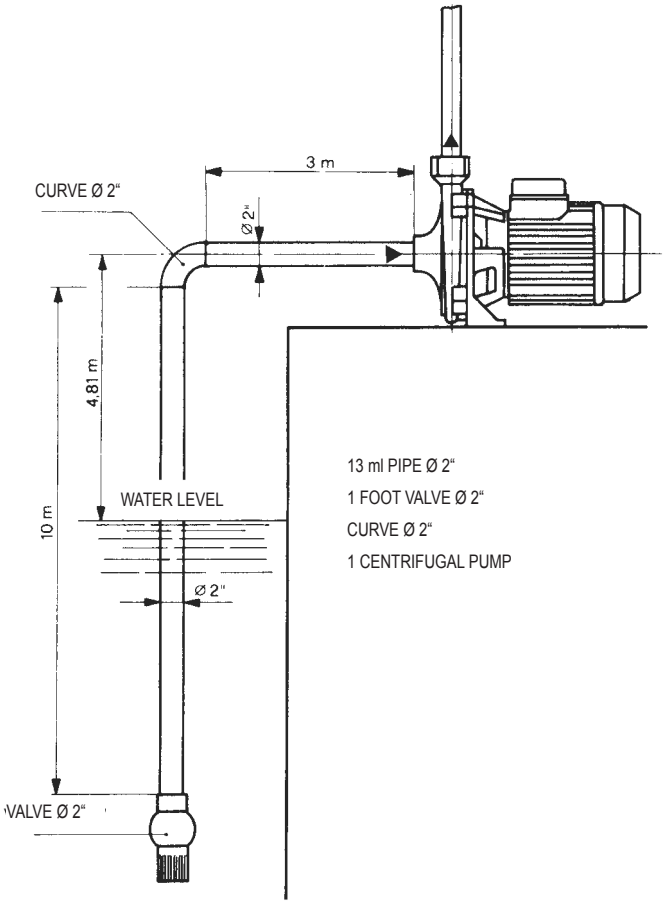
# PRACTICAL NOTES ON NPSH

NPSH stands for Net Positive Suction Head.
The physical meaning of this expression is the absolute pressure that must exist at the suction port of the pump in order to pump the liquid without causing cavitation.
This can occur when the absolute pressure falls to values likely to allow the formation of vapour bubbles within the fluid, causing the pump to work with reduced head.
Therefore, NPSH can also be seen as the pressure required to compensate load losses in the path between the suction port and the point with the lowest pressure of the impeller.
All this demonstrates the importance of checking that the pump is not producing cavitation, as in addition to creating high noise similar to metal hammering, cavitation will also quickly damage the impeller.
A special formula associates the NPSH value required by the pump with the conditions of the system and with the type of liquid, allowing to calculate the minimum pressure required at the suction, and consequently to determine the position in which to locate the pump in relation to the free surface of the liquid to be pumped.
The general NPSH formula is:

$$NPSH = Z1 + \left(\frac{p1+pb-pv}{\gamma} \times 10\right) - Hr$$

$$Z1 = NPSH - \left(\frac{p1+pb-pv}{\gamma} \times 10\right) + Hr$$

where:
Z1 = the difference in level (in m) between the axis of the pump and the free surface of the liquid to be pumped.
p1 = the possible pressure (in kg/cm2) on the surface of the liquid in the tank from which it is collected. If the liquid is collected from an open tank and the surface of the liquid is in contact with the atmosphere, p1 will be equal to 0.
pb = atmospheric pressure (in kg/cm2) at the site of installation.
pv = the vapour tension (in kg/cm2) of the liquid at pumping temperature.
$\gamma$ = the specific weight (in kg/dm2) of the liquid at pumping temperature.
10 = conversion factor of the units of measure used.
Hr = head loss (in m) in the suction pipework.
To give a practical example, the diagram below is of a system (see the Figure) for a centrifugal pump, for which a flow rate Q of 235 l/min is required, under four different conditions.





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## CALCULATION OF THE HEAD LOSS AT THE SUCTION (Hr)

Flow rate : Q = 235 l/min = 0,00392 $m^3/s$
Cross section area of the pipe : S = 19,6 $cm^2$ = 0,00196 $m^2$

Velocity of the water in the pipe : V = Q/S $\frac{0,00392}{0.00196} = 2\ m^2s$

The head losses (see table 1 & 2) are:

- 2" foot valve = 0,610 m
- Curve (assume $\frac{d}{R} = 1$) = 0,058 m
- Suction piping ( 10 m + 3 m) = 1,370 m
- Total loss at the suction = 2,040 m

Let's now consider the four different conditions, notwithstanding the Hr head losses, and assuming an NPSH for the pump equal to 3,25 m, at the flow rate being considered. The atmospheric pressure pb can be read from the diagram, the vapour tension pv and the specific weight can be found on table 3.

**1st case:** system at sea level and water at 20 °C.

$$3,25 = Z1 + \left(\frac{1,033 - 0.0238}{0.9982} \times 10\right) - 2,04$$

$$Z1 = 3,25 - \left(\frac{1,033 - 0.0238}{0.9982} \times 10\right) + 2,04 = -4,82$$

Which means that the pump, for the flow rate being considered, can collect water at 20° from a maximum depth of 4,82 m. It must be noted that a for flow rate greater than 235 l/min, when increasing the value of the NPHS of the pump and the head loss at the suction, the maximum suction depth will be less 4,82m. The opposite happens for flow rates lower than 235 l/min. From this, it follows that in order to bring the pump back to regular operation, it is often sufficient to partially close the delivery valve and reduce the flow rate.

**2nd case:** system at sea level and water at 60 °C.

$$3,25 = Z1 + \left(\frac{1,033 - 0.2031}{0.9831} \times 10\right) - 2,04$$

$$Z1 = 3,25 - \left(\frac{1,033 - 0.2031}{0.9831} \times 10\right) + 2,04 = -3,15$$

Which means that the pump, for the flow rate being considered, can collect water at 60° from a maximum depth of 3,15 m.

**3rd case:** system at sea level and water at 90°C.

$$3,25 = Z1 + \left(\frac{1,033 - 0.7149}{0.9653} \times 10\right) - 2,04$$

$$Z1 = 3,25 - \left(\frac{1,033 - 0.7149}{0.9653} \times 10\right) + 2,04 = -1,99$$

Which means that the free surface of the water at 90 °C for the flow rate considered must be 1,99 metres higher than the axis of the pump.

**4th case:** system at 1500 m above sea level and water at 50 °C.

$$3,25 = Z1 + \left(\frac{0,860 - 0.1258}{0.9880} \times 10\right) - 2,04$$

$$Z1 = 3,25 - \left(\frac{0,860 - 0.1258}{0.9880} \times 10\right) + 2,04 = -2,14$$

Which means that the pump, for the flow rate being considered, in a system at 1500 metres above sea level can collect water at 50 °C from a maximum depth of 2,14 metres.

**Note:** it's always wise to include a safety margin (0,5m for cold water) to allow for errors and unforeseen variations in the estimated values. Such a margin is even more important with liquids near boiling point, as small temperature changes can produce large differences in operating conditions. For example, in case 3, if the temperature of the water were at any time to reach 95°C, instead of 90 °C, the necessary pump suction pressure would no longer be 1,99 metres, but would increase from 1,99 metres to 3,51 metres.


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# NOTES ON THE MOTORS OF ELECTRIC PUMPS

| INDEX OF SYMBOLS USED |
|---|
| $P_1$ : POWER ABSORBED BY THE MOTOR IN kW. |
| $P_2$ : POWER DELIVERED BY THE MOTOR IN kW OR HP. |
| V ~ = AC POWER INPUT VOLTAGE AT THE MAINS. |
| Hz = FREQUENCY IN CYCLES PER SECOND OF THE POWER INPUT VOLTAGE. |
| I = CURRENT ABSORBED BY THE MOTOR IN AMPERES. |
| cosφ = POWER FACTOR. |
| $\mathbf{n}^{1/min}$ = SPEED OF ROTATION IN RPM. |
| η = OUTPUT POWER (RELATION BETWEEN DEVELOPED POWER AND ABSORBED POWER P2/P1). |
| p = NUMBER OF POLES OF THE MOTOR. |
| Cn = NOMINAL TORQUE OF THE MOTOR. |

## NO-LOAD SPEED OF ROTATION

The no-load speed of single-phase and three-phase electric induction motors is given by the formula:

$$\mathbf{n}^{1/min} = \frac{120 \times Hz}{p}$$

No-load speed of rotation $\mathbf{n}^{1/min}$

| FREQUENCY Hz | 2 POLES | 4 POLES |
|---|---|---|
| 50 | 3000 | 1500 |
| 60 | 3600 | 1800 |

The full-load speed is 2 to 7 % lower than the no-load speed (2 to 7 % sliding).

## CURRENT ABSORBED

Single-phase: $I = \frac{1000 \times P_2\,(kW)}{V \times \cos\varphi \times \eta}$ or: $I = \frac{736 \times P_2\,(HP)}{V \times \cos\varphi \times \eta}$

Three-phase: $I = \frac{1000 \times P_2\,(kW)}{1.73 \times V \times \cos\varphi \times \eta}$ or: $I = \frac{736 \times P_2\,(HP)}{1.73 \times V \times \cos\varphi \times \eta}$

## ABSORBED POWER

Single-phase: $P_1\,(kW) = \frac{V \times I \times \cos\varphi}{1000}$

Three-phase: $P_1\,(kW) = \frac{1.73 \times V \times I \times \cos\varphi}{1000}$

## POWER DELIVERED AT THE MOTOR AXIS

Single-phase: $P_2\,(kW) = \frac{V \times I \times \cos\varphi \times \eta}{1000}$ or: $P_2\,(HP) = \frac{V \times I \times \cos\varphi \times \eta}{736}$

Three-phase: $P_2\,(kW) = \frac{1{,}73 \times V \times I \times \cos\varphi \times \eta}{1000}$ or: $P_2\,(HP) = \frac{1{,}73 \times V \times I \times \cos\varphi \times \eta}{736}$

## YIELD

$$\eta = \frac{P_2\,(kW)}{P_1\,(kW)}$$



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## POWER FACTOR

Single-phase: $\cos\varphi = \frac{P_2\,(kW) \times 1000}{V \times I \times \eta}$ or: $\cos\varphi = \frac{P_1\,(kW) \times 1000}{V \times I}$

Three-phase: $\cos\varphi = \frac{P_2\,(kW) \times 1000}{1{,}73 \times V \times I \times \eta}$ or: $\cos\varphi = \frac{P_1\,(kW) \times 1000}{1{,}73 \times V \times I}$

## TORQUE FACTOR

$Cn = \frac{P_2\,(kW) \times 1000}{1.027 \times \mathbf{n}^{1/min}}$ in kgm

$Cn = \frac{P_2\,(HP) \times 736}{1.027 \times \mathbf{n}^{1/min}}$ in kgm

$Cn = \frac{702 \times HP}{\mathbf{n}^{1/min}}$ in decaNewtonmetres

## RELATIONSHIP BETWEEN KW AND HP

1 HP = 0,736 kW  1 kW = 1,36 HP  $\frac{HP}{1.36} = kW$  kW x 1,36 = HP

## STARTING CURRENT (ISP)

The starting current ( at switch on) of a motor is 4 to 8 times greater than the nominal current, depending on the power of the motor.
Isp = In x 4 ÷ 8

## DETAILS ON CAPACITORS

The approximate current absorbed by a capacitor is:

$I = \frac{6{,}28 \times F \times C \times V}{1{,}000{,}000}$

Where:
I = current in Amps absorbed by the capacitor.
F = frequency in Hz of the applied voltage.
C = capacity of capacitor µF.
V = applied voltage.

Example:
The current absorbed by a 14 µF capacitor connected to a 220 Volt - 50 Hz power input is:

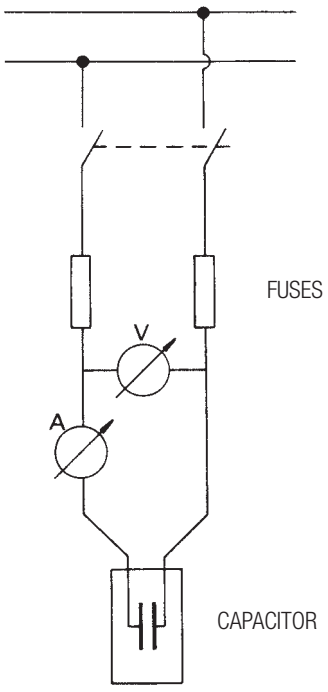
$I = \frac{6{,}28 \times 50 \times 14 \times 220}{1{,}000{,}000} = 0{,}96$ Amperes

The approximate capacity of a capacitor is determined by:

$C = \frac{I}{6{,}28 \times F \times V} \times 1{,}000{,}000$

Example:
The capacity of a capacitor absorbing 1,4 Amps connected to a 220 Volt - 50 Hz power input is:

$C = \frac{1.4}{6{,}28 \times 50 \times 220} \times 1{,}000{,}000 = 20{,}2\ \mu F$




## STAR-DELTA START-UP

The normally delta Δ connected motor is connected to the network using a star type connection. The current and the starting torque are both reduced to 1/3 of the value they would be if delta Δ connected.

## PROTECTION

It is recommended that motors are connected to the power input network using appropriate three-fuse thermal magnetic circuit breakers, or in any case circuit breakers complying with current local regulations.

# HEAD LOSS

**In centimetres of column water for each metre of straight pipe**

| V | Q | PIPE DIAMETER IN mm. | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | h | 20 | 25 | 30 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 175 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
| 0.5 | Q | 9.4 | 14.7 | 21.2 | 37.7 | 59.0 | 115 | 151 | 235 | 369 | 530 | 723 | 940 | 1480 | 2120 | 2880 | 3770 | 4780 | 5890 |
| | h | 2.4 | 1.9 | 1.5 | 1.0 | 0.8 | 0.56 | 0.46 | 0.36 | 0.28 | 0.23 | 0.19 | 0.16 | 0.13 | 0.105 | 0.089 | 0.076 | 0.067 | 0.06 |
| 0.6 | Q | 11.3 | 17.7 | 25.4 | 45.3 | 70.7 | 138 | 181 | 282 | 442 | 636 | 887 | 1130 | 1770 | 2540 | 3460 | 4520 | 5730 | 7060 |
| | h | 3.3 | 2.6 | 2.1 | 1.5 | 1.12 | 0.78 | 0.65 | 0.5 | 0.39 | 0.32 | 0.27 | 0.23 | 0.18 | 0.15 | 0.12 | 0.11 | 0.096 | 0.086 |
| 0.7 | Q | 13.2 | 20.6 | 29.7 | 52.9 | 82.5 | 161 | 211 | 329 | 516 | 742 | 1010 | 1315 | 2070 | 2960 | 4040 | 5270 | 6690 | 8250 |
| | h | 4.4 | 3.4 | 2.7 | 1.9 | 1.5 | 1.0 | 0.86 | 0.67 | 0.52 | 0.43 | 0.36 | 0.31 | 0.24 | 0.2 | 0.17 | 0.15 | 0.13 | 0.12 |
| 0.8 | Q | 15.05 | 23.6 | 33.9 | 60.4 | 94.5 | 184 | 241 | 377 | 590 | 848 | 1155 | 1505 | 2360 | 3390 | 4620 | 6030 | 7650 | 9420 |
| | h | 5.6 | 4.3 | 3.4 | 2.5 | 1.9 | 1.3 | 1.1 | 0.86 | 0.67 | 0.55 | 0.46 | 0.4 | 0.31 | 0.26 | 0.22 | 0.19 | 0.17 | 0.15 |
| 0.9 | Q | 16.95 | 26.5 | 38.2 | 68.0 | 106.0 | 207 | 272 | 423 | 664 | 955 | 1300 | 1695 | 2660 | 3810 | 5200 | 6780 | 8600 | 10600 |
| | h | 6.9 | 5.3 | 4.3 | 3.0 | 2.4 | 1.7 | 1.4 | 1.1 | 0.84 | 0.69 | 0.58 | 0.5 | 0.39 | 0.32 | 0.27 | 0.24 | 0.21 | 0.19 |
| 1.0 | Q | 18.8 | 29.5 | 42.4 | 75.5 | 117.7 | 230 | 302 | 471 | 737 | 1060 | 1445 | 1880 | 2950 | 4230 | 5770 | 7530 | 9550 | 11770 |
| | h | 8.3 | 6.4 | 5.1 | 3.7 | 2.9 | 2.1 | 1.7 | 1.3 | 1.0 | 0.84 | 0.71 | 0.61 | 0.48 | 0.4 | 0.34 | 0.29 | 0.26 | 0.23 |
| 1.1 | Q | 20.7 | 32.4 | 46.6 | 83.0 | 129.5 | 252 | 332 | 518 | 81 | 1165 | 1585 | 2070 | 3250 | 4650 | 6350 | 8290 | 10500 | 12950 |
| | h | 9.9 | 7.6 | 6.2 | 4.4 | 3.4 | 2.4 | 2.0 | 1.6 | 1.2 | 1.0 | 0.85 | 0.74 | 0.58 | 0.48 | 0.4 | 0.35 | 0.31 | 0.28 |
| 1.2 | Q | 22.6 | 35.4 | 50.9 | 90.6 | 141.0 | 276 | 362 | 565 | 885 | 1272 | 1730 | 2260 | 3550 | 5080 | 6930 | 9040 | 11450 | 14140 |
| | h | 11.7 | 9.0 | 7.2 | 5.2 | 4.0 | 2.9 | 2.4 | 1.9 | 1.5 | 1.2 | 1.0 | 0.87 | 0.69 | 0.56 | 0.48 | 0.42 | 0.37 | 0.32 |
| 1.3 | Q | 24.5 | 38.3 | 55.0 | 98.0 | 153.0 | 299 | 392 | 612 | 960 | 1378 | 1875 | 2450 | 3840 | 5500 | 7500 | 9800 | 12400 | 15320 |
| | h | 13.5 | 10.4 | 8.4 | 6.0 | 4.7 | 3.3 | 2.8 | 2.2 | 1.71 | 1.4 | 1.15 | 1.0 | 0.8 | 0.66 | 0.56 | 0.49 | 0.43 | 0.38 |
| 1.4 | Q | 26.35 | 41.3 | 59.3 | 105.5 | 165.0 | 302 | 422 | 660 | 1032 | 1473 | 2020 | 2635 | 4140 | 5920 | 8090 | 10530 | 13370 | 16500 |
| | h | 15.4 | 11.9 | 9.6 | 6.9 | 5.4 | 3.8 | 3.2 | 2.5 | 2.0 | 1.6 | 1.3 | 1.17 | 0.92 | 0.76 | 0.64 | 0.56 | 0.5 | 0.44 |
| 1.5 | Q | 28.25 | 44.2 | 63.6 | 113.0 | 176.5 | 345 | 452 | 707 | 1106 | 1590 | 2165 | 2825 | 4430 | 6350 | 8660 | 11300 | 14320 | 17680 |
| | h | 17.4 | 13.5 | 10.9 | 7.8 | 6.1 | 4.4 | 3.6 | 2.8 | 2.25 | 1.82 | 1.5 | 1.34 | 1.05 | 0.87 | 0.74 | 0.64 | 0.57 | 0.51 |
| 1.6 | Q | 30.1 | 47.1 | 67.8 | 121.0 | 188.5 | 368 | 483 | 753 | 1180 | 1695 | 2310 | 3010 | 4730 | 6770 | 9240 | 12055 | 5015270 | 18850 |
| | h | 19.6 | 15.3 | 12.4 | 8.9 | 6.9 | 4.9 | 4.1 | 3.2 | 2.55 | 2.05 | 1.7 | 1.53 | 1.18 | 0.99 | 0.84 | 0.72 | 0.64 | 0.58 |
| 1.7 | Q | 32.0 | 50.1 | 72.0 | 128.0 | 200.0 | 392 | 513 | 800 | 1253 | 1802 | 2455 | 3200 | 5020 | 7190 | 9820 | 12800 | 16230 | 20030 |
| | h | 21.9 | 17.2 | 13.9 | 10.0 | 7.8 | 5.4 | 4.6 | 3.6 | 2.85 | 2.3 | 1.95 | 1.7 | 1.33 | 1.11 | 0.94 | 0.81 | 0.73 | 0.65 |
| 1.8 | Q | 33.9 | 53.0 | 76.3 | 136.0 | 212.0 | 415 | 543 | 848 | 1327 | 1905 | 2600 | 3390 | 5320 | 7610 | 10380 | 13550 | 17200 | 21200 |
| | h | 24.2 | 19.1 | 15.4 | 11.1 | 8.7 | 6.0 | 5.1 | 4.0 | 3.15 | 2.6 | 2.2 | 1.9 | 1.48 | 1.24 | 1.05 | 0.91 | 0.81 | 0.73 |
| 1.9 | Q | 35.8 | 56.0 | 80.5 | 143.5 | 224.0 | 438 | 573 | 895 | 1400 | 2015 | 2740 | 3580 | 5610 | 8040 | 10960 | 14300 | 18150 | 22400 |
| | h | 26.8 | 21.0 | 17.0 | 12.3 | 9.6 | 6.8 | 5.6 | 4.4 | 3.45 | 2.85 | 2.45 | 2.1 | 1.64 | 1.38 | 1.17 | 1.01 | 0.9 | 0.81 |
| 2.0 | Q | 37.7 | 59.0 | 84.8 | 151.0 | 235.5 | 461 | 603 | 943 | 1475 | 2120 | 2885 | 3765 | 5910 | 8460 | 11540 | 15060 | 19100 | 23570 |
| | h | 29.6 | 23.0 | 18.6 | 13.4 | 10.5 | 7.5 | 6.2 | 4.9 | 3.8 | 3.17 | 2.7 | 2.33 | 1 | 1.52 | 1.3 | 1.12 | 0.99 | 0.89 |
| 2.1 | Q | 39.5 | 62.0 | 89.0 | 158.5 | 247.5 | 484 | 633 | 990 | 1548 | 225 | 3030 | 3955 | 6200 | 8890 | 12100 | 15810 | 20050 | 24750 |
| | h | 32.2 | 25.1 | 20.4 | 14.8 | 11.5 | 8.2 | 6.8 | 5.4 | 4.2 | 3.5 | 2.95 | 2.55 | 2.0 | 1.68 | 1.43 | 1.22 | 1.08 | 0.98 |
| 2.2 | Q | 41.5 | 64.9 | 93.2 | 176.0 | 259.0 | 507 | 663 | 1036 | 1620 | 2330 | 3175 | 4145 | 6500 | 9300 | 12700 | 16570 | 21000 | 25930 |
| | h | 35.0 | 27.3 | 22.3 | 16.2 | 12.5 | 9.1 | 7.4 | 5.9 | 4.6 | 3.85 | 3.25 | 2.8 | 22 | 1.85 | 1.56 | 1.34 | 1.18 | 1.08 |
| 2.3 | Q | 43.3 | 67.9 | 97.5 | 173.5 | 271.0 | 530 | 694 | 1082 | 1695 | 2440 | 3320 | 4330 | 6800 | 9730 | 13270 | 17310 | 21950 | 27100 |
| | h | 38.0 | 29.7 | 24.2 | 17.7 | 13.6 | 9.8 | 8.1 | 6.4 | 5.0 | 4.15 | 3.5 | 3.05 | 2.4 | 2.03 | 1.7 | 1.46 | 1.28 | 1.18 |
| 2.4 | Q | 45.2 | 70.8 | 101.5 | 181.0 | 282.5 | 553 | 724 | 1130 | 1770 | 2545 | 3460 | 4520 | 7090 | 10140 | 13850 | 18090 | 22900 | 28300 |
| | h | 42.1 | 32.1 | 26.2 | 19.1 | 14.7 | 10.6 | 8.8 | 6.9 | 5.45 | 455 | 3.8 | 3.3 | 2.62 | 2.21 | 1.85 | 1.58 | 1.38 | 1.28 |
| 2.5 | Q | 47.1 | 73.7 | 105.8 | 189.0 | 294.5 | 576 | 755 | 1178 | 1843 | 2650 | 3610 | 4710 | 7390 | 10570 | 14420 | 18820 | 23880 | 29450 |
| | h | 45.0 | 34.7 | 28.3 | 20.5 | 16.0 | 11.4 | 9.6 | 7.5 | 5.9 | 4.9 | 4.1 | 3.58 | 2.84 | 2.4 | 2.0 | 1.7 | 1.5 | 1.4 |
| 2.6 | Q | 49.0 | 76.6 | 110.0 | 196.0 | 306.0 | 599 | 785 | 1225 | 1915 | 2755 | 3755 | 4900 | 7680 | 11000 | 15000 | 19590 | 24820 | 30630 |
| | h | 48.3 | 37.3 | 30.4 | 22.2 | 17.2 | 12.3 | 10.4 | 8.1 | 6.35 | 5.25 | 4.4 | 3.85 | 3.07 | 2.59 | 2.17 | 1.84 | 1.62 | 1.51 |
| 2.7 | Q | 50.9 | 79.6 | 114.3 | 204.0 | 318.0 | 622 | 815 | 1271 | 1990 | 2860 | 3900 | 5090 | 7980 | 111410 | 15590 | 20340 | 25800 | 31820 |
| | h | 51.7 | 40.0 | 32.5 | 23.8 | 18.5 | 13.2 | 11.2 | 8.7 | 6.85 | 5.65 | 4.75 | 4.15 | 3.3 | 2.78 | 2.34 | 1.98 | 1.74 | 1.62 |
| 2.8 | Q | 52.7 | 82.6 | 118.5 | 211.5 | 330.0 | 645 | 845 | 1320 | 2060 | 2970 | 4040 | 5280 | 8270 | 11830 | 16160 | 21090 | 26730 | 33000 |
| | h | 55.2 | 42.5 | 34.8 | 25.5 | 19.9 | 14.0 | 12.0 | 9.3 | 7.35 | 6.05 | 5.10 | 4.45 | 3.56 | 2.98 | 2.51 | 2.13 | 1.88 | 1.74 |
| 2.9 | Q | 54.6 | 85.5 | 123.0 | 219.0 | 342.0 | 668 | 875 | 1365 | 2140 | 3075 | 4190 | 5460 | 8560 | 12250 | 16730 | 21480 | 27700 | 34200 |
| | h | 58.7 | 45.1 | 37.1 | 27.1 | 21.3 | 15.2 | 12.8 | 10.0 | 7.85 | 6.45 | 5.5 | 4.75 | 3.82 | 3.18 | 2.7 | 2.3 | 2.03 | 1.87 |
| 3.0 | Q | 56.5 | 88.5 | 127.0 | 226.5 | 354.0 | 691 | 905 | 1414 | 2210 | 3180 | 4330 | 5650 | 8850 | 12690 | 17310 | 22600 | 28650 | 35350 |
| | h | 62.9 | 47.9 | 39.6 | 28.8 | 22.6 | 16.3 | 13.6 | 10.7 | 8.4 | 6.9 | 5.9 | 5.1 | 4.1 | 3.4 | 2.9 | 2.5 | 2.2 | 2.0 |



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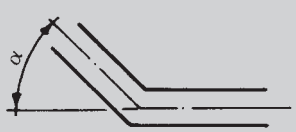
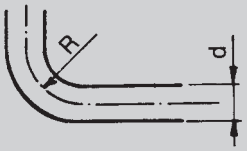
# HEAD LOSS

**in cm of column of water in bends, gate valves, and foot valves**

| VELOCITY OF WATER IN m/s | SHARP EDGED BENDS | | | | | NORMAL BENDS | | | | | GATE VALVE | FOOT VALVE | NON-RETURN VALVE | HEAD LOSS ON EXIT FROM PIPES $V^2:2G$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| |  | | | | |  | | | | | | | | |
| | $\alpha = 30°$ | $\alpha = 40°$ | $\alpha = 60°$ | $\alpha = 80°$ | $\alpha = 90°$ | $\frac{d}{R} = 0,4$ | $\frac{d}{R} = 0,6$ | $\frac{d}{R} = 0,8$ | $\frac{d}{R} = 1$ | $\frac{d}{R} = 1,5$ | | | | |
| **0,10** | 0,03 | 0,04 | 0,05 | 0,07 | 008 | 0,07 | 0,08 | 0,01 | 0,0155 | 0,027 | 0,03 | 30 | 30 | 0,05 |
| **0,15** | 0,06 | 0,73 | 0,1 | 0,14 | 0.17 | 0,016 | 0,019 | 0,024 | 0,033 | 0,06 | 0,033 | 31 | 31 | 0,12 |
| **0,2** | 0,11 | 0,13 | 0,18 | 0,26 | 0.31 | 0,028 | 0,033 | 0,04 | 0,059 | 0,11 | 0,058 | 31 | 31 | 0,21 |
| **0,25** | 0,17 | 0,21 | 0,28 | 0,4 | 0.48 | 0,044 | 0,052 | 0,063 | 0,091 | 0,17 | 0,09 | 31 | 31 | 0,32 |
| **0,3** | 0,25 | 0,3 | 0,41 | 0,6 | 0.7 | 0,063 | 0,074 | 0,09 | 0,13 | 0,25 | 0,13 | 31 | 31 | 0,46 |
| **0,35** | 0,33 | 0,4 | 0,54 | 0,8 | 0.93 | 0,085 | 0,10 | 0,12 | 0,18 | 0,33 | 0,18 | 31 | 31 | 0,62 |
| **0,14** | 0,43 | 0,52 | 0,71 | 1,0 | 1.2 | 0,11 | 0,13 | 0,16 | 0,23 | 0,43 | 0,23 | 32 | 31 | 0,82 |
| **0,5** | 0,67 | 0,81 | 1,1 | 1,6 | 1.9 | 0,18 | 0,21 | 0,26 | 0,37 | 0,67 | 0,37 | 33 | 32 | 1,27 |
| **0,6** | 0,97 | 1,2 | 1,6 | 2,3 | 2.8 | 0,25 | 0,29 | 0,36 | 0,52 | 0,97 | 0,52 | 34 | 32 | 1,84 |
| **0,7** | 1,35 | 1,65 | 2,2 | 3,2 | 3.9 | 0,34 | 0,40 | 0,48 | 0,70 | 1,35 | 0,7 | 35 | 32 | 2,5 |
| **0,8** | 1,7 | 2,1 | 2,8 | 4,0 | 4.8 | 0,45 | 0,53 | 0,64 | 0,93 | 1,7 | 0,95 | 36 | 33 | 3,3 |
| **0,9** | 2,2 | 2,7 | 6 | 5,2 | 6.2 | 0,57 | 0,67 | 0,82 | 1,18 | 2,2 | 1,2 | 37 | 34 | 4,2 |
| **1,0** | 2,7 | 3,3 | 4,5 | 6,4 | 7.6 | 0,7 | 0,82 | 1,0 | 1,45 | 2,7 | 1,45 | 38 | 35 | 5,1 |
| **1,5** | 6,0 | 7,3 | 10,0 | 14,0 | 17.0 | 1,6 | 1,9 | 2,3 | 3,3 | 6,0 | 3,3 | 47 | 40 | 11,5 |
| **2,0** | 11,0 | 14,0 | 18,0 | 26,0 | 31.0 | 2,8 | 3,3 | 4,0 | 5,8 | 11,0 | 5,8 | 61 | 48 | 20,4 |
| **2,5** | 17,0 | 21,0 | 28,0 | 40,0 | 48.0 | 4,4 | 5,2 | 6,3 | 9,1 | 17,0 | 9,1 | 78 | 58 | 32,0 |
| **3,0** | 25,0 | 30,0 | 41,0 | 60,0 | 70.0 | 6,3 | 7,4 | 9,0 | 13,0 | 25,0 | 13,0 | 100 | 71 | 46,0 |
| **3,5** | 33,0 | 40,0 | 55,0 | 78,0 | 93.0 | 8,5 | 10,0 | 12,0 | 18,0 | 33,0 | 18,0 | 123 | 85 | 62,0 |
| **4,0** | 43,0 | 52,0 | 70,0 | 100,0 | 120.0 | 11,0 | 13,0 | 16,0 | 23,0 | 42,0 | 23,0 | 150 | 100 | 82,0 |
| **4,5** | 55,0 | 67,0 | 90,0 | 130,0 | 160.0 | 14,0 | 21,0 | 26,0 | 37,0 | 55,0 | 37,0 | 190 | 120 | 103,0 |
| **5,0** | 67,0 | 82,0 | 110,0 | 160,0 | 190.0 | 18,0 | 29,0 | 36,0 | 52,0 | 67,0 | 52,0 | 220 | 140 | 127,0 |

Q = flow rate in l/min
v = velocity of water in metres per second
d = diameter of pipes in m metres
h = head loss in cm of water column for each metre of pipework, calculated according to the Lang formula:

$$h = \lambda \times \frac{100}{d} \times \frac{v^2}{2g} \qquad \lambda = 0,02 + \frac{0.0018}{\sqrt{v \times d}}$$

The only loss in bends is that due to the contraction of the liquid stream when changing direction (the development of the curves must therefore be included in the length of the pipework); the head loss for gate valves has been determined through technical tests.
The head loss for gate valves and normal bends is equal to that of 5 m of straight pipework, while that of non-return valves is equal to 15 m.
The values given are for pipes with a completely smooth internal surface. In case of rough or scaled pipes, allowances must be made accordingly.



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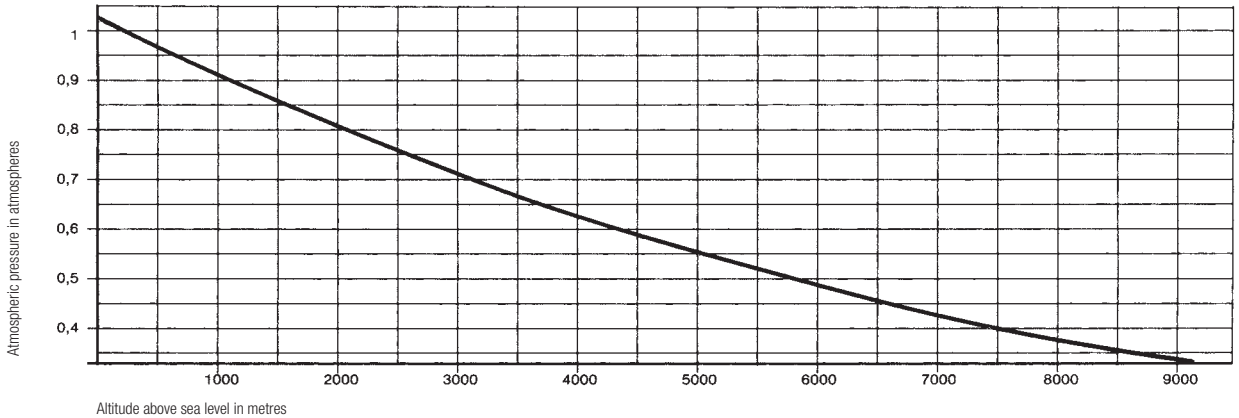
## VAPOUR TENSION AND SPECIFIC WEIGHT OF WATER AS A FUNCTION OF TEMPERATURE

| t °C | pv kg/cm² | γ kg/dm³ | t °C | pv kg/cm² | γ kg/dm³ | t °C | pv kg/cm² | γ kg/dm³ | t °C | pv kg/cm² | γ kg/dm³ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 00 | 0.0062 | 0.9998 | 41 | 0.793 | 0.9917 | 082 | 0.5234 | 0.9705 | 170 | 008.076 | 0.8973 |
| 01 | 0.0067 | 0.9999 | 42 | 0.836 | 0.9913 | 083 | 0.5447 | 0.9698 | 175 | 009.101 | 0.8920 |
| 02 | 0.0072 | 0.9999 | 43 | 0.0881 | 0.9909 | 084 | 0.5667 | 0.9693 | 180 | 010.225 | 0.8869 |
| 03 | 0.0077 | 1.0000 | 44 | 0.0928 | 0.9905 | 085 | 0.5897 | 0.9687 | 185 | 011.456 | 0.8814 |
| 04 | 0.0083 | 1.0000 | 45 | 0.0977 | 0.9900 | 086 | 0.6129 | 0.9680 | 190 | 012.800 | 0.8760 |
| 05 | 0.0089 | 1.0000 | 46 | 0.1028 | 0.9898 | 087 | 0.6372 | 0.9673 | 195 | 014.265 | 0.8703 |
| 06 | 0.0095 | 0.9999 | 47 | 0.1082 | 0.9883 | 088 | 0.6623 | 0.9667 | 200 | 015.857 | 0.8646 |
| 07 | 0.0102 | 0.9999 | 48 | 0.1138 | 0.9889 | 089 | 0.6882 | 0.9659 | 205 | 017.858 | 0.8587 |
| 08 | 0.0109 | 0.9998 | 49 | 0.1197 | 0.9885 | 090 | 0.7149 | 0.9653 | 210 | 019.456 | 0.8528 |
| 09 | 0.0117 | 0.9997 | 50 | 0.1258 | 0.9880 | 091 | 0.7425 | 0.9646 | 215 | 021.477 | 0.8465 |
| 10 | 0.0125 | 0.9996 | 51 | 0.1322 | 0.9876 | 092 | 0.7710 | 0.9640 | 220 | 023.659 | 0.8403 |
| 11 | 0.0134 | 0.9995 | 52 | 0.1388 | 0.9871 | 093 | 0.8004 | 0.9632 | 225 | 026.007 | 0.8339 |
| 12 | 0.0143 | 0.9994 | 53 | 0.1457 | 0.9866 | 094 | 0.8307 | 0.9625 | 230 | 028.531 | 0.8272 |
| 13 | 0.0153 | 0.9993 | 54 | 0.1530 | 0.9861 | 095 | 0.8619 | 0.9619 | 235 | 031.239 | 0.8206 |
| 14 | 0.0163 | 0.9992 | 55 | 0.1605 | 0.9857 | 096 | 0.8942 | 0.9611 | 240 | 034.140 | 0.8136 |
| 15 | 0.0174 | 0.9990 | 56 | 0.1683 | 0.9852 | 097 | 0.9271 | 0.9604 | 245 | 037.244 | 0.8064 |
| 16 | 0.0185 | 0.9989 | 57 | 0.1765 | 0.9847 | 098 | 0.9616 | 0.9596 | 250 | 040.560 | 0.7992 |
| 17 | 0.0197 | 0.9987 | 58 | 0.1850 | 0.9842 | 099 | 0.9969 | 0.9590 | 255 | 044.100 | 0.7918 |
| 18 | 0.0210 | 0.9985 | 59 | 0.1939 | 0.9836 | 100 | 1.0032 | 0.9583 | 260 | 047.870 | 0.7840 |
| 19 | 0.0224 | 0.9984 | 60 | 0.2031 | 0.9831 | 102 | 1.1092 | 0.9568 | 265 | 051.880 | 0.7759 |
| 20 | 0.0238 | 0.9982 | 61 | 0.2127 | 0.9826 | 104 | 1.1898 | 0.9554 | 270 | 056.140 | 0.7678 |
| 21 | 0.0253 | 0.9979 | 62 | 0.2227 | 0.9821 | 106 | 1.2751 | 0.9540 | 275 | 060.660 | 0.7593 |
| 22 | 0.0269 | 0.9977 | 63 | 0.2330 | 0.9816 | 108 | 1.6354 | 0.9525 | 280 | 065.460 | 0.7506 |
| 23 | 0.0286 | 0.9974 | 64 | 0.2438 | 0.9810 | 110 | 1.4609 | 0.9510 | 285 | 070.540 | 0.7416 |
| 24 | 0.0304 | 0.9972 | 65 | 0.2550 | 0.9804 | 112 | 1.5618 | 0.9495 | 290 | 075.920 | 0.7323 |
| 25 | 0.0323 | 0.9970 | 66 | 0.2666 | 0.9800 | 114 | 1.6684 | 0.9479 | 286 | 081.600 | 0.7227 |
| 26 | 0.0343 | 0.9966 | 67 | 0.2787 | 0.9794 | 116 | 1.7809 | 0.9464 | 300 | 087.610 | 0.7214 |
| 27 | 0.0363 | 0.9964 | 68 | 0.2912 | 0.9788 | 118 | 1.8995 | 0.9448 | 305 | 093.950 | 0.7017 |
| 28 | 0.0385 | 0.9961 | 69 | 0.3042 | 0.9782 | 120 | 2.0245 | 0.9431 | 310 | 100.640 | 0.6906 |
| 29 | 0.0408 | 0.9957 | 70 | 0.3177 | 0.9777 | 122 | 2.1561 | 0.9414 | 315 | 107.690 | 0.6793 |
| 30 | 0.0432 | 0.9955 | 71 | 0.3317 | 0.9771 | 124 | 2.2947 | 0.9398 | 320 | 115.130 | 0.6671 |
| 31 | 0.0458 | 0.9952 | 72 | 0.3463 | 0.9765 | 126 | 2.4404 | 0.9381 | 325 | 122.950 | 0.6540 |
| 32 | 0.0485 | 0.9949 | 73 | 0.3613 | 0.9759 | 128 | 2.5935 | 0.9365 | 330 | 131.180 | 0.6402 |
| 33 | 0.0513 | 0.9946 | 74 | 0.3869 | 0.9754 | 130 | 2.7544 | 0.9348 | 335 | 139.850 | 0.6257 |
| 34 | 0.0542 | 0.9942 | 75 | 0.3931 | 0.9748 | 135 | 3.1920 | 0.9305 | 340 | 148.960 | 0.6093 |
| 35 | 0.0573 | 0.9939 | 76 | 0.4098 | 0.9742 | 140 | 3.6850 | 0.9260 | 345 | 157.540 | 0.5910 |
| 36 | 0.0606 | 0.9934 | 77 | 0.4274 | 0.9737 | 145 | 4.2370 | 0.9216 | 350 | 168.630 | 0.5724 |
| 37 | 0.0640 | 0.9932 | 78 | 0.4451 | 0.9730 | 150 | 4.8540 | 0.9169 | 355 | 179.240 | 0.5512 |
| 38 | 0.0675 | 0.9928 | 79 | 0.4637 | 0.9724 | 155 | 5.5400 | 0.9121 | 360 | 190.420 | 0.5243 |
| 39 | 0.0713 | 0.9925 | 80 | 0.4829 | 0.9718 | 160 | 6.3020 | 0.9073 | 365 | 202.210 | 0.4926 |
| 40 | 0.0752 | 0.9921 | 81 | 0.5028 | 0.9712 | 165 | 7.1460 | 0.9023 | 370 | 214.680 | 0.4484 |

## ATMOSPHERIC PRESSURE AT VARIOUS HEIGHTS



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## FLOW RATE OF WATER FROM NOZZLES AND FIRE HOSES IN l/s AS A FUNCTION OF THE PRESSURE MEASURED UPSTREAM THE NOZZLE, IN METRES OF COLUMN OF WATER.

| Ø NOZZLE IN mm | PRESSURE in m.c.w. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 |
| 1 | 0.0068 | 0.0083 | 0.0096 | 0.0107 | 0.0118 | 0.0127 | 0.0136 | 0.0144 | 0.0152 | 0.0159 | 0.0167 | 0.0174 | 0.018 |
| 2 | 0.273 | 0.0334 | 0.0386 | 0.0432 | 0.0473 | 0.0511 | 0.0546 | 0.0579 | 0.0611 | 0.064 | 0.0668 | 0.696 | 0.0722 |
| 3 | 0.614 | 0.0751 | 0.0868 | 0.097 | 0.1063 | 0.1148 | 0.1228 | 0.13 | 0.137 | 0.144 | 0.15 | 0.156 | 0.162 |
| 4 | 0.109 | 0.133 | 0.154 | 0.175 | 0.189 | 0.204 | 0.218 | 0.231 | 0.244 | 0.255 | 0.267 | 0.278 | 0.288 |
| 5 | 1.171 | 0.209 | 0.242 | 0.271 | 0.296 | 0.32 | 0.342 | 0.363 | 0.383 | 0.401 | 0.419 | 0.4336 | 0.453 |
| 6 | 0.246 | 0.301 | 0.348 | 0.389 | 0.426 | 0.455 | 0.492 | 0.522 | 0.55 | 0.577 | 0.603 | 0.627 | 0.652 |
| 7 | 0.334 | 0.408 | 0.472 | 0.527 | 0.578 | 0.625 | 0.667 | 0.708 | 0.747 | 0.783 | 0.817 | 0.851 | 0.883 |
| 8 | 0.436 | 0.534 | 0.616 | 0.689 | 0.755 | 0.815 | 0.871 | 0.925 | 0.975 | 1.022 | 1.067 | 1.11 | 1.152 |
| 9 | 0.553 | 0.677 | 0.782 | 0.875 | 0.958 | 1.035 | 1.107 | 1.172 | 1.236 | 1.297 | 1.355 | 1.41 | 1.461 |
| 10 | 0.684 | 0.836 | 0.966 | 1.08 | 1.183 | 1.27 | 1.368 | 1.448 | 1.523 | 1.6 | 1.672 | 1.742 | 1.808 |
| 11 | 0.83 | 1.017 | 1.173 | 1.313 | 1.439 | 1.555 | 1.66 | 1.76 | 1.855 | 1.99 | 2.03 | 2.117 | 2.196 |
| 12 | 0.982 | 1.2 | 1.387 | 1.55 | 1.7 | 1.87 | 1.964 | 2.08 | 2.19 | 2.3 | 2.4 | 2.5 | 2.59 |
| 13 | 1.154 | 1.412 | 1.63 | 1.825 | 2.0 | 2.16 | 2.31 | 2.45 | 2.58 | 2.7 | 2.83 | 2.94 | 3.05 |
| 14 | 1.337 | 1.635 | 1.89 | 2.113 | 2.313 | 2.5 | 2.67 | 2.834 | 2.99 | 3.135 | 3.27 | 3.41 | 2.538 |
| 15 | 1.535 | 1.88 | 2.17 | 2.417 | 2.66 | 2.87 | 3.07 | 3.25 | 3.43 | 3.6 | 3.76 | 3.91 | 4.06 |
| 16 | 1.742 | 2.132 | 2.464 | 2.757 | 3.02 | 3.26 | 3.486 | 3.7 | 3.9 | 4.08 | 4.27 | 4.45 | 4.62 |
| 17 | 1.97 | 2.413 | 2.787 | 3.119 | 3.417 | 3.686 | 3.947 | 4.18 | 4.41 | 4.62 | 4.83 | 58.025 | 5.21 |
| 18 | 2.21 | 2.703 | 3.125 | 3.499 | 3.83 | 4.13 | 4.42 | 4.68 | 4.94 | 5.18 | 5.42 | 5.64 | 5.85 |
| 20 | 2.73 | 3.34 | 3.86 | 4.32 | 4.73 | 5.11 | 5.46 | 5.78 | 6.11 | 6.4 | 6.78 | 6.96 | 7.23 |
| 22 | 3.298 | 4.04 | 4.66 | 5.22 | 5.72 | 6.17 | 6.75 | 7.0 | 7.48 | 7.74 | 8.07 | 8.4 | 8.8 |
| 25 | 4.265 | 5.22 | 6.02 | 6.74 | 7.38 | 7.87 | 8.52 | 9.04 | 9.53 | 9.99 | 10.42 | 10.85 | 11.25 |
| 26 | 4.6 | 5.64 | 6.5 | 7.27 | 7.97 | 8.61 | 9.2 | 9.76 | 10.28 | 10.69 | 11.27 | 11.71 | 12.16 |
| 28 | 5.36 | 6.56 | 7.56 | 8.46 | 9.28 | 10.2 | 10.7 | 11.36 | 11.9 | 12.55 | 13.12 | 13.64 | 14.09 |
| 32 | 6.97 | 8.55 | 9.85 | 11.02 | 12.08 | 13.05 | 13.93 | 14.8 | 15.6 | 16.7 | 17.2 | 17.79 | 18.44 |
| 35 | 8.358 | 10.23 | 11.8 | 13.2 | 14.45 | 15.6 | 16.7 | 17.7 | 18.68 | 19.59 | 20.43 | 21.26 | 22.09 |
| 45 | 13.8 | 16.9 | 19.5 | 21.82 | 23.9 | 25.84 | 27.6 | 29.3 | 30.9 | 32.39 | 33.8 | 35.2 | 26.5 |
| 55 | 20.3 | 25.2 | 28.5 | 32.6 | 35.7 | 38.6 | 41.2 | 44.0 | 46.1 | 48.3 | 50.5 | 52.6 | 54.5 |
| 65 | 28.5 | 34.8 | 40.2 | 45.0 | 49.3 | 53.4 | 56.9 | 60.5 | 63.6 | 66.6 | 69.7 | 72.6 | 75.4 |
| 75 | 38.3 | 46.9 | 54.2 | 60.6 | 66.4 | 71.7 | 76.6 | 81.4 | 85.6 | 90.0 | 93.9 | 97.7 | 101.4 |
| 85 | 49.4 | 60.5 | 69.7 | 77.0 | 85.5 | 92.4 | 98.7 | 104.7 | 110.3 | 115.7 | 121.0 | 125.0 | 130.5 |
| 95 | 61.5 | 75.4 | 87.0 | 97.4 | 106.5 | 115.2 | 123.0 | 130.5 | 137.6 | 143.3 | 150.8 | 1570.0 | 162.8 |

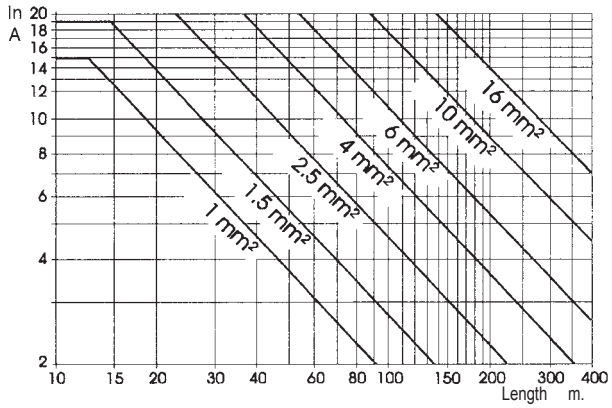

| Ø NOZZLE IN mm | PRESSURE in m.c.w. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 |
| 1 | 0.0068 | 0.0083 | 0.0096 | 0.0107 | 0.0118 | 0.0127 | 0.0136 | 0.0144 | 0.0152 | 0.0159 | 0.0167 | 0.0174 | 0.018 |
| 2 | 0.273 | 0.0334 | 0.0386 | 0.0432 | 0.0473 | 0.0511 | 0.0546 | 0.0579 | 0.0611 | 0.064 | 0.0668 | 0.696 | 0.0722 |
| 3 | 0.614 | 0.0751 | 0.0868 | 0.097 | 0.1063 | 0.1148 | 0.1228 | 0.13 | 0.137 | 0.144 | 0.15 | 0.156 | 0.162 |
| 4 | 0.109 | 0.133 | 0.154 | 0.175 | 0.189 | 0.204 | 0.218 | 0.231 | 0.244 | 0.255 | 0.267 | 0.278 | 0.288 |
| 5 | 1.171 | 0.209 | 0.242 | 0.271 | 0.296 | 0.32 | 0.342 | 0.363 | 0.383 | 0.401 | 0.419 | 0.4336 | 0.453 |
| 6 | 0.246 | 0.301 | 0.348 | 0.389 | 0.426 | 0.455 | 0.492 | 0.522 | 0.55 | 0.577 | 0.603 | 0.627 | 0.652 |
| 7 | 0.334 | 0.408 | 0.472 | 0.527 | 0.578 | 0.625 | 0.667 | 0.708 | 0.747 | 0.783 | 0.817 | 0.851 | 0.883 |
| 8 | 0.436 | 0.534 | 0.616 | 0.689 | 0.755 | 0.815 | 0.871 | 0.925 | 0.975 | 1.022 | 1.067 | 1.11 | 1.152 |
| 9 | 0.553 | 0.677 | 0.782 | 0.875 | 0.958 | 1.035 | 1.107 | 1.172 | 1.236 | 1.297 | 1.355 | 1.41 | 1.461 |
| 10 | 0.684 | 0.836 | 0.966 | 1.08 | 1.183 | 1.27 | 1.368 | 1.448 | 1.523 | 1.6 | 1.672 | 1.742 | 1.808 |
| 11 | 0.83 | 1.017 | 1.173 | 1.313 | 1.439 | 1.555 | 1.66 | 1.76 | 1.855 | 1.99 | 2.03 | 2.117 | 2.196 |
| 12 | 0.982 | 1.2 | 1.387 | 1.55 | 1.7 | 1.87 | 1.964 | 2.08 | 2.19 | 2.3 | 2.4 | 2.5 | 2.59 |
| 13 | 1.154 | 1.412 | 1.63 | 1.825 | 2.0 | 2.16 | 2.31 | 2.45 | 2.58 | 2.7 | 2.83 | 2.94 | 3.05 |
| 14 | 1.337 | 1.635 | 1.89 | 2.113 | 2.313 | 2.5 | 2.67 | 2.834 | 2.99 | 3.135 | 3.27 | 3.41 | 2.538 |
| 15 | 1.535 | 1.88 | 2.17 | 2.417 | 2.66 | 2.87 | 3.07 | 3.25 | 3.43 | 3.6 | 3.76 | 3.91 | 4.06 |
| 16 | 1.742 | 2.132 | 2.464 | 2.757 | 3.02 | 3.26 | 3.486 | 3.7 | 3.9 | 4.08 | 4.27 | 4.45 | 4.62 |
| 17 | 1.97 | 2.413 | 2.787 | 3.119 | 3.417 | 3.686 | 3.947 | 4.18 | 4.41 | 4.62 | 4.83 | 58.025 | 5.21 |
| 18 | 2.21 | 2.703 | 3.125 | 3.499 | 3.83 | 4.13 | 4.42 | 4.68 | 4.94 | 5.18 | 5.42 | 5.64 | 5.85 |
| 20 | 2.73 | 3.34 | 3.86 | 4.32 | 4.73 | 5.11 | 5.46 | 5.78 | 6.11 | 6.4 | 6.78 | 6.96 | 7.23 |
| 22 | 3.298 | 4.04 | 4.66 | 5.22 | 5.72 | 6.17 | 6.75 | 7.0 | 7.48 | 7.74 | 8.07 | 8.4 | 8.8 |
| 25 | 4.265 | 5.22 | 6.02 | 6.74 | 7.38 | 7.87 | 8.52 | 9.04 | 9.53 | 9.99 | 10.42 | 10.85 | 11.25 |
| 26 | 4.6 | 5.64 | 6.5 | 7.27 | 7.97 | 8.61 | 9.2 | 9.76 | 10.28 | 10.69 | 11.27 | 11.71 | 12.16 |
| 28 | 5.36 | 6.56 | 7.56 | 8.46 | 9.28 | 10.2 | 10.7 | 11.36 | 11.9 | 12.55 | 13.12 | 13.64 | 14.09 |
| 32 | 6.97 | 8.55 | 9.85 | 11.02 | 12.08 | 13.05 | 13.93 | 14.8 | 15.6 | 16.7 | 17.2 | 17.79 | 18.44 |
| 35 | 8.358 | 10.23 | 11.8 | 13.2 | 14.45 | 15.6 | 16.7 | 17.7 | 18.68 | 19.59 | 20.43 | 21.26 | 22.09 |
| 45 | 13.8 | 16.9 | 19.5 | 21.82 | 23.9 | 25.84 | 27.6 | 29.3 | 30.9 | 32.39 | 33.8 | 35.2 | 26.5 |
| 55 | 20.3 | 25.2 | 28.5 | 32.6 | 35.7 | 38.6 | 41.2 | 44.0 | 46.1 | 48.3 | 50.5 | 52.6 | 54.5 |
| 65 | 28.5 | 34.8 | 40.2 | 45.0 | 49.3 | 53.4 | 56.9 | 60.5 | 63.6 | 66.6 | 69.7 | 72.6 | 75.4 |
| 75 | 38.3 | 46.9 | 54.2 | 60.6 | 66.4 | 71.7 | 76.6 | 81.4 | 85.6 | 90.0 | 93.9 | 97.7 | 101.4 |
| 85 | 49.4 | 60.5 | 69.7 | 77.0 | 85.5 | 92.4 | 98.7 | 104.7 | 110.3 | 115.7 | 121.0 | 125.0 | 130.5 |
| 95 | 61.5 | 75.4 | 87.0 | 97.4 | 106.5 | 115.2 | 123.0 | 130.5 | 137.6 | 143.3 | 150.8 | 1570.0 | 162.8 |

## TABLE OF EQUIVALENT STANDARDS FOR MATERIALS

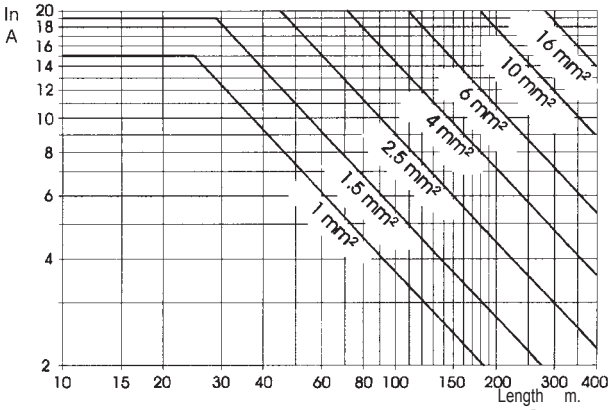
| MATERIAL | UNI | DIN | ISO | AISI | ASTM |
|---|---|---|---|---|---|
| STEEL | X 30Cr13 UNI 6900/71<br>X 12CrS13 UNI 6900/71<br>X 20Cr13 UNI 6900/71<br>X 10CrNiS1809 UNI 6900/71<br>X 5CrNi 1810 UNI 6900/71<br>X 10CrS17 UNI 6900/71 | X 30Cr13 DIN 17440<br>X 12CrS13 DIN 17440<br>X 20Cr13 DIN 17440<br>X 10CrNiS1809 DIN 17440<br>X 5CrNi 1810 DIN 17440<br>X 10CrS17 DIN 17440 | –<br>–<br>–<br>XIII-17 ISO 683/XIII<br>XIII-11 ISO 683/XIII<br>XIII-84 ISO 683/XIII | AISI 420B<br>AISI 416<br>AISI 420A<br>AISI 303<br>AISI 304<br>AISI 430F | –<br>–<br>S 42000 A 276<br>S 30300 A 276<br>S 30400 A 276<br>– |
| CAST IRON | G 20 UNI ISO 185<br>G 25 UNI ISO 185 | GG 20 DIN 1691<br>GG 25 DIN 1691 | Grade 20 ISO R 185<br>Grade 20 ISO R 185 | –<br>– | Class 25 A 48<br>Class 35 A 48 |
| BRASS | G CuZn38Al 1Fe 1Mni UNI 6138/68<br>P CuZn40 Pb2 UNI 5705 | –<br>P CuZn40 Pb2 DIN 17660 | –<br>– | –<br>– | B 30 C 86550<br>C 37740 |
| BRONZE | G CuSn12 UNI 7013/72 | G CuSn12 DIN 17006 | CuSn 12 ISO 1338 | – | B 205 C 90700 |

## CHART FOR THE SELECTION OF THE POWER INPUT CABLE IN RELATION TO LENGTH

Voltage 1 x 230 V ~ direct start
3 % voltage drop
Ambient temperature 30 °C

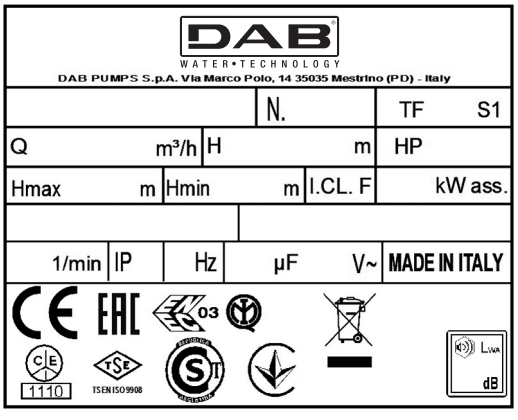



Voltage 3 x 400 V ~ direct start
3 % voltage drop
Ambient temperature 30 °C




## EXPLANATION OF PUMP DATA PLATES

| No. | SERIAL NUMBER | - |
|---|---|---|
| Q | FLOW | $m^3/h$ |
| H | HEAD | m |
| H max | MAXIMUM HEAD | m |
| H min | MINIMUM HEAD | m |
| – | REVOLUTIONS PER MINUTE | 1/min |
| – | ABSORBED POWER | kWass |
| – | NOMINAL DEVELOPED POWER | HP |
| – | VOLTAGE | V ~ |
| – | FREQUENCY | Hz |
| – | CURRENT | A |
| – | PROTECTION CLASS (IEC) | IP |
| I.C.L. | INSULATION CLASS | µF Vc |
| – | CAPACITY AND VOLTAGE OF CAPACITOR | µF Vc |
| $\nabla_m$ | MAXIMUM IMMERSION | m |
| $L_{WA}$ | NOISE LEVEL | dB |



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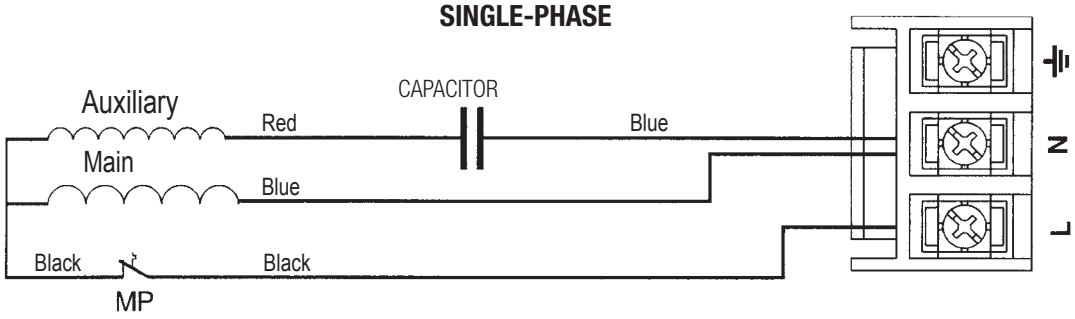
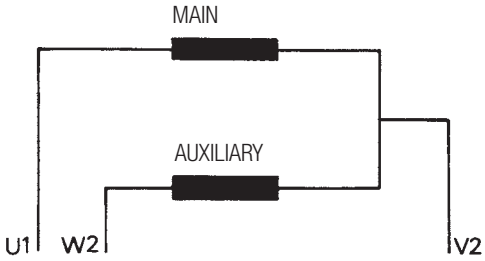
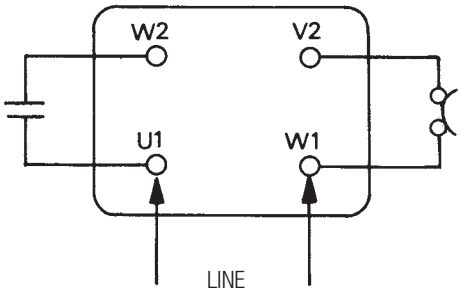
## WIRING DIAGRAMS FOR ELECTRIC MOTORS

### SINGLE-PHASE




Overload protection inside the winding - MEC 63-71 M

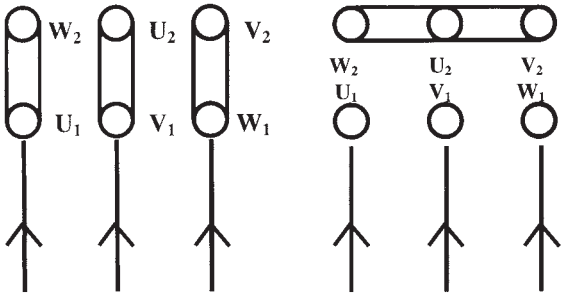



Overload protection inside the terminal board - MEC 80 M

### THREE-PHASE

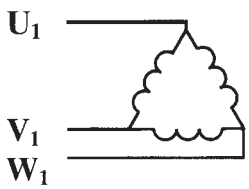
#### 3 ~ 230/400 V



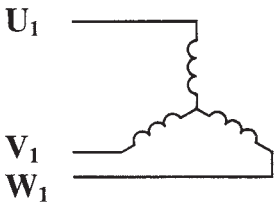

Power input line 230 V

400 V

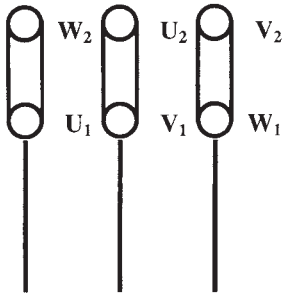
TRIANGLE connection




STAR connection

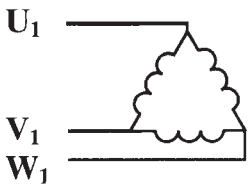



#### 3 ~ 400 Δ V




Power input line

DELTA connection




Clockwise rotation when viewed from the fan end

# NOTES



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60171419 - 05/2015