

60 Hz



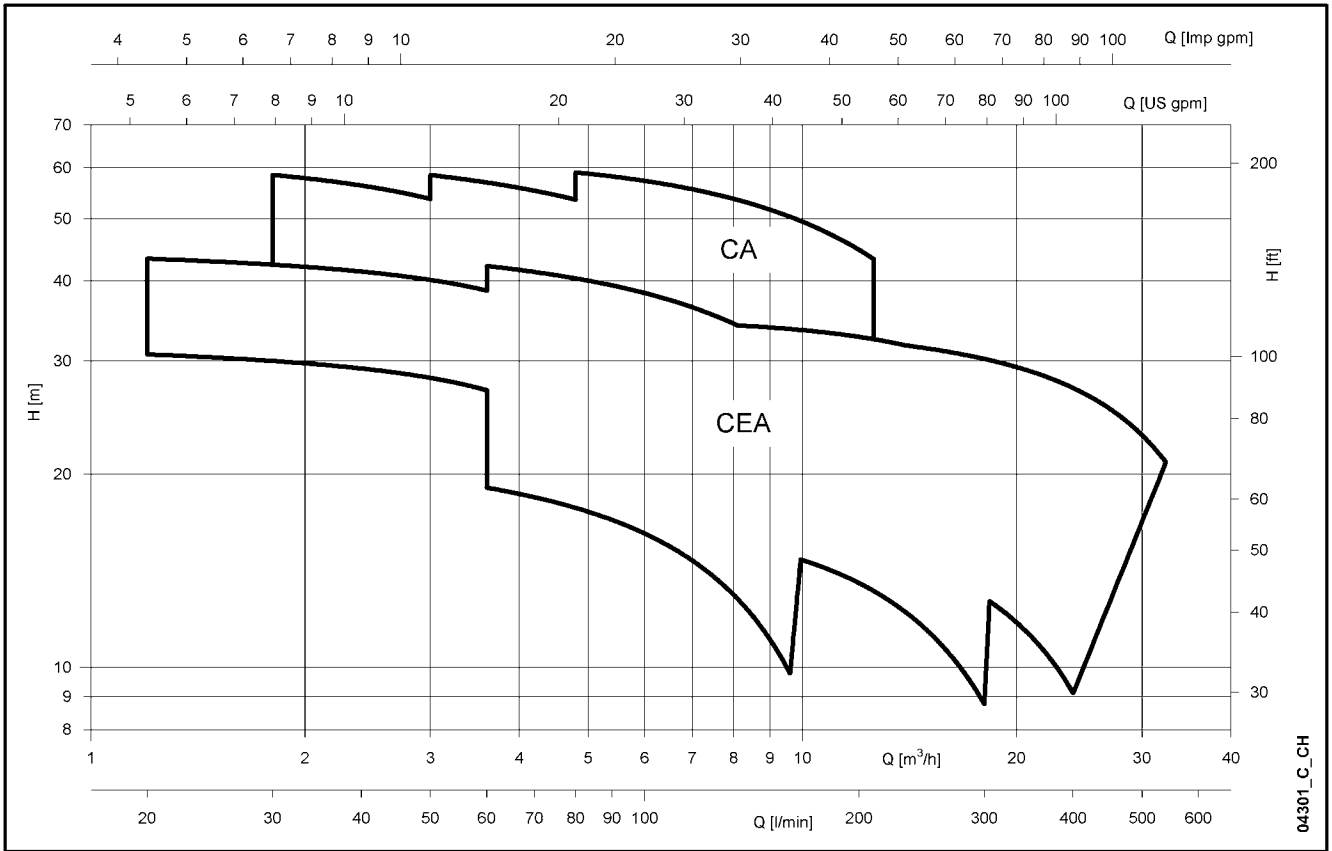
CEA-CA Series CEA(N)-CA(N) made of AISI 316

SINGLE AND TWIN-IMPELLER CENTRIFUGAL ELECTRIC PUMPS
EQUIPPED WITH IE2/IE3 MOTORS COMPLYING WITH REGULATION (EC) n. 640/2009

Cod. 191013651 Rev.C Ed.10/2012

 **LOWARA**
a xylem brand

**CEA-CA - CEA(N)-CA(N) SERIES
HYDRAULIC PERFORMANCE RANGE AT 60 Hz**

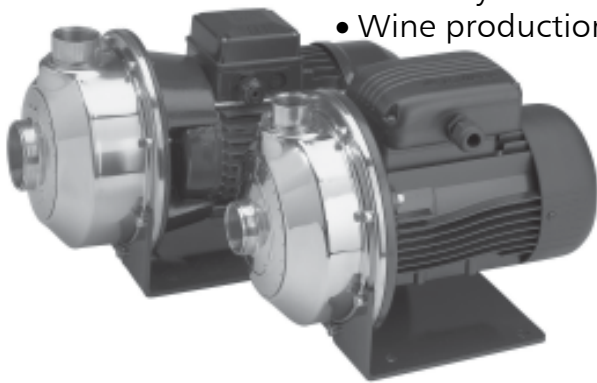


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Single-Impeller Centrifugal Electric Pumps

CEA-CEA(N) 60 Hz Series



MARKET SECTORS

CIVIL, AGRICULTURAL, INDUSTRIAL.

APPLICATIONS

Version made of AISI 304

- Handling of chemically and mechanically non-aggressive water and liquids (*).
- Water supply.
- Irrigation.
- Water circulation (cold, hot, refrigerated).

* For moderately aggressive liquids, a version with FPM elastomers is available (CEA./..V). For very aggressive liquids, please contact our sales network.

On request "N" Version made of AISI 316 (for aggressive liquids)

- Reverse osmosis (where demineralized water is used).
- Industrial washing.
- Thermal waters.
- Chlorine dispensing in swimming pools.
- Jewellery industry.
- Wine production.

up to 1,5 kW. For higher powers, the overload protection must be provided and installed by the user in the control panel.

Three-phase version:

220-230/380-400 V, 60 Hz, 2 poles, the overload protection must be provided and installed by the user in the control panel.

- Condensate drain plug in the standard version.

CONSTRUCTION CHARACTERISTICS

- Close-coupled, single-impeller centrifugal pump featuring axial suction and radial discharge.
- Compact construction, with pump coupled directly to motor; special motor shaft extension supported by ball bearings.
- Rotating assembly has back pull-out design, no need to disconnect the pump body from the pipe line.
- Threaded suction and discharge ports (Rp ISO 7).
- High performance closed **impeller** made of AISI 304 stainless steel.
- **Mechanical seal** with ceramic/carbon rings, NBR elastomers, other parts are made of AISI 304 stainless steel. Mounting dimensions according to EN 12756 (ex DIN 24960) and ISO 3069.
- **NBR O-rings**
- Mounting pedestal.

OPTIONAL FEATURES

- Different voltages and frequencies.
- Different materials for the mechanical seal and O-rings.

SPECIFICATIONS PUMP

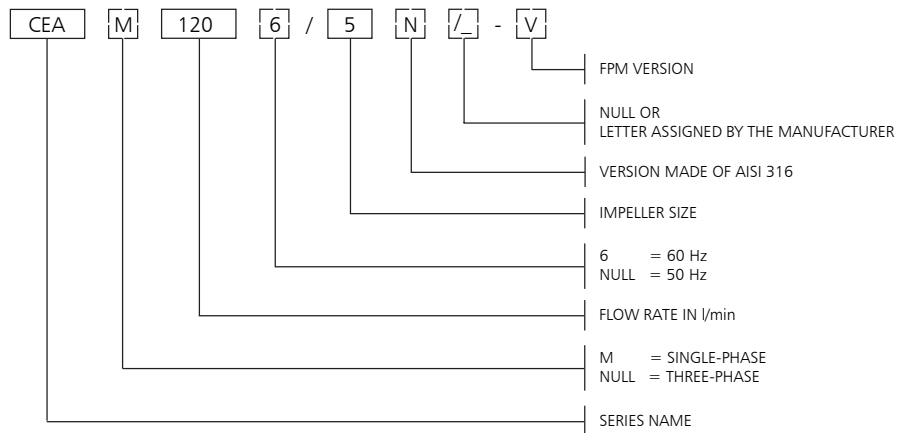
- **Delivery:** up to 540 l/min (32 m³/h).
- **Head:** up to 46 m.
- **Temperature** of pumped liquid: -10°C to 85°C standard version. -10°C to +110°C (N and V versions).
- **Maximum** operating pressure: 8 bar (PN 8).
- Counterclockwise rotation facing the pump from the suction port.

MOTOR

- Asynchronous, squirrel cage rotor, closed construction, external ventilation.
- **Protection class:** IP55.
- **Insulation:** Class 155 (F).
- Performances to EN 60034-1 specification.
- **Standard voltage:**
Single-phase versions: 220-230 V, 60 Hz, 2 poles, with automatic reset overload protection

□ **Standard supplied IE2/IE3 motors are compliant with Regulation (EC) no. 640/2009.**

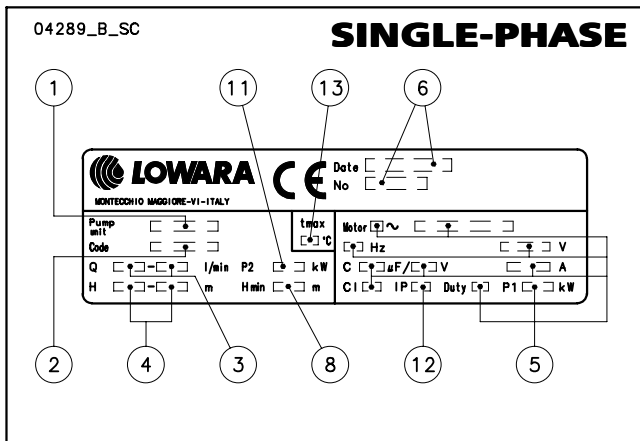
CEA-CEA(N) SERIES IDENTIFICATION CODE



EXAMPLE : CEAM 1206/5-V

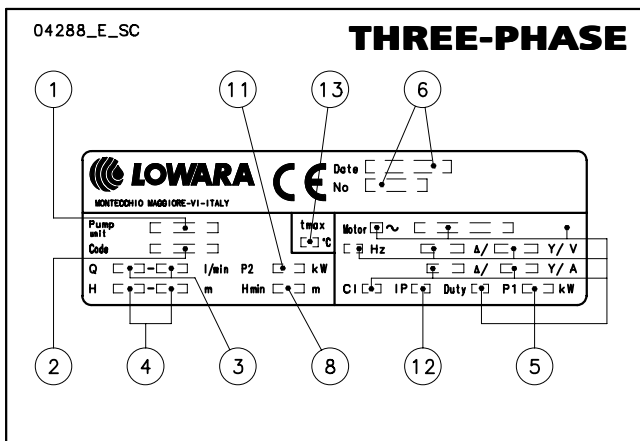
CEA series electric pump, single-phase, flow rate 120 l/min
60 Hz, Impeller size 5, FPM version.

RATING PLATE



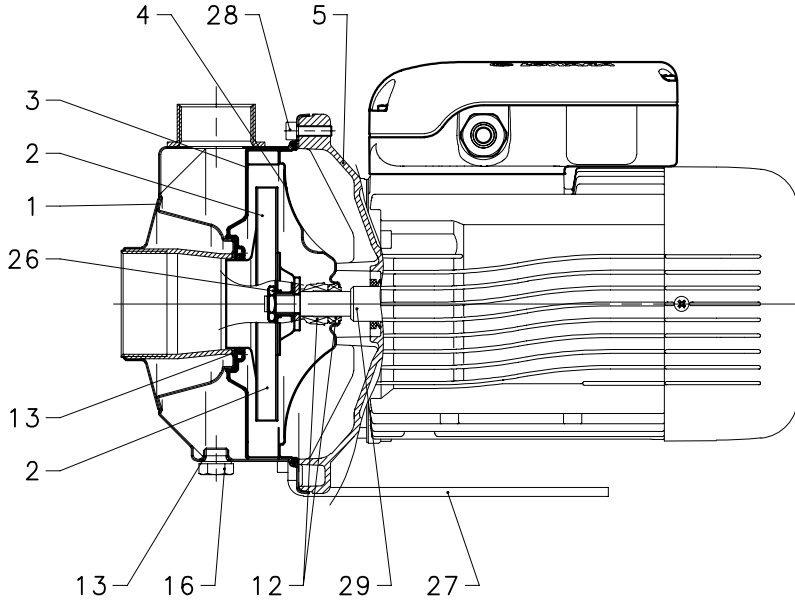
LEGEND

- 1 - Electric pump type
- 2 - Code
- 3 - Delivery range
- 4 - Head range
- 5 - Electrical data
- 6 - Serial number (date + sequential number)
- 8 - Minimum head
- 11 - Rated power
- 12 - Electric pump protection class
- 13 - Maximum temperature of pumped liquid



CEA - CEA(N) SERIES LIST OF MODELS AND TABLE OF MATERIALS

04304_C_DS



| VERSIONS |
|------------|
| CEA706/3 |
| CEA706/4 |
| CEA706/5 |
| CEA1206/1 |
| CEA1206/2 |
| CEA1206/3 |
| CEA1206/4 |
| CEA1206/5 |
| CEA2106/0 |
| CEA2106/1 |
| CEA2106/2 |
| CEA2106/3 |
| CEA2106/4 |
| CEA3706/0 |
| CEA3706/0A |
| CEA3706/1 |
| CEA3706/2 |
| CEA3706/3 |

cea-ceaN-2p60-en_b_mo

CEA SERIES TABLE OF MATERIALS

| REF. N. | PART | MATERIAL | REFERENCE STANDARDS | |
|---------|------------------------------------|---|-------------------------------------|----------|
| | | | EUROPE | USA |
| 1 | Pump body | Stainless steel | EN 10088-1-X5CrNi18-10 (1.4301) | AISI 304 |
| 2 | Impeller | Stainless steel | EN 10088-1-X5CrNi18-10 (1.4301) | AISI 304 |
| 3 | Diffuser | Stainless steel | EN 10088-1-X5CrNi18-10 (1.4301) | AISI 304 |
| 4 | Seal housing | Stainless steel | EN 10088-1-X5CrNi18-10 (1.4301) | AISI 304 |
| 5 | Adapter | Aluminium | EN 1706-AC-AISI11Cu2 (Fe) (AC46100) | - |
| 12 | Mechanical seal | Ceramic / Carbon / NBR (standard version) | | |
| 13 | Elastomers | NBR (standard version) | | |
| 16 | Fill/drain plugs | Stainless steel | EN 10088-1-X5CrNiMo17-12-2 (1.4401) | AISI 316 |
| 26 | Impeller lock nut | Stainless steel | EN 10088-1-X5CrNiMo17-12-2 (1.4401) | AISI 316 |
| 27 | Mounting pedestal | Painted steel | | |
| 28 | Pump body fastening nuts and bolts | Zinc-plated steel | | |
| 29 | Shaft extension | Stainless steel | EN 10088-1-X5CrNiMo17-12-2 (1.4401) | AISI 316 |

CEA(N) SERIES TABLE OF MATERIALS (ON REQUEST)

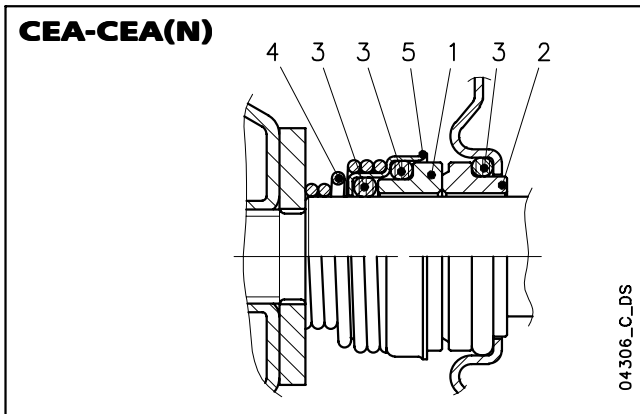
cea-cea-en_b_tm

| REF. N. | PART | MATERIAL | REFERENCE STANDARDS | |
|---------|------------------------------------|------------------------|-------------------------------------|-----------|
| | | | EUROPE | USA |
| 1 | Pump body | Stainless steel | EN 10088-1-X2CrNiMo17-12-2 (1.4404) | AISI 316L |
| 2 | Impeller | Stainless steel | EN 10088-1-X2CrNiMo17-12-2 (1.4404) | AISI 316L |
| 3 | Diffuser | Stainless steel | EN 10088-1-X2CrNiMo17-12-2 (1.4404) | AISI 316L |
| 4 | Seal housing | Stainless steel | EN 10088-1-X2CrNiMo17-12-2 (1.4404) | AISI 316L |
| 5 | Adapter | Aluminium | EN 1706-AC-AISI11Cu2 (Fe) (AC46100) | - |
| 12 | Mechanical seal | Ceramic / Carbon /EPDM | | |
| 13 | Elastomers | EPDM | | |
| 16 | Fill/drain plugs | Stainless steel | EN 10088-1-X5CrNiMo17-12-2 (1.4401) | AISI 316 |
| 26 | Impeller lock nut | Stainless steel | EN 10088-1-X5CrNiMo17-12-2 (1.4401) | AISI 316 |
| 27 | Mounting pedestal | Painted steel | | |
| 28 | Pump body fastening nuts and bolts | Zinc-plated | | |
| 29 | Shaft extension | Stainless steel | EN 10088-1-X5CrNiMo17-12-2 (1.4401) | AISI 316 |

cea-ceaN-en_a_tm

CEA-CEA(N) MECHANICAL SEAL, ACCORDING TO EN 12756

Mechanical seal with mounting dimensions according to EN12756 (ex DIN 24960) and ISO 3069.



CEA-CEA(N) LIST OF MATERIALS

| POSITION 1 - 2 | POSITION 3 | POSITION 4 - 5 |
|---|-----------------|---------------------|
| B : Resin impregnated carbon | P : NBR | F : AISI 304 |
| C : Special resin impregnated carbon | E : EPDM | G : AISI 316 |
| Q₁ : Silicon carbide | V : FPM | |
| U₃ : Tungsten carbide | | |
| V : Ceramic | | |

cea-ca_ten-mec-en_b_tm

CEA MECHANICAL SEALS

| TYPE | POSITION | | | | | TEMPERATURE (°C) |
|---------------------------------------|------------------------|---------------------|-----------------|--------------|-----------------------|---------------------|
| | 1 ROTATING ASSEMBLY | 2 FIXED ASSEMBLY | 3 ELASTOMERS | 4 SPRINGS | 5 OTHER COMPONENTS | |
| STANDARD MECHANICAL SEAL | | | | | | |
| VBPGF | V | B | P | G | F | -10 +85 |
| OTHER TYPES OF MECHANICAL SEAL | | | | | | |
| VBEGG | V | B | E | G | G | -10 +110 |
| VCEGG | V | C | E | G | G | -10 +110 |
| Q ₁ Q ₁ EGG | Q ₁ | Q ₁ | E | G | G | -10 +110 |
| U ₃ CEGG | U ₃ | C | E | G | G | -10 +110 |
| U ₃ U ₃ EGG | U ₃ | U ₃ | E | G | G | -10 +110 |
| VBVGG | V | B | V | G | G | -10 +110 |
| VCVGG | V | C | V | G | G | -10 +110 |
| Q ₁ Q ₁ VGG | Q ₁ | Q ₁ | V | G | G | -10 +110 |
| U ₃ CVGG | U ₃ | C | V | G | G | -10 +110 |
| U ₃ U ₃ VGG | U ₃ | U ₃ | V | G | G | -10 +110 |

cea_tipi-ten-mec_b_tc

CEA(N) MECHANICAL SEALS

| TYPE | POSITION | | | | | TEMPERATURE (°C) |
|---------------------------------------|------------------------|---------------------|-----------------|--------------|-----------------------|---------------------|
| | 1 ROTATING ASSEMBLY | 2 FIXED ASSEMBLY | 3 ELASTOMERS | 4 SPRINGS | 5 OTHER COMPONENTS | |
| STANDARD MECHANICAL SEAL | | | | | | |
| VBEGG | V | B | E | G | G | -10 +110 |
| OTHER TYPES OF MECHANICAL SEAL | | | | | | |
| VCEGG | V | C | E | G | G | -10 +110 |
| Q ₁ Q ₁ EGG | Q ₁ | Q ₁ | E | G | G | -10 +110 |
| VCVGG | V | C | V | G | G | -10 +110 |
| Q ₁ Q ₁ VGG | Q ₁ | Q ₁ | V | G | G | -10 +110 |

cean-can_tipi-ten-mec-en_b_tc

CEA-CEA(N) SERIES HYDRAULIC PERFORMANCE TABLE AT 60 Hz, 2 POLES

| PUMP TYPE | RATED POWER | | Q = DELIVERY | | | | | | | | | | | | | | | | | | |
|---------------------------------------|-------------|------|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----|
| | | | l/min | 20 | 30 | 40 | 60 | 80 | 120 | 140 | 160 | 180 | 240 | 300 | 320 | 380 | 420 | 460 | 500 | 540 | |
| | kW | HP | m ³ /h | 0 | 1,2 | 1,8 | 2,4 | 3,6 | 4,8 | 7,2 | 8,4 | 9,6 | 10,8 | 14,4 | 18 | 19,2 | 22,8 | 25,2 | 28 | 30 | 32 |
| H = TOTAL HEAD METRES COLUMN OF WATER | | | | | | | | | | | | | | | | | | | | | |
| CEA(M) 706/3 | 0,75 | 1 | 32,3 | 30,7 | 30,0 | 29,2 | 27,0 | 23,5 | | | | | | | | | | | | | |
| CEA(M) 706/4 | 0,9 | 1,2 | 39,2 | 37,5 | 36,6 | 35,7 | 33,4 | 29,9 | | | | | | | | | | | | | |
| CEA(M) 706/5 | 1,1 | 1,5 | 45,2 | 43,3 | 42,4 | 41,4 | 38,6 | 34,4 | | | | | | | | | | | | | |
| CEA(M) 1206/1 | 0,55 | 0,75 | 22,1 | | | | 19,1 | 17,7 | 14,4 | 12,2 | 9,8 | | | | | | | | | | |
| CEA(M) 1206/2 | 0,75 | 1 | 27,8 | | | | 24,1 | 22,6 | 19,1 | 16,9 | 14,3 | | | | | | | | | | |
| CEA(M) 1206/3 | 0,9 | 1,2 | 32,8 | | | | 29,1 | 27,7 | 24,1 | 22,0 | 19,6 | | | | | | | | | | |
| CEA(M) 1206/4 | 1,5 | 2 | 40,5 | | | | 36,3 | 34,6 | 30,6 | 28,2 | 25,4 | | | | | | | | | | |
| CEA(M) 1206/5 | 1,85 | 2,5 | 46,6 | | | | 42,2 | 40,4 | 36,0 | 33,4 | 30,6 | 27,4 | | | | | | | | | |
| CEA(M) 2106/0 | 0,75 | 1 | 17,0 | | | | | | 15,9 | 15,5 | 14,9 | 14,3 | 11,9 | 8,8 | | | | | | | |
| CEA(M) 2106/1 | 1,1 | 1,5 | 21,1 | | | | | | 20,4 | 20,0 | 19,5 | 19,0 | 16,9 | 14,0 | | | | | | | |
| CEA(M) 2106/2 | 1,5 | 2 | 25,3 | | | | | | 24,5 | 24,1 | 23,7 | 23,2 | 21,3 | 18,7 | | | | | | | |
| CEA(M) 2106/3 | 1,85 | 2,5 | 30,0 | | | | | | 29,4 | 29,1 | 28,8 | 28,3 | 26,7 | 24,3 | 23,3 | | | | | | |
| CEA(M) 2106/4 | 2,2 | 3 | 34,8 | | | | | | 34,3 | 34,0 | 33,6 | 33,2 | 31,5 | 28,9 | 27,9 | | | | | | |
| CEA(M) 3706/0 | 1,1 | 1,5 | 16,9 | | | | | | | | 15,9 | 15,6 | 14,4 | 12,8 | 12,2 | 10,0 | | | | | |
| CEA(M) 3706/0A | 1,5 | 2 | 19,8 | | | | | | | | 19,4 | 19,2 | 18,4 | 17,2 | 16,7 | 14,6 | 12,9 | | | | |
| CEA(M) 3706/1 | 1,85 | 2,5 | 23,5 | | | | | | | | 22,9 | 22,6 | 21,7 | 20,3 | 19,8 | 17,8 | 16,3 | 14,5 | | | |
| CEA 3706/2 | 3 | 4 | 29,6 | | | | | | | | 29,0 | 28,8 | 27,9 | 26,6 | 26,1 | 24,2 | 22,7 | 21,0 | 19,0 | | |
| CEA 3706/3 | 3 | 4 | 35,0 | | | | | | | | 33,0 | 32,7 | 31,6 | 30,2 | 29,7 | 27,9 | 26,5 | 24,9 | 23,0 | 20,9 | |

cea-2p60-en_c_th

CEA-CEA(N) SERIES ELECTRICAL DATA AT 60 Hz, 2 POLES

| PUMP TYPE | MOTOR TYPE | INPUT POWER* | INPUT CURRENT* | CAPACIT. | PUMP TYPE | MOTOR TYPE | INPUT POWER* | INPUT CURRENT* | INPUT CURRENT* |
|--------------|--------------|--------------|----------------|------------|-------------|--------------|--------------|----------------|----------------|
| | | | | | | | | | |
| SINGLE PHASE | | kW | A | μF / 450 V | THREE PHASE | | kW | A | A |
| CEAM706/3 | SM71BG/1076 | 0,96 | 4,39 | 20 | CEA706/3 | SM80BG/307PE | 0,84 | 2,89 | 1,67 |
| CEAM706/4 | SM71BG/1096 | 1.30 | 5,91 | 25 | CEA706/4 | SM80BG/311PE | 1,17 | 3,98 | 2,30 |
| CEAM706/5 | SM80BG/1116 | 1,54 | 7,13 | 30 | CEA706/5 | SM80BG/311PE | 1,46 | 4,61 | 2,66 |
| CEAM1206/1 | SM71BG/1056 | 0,84 | 3,87 | 16 | CEA1206/1 | SM71BG/305 | 0,74 | 2,36 | 1,36 |
| CEAM1206/2 | SM71BG/1076 | 1,05 | 4,79 | 20 | CEA1206/2 | SM80BG/307PE | 0,94 | 3,11 | 1,79 |
| CEAM1206/3 | SM71BG/1096 | 1,39 | 6,31 | 25 | CEA1206/3 | SM80BG/311PE | 1,27 | 4,19 | 2,42 |
| CEAM1206/4 | SM80BG/1156 | 1,85 | 8,71 | 40 | CEA1206/4 | SM80BG/315PE | 1,71 | 5,51 | 3,18 |
| CEAM1206/5 | PLM90BG/1226 | 2,24 | 10,6 | 60 | CEA1206/5 | PLM90BG/322 | 2,23 | 7,37 | 4,26 |
| CEAM2106/0 | SM71BG/1076 | 1,06 | 4,85 | 20 | CEA2106/0 | SM80BG/307PE | 0,95 | 3,13 | 1,81 |
| CEAM2106/1 | SM80BG/1116 | 1,50 | 6,98 | 30 | CEA2106/1 | SM80BG/311PE | 1,40 | 4,47 | 2,58 |
| CEAM2106/2 | SM80BG/1156 | 1,90 | 8,87 | 40 | CEA2106/2 | SM80BG/315PE | 1,74 | 5,58 | 3,22 |
| CEAM2106/3 | PLM90BG/1226 | 2,28 | 10,7 | 60 | CEA2106/3 | PLM90BG/322 | 2,27 | 7,46 | 4,31 |
| CEAM2106/4 | PLM90BG/1226 | 2,91 | 13,5 | 60 | CEA2106/4 | PLM90BG/322 | 2,95 | 9,11 | 5,26 |
| CEAM3706/0 | SM80BG/1116 | 1,54 | 7,15 | 30 | CEA3706/0 | SM80BG/311PE | 1,45 | 4,59 | 2,65 |
| CEAM3706/0A | SM80BG/1156 | 1,97 | 9,19 | 40 | CEA3706/0A | SM80BG/315PE | 1,84 | 5,83 | 3,36 |
| CEAM3706/1 | PLM90BG/1226 | 2,41 | 11,3 | 60 | CEA3706/1 | PLM90BG/322 | 2,42 | 7,79 | 4,50 |
| | | | | | CEA3706/2 | PLM90BG/330 | 3,21 | 10,1 | 5,85 |
| | | | | | CEA3706/3 | PLM90BG/330 | 3,92 | 11,9 | 6,89 |

* Maximum value in specified range

cea-2p60-en_e_te

MOTORS FOR CEA-CEA(N) SERIES

Standard supplied IE2/IE3 three-phase surface motors $\geq 0,75$ kW are compliant with Regulation (EC) no. 640/2009 and IEC 60034-30.

Electrical performances according to EN 60034-1.

Insulation class 155 (F). IP55 protection. Condensate drain plugs on standard version.

Cooling by fan according to EN 60034-6.

Cable gland metric size according to EN 50262. Standard voltage:

- **Single-phase** version: 220-230 V 60 Hz (incorporated automatic-reset overload protection).
- **Three-phase** version : 220 V Δ , 380 V Y, 60 Hz (overload protection to be provided by the user).

SINGLE-PHASE MOTORS AT 60 Hz, 2 POLES

| P _N kW | MOTOR TYPE | IEC SIZE | Construction Design | INPUT CURRENT I _n (A) | CAPACITOR | | DATA FOR 220 V 50 Hz VOLTAGE | | | | | | |
|----------------------|--------------|----------|---------------------|-------------------------------------|-----------|-----|------------------------------|---------------------------------|------|------|----------------------|--------------------------------|--------------------------------|
| | | | | | μF | V | min ⁻¹ | I _s / I _n | η % | cosφ | T _n Nm | T _s /T _n | T _m /T _n |
| | | | | | | | | | | | | | |
| 0,55 | SM71BG/1056 | 71 | SPECIAL | 3,68-3,62 | 16 | 450 | 3400 | 4,28 | 70,2 | 0,97 | 1,54 | 0,66 | 2,11 |
| 0,75 | SM71BG/1076 | 71 | | 4,98-4,88 | 20 | 450 | 3380 | 3,90 | 69,8 | 0,98 | 2,12 | 0,64 | 1,91 |
| 0,9 | SM71BG/1096 | 71 | | 6,04-5,96 | 25 | 450 | 3370 | 3,80 | 72,9 | 0,98 | 2,69 | 0,58 | 1,86 |
| 1,1 | SM80BG/1116 | 80 | | 6,94-6,89 | 30 | 450 | 3435 | 4,54 | 74,2 | 0,97 | 3,06 | 0,62 | 2,03 |
| 1,5 | SM80BG/1156 | 80 | | 9,28-9,35 | 40 | 450 | 3455 | 4,91 | 76,3 | 0,96 | 4,14 | 0,49 | 2,19 |
| 1,85 | PLM90BG/1226 | 90 | | 12,3-11,7 | 60 | 450 | 3455 | 4,99 | 83,4 | 0,98 | 6,08 | 0,54 | 2,06 |
| 2,2 | PLM90BG/1226 | 90 | | 12,3-11,7 | 60 | 450 | 3455 | 4,99 | 83,4 | 0,98 | 6,08 | 0,54 | 2,06 |

cea-motm-2p60-en_a_te

THREE-PHASE MOTORS AT 60 Hz, 2 POLES

| P _N kW | Efficiency η _N % | | | | | | | | | | | | IE | Year of construction | | |
|----------------------|--------------------------------|------|------|--------------------|------|------|--------------------|------|------|--------------------|------|------|----|----------------------|---|--------------|
| | Δ 220 V Y 380 V | | | Δ 230 V Y 400 V | | | Δ 380 V Y 660 V | | | Δ 400 V Y 690 V | | | | | | |
| | 4/4 | 3/4 | 2/4 | 4/4 | 3/4 | 2/4 | 4/4 | 3/4 | 2/4 | 4/4 | 3/4 | 2/4 | | | | |
| 0,55 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 | By June 2011 |
| 0,75 | 83,4 | 82,4 | 79,0 | 83,4 | 82,4 | 79,0 | 83,4 | 82,4 | 79,0 | 83,4 | 82,4 | 79,0 | | | | |
| 0,9 | 85,6 | 85,0 | 82,1 | 85,6 | 85,0 | 82,1 | 85,6 | 85,0 | 82,1 | 85,6 | 85,0 | 82,1 | | | | |
| 1,1 | 85,6 | 85,0 | 82,1 | 85,6 | 85,0 | 82,1 | 85,6 | 85,0 | 82,1 | 85,6 | 85,0 | 82,1 | | | | |
| 1,5 | 87,2 | 87,0 | 84,6 | 87,2 | 87,0 | 84,6 | 87,2 | 87,0 | 84,6 | 87,2 | 87,0 | 84,6 | | | | |
| 1,85 | 85,5 | 85,5 | 84,5 | 85,5 | 85,5 | 84,5 | 85,5 | 85,5 | 84,5 | 85,5 | 85,5 | 84,5 | | | | |
| 2,2 | 85,5 | 85,5 | 84,5 | 85,5 | 85,5 | 84,5 | 85,5 | 85,5 | 84,5 | 85,5 | 85,5 | 84,5 | | | | |
| 3 | 87,8 | 88,0 | 86,0 | 87,8 | 88,0 | 86,0 | 87,8 | 88,0 | 86,0 | 87,8 | 88,0 | 86,0 | | | | |

| P _N kW | Manufacturer | | IEC SIZE | Construction Design | N. of Poles | f _N Hz | Data for 380 V / 60 Hz | | | | |
|----------------------|---|--|----------|---------------------|-------------|----------------------|------------------------|---------------------------------|----------------------|--------------------------------|--------------------------------|
| | Lowara srl Unipersonale Reg. No. 03471820260 Montecchio Maggiore Vicenza - Italia | | | | | | cosφ | I _s / I _n | T _N Nm | T _s /T _N | T _m /T _n |
| | Model | | | | | | | | | | |
| 0,55 | SM71BG /305 | | 71 | SPECIAL | 2 | 60 | 0,84 | 5,83 | 1,55 | 3,09 | 2,77 |
| 0,75 | SM80BG /307 PE | | 80 | | | | 0,79 | 8,25 | 2,05 | 3,80 | 4,02 |
| 0,9 | SM80BG /311 PE | | 80 | | | | 0,80 | 9,11 | 3,01 | 4,15 | 4,29 |
| 1,1 | SM80BG /311 PE | | 80 | | | | 0,80 | 9,11 | 3,01 | 4,15 | 4,29 |
| 1,5 | SM80BG /315 PE | | 80 | | | | 0,82 | 9,79 | 4,10 | 4,36 | 4,37 |
| 1,85 | PLM90BG /322 | | 90 | | | | 0,83 | 9,59 | 6,00 | 3,80 | 4,02 |
| 2,2 | PLM90BG /322 | | 90 | | | | 0,83 | 9,59 | 6,00 | 3,80 | 4,02 |
| 3 | PLM90BG /330 | | 90 | | | | 0,84 | 9,12 | 8,22 | 3,52 | 3,65 |

| P _N kW | Voltage U _N V | | | | | | | | n _N min ⁻¹ | Operating conditions ** | | |
|----------------------|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------------------------------------|---------------------------|-------------------------|------|
| | Δ | | Y | | Δ | | Y | | | Altitudine s.l.m. m | T. amb min/max °C | ATEX |
| | 220 V | 230 V | 380 V | 400 V | 380 V | 400 V | 660 V | 690 V | | | | |
| 0,55 | 2,37 | 2,30 | 1,37 | 1,33 | - | - | - | - | 3380 ÷ 3415 | See note. 1000 VI | -15 / 40 | No |
| 0,75 | 3,03 | 3,01 | 1,75 | 1,74 | 1,75 | 1,74 | 1,01 | 1,00 | 3490 ÷ 3500 | | | |
| 0,9 | 4,24 | 4,24 | 2,45 | 2,45 | 2,44 | 2,43 | 1,41 | 1,40 | 3490 ÷ 3505 | | | |
| 1,1 | 4,24 | 4,24 | 2,45 | 2,45 | 2,44 | 2,43 | 1,41 | 1,40 | 3490 ÷ 3505 | | | |
| 1,5 | 5,58 | 5,53 | 3,22 | 3,19 | 3,23 | 3,22 | 1,86 | 1,86 | 3485 ÷ 3505 | | | |
| 1,85 | 8,14 | 8,12 | 4,70 | 4,69 | 4,69 | 4,68 | 2,71 | 2,70 | 3495 ÷ 3505 | | | |
| 2,2 | 8,14 | 8,12 | 4,70 | 4,69 | 4,69 | 4,68 | 2,71 | 2,70 | 3495 ÷ 3505 | | | |
| 3 | 10,7 | 10,5 | 6,19 | 6,06 | 6,20 | 6,11 | 3,58 | 3,53 | 3480 ÷ 3495 | | | |

Note: Observe the regulations and codes locally in force regarding sorted waste disposal.

cea-ie2-mott-2p60-en_b_te

** Operating conditions to be referred to motor only. About electric pump, refer to limits in user's manual.

AVAILABLE VOLTAGES MOTORS FOR CEA-CEA(N) SERIES

| P _N kW | IEC SIZE | SINGLE-PHASE | | | | | | | |
|----------------------|----------|--------------|---------|-------------|-------------|---------|-------------|-------------|-------------|
| | | 50 Hz | | | | 60 Hz | | | |
| | | 1 x 220-240 | 1 x 100 | 1 x 110-120 | 1 x 220-230 | 1 x 100 | 1 x 110-115 | 1 x 120-127 | 1 x 200-210 |
| 0,4 | 63 | s | o | o | s | - | o | - | - |
| 0,55 | 71 | s | o | o | s | o | o | o | o |
| 0,75 | 71 | s | o | o | s | o | o | o | o |
| 0,95 | 71 | s | o | o | s | o | o | o | o |
| 1,1 | 80 | s | - | o | s | - | o | - | o |
| 1,5 | 80 | s | - | - | s | - | o | - | o |
| 2,2 | 90 | s | - | - | s | - | - | - | - |

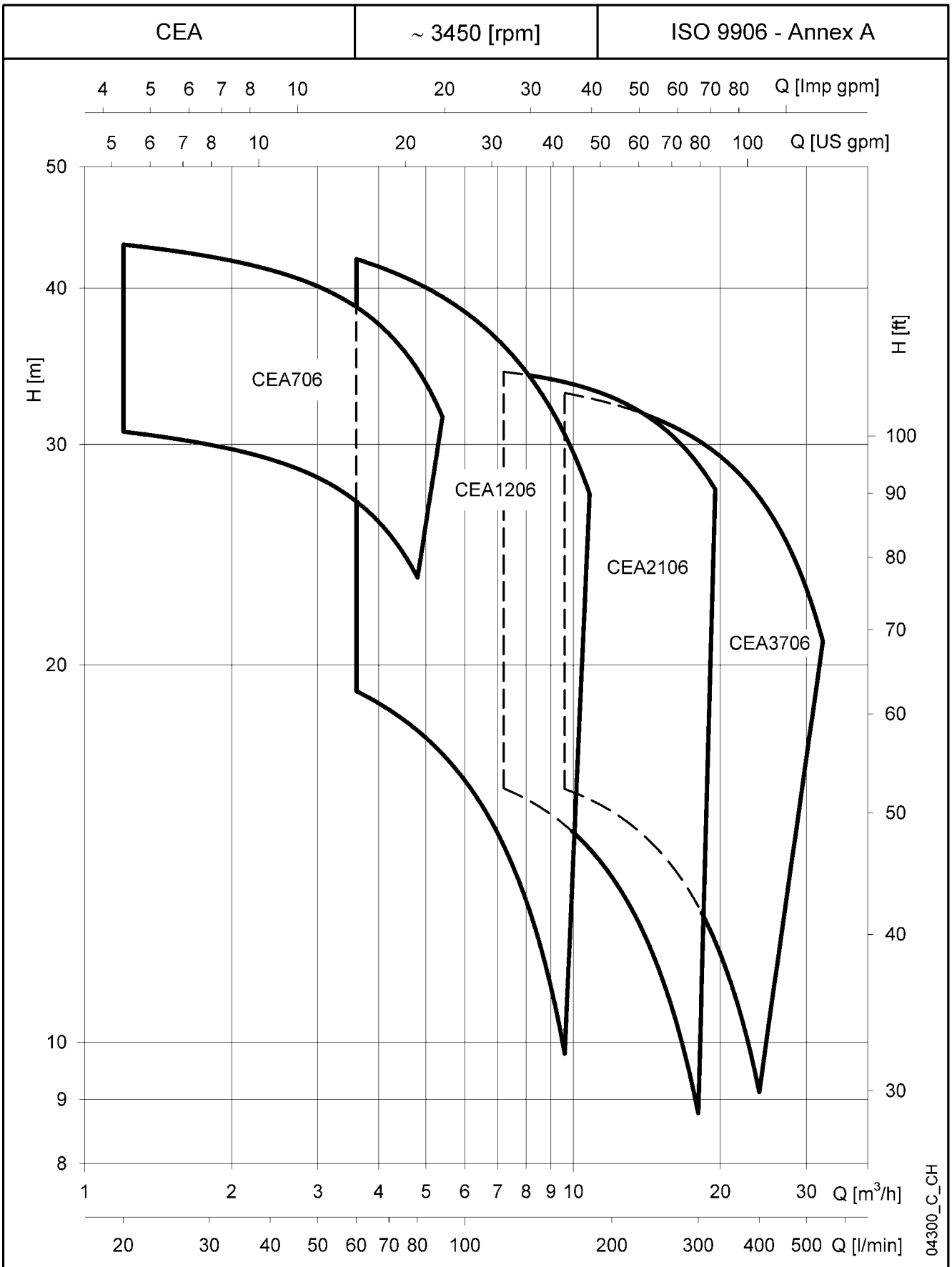
s = Standard voltage o = Optional voltage

| P _N kW | THREE-PHASE - 2 POLES | | | | | | | | | | | | | | | | | |
|----------------------|-----------------------------|-------------------------|---------------------|---------------------|---------------------|---------------|---------------|---------------------|-----------------------------|---------------------|-------------------|---------------------|---------------------|---------------------|-----------|-------------------|-------------------|-------------------|
| | 50 Hz | | | | | | 60 Hz | | | | | | 50/60 Hz | | | | | |
| | 3 x 220-230-240/380-400-415 | 3 x 380-400-415/660-690 | 3 x 200-208/346-360 | 3 x 255-265/440-460 | 3 x 290-300/500-525 | 3 x 440-460/- | 3 x 500-525/- | 3 x 220-230/380-400 | 3 x 255-265-277/440-460-480 | 3 x 380-400/660-690 | 3 x 440-460-480/- | 3 x 110-115/190-200 | 3 x 200-208/346-360 | 3 x 330-346/575-600 | 3 x 575/- | 3 x 230/400 50 Hz | 3 x 265/460 60 Hz | 3 x 400/690 50 Hz |
| 0,4 | s | o | o | o | o | o | s | o | o | o | o | o | o | o | o | o | o | o |
| 0,55 | s | o | o | o | o | o | s | o | o | o | o | o | o | o | o | o | o | o |
| 0,75 | s | o | o | o | o | o | s | o | o | o | o | o | o | o | o | o | o | o |
| 0,95 | s | o | o | o | o | o | s | o | o | o | o | o | o | o | o | o | o | o |
| 1,1 | s | o | o | o | o | o | s | o | o | o | o | o | o | o | o | o | o | o |
| 1,5 | s | o | o | o | o | o | s | o | o | o | o | o | o | o | o | o | o | o |
| 2,2 | s | o | o | o | o | o | s | o | o | o | o | o | o | o | o | o | o | o |
| 3 | s | o | o | o | o | o | s | o | o | o | o | o | o | o | o | o | o | o |

- = Not available

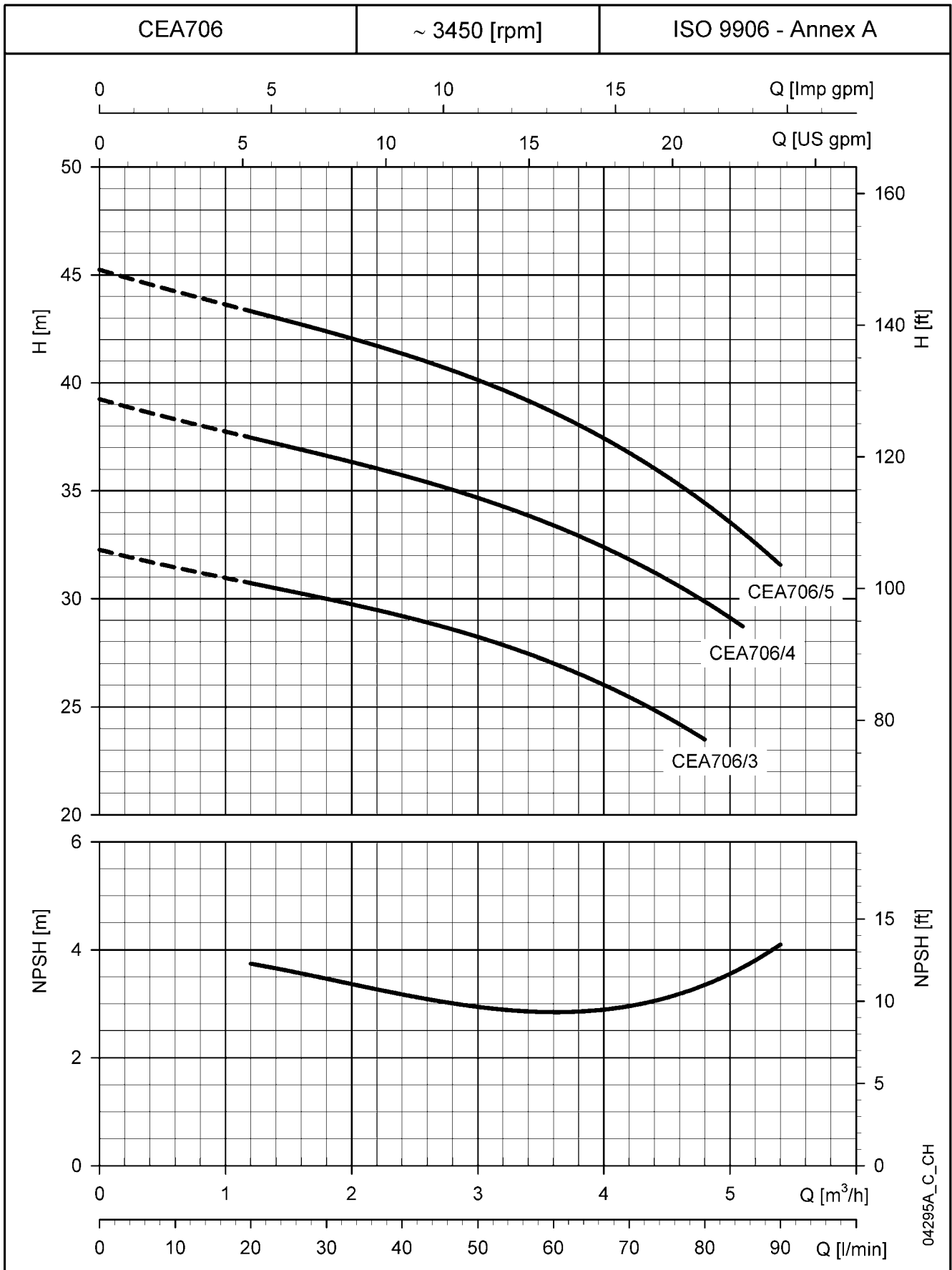
cea-volt-low-a-en_a_te

**CEA-CEA(N) SERIES
HYDRAULIC PERFORMANCE RANGE AT 60 Hz, 2 POLES**



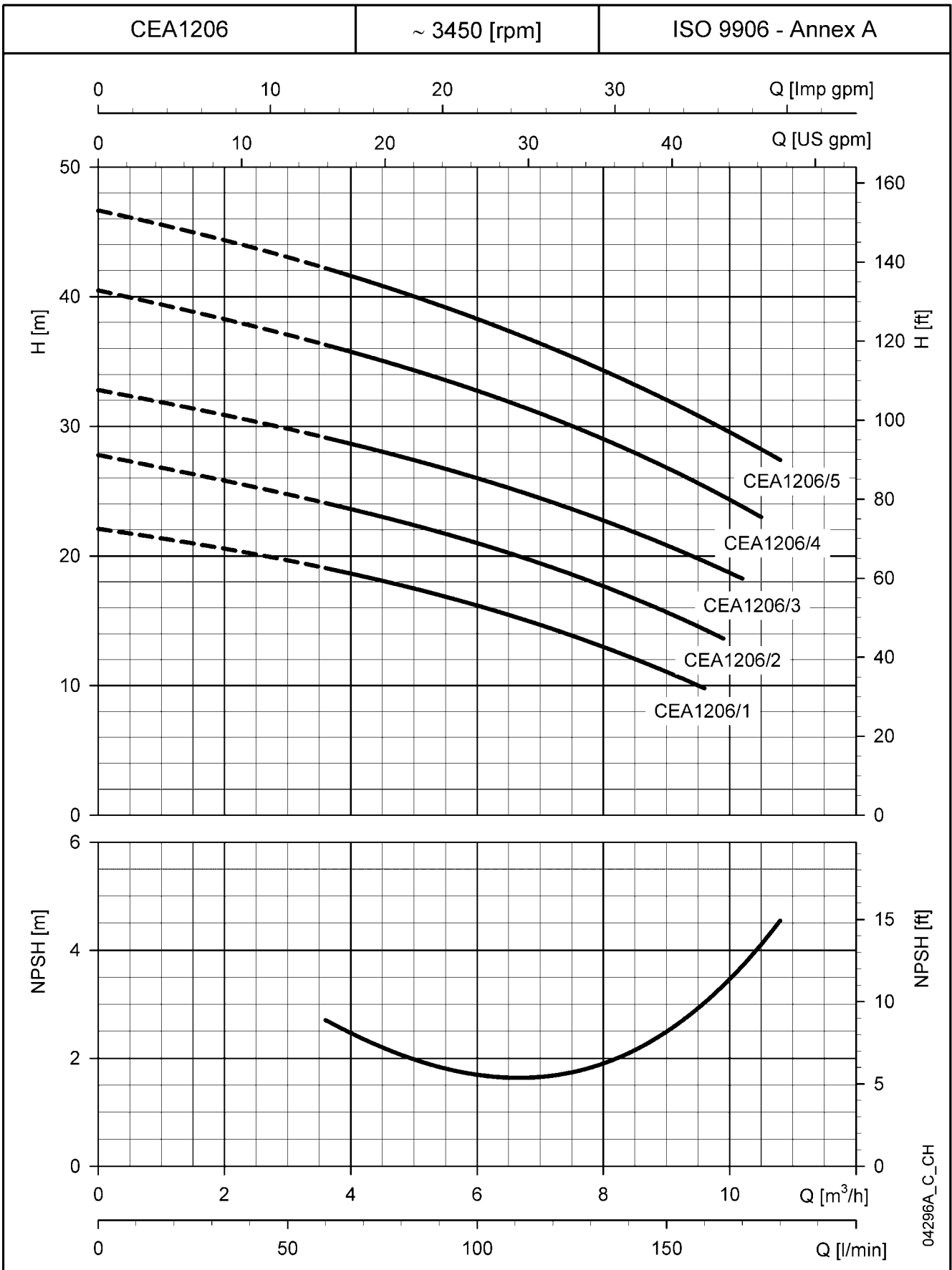
04300_C_CH

**CEA706 SERIES
OPERATING CHARACTERISTICS AT 60 Hz, 2 POLES**



These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.

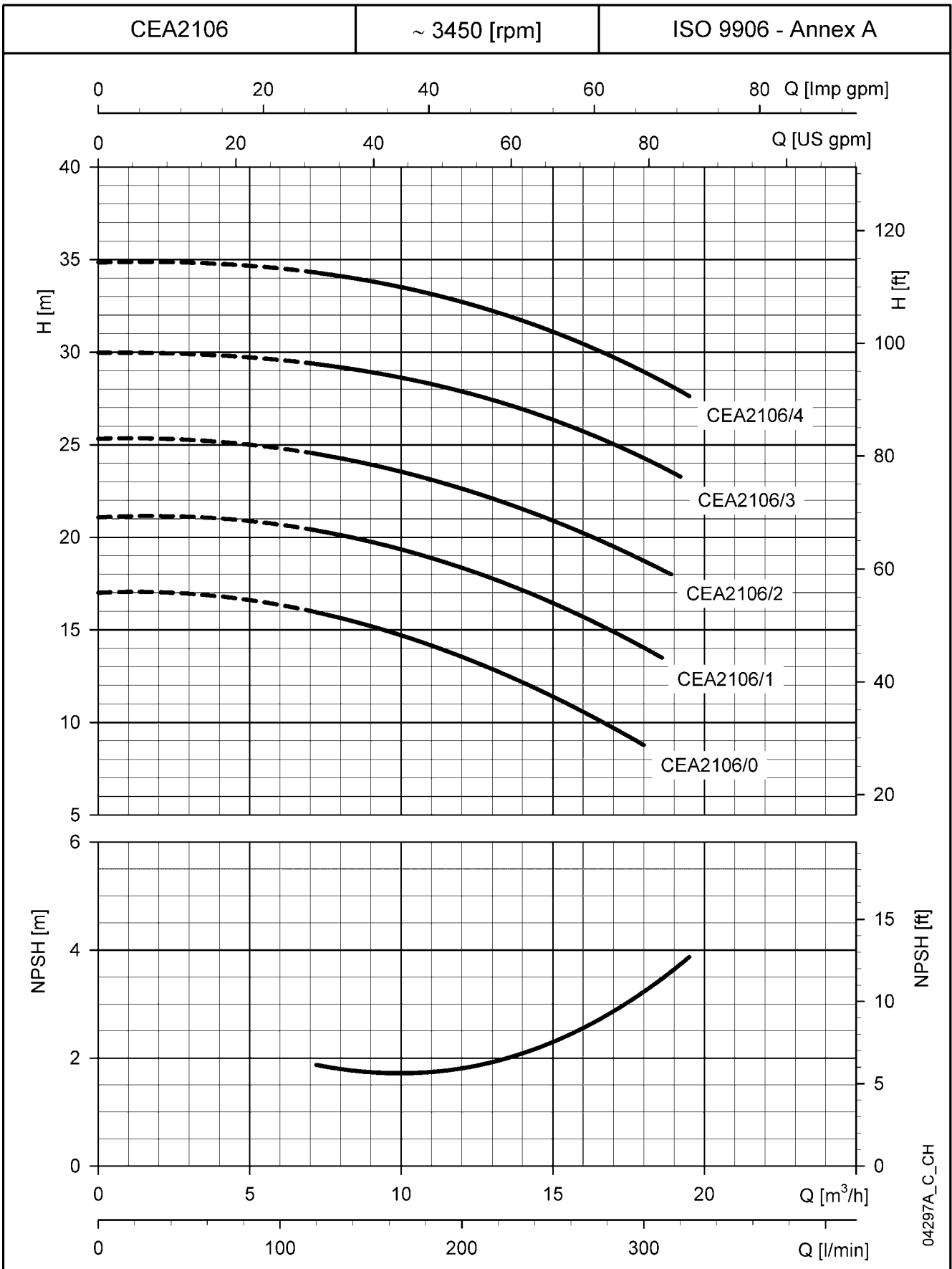
**CEA1206 SERIES
OPERATING CHARACTERISTICS AT 60 Hz, 2 POLES**



04296A_C_CH

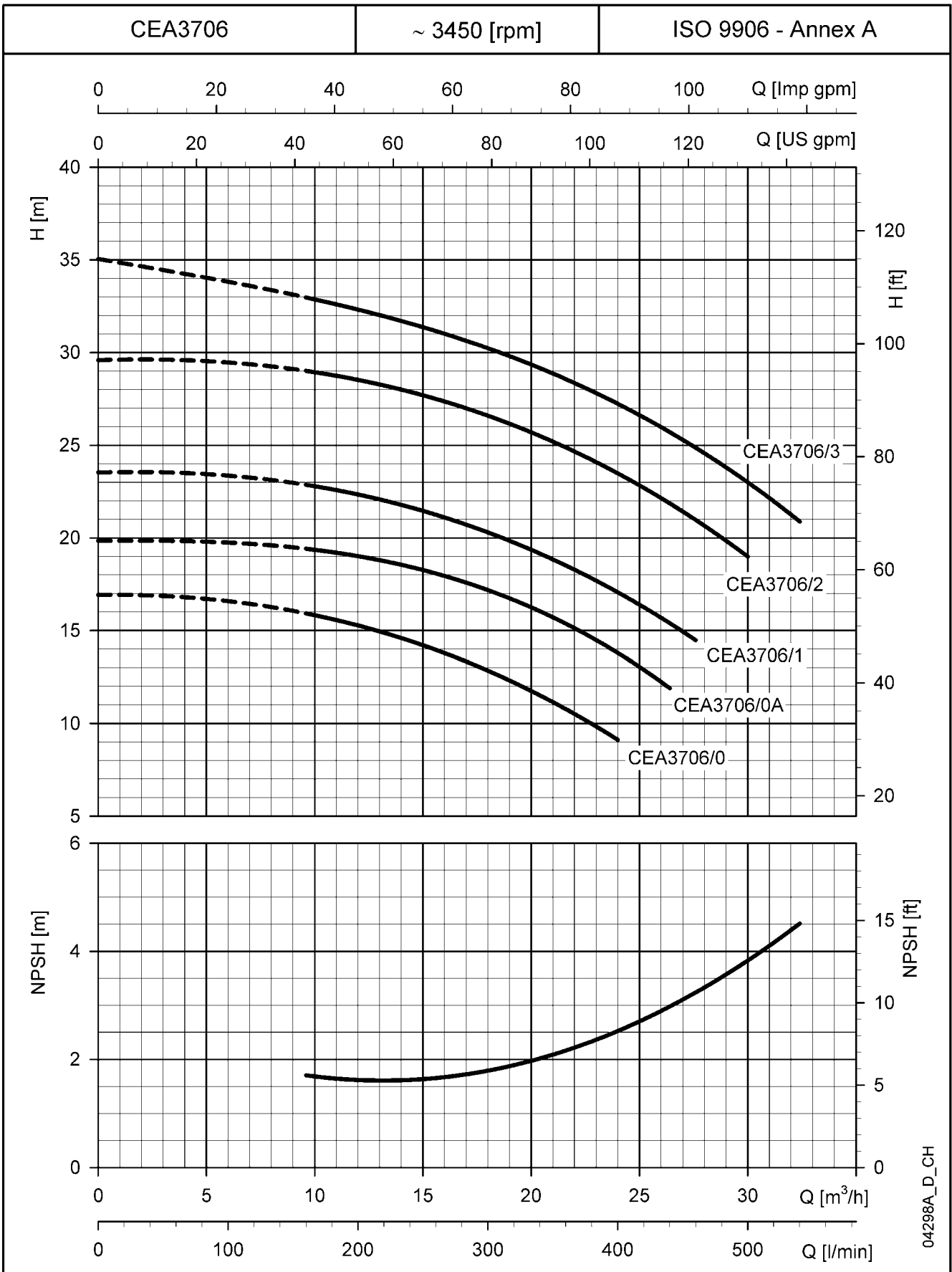
These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.

**CEA2106 SERIES
OPERATING CHARACTERISTICS AT 60 Hz, 2 POLES**



These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.

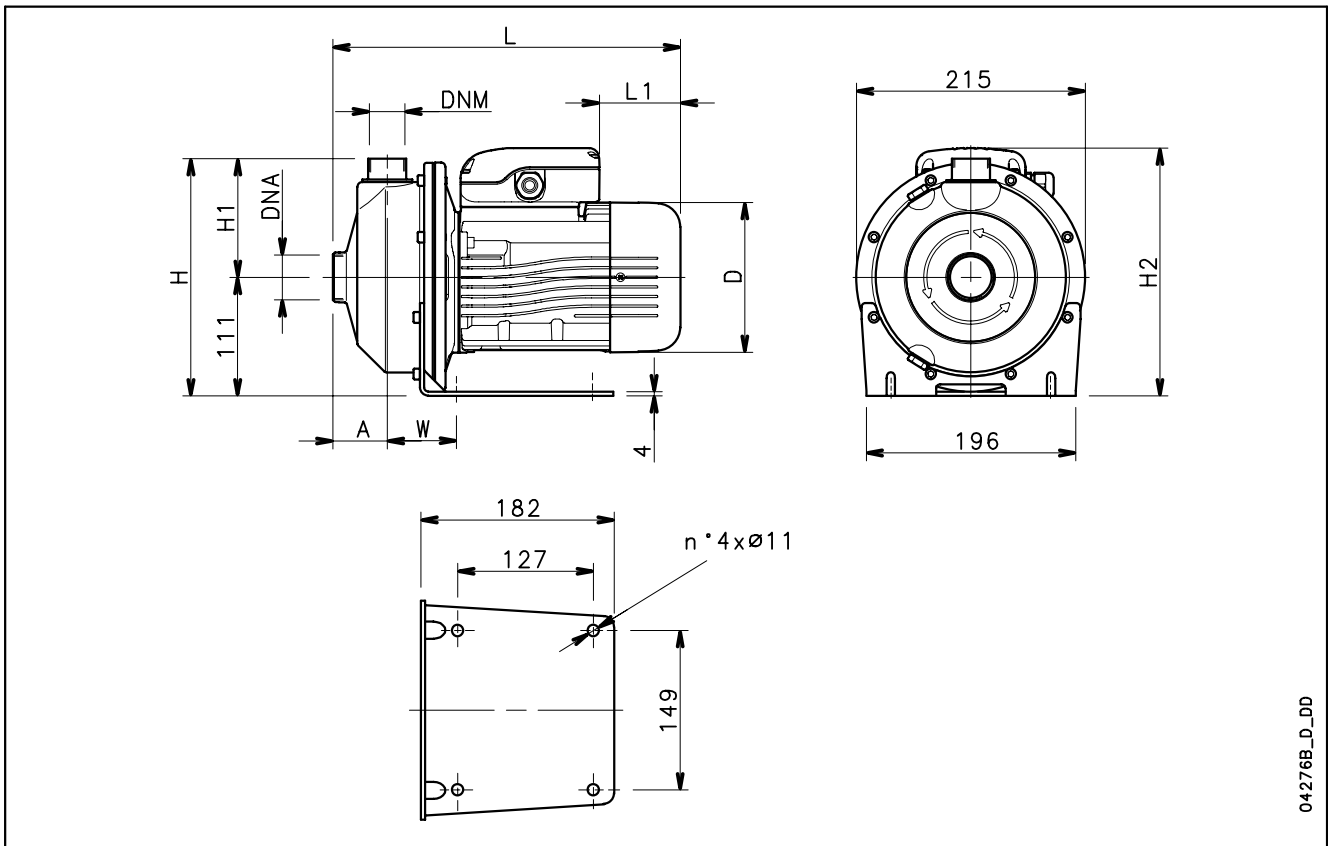
**CEA3706 SERIES
OPERATING CHARACTERISTICS AT 60 Hz, 2 POLES**



04298A_D_CH

These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.

CEA-CEA(N) SERIES DIMENSIONS AND WEIGHTS AT 60 Hz, 2 POLES



04276B_D_DD

| PUMP TYPE | DIMENSIONS (mm) | | | | | | | | DNA | DNM | WEIGHT kg |
|----------------|-----------------|-----|-----|-----|-----|-----|-----|----|-------|-------|--------------|
| | A | D | H | H1 | H2 | L | L1 | W | | | |
| CEAM 706/3/A | 51 | 140 | 222 | 111 | 232 | 325 | 76 | 65 | Rp 1¼ | Rp 1 | 12,8 |
| CEAM 706/4/A | 51 | 140 | 222 | 111 | 241 | 325 | 31 | 65 | Rp 1¼ | Rp 1 | 13 |
| CEAM 706/5/A | 51 | 156 | 222 | 111 | 248 | 371 | 69 | 65 | Rp 1¼ | Rp 1 | 14,5 |
| CEAM 1206/1/A | 51 | 140 | 222 | 111 | 232 | 325 | 76 | 65 | Rp 1¼ | Rp 1 | 11,7 |
| CEAM 1206/2/A | 51 | 140 | 222 | 111 | 232 | 325 | 76 | 65 | Rp 1¼ | Rp 1 | 11,7 |
| CEAM 1206/3/A | 51 | 140 | 222 | 111 | 241 | 325 | 31 | 65 | Rp 1¼ | Rp 1 | 11,7 |
| CEAM 1206/4/A | 51 | 156 | 222 | 111 | 248 | 371 | 69 | 65 | Rp 1¼ | Rp 1 | 16,7 |
| CEAM 1206/5/P | 51 | 174 | 222 | 111 | 262 | 416 | 84 | 65 | Rp 1¼ | Rp 1 | 24,4 |
| CEAM 2106/0/A | 54 | 140 | 224 | 113 | 232 | 339 | 76 | 76 | Rp 1½ | Rp 1¼ | 12,8 |
| CEAM 2106/1/A | 54 | 156 | 224 | 113 | 248 | 385 | 69 | 76 | Rp 1½ | Rp 1¼ | 16,8 |
| CEAM 2106/2/A | 54 | 156 | 224 | 113 | 248 | 385 | 69 | 76 | Rp 1½ | Rp 1¼ | 17 |
| CEAM 2106/3/P | 54 | 174 | 224 | 113 | 262 | 429 | 84 | 76 | Rp 1½ | Rp 1¼ | 24,6 |
| CEAM 2106/4/P | 54 | 174 | 224 | 113 | 262 | 429 | 84 | 76 | Rp 1½ | Rp 1¼ | 25 |
| CEAM 3706/0/A | 54 | 156 | 224 | 113 | 248 | 385 | 69 | 76 | Rp 2 | Rp 1¼ | 15 |
| CEAM 3706/0A/A | 54 | 156 | 224 | 113 | 248 | 385 | 69 | 76 | Rp 2 | Rp 1¼ | 21 |
| CEAM 3706/1/P | 54 | 174 | 224 | 113 | 262 | 429 | 84 | 76 | Rp 2 | Rp 1¼ | 26 |
| CEA 706/3/D | 51 | 155 | 222 | 111 | 240 | 371 | 114 | 65 | Rp 1¼ | Rp 1 | 13 |
| CEA 706/4/D | 51 | 155 | 222 | 111 | 240 | 371 | 114 | 65 | Rp 1¼ | Rp 1 | 14,6 |
| CEA 706/5/D | 51 | 155 | 222 | 111 | 240 | 371 | 114 | 65 | Rp 1¼ | Rp 1 | 16,3 |
| CEA 1206/1/A | 51 | 140 | 222 | 111 | 232 | 325 | 76 | 65 | Rp 1¼ | Rp 1 | 11,5 |
| CEA 1206/2/D | 51 | 155 | 222 | 111 | 240 | 371 | 114 | 65 | Rp 1¼ | Rp 1 | 14,2 |
| CEA 1206/3/D | 51 | 155 | 222 | 111 | 240 | 371 | 114 | 65 | Rp 1¼ | Rp 1 | 15 |
| CEA 1206/4/D | 51 | 155 | 222 | 111 | 240 | 371 | 114 | 65 | Rp 1¼ | Rp 1 | 16,2 |
| CEA 1206/5/C | 51 | 174 | 222 | 111 | 245 | 416 | 172 | 65 | Rp 1¼ | Rp 1 | 20,3 |
| CEA 2106/0/D | 54 | 155 | 224 | 113 | 240 | 385 | 114 | 76 | Rp 1½ | Rp 1¼ | 14 |
| CEA 2106/1/D | 54 | 155 | 224 | 113 | 240 | 385 | 114 | 76 | Rp 1½ | Rp 1¼ | 16 |
| CEA 2106/2/D | 54 | 155 | 224 | 113 | 240 | 385 | 114 | 76 | Rp 1½ | Rp 1¼ | 17,7 |
| CEA 2106/3/C | 54 | 174 | 224 | 113 | 245 | 429 | 172 | 76 | Rp 1½ | Rp 1¼ | 21,8 |
| CEA 2106/4/C | 54 | 174 | 224 | 113 | 245 | 429 | 172 | 76 | Rp 1½ | Rp 1¼ | 22,2 |
| CEA 3706/0/D | 54 | 155 | 224 | 113 | 240 | 385 | 114 | 76 | Rp 2 | Rp 1¼ | 16 |
| CEA 3706/0A/D | 54 | 155 | 224 | 113 | 240 | 385 | 114 | 76 | Rp 2 | Rp 1¼ | 17,7 |
| CEA 3706/1/C | 54 | 174 | 224 | 113 | 245 | 429 | 172 | 76 | Rp 2 | Rp 1¼ | 22,2 |
| CEA 3706/2/P | 54 | 174 | 224 | 113 | 245 | 429 | 172 | 76 | Rp 2 | Rp 1¼ | 23 |
| CEA 3706/3/P | 54 | 174 | 224 | 113 | 245 | 429 | 172 | 76 | Rp 2 | Rp 1¼ | 24 |

cea-2p60-en_f_td

Twin-Impeller Centrifugal Electric Pumps

CA-CA(N) 60 Hz Series

MARKET SECTORS

CIVIL, AGRICULTURAL, INDUSTRIAL.

APPLICATIONS

- Handling of chemically and mechanically non-aggressive water and liquids (*).
- Water supply.
- Irrigation.
- Water circulation (cold, hot, refrigerated).

* For moderately aggressive liquids, a version with FPM elastomers is available (CA../..V). For very aggressive liquids, please contact our sales network.

On request "N" Version made of AISI 316 (for aggressive liquids)

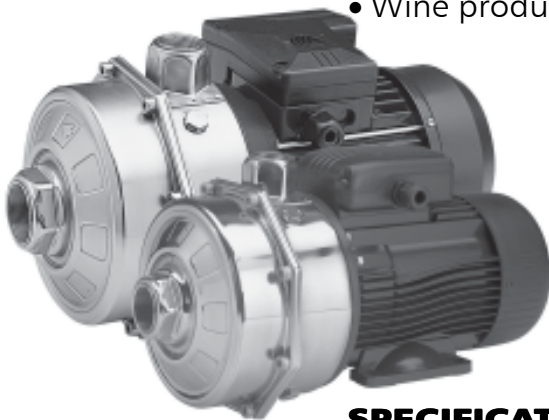
- Reverse osmosis (where demineralized water is used).
- Industrial washing.
- Thermal waters.
- Chlorine dispensing in swimming pools.
- Jewellery industry.
- Wine production.

up to 1,5 kW. For higher powers, the overload protection must be provided and installed by the user in the control panel.

Three-phase version:

220-230/380-400 V, 60 Hz, 2 poles, the overload protection must be provided and installed by the user in the control panel.

- Condensate drain plug in the standard version.



SPECIFICATIONS PUMP

- **Delivery:** up to 210 l/min (12,5 m³/h).
- **Head:** up to 64 m.
- **Temperature** of pumped liquid: -10°C to 85°C standard version. -10°C to +110°C (N and V versions).
- **Maximum** operating pressure: 8 bar (PN 8).
- Counterclockwise rotation facing the pump from the suction port.

MOTOR

- Asynchronous, squirrel cage rotor, closed construction, external ventilation.
- **Protection class:** IP55.
- **Insulation:** class 155 (F).
- Performances to EN 60034-1 specification.
- **Standard voltage:** **Single-phase** versions: 220-230 V, 60 Hz, 2 poles, with automatic reset overload protection

CONSTRUCTION CHARACTERISTICS

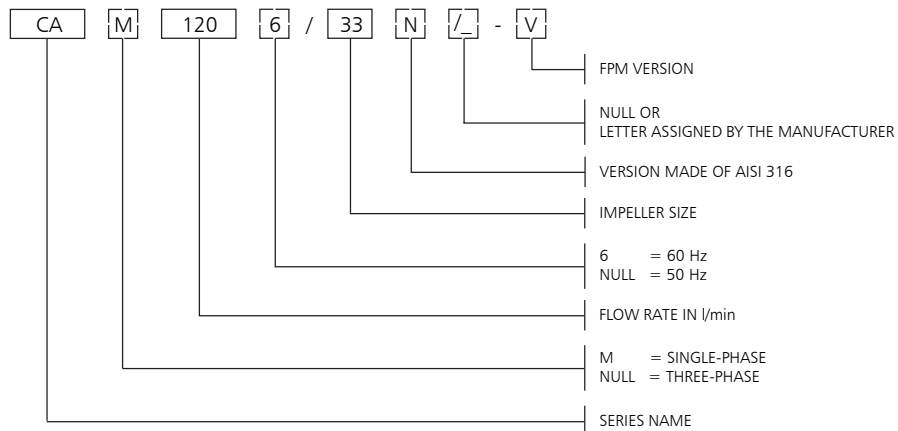
- Close-coupled, single-impeller centrifugal pump featuring axial suction and radial discharge.
- Compact construction, with pump coupled directly to motor; special motor shaft extension supported by ball bearings.
- Rotating assembly has back pull-out design, no need to disconnect the pump body from the pipe line.
- Threaded suction and discharge ports (Rp ISO 7).
- High performance closed **impeller** made of AISI 304 stainless steel.
- **Mechanical seal** with ceramic/carbon rings, NBR elastomers, other parts are made of AISI 304 stainless steel. Mounting dimensions according to EN 12756 (ex DIN 24960) and ISO 3069.
- **NBR O-rings**
- Mounting pedestal.

OPTIONAL FEATURES

- Different voltages and frequencies.
- Different materials for the mechanical seal and O-rings.

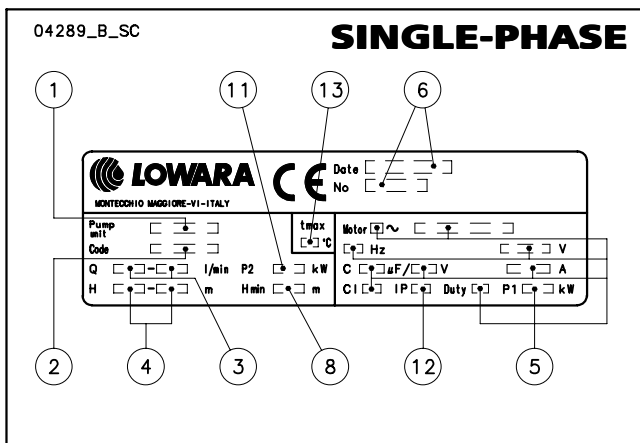
□ **Standard supplied IE2/IE3 motors are compliant with Regulation (EC) no. 640/2009.**

CA-CA(N) SERIES IDENTIFICATION CODE

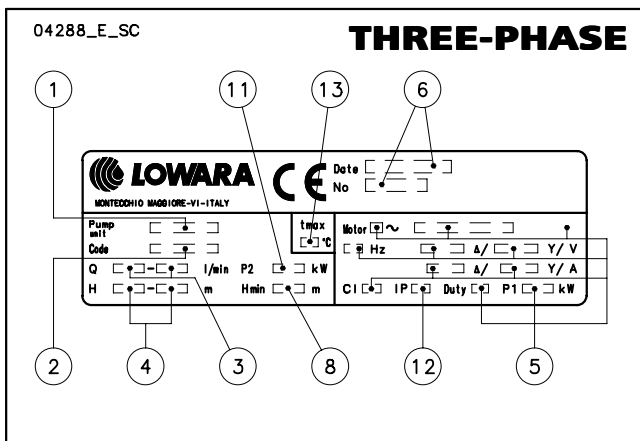
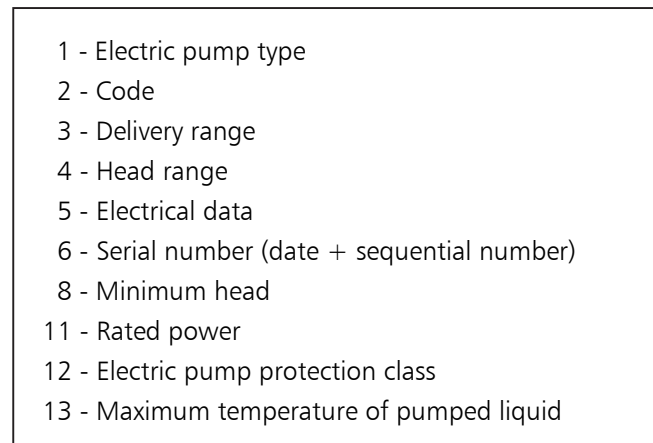


EXAMPLE : CAM 1206/33-V
 CA series electric pump, single-phase, flow rate 120 l/min
 60 Hz, Impeller size 33, FPM version.

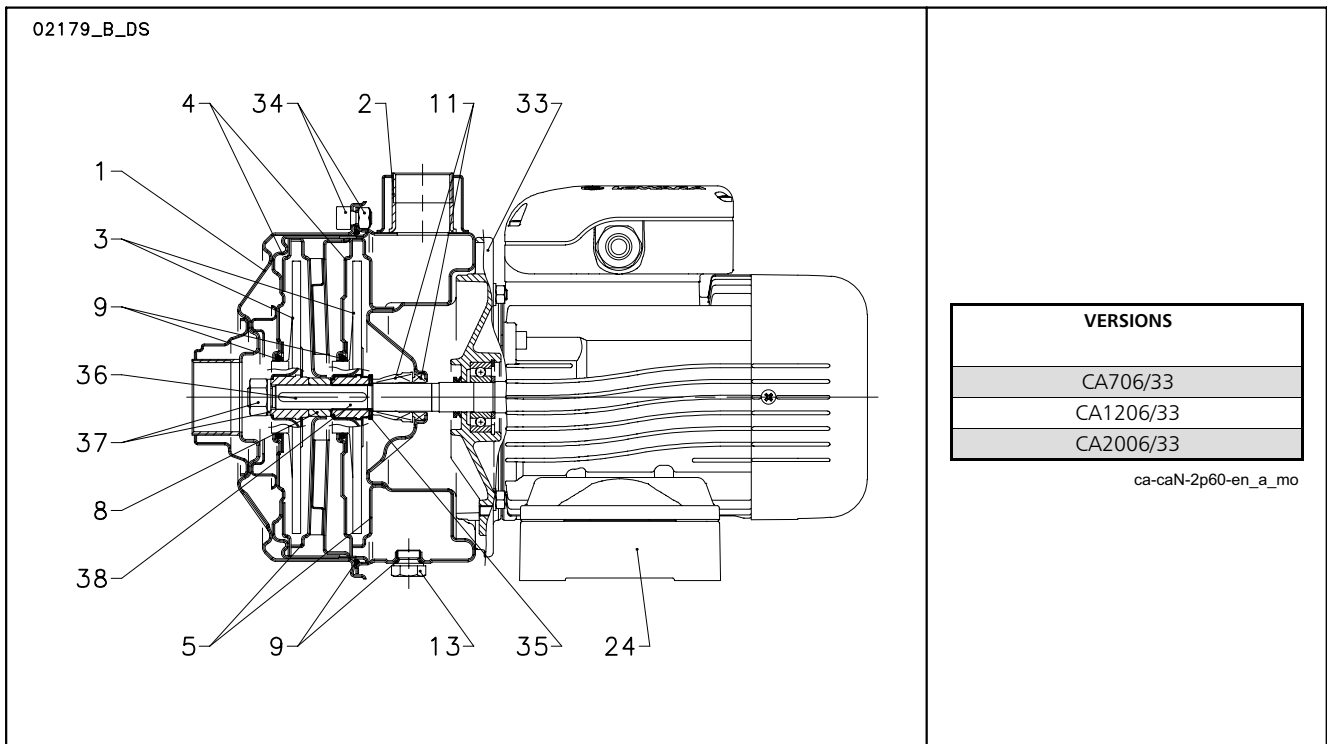
RATING PLATE



LEGEND



CA - CA(N) SERIES LIST OF MODELS AND TABLE OF MATERIALS



CA SERIES TABLE OF MATERIALS

| REF. N. | PART | MATERIAL | REFERENCE STANDARDS | |
|---------|------------------------------------|---|-------------------------------------|----------|
| | | | EUROPE | USA |
| 1 | Suction flange | Stainless steel | EN 10088-1-X5CrNi18-10 (1.4301) | AISI 304 |
| 2 | Pump body | Stainless steel | EN 10088-1-X5CrNi18-10 (1.4301) | AISI 304 |
| 3 | Impeller | Stainless steel | EN 10088-1-X5CrNi18-10 (1.4301) | AISI 304 |
| 4 | Diffuser cover | Stainless steel | EN 10088-1-X5CrNi18-10 (1.4301) | AISI 304 |
| 5 | Diffuser | Stainless steel | EN 10088-1-X5CrNi18-10 (1.4301) | AISI 304 |
| 8 | Impeller spacer | Stainless steel | EN 10088-1-X5CrNi18-10 (1.4301) | AISI 304 |
| 9 | Elastomers | NBR (standard version) | | |
| 11 | Mechanical seal | Ceramic / Carbon / NBR (standard version) | | |
| 13 | Fill/drain plugs | Stainless steel | EN 10088-1-X5CrNiMo17-12-2 (1.4401) | AISI 316 |
| 24 | Mounting pedestal | Aluminium | EN 1706-AC-AISI11Cu2 (Fe) (AC46100) | - |
| 33 | Adapter | Aluminium | EN 1706-AC-AISI11Cu2 (Fe) (AC46100) | - |
| 34 | Pump body fastening nuts and bolts | Zinc-plated steel | | |
| 35 | Impeller shoulder washer | Stainless steel | EN 10088-1-X5CrNi18-10 (1.4301) | AISI 304 |
| 36 | Key | Stainless steel | EN 10088-1-X5CrNiMo17-12-2 (1.4401) | AISI 316 |
| 37 | Impeller lock nut and washer | Stainless steel | EN 10088-1-X5CrNi18-10 (1.4301) | AISI 304 |
| 38 | Shaft extension | Stainless steel | EN 10088-1-X5CrNiMo17-12-2 (1.4401) | AISI 316 |

CA(N) SERIES TABLE OF MATERIALS (ON REQUEST)

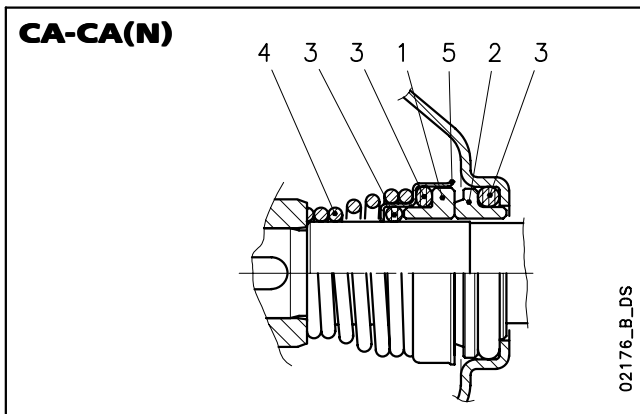
ca-ca-en_b_tm

| REF. N. | PART | MATERIAL | REFERENCE STANDARDS | |
|---------|------------------------------------|--|-------------------------------------|-----------|
| | | | EUROPE | USA |
| 1 | Suction flange | Stainless steel | EN 10088-1-X2CrNiMo17-12-2 (1.4404) | AISI 316L |
| 2 | Pump body | Stainless steel | EN 10088-1-X2CrNiMo17-12-2 (1.4404) | AISI 316L |
| 3 | Impeller | Stainless steel | EN 10088-1-X2CrNiMo17-12-2 (1.4404) | AISI 316L |
| 4 | Diffuser cover | Stainless steel | EN 10088-1-X2CrNiMo17-12-2 (1.4404) | AISI 316L |
| 5 | Diffuser | Stainless steel | EN 10088-1-X2CrNiMo17-12-2 (1.4404) | AISI 316L |
| 8 | Impeller spacer | Stainless steel | EN 10088-1-X5CrNiMo17-12-2 (1.4401) | AISI 316 |
| 9 | Elastomers | EPDM (standard version) | | |
| 11 | Mechanical seal | Ceramic / Carbon / EPDM (standard version) | | |
| 13 | Fill/drain plugs | Stainless steel | EN 10088-1-X5CrNiMo17-12-2 (1.4401) | AISI 316 |
| 24 | Mounting pedestal | Aluminium | EN 1706-AC-AISI11Cu2 (Fe) (AC46100) | - |
| 33 | Adapter | Aluminium | EN 1706-AC-AISI11Cu2 (Fe) (AC46100) | - |
| 34 | Pump body fastening nuts and bolts | Zinc-plated steel | | |
| 35 | Impeller shoulder washer | Stainless steel | EN 10088-1-X2CrNiMo17-12-2 (1.4404) | AISI 316L |
| 36 | Key | Stainless steel | EN 10088-1-X5CrNiMo17-12-2 (1.4401) | AISI 316 |
| 37 | Impeller lock nut and washer | Stainless steel | EN 10088-1-X5CrNiMo17-12-2 (1.4401) | AISI 316 |
| 38 | Shaft extension | Stainless steel | EN 10088-1-X5CrNiMo17-12-2 (1.4401) | AISI 316 |

ca-caN-en_a_tm

CA-CA(N) MECHANICAL SEAL, ACCORDING TO EN 12756

Mechanical seal with mounting dimensions according to EN12756 (ex DIN 24960) and ISO 3069.



CA-CA(N) LIST OF MATERIALS

| POSITION 1 - 2 | POSITION 3 | POSITION 4 - 5 |
|---|-----------------|---------------------|
| B : Resin impregnated carbon | P : NBR | F : AISI 304 |
| C : Special resin impregnated carbon | E : EPDM | G : AISI 316 |
| Q₁ : Silicon carbide | V : FPM | |
| U₃ : Tungsten carbide | | |
| V : Ceramic | | |

cea-ca_ten-mec-en_b_tm

CA MECHANICAL SEALS

| TYPE | POSITION | | | | | TEMPERATURE (°C) |
|---------------------------------------|------------------------|---------------------|-----------------|--------------|-----------------------|---------------------|
| | 1 ROTATING ASSEMBLY | 2 FIXED ASSEMBLY | 3 ELASTOMERS | 4 SPRINGS | 5 OTHER COMPONENTS | |
| STANDARD MECHANICAL SEAL | | | | | | |
| VBPGF | V | B | P | G | F | -10 +85 |
| OTHER TYPES OF MECHANICAL SEAL | | | | | | |
| VBEGF | V | B | E | G | F | -10 +110 |
| VCEGG | V | C | E | G | G | -10 +110 |
| Q ₁ Q ₁ EGF | Q ₁ | Q ₁ | E | G | F | -10 +110 |
| U ₃ BEGF | U ₃ | B | E | G | F | -10 +110 |
| U ₃ CEGF | U ₃ | C | E | G | F | -10 +110 |
| U ₃ U ₃ EGF | U ₃ | U ₃ | E | G | F | -10 +110 |
| VBVGF | V | B | V | G | F | -10 +110 |
| VCVGF | V | C | V | G | F | -10 +110 |
| Q ₁ Q ₁ VGF | Q ₁ | Q ₁ | V | G | F | -10 +110 |
| U ₃ CVGF | U ₃ | C | V | G | F | -10 +110 |
| U ₃ U ₃ VGF | U ₃ | U ₃ | V | G | F | -10 +110 |

ca_tipi-ten-mec-en_b_tc

CA(N) MECHANICAL SEALS

| TYPE | POSITION | | | | | TEMPERATURE (°C) |
|---------------------------------------|------------------------|---------------------|-----------------|--------------|-----------------------|---------------------|
| | 1 ROTATING ASSEMBLY | 2 FIXED ASSEMBLY | 3 ELASTOMERS | 4 SPRINGS | 5 OTHER COMPONENTS | |
| STANDARD MECHANICAL SEAL | | | | | | |
| VBEGG | V | B | E | G | G | -10 +110 |
| OTHER TYPES OF MECHANICAL SEAL | | | | | | |
| VCEGG | V | C | E | G | G | -10 +110 |
| Q ₁ Q ₁ EGG | Q ₁ | Q ₁ | E | G | G | -10 +110 |
| VCVGG | V | C | V | G | G | -10 +110 |
| Q ₁ Q ₁ VGG | Q ₁ | Q ₁ | V | G | G | -10 +110 |

cean-can_tipi-ten-mec-en_b_tc

CA-CA(N) SERIES HYDRAULIC PERFORMANCE TABLE AT 60 Hz, 2 POLES

| PUMP TYPE | RATED POWER | | Q = DELIVERY | | | | | | | | | | | | |
|---------------|-------------|---------------------------------------|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| | | | l/min | 0 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 120 | 150 | 180 | 210 |
| | | | m ³ /h | 0 | 1,8 | 2,4 | 3 | 3,6 | 4,2 | 4,8 | 5,4 | 7,2 | 9 | 10,8 | 12,6 |
| | | H = TOTAL HEAD METRES COLUMN OF WATER | | | | | | | | | | | | | |
| | kW | HP | | | | | | | | | | | | | |
| CA(M) 706/33 | 1,5 | 2 | 62,6 | 58,5 | 56,3 | 53,7 | 50,6 | 46,9 | 42,8 | 38,1 | | | | | |
| CA(M) 1206/33 | 2,2 | 3 | 64,2 | | | 58,5 | 56,9 | 55,3 | 53,5 | 51,7 | 45,5 | 38,7 | | | |
| CA 2006/33 | 3 | 4 | 63,9 | | | | | | 60,4 | 59,8 | 57,5 | 54,7 | 51,3 | 47,4 | |

ca-2p60-en_d_th

CA-CA(N) SERIES ELECTRICAL DATA AT 60 Hz, 2 POLES

| PUMP TYPE | MOTOR TYPE | INPUT POWER* | INPUT CURRENT* 220-230 V | CAPACITOR μF / 450 V | PUMP TYPE | MOTOR TYPE | INPUT POWER* | INPUT CURRENT* 220-230 V | INPUT CURRENT* 380-400 V |
|------------|--------------|--------------|-----------------------------|-------------------------|-----------|--------------|--------------|-----------------------------|-----------------------------|
| | | | | | | | | | |
| CAM706/33 | SM80CA/1156 | 2,01 | 9,32 | 40 | CA706/33 | SM80CA/315PE | 1,81 | 5,73 | 3,31 |
| CAM1206/33 | PLM90CA/1226 | 2,59 | 12,1 | 60 | CA1206/33 | PLM90CA/322 | 2,61 | 8,23 | 4,75 |
| | | | | | CA2006/33 | PLM90CA/330 | 3,35 | 10,5 | 6,07 |

* Maximum value in specified range

ca-2p60-en_f_te

MOTORS FOR CA-CA(N) SERIES

Standard supplied IE2/IE3 three-phase surface motors $\geq 0,75$ kW are compliant with Regulation (EC) no. 640/2009 and IEC 60034-30.

Electrical performances according to EN 60034-1.

Insulation class 155 (F). IP55 protection. Condensate drain plugs on standard version.

Cooling by fan according to EN 60034-6.

Cable gland metric size according to EN 50262. Standard voltage:

- **Single-phase** version: 220-230 V 60 Hz (incorporated automatic-reset overload protection).
- **Three-phase** version : 220 V Δ , 380 V Y, 60 Hz (overload protection to be provided by the user).

SINGLE-PHASE MOTORS AT 60 Hz, 2 POLES

| P _N kW | MOTOR TYPE | IEC SIZE | Construction Design | INPUT CURRENT I _n (A) 220-230 V | CAPACITOR | | DATA FOR 220 V 50 Hz VOLTAGE | | | | | | |
|----------------------|--------------|----------|---------------------|--|-----------|-----|------------------------------|---------------------------------|----------|------------|----------------------|--------------------------------|--------------------------------|
| | | | | | μ F | V | min ⁻¹ | I _s / I _n | η % | cos ϕ | T _n Nm | T _s /T _n | T _m /T _n |
| 1,5 | SM80CA/1156 | 80 | SPECIAL | 9,28-9,35 | 40 | 450 | 3455 | 4,91 | 76,3 | 0,96 | 4,14 | 0,49 | 2,19 |
| 2,2 | PLM90CA/1226 | 90 | | 12,3-11,7 | 70 | 450 | 3455 | 4,99 | 83,4 | 0,98 | 6,08 | 0,54 | 2,06 |
| | | | | | | | | | | | | | |

ca-motm-2p60-en_a_te

THREE-PHASE MOTORS AT 60 Hz, 2 POLES

| P _N kW | Efficiency η_N % | | | | | | | | | | | | IE | Year of construction |
|----------------------|---------------------------|------|------|---------------------------|------|------|---------------------------|------|------|---------------------------|------|------|----|----------------------|
| | Δ 220 V Y 380 V | | | Δ 230 V Y 400 V | | | Δ 380 V Y 660 V | | | Δ 400 V Y 690 V | | | | |
| | 4/4 | 3/4 | 2/4 | 4/4 | 3/4 | 2/4 | 4/4 | 3/4 | 2/4 | 4/4 | 3/4 | 2/4 | | |
| 1,5 | 87,2 | 87,0 | 84,6 | 87,2 | 87,0 | 84,6 | 87,2 | 87,0 | 84,6 | 87,2 | 87,0 | 84,6 | 3 | By June 2011 |
| 2,2 | 85,5 | 85,5 | 84,5 | 85,5 | 85,5 | 84,5 | 85,5 | 85,5 | 84,5 | 85,5 | 85,5 | 84,5 | 2 | |
| 3 | 87,8 | 88,0 | 86,0 | 87,8 | 88,0 | 86,0 | 87,8 | 88,0 | 86,0 | 87,8 | 88,0 | 86,0 | | |

| P _N kW | Manufacturer | | IEC SIZE | Construction Design | N. of Poles | f _N Hz | Data for 380 V / 60 Hz | | | | |
|----------------------|---|--|----------|---------------------|-------------|----------------------|------------------------|---------------------------------|----------------------|--------------------------------|--------------------------------|
| | Lowara srl Unipersonale Reg. No. 03471820260 Montecchio Maggiore (Vicenza) Italia | | | | | | cos ϕ | I _s / I _N | T _N Nm | T _s /T _N | T _m /T _N |
| | Model | | | | | | | | | | |
| 1,5 | SM80CA /315PE | | 80 | SPECIAL | 2 | 60 | 0,82 | 9,79 | 4,10 | 4,36 | 4,37 |
| 2,2 | PLM90CA /322 | | 90 | | | | 0,83 | 9,59 | 6,00 | 3,80 | 4,02 |
| 3 | PLM90CA /330 | | 90 | | | | 0,84 | 9,12 | 8,22 | 3,52 | 3,65 |

| P _N kW | Voltage U _N V | | | | | | | | η_N min ⁻¹ | See note. | Operating conditions ** | | |
|----------------------|-----------------------------|-------|-------|-------|----------|-------|-------|-------|-------------------------------|------------|---------------------------|-------------------------|-------------|
| | Δ | | Y | | Δ | | Y | | | | Altitudine s.l.m. m | T. amb min/max °C | ATEX |
| | 220 V | 230 V | 380 V | 400 V | 380 V | 400 V | 660 V | 690 V | | | | | |
| | I _N (A) | | | | | | | | | | | | |
| 1,5 | 5,58 | 5,53 | 3,22 | 3,19 | 3,23 | 3,22 | 1,86 | 1,86 | 3485 ÷ 3505 | 1000 VI | -15 / 40 | No | |
| 2,2 | 8,14 | 8,12 | 4,70 | 4,69 | 4,69 | 4,68 | 2,71 | 2,70 | | | | | |
| 3 | 10,7 | 10,5 | 6,19 | 6,06 | 6,20 | 6,11 | 3,58 | 3,53 | | | | | 3480 ÷ 3495 |

Note: Observe the regulations and codes locally in force regarding sorted waste disposal.

ca-ie2-mott-2p60-en_c_te

** Operating conditions to be referred to motor only. About electric pump, refer to limits in user's manual.

AVAILABLE VOLTAGES MOTORS FOR CA-CA(N) SERIES

| P _N kW | IEC SIZE | SINGLE-PHASE | | | | | | | |
|----------------------|----------|--------------|---------|-------------|-------------|---------|-------------|-------------|-------------|
| | | 50 Hz | | | | 60 Hz | | | |
| | | 1 x 220-240 | 1 x 100 | 1 x 110-120 | 1 x 220-230 | 1 x 100 | 1 x 110-115 | 1 x 120-127 | 1 x 200-210 |
| 0,75 | 71 | s | o | o | s | o | o | o | o |
| 0,95 | 71 | s | o | o | s | o | o | o | o |
| 1,1 | 80 | s | - | o | s | - | o | - | o |
| 1,5 | 80 | s | - | - | s | - | o | - | o |
| 2,2 | 90 | s | - | - | s | - | - | - | - |

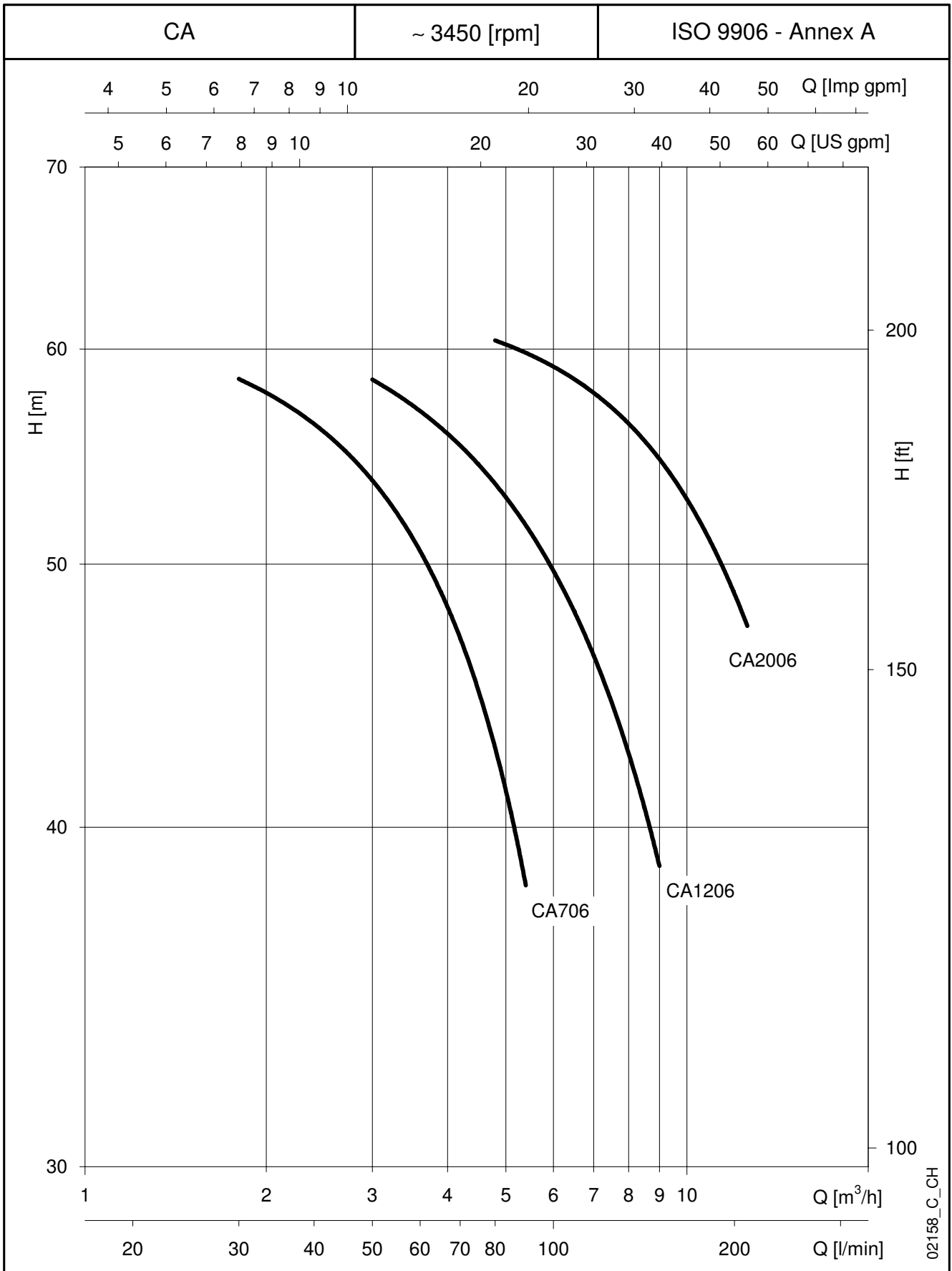
s = Standard voltage o = Optional voltage

| P _N kW | THREE-PHASE - 2 POLES | | | | | | | | | | | | | | | | | | |
|----------------------|-----------------------------|-------------------------|---------------------|---------------------|---------------------|---------------|---------------|---------------------|-----------------------------|---------------------|-------------------|---------------------|---------------------|---------------------|-----------|-------------------|-------------------|-------------------|-----------------|
| | 50 Hz | | | | | | | 60 Hz | | | | | 50/60 Hz | | | | | | |
| | 3 x 220-230-240/380-400-415 | 3 x 380-400-415/660-690 | 3 x 200-208/346-360 | 3 x 255-265/440-460 | 3 x 290-300/500-525 | 3 x 440-460/- | 3 x 500-525/- | 3 x 220-230/380-400 | 3 x 255-265-277/440-460-480 | 3 x 380-400/660-690 | 3 x 440-460-480/- | 3 x 110-115/190-200 | 3 x 200-208/346-360 | 3 x 330-346/575-600 | 3 x 575/- | 3 x 230/400 50 Hz | 3 x 265/460 60 Hz | 3 x 400/690 50 Hz | 3 x 460/- 60 Hz |
| 0,75 | s | o | o | o | o | o | o | s | o | o | o | o | o | o | o | o | o | o | o |
| 0,95 | s | o | o | o | o | o | o | s | o | o | o | o | o | o | o | o | o | o | o |
| 1,1 | s | o | o | o | o | o | o | s | o | o | o | o | o | o | o | o | o | o | o |
| 1,5 | s | o | o | o | o | o | o | s | o | o | o | o | o | o | o | o | o | o | o |
| 2,2 | s | o | o | o | o | o | o | s | o | o | o | o | o | o | o | o | o | o | o |
| 3 | s | o | o | o | o | o | o | s | o | o | o | o | o | o | o | o | o | o | o |

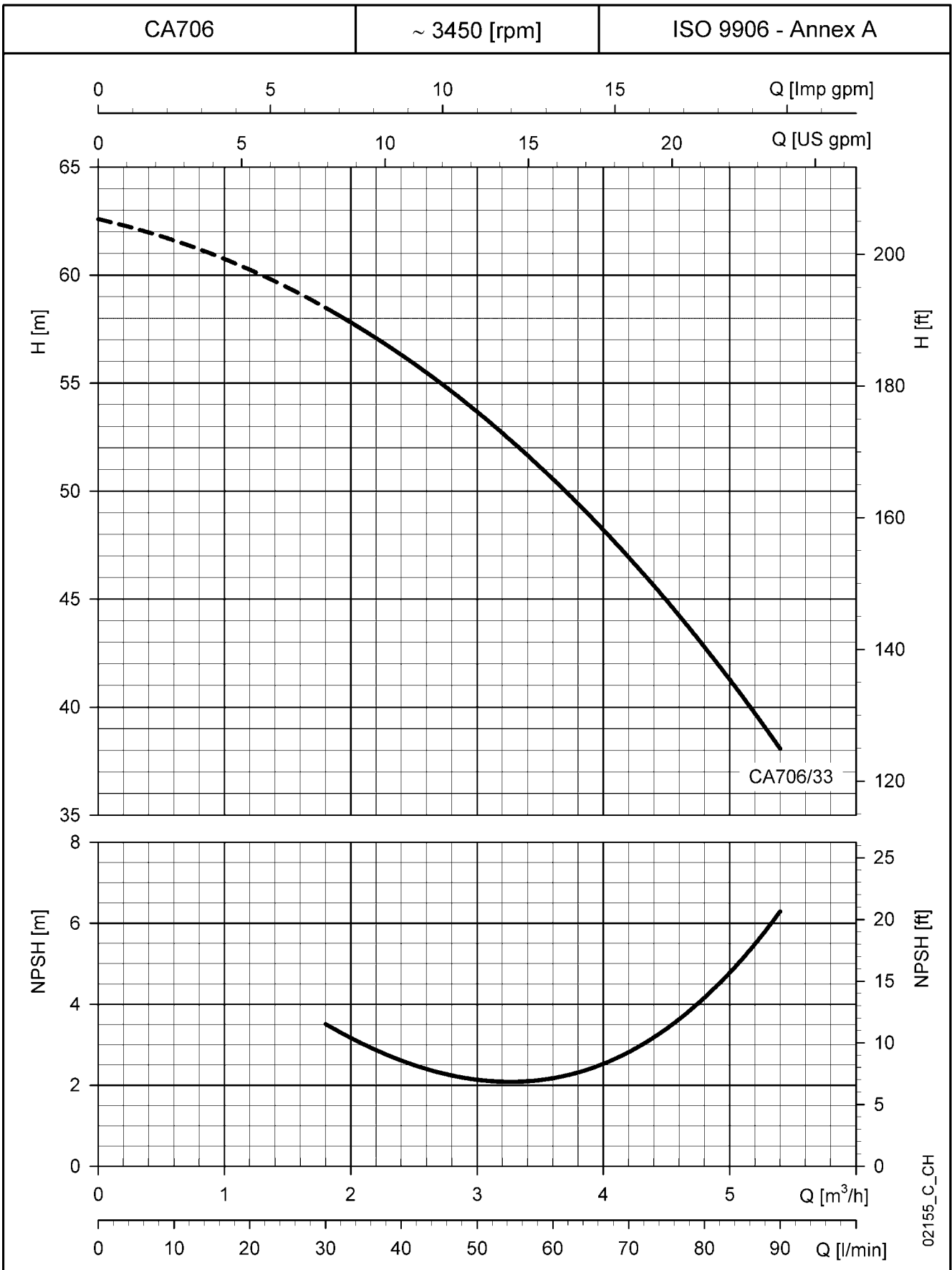
- = Not available

ca-volt-low-a-en_a_te

**CA-CA(N) SERIES
HYDRAULIC PERFORMANCE RANGE AT 60 Hz, 2 POLES**

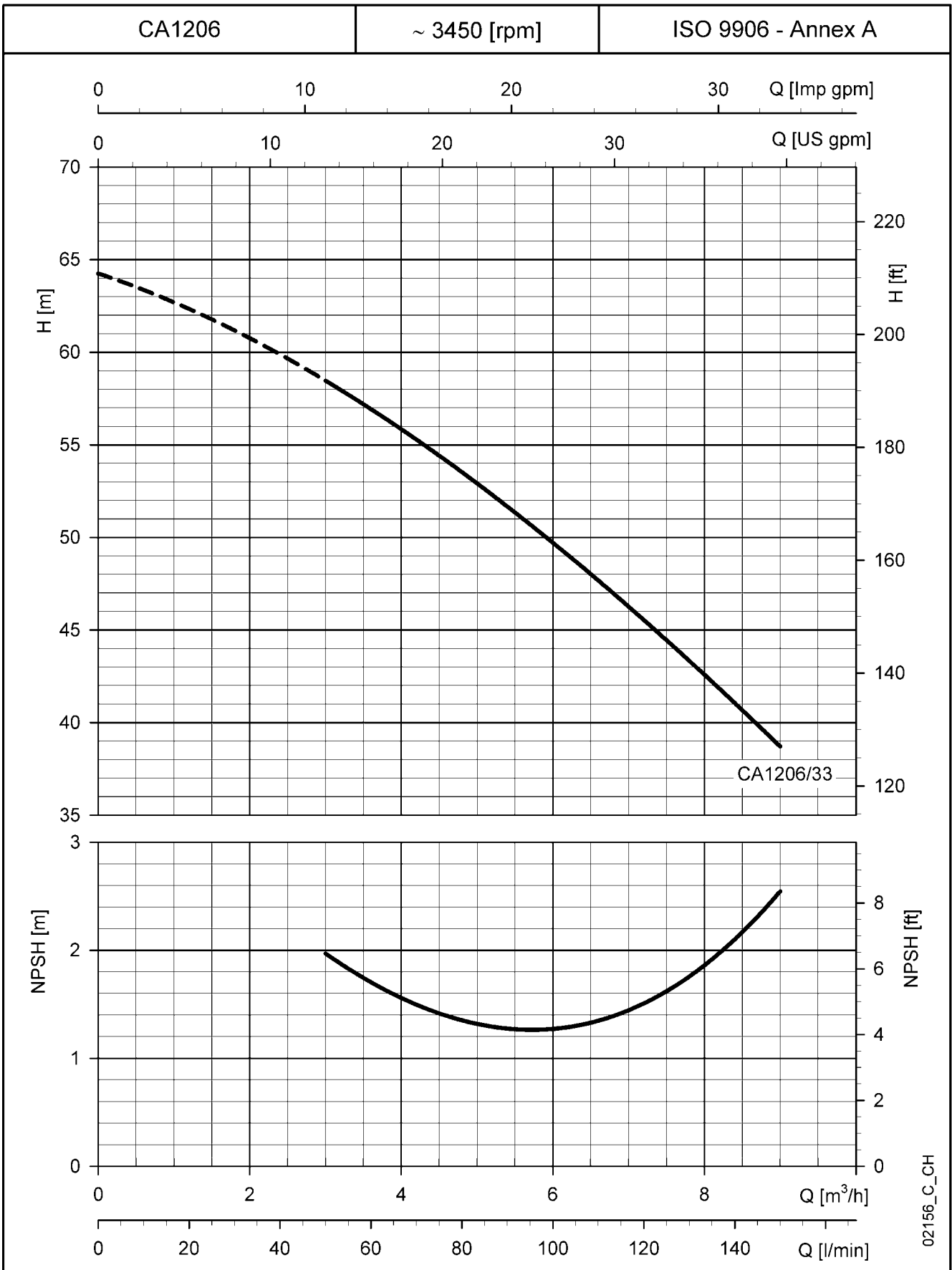


**CA706 SERIES
OPERATING CHARACTERISTICS AT 60 Hz, 2 POLES**



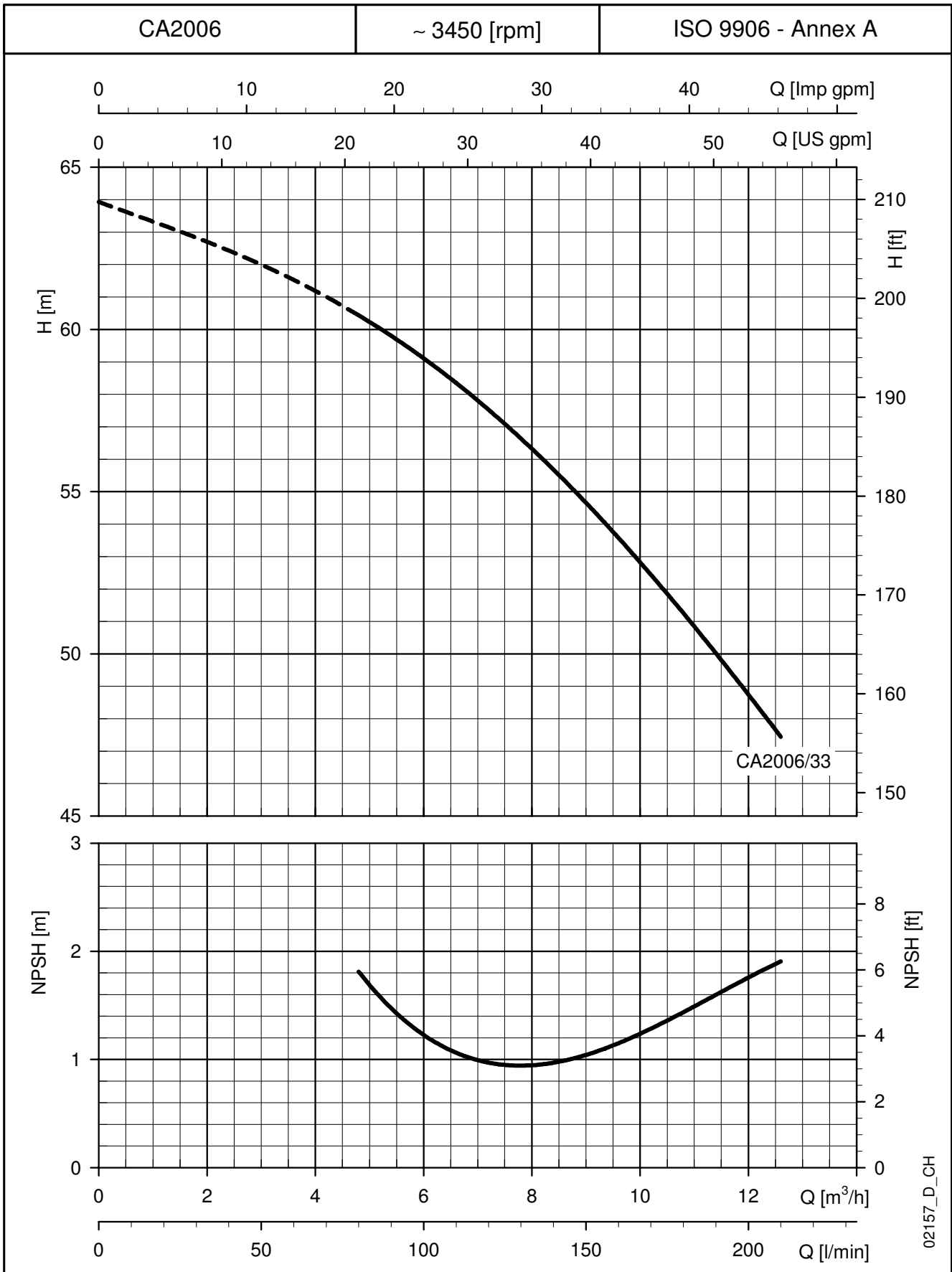
These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.

**CA1206 SERIES
OPERATING CHARACTERISTICS AT 60 Hz, 2 POLES**



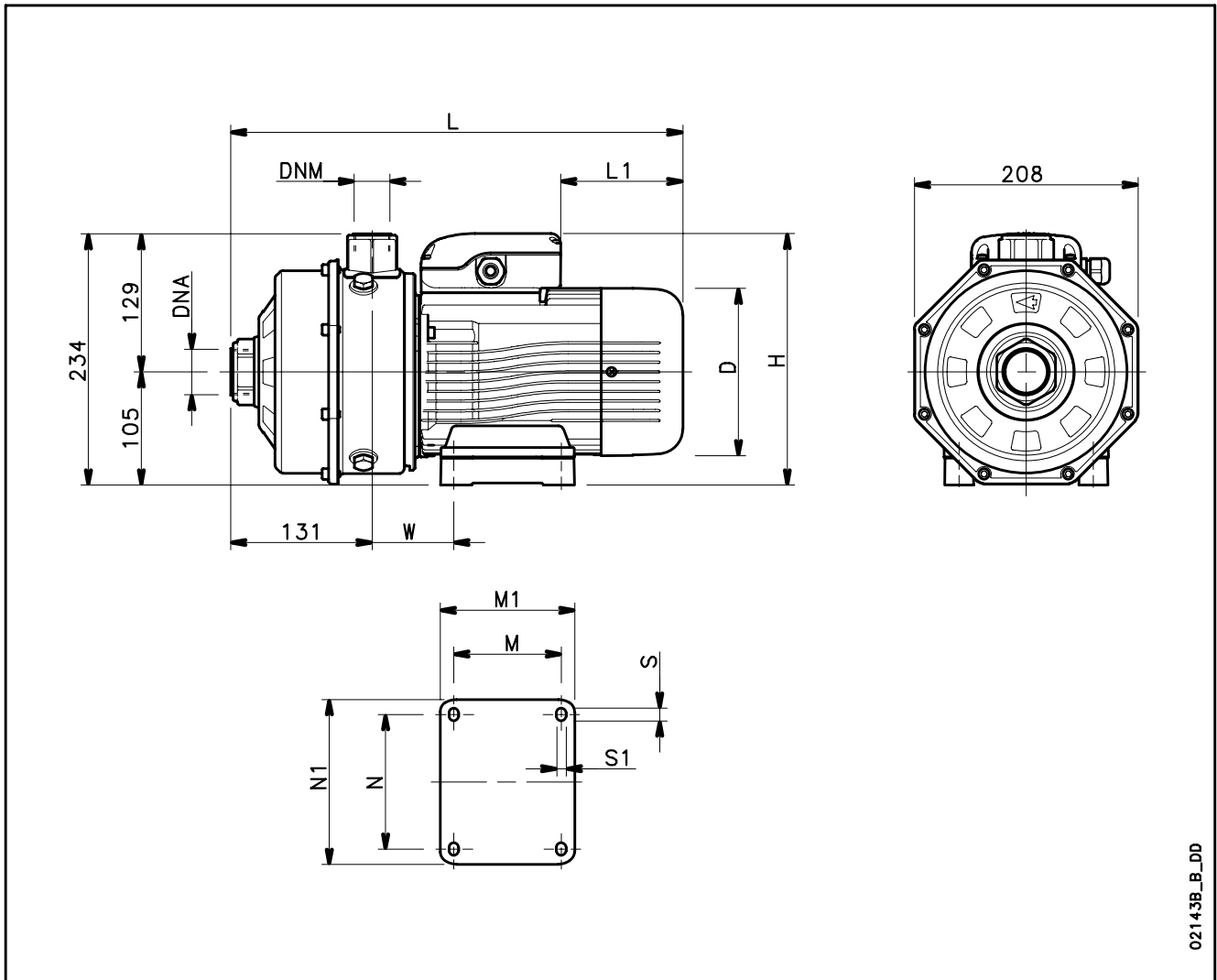
These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.

**CA2006 SERIES
OPERATING CHARACTERISTICS AT 60 Hz, 2 POLES**



These performances are valid for liquids with density $\rho = 1.0 \text{ Kg/dm}^3$ and kinematic viscosity $\nu = 1 \text{ mm}^2/\text{sec}$.

CA-CA(N) SERIES DIMENSIONS AND WEIGHTS AT 60 Hz, 2 POLES



021*3B_B_DD

| PUMP TYPE | DIMENSIONS (mm) | | | | | | | | | | | DNA | DNM | WEIGHT kg |
|---------------|-----------------|-----|-----|-----|-----|-----|-----|-----|----|----|----|-------|------|--------------|
| | D | H | L | L1 | M | M1 | N | N1 | S | S1 | W | | | |
| CAM 706/33/B | 155 | 242 | 420 | 69 | 100 | 125 | 125 | 153 | 12 | 9 | 76 | Rp 1¼ | Rp 1 | 18,4 |
| CAM 1206/33/P | 174 | 256 | 454 | 84 | 125 | 155 | 140 | 170 | 13 | 10 | 98 | Rp 1¼ | Rp 1 | 21,2 |
| CA 706/33/D | 155 | 234 | 420 | 114 | 100 | 125 | 125 | 153 | 12 | 9 | 76 | Rp 1¼ | Rp 1 | 19,5 |
| CA 1206/33/P | 174 | 239 | 454 | 172 | 125 | 155 | 140 | 170 | 13 | 10 | 98 | Rp 1¼ | Rp 1 | 22 |
| CA 2006/33/P | 174 | 239 | 454 | 172 | 125 | 155 | 140 | 170 | 13 | 10 | 98 | Rp 1½ | Rp 1 | 27 |

ca-2p60-en_f_td

TECHNICAL APPENDIX

TYPICAL APPLICATIONS CEA AND CA SERIES ELECTRIC PUMPS

Water Purification:

Filtration
De-ionized water
Water treatment
Commercial and residential pools

Plastic Industry:

Temperature Regulators
Extrusion machines
Manufacture of polymers

Agricultural Residential Applications:

Irrigation
Greenhouses
Humidifiers
Water supply

Heating, Ventilating & Air

Conditioning:

Air scrubbers
Water re-circulation
Cooling towers
Cooling systems
Temperature control
Chillers
Induction heating
Heat exchangers
Water heating
Booster packages

General Industry:

Spray booths
Light chemical transfer
Booster systems

Medical:

Laser cooling
Massage
Medical chillers
Sanitary equipment

Waste Management:

Waste treatment
Pollution control

Machine Tool:

Degreasing
Parts washing
Chemical treatment
Heat treatment

Graphics:

Film washing
Cooling processes

Marine Sector:

Water on board ships

Computers:

Circuit board washing
Unit cooling

Laundry:

Commercial washers

Food and Drink:

Food processing
Bottle washing
Citrus processing
Dishwashing
Brewing
Sanitary ware

CEA - CA SERIES

standard configuration: carbon/ceramic mechanical seal, NBR O-rings
 Compatibility chart for most commonly used liquids, for other compatible liquids refer to our web page www.lowara.com

| LIQUIDO LIQUID | FORMULA | CONCENTRAZIONE CONCENTRATION % | TEMPERATURA TEMPERATURE - MIN (°C) - MAX (°C) | PESO SPEC. DENSITY kg/dm ³ | mechanical seal materials | | TENUTA MECCANICA MECHANICAL SEAL | | | |
|--|--|--------------------------------------|--|---|--|--------|-------------------------------------|----------|----------|----------|
| | | | | | mechanical seal | o-ring | STD | number A | number P | Numero N |
| Acido Acetico Acetic acid configuration code | CH ₃ CO OH | 80 | -5 +70 | 1.05 | Carb. di tung. - Carb. di sil. ...XPB | EPDM | 3 | 3 | 1 | 3 |
| Acido Citrico Citric acid configuration code | C ₆ H ₈ O ₇ | 5 | -5 +70 | 1.54 | carbon - ceramic ...XAA | FPM | 2 | 1 | 2 | 2 |
| Acido Fosforico Phosphoric acid configuration code | H ₃ PO ₄ | 20 | -5 +30 | 1.33 | Carb. di tung. - Carb. di sil. ...XPB | EPDM | 3 | 2 | 1 | 1 |
| Acqua Water configuration code | H ₂ O | 100 | -5 +85 | | carbon - ceramic standard product | NBR | 1 | 1 | 1 | 1 |
| Acqua Deionizzata Water deionized configuration code | | 100 | -5 +85 | | carbon - ceramic ...XAA | FPM | | | | |
| Acqua Demineralizzata Water demineralized configuration code | | 100 | -5 +85 | | carbon - ceramic standard product | NBR | | | | |
| Acqua di mare (4) Sea water (4) configuration code | | / | -5 +25 | | not recommended | | | | | |
| Alcool Butilico Butyl alcohol configuration code | CH ₃ (CH ₂) ₇ CH ₂ OH | 100 | -5 +80 | 0.81 | carbon - ceramic standard product | NBR | 1 | 1 | 2 | 1 |
| Alcool Etilico Ethyl alcohol (Ethanol) configuration code | | 100 | -5 +40 | 0.81 | carbon - ceramic standard product | NBR | | | | |
| Alcool Metilico Methyl alcohol configuration code | CH ₃ OH | 100 | -5 +40 | 0.79 | carbon - ceramic standard product | NBR | 1 | 3 | 1 | 3 |
| Cloroformio Chloroform configuration code | CHCl ₃ | / | -5 +30 | 1.48 | Carb. di tung. - Carb. di sil. ...XNA | FPM | 3 | 2 | 3 | 1 |
| Freon 112 | CCl ₂ FCCl ₂ F | 100 | -5 | 1.57 | | | 2 | 2 | 3 | 1 |

WATER REQUIREMENTS IN CIVIL USERS

Determination of the water requirement depends on the type of users and contemporaneity factor. The calculation may be subject to regulations, standards or customs that may vary from country to country. The calculation method shown below is an example based on practical experience, designed to provide a reference value and not a substitute for detailed analytical calculation.

Water requirements in condominiums

The **consumption table** shows the maximum values for each delivery point, depending on the plumbing amenities.

MAXIMUM CONSUMPTION FOR EACH DELIVERY POINT

| TYPE | CONSUMPTION (l/min) |
|-------------------------------|---------------------|
| Sink | 9 |
| Dishwasher | 10 |
| Washing machine | 12 |
| Shower | 12 |
| Bathtub | 15 |
| Washbasin | 6 |
| Bidet | 6 |
| Flush tank WC | 6 |
| Controlled flushing system WC | 90 |

G-at-cm_a_th

The **sum of the water consumption values** of each delivery point determines the maximum theoretical requirement, which must be reduced according to the **contemporaneity coefficient**, because in actual fact the delivery points are never used all together.

| | |
|---|---|
| $f = \frac{1}{\sqrt{(0,857 \times Nr \times Na)}}$ | Coefficient for apartments with one bathroom and flush tank WC |
| $f = \frac{1}{\sqrt{(0,857 \times Nr \times Na)}}$ | Coefficient for apartments with one bathroom and controlled flushing system WC |
| $f = \frac{1,03}{\sqrt{(0,545 \times Nr \times Na)}}$ | Coefficient for apartments with two bathrooms and flush tank WC |
| $f = \frac{0,8}{\sqrt{(0,727 \times Nr \times Na)}}$ | Coefficient for apartments with two bathrooms and controlled flushing system WC |
| f= coefficient; Nr= number of delivery points; Na= number of apartments | |

The **table of water requirements in civil users** shows the maximum contemporaneity flow-rate values based on the **number of apartments** and the type of WC for apartments with one bathroom and two bathrooms. As regards apartments with one bathroom, 7 drawing points have been taken into consideration, while 11 points have been considered for apartments with two bathrooms. If the number of drawing points or apartments is different, use the formulas to **calculate** the requirement.

TABLE OF WATER REQUIREMENTS IN CIVIL USERS

| NUMBER OF APARTMENTS | WITH FLUSH TANK WC | | WITH CONTROLLED FLUSHING SYSTEM WC | |
|----------------------|--------------------|-----|------------------------------------|------|
| | 1 | 2 | 1 | 2 |
| | FLOW RATE (l/min) | | | |
| 1 | 32 | 40 | 60 | 79 |
| 2 | 45 | 56 | 85 | 111 |
| 3 | 55 | 68 | 105 | 136 |
| 4 | 63 | 79 | 121 | 157 |
| 5 | 71 | 88 | 135 | 176 |
| 6 | 78 | 97 | 148 | 193 |
| 7 | 84 | 105 | 160 | 208 |
| 8 | 90 | 112 | 171 | 223 |
| 9 | 95 | 119 | 181 | 236 |
| 10 | 100 | 125 | 191 | 249 |
| 11 | 105 | 131 | 200 | 261 |
| 12 | 110 | 137 | 209 | 273 |
| 13 | 114 | 143 | 218 | 284 |
| 14 | 119 | 148 | 226 | 295 |
| 15 | 123 | 153 | 234 | 305 |
| 16 | 127 | 158 | 242 | 315 |
| 17 | 131 | 163 | 249 | 325 |
| 18 | 134 | 168 | 256 | 334 |
| 19 | 138 | 172 | 263 | 343 |
| 20 | 142 | 177 | 270 | 352 |
| 21 | 145 | 181 | 277 | 361 |
| 22 | 149 | 185 | 283 | 369 |
| 23 | 152 | 190 | 290 | 378 |
| 24 | 155 | 194 | 296 | 386 |
| 25 | 158 | 198 | 302 | 394 |
| 26 | 162 | 202 | 308 | 401 |
| 27 | 165 | 205 | 314 | 409 |
| 28 | 168 | 209 | 320 | 417 |
| 29 | 171 | 213 | 325 | 424 |
| 30 | 174 | 217 | 331 | 431 |
| 35 | 187 | 234 | 357 | 466 |
| 40 | 200 | 250 | 382 | 498 |
| 45 | 213 | 265 | 405 | 528 |
| 50 | 224 | 280 | 427 | 557 |
| 55 | 235 | 293 | 448 | 584 |
| 60 | 245 | 306 | 468 | 610 |
| 65 | 255 | 319 | 487 | 635 |
| 70 | 265 | 331 | 506 | 659 |
| 75 | 274 | 342 | 523 | 682 |
| 80 | 283 | 354 | 540 | 704 |
| 85 | 292 | 364 | 557 | 726 |
| 90 | 301 | 375 | 573 | 747 |
| 95 | 309 | 385 | 589 | 767 |
| 100 | 317 | 395 | 604 | 787 |
| 120 | 347 | 433 | 662 | 863 |
| 140 | 375 | 468 | 715 | 932 |
| 160 | 401 | 500 | 764 | 996 |
| 180 | 425 | 530 | 811 | 1056 |
| 200 | 448 | 559 | 854 | 1114 |

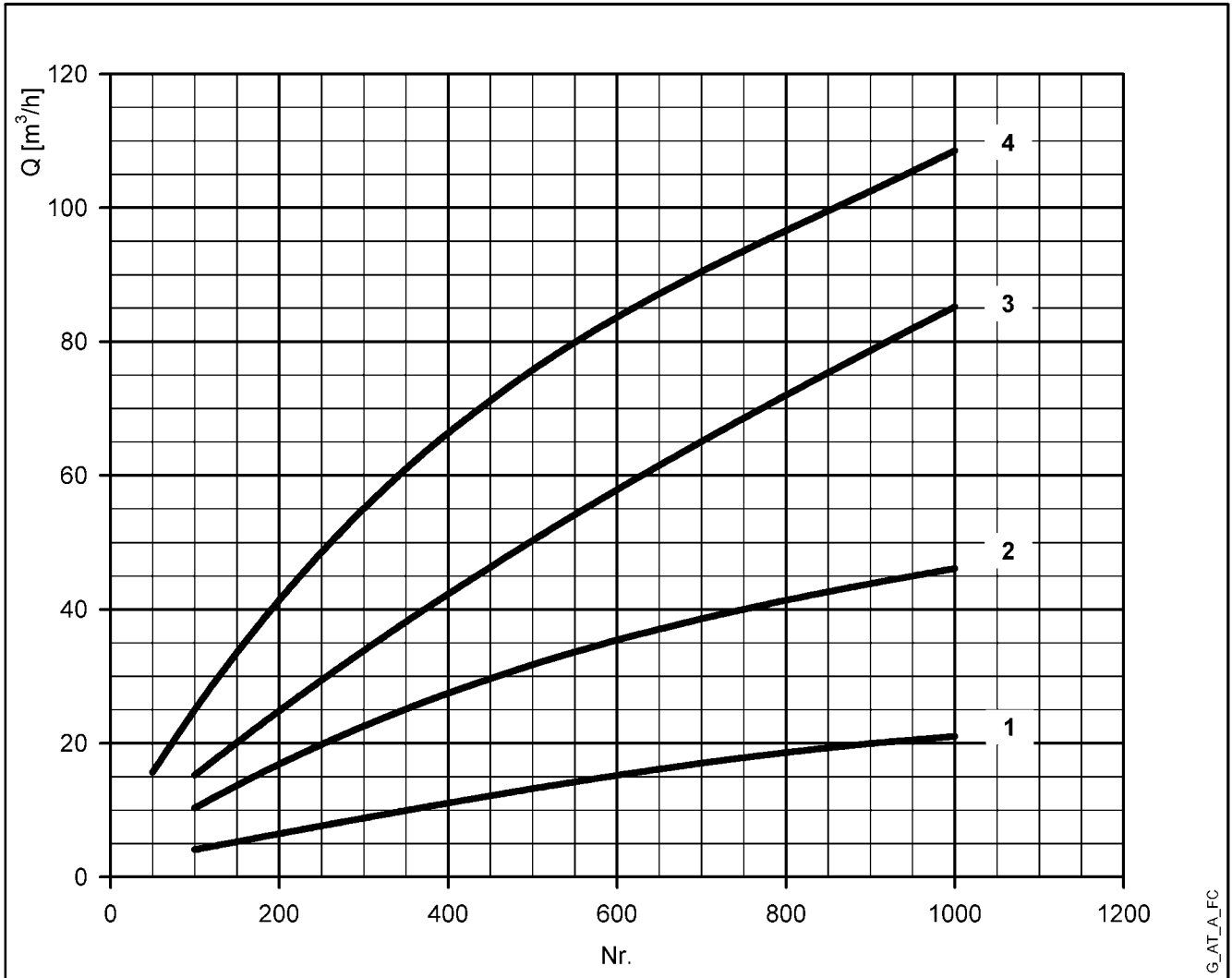
For seaside resorts, a flow rate increased by at least 20% must be considered.

G-at-fi_a_th

WATER REQUIREMENTS FOR COMMUNITY BUILDINGS

The requirements of buildings intended for specific uses, such as **offices, residential units, hotels, department stores, nursing homes** and so on, are different from those of condominiums, and both their global daily water consumption and the maximum contemporaneity flow rate are usually greater. The **diagram of water requirements for community buildings** shows the maximum contemporaneity flow rate of some types of communities, for guidance.

These requirements must be determined case by case with the utmost accuracy, using analytical calculation methods, according to particular needs and local provisions.



For seaside resorts, the flow rate must be increased by at least 20%.

- 1 = Offices (N. of people)
- 2 = Department stores (N. of people)
- 3 = Nursing homes (N. of beds)
- 4 = Hotels, residences (N. of beds)

NPSH

The minimum operating values that can be reached at the pump suction end are limited by the onset of cavitation.

Cavitation is the formation of vapour-filled cavities within liquids where the pressure is locally reduced to a critical value, or where the local pressure is equal to, or just below the vapour pressure of the liquid.

The vapour-filled cavities flow with the current and when they reach a higher pressure area the vapour contained in the cavities condenses. The cavities collide, generating pressure waves that are transmitted to the walls. These, being subjected to stress cycles, gradually become deformed and yield due to fatigue. This phenomenon, characterized by a metallic noise produced by the hammering on the pipe walls, is called incipient cavitation.

The damage caused by cavitation may be magnified by electrochemical corrosion and a local rise in temperature due to the plastic deformation of the walls. The materials that offer the highest resistance to heat and corrosion are alloy steels, especially austenitic steel. The conditions that trigger cavitation may be assessed by calculating the total net suction head, referred to in technical literature with the acronym NPSH (Net Positive Suction Head).

The NPSH represents the total energy (expressed in m.) of the liquid measured at suction under conditions of incipient cavitation, excluding the vapour pressure (expressed in m.) that the liquid has at the pump inlet.

To find the static height h_z at which to install the machine under safe conditions, the following formula must be verified:

$$h_p + h_z \geq (\text{NPSH}_r + 0.5) + h_f + h_{pv} \quad \textcircled{1}$$

where:

h_p is the absolute pressure applied to the free liquid surface in the suction tank, expressed in m. of liquid; h_p is the quotient between the barometric pressure and the specific weight of the liquid.

h_z is the suction lift between the pump axis and the free liquid surface in the suction tank, expressed in m.; h_z is negative when the liquid level is lower than the pump axis.

h_f is the flow resistance in the suction line and its accessories, such as: fittings, foot valve, gate valve, elbows, etc.

h_{pv} is the vapour pressure of the liquid at the operating temperature, expressed in m. of liquid. h_{pv} is the quotient between the Pv vapour pressure and the liquid's specific weight.

0,5 is the safety factor.

The maximum possible suction head for installation depends on the value of the atmospheric pressure (i.e. the elevation above sea level at which the pump is installed) and the temperature of the liquid.

To help the user, with reference to water temperature (4° C) and to the elevation above sea level, the following tables show the drop in hydraulic pressure head in relation to the elevation above sea level, and the suction loss in relation to temperature.

| Water temperature (°C) | 20 | 40 | 60 | 80 | 90 | 110 | 120 |
|------------------------|-----|-----|-----|-----|-----|------|------|
| Suction loss (m) | 0,2 | 0,7 | 2,0 | 5,0 | 7,4 | 15,4 | 21,5 |

| Elevation above sea level (m) | 500 | 1000 | 1500 | 2000 | 2500 | 3000 |
|-------------------------------|------|------|------|------|------|------|
| Suction loss (m) | 0,55 | 1,1 | 1,65 | 2,2 | 2,75 | 3,3 |

Friction loss is shown in the tables at pages 40-41 of this catalogue. To reduce it to a minimum, especially in cases of high suction head (over 4-5 m.) or within the operating limits with high flow rates, we recommend using a suction line having a larger diameter than that of the pump's suction port. It is always a good idea to position the pump as close as possible to the liquid to be pumped.

Make the following calculation:

Liquid: water at ~15°C $\gamma = 1 \text{ kg/dm}^3$

Flow rate required: 30 m³/h

Head for required delivery: 43 m.

Suction lift: 3,5 m.

The selection is an FHE 40-200/75 pump whose NPSH required value is, at 30 m³/h, di 2,5 m.

For water at 15 °C

$$h_p = P_a / \gamma = 10,33\text{m}, h_{pv} = P_v / \gamma = 0,174\text{m} (0,01701 \text{ bar})$$

The H_f flow resistance in the suction line with foot valves is ~ 1,2 m.

By substituting the parameters in formula $\textcircled{1}$ with the numeric values above, we have:

$$10,33 + (-3,5) \geq (2,5 + 0,5) + 1,2 + 0,17$$

from which we have: 6,8 > 4,4

The relation is therefore verified.

TECHNICAL APPENDIX VAPOUR PRESSURE PS VAPOUR PRESSURE AND ρ DENSITY OF WATER TABLE

| t °C | T K | ps bar | ρ kg/dm ³ | t °C | T K | ps bar | ρ kg/dm ³ | t °C | T K | ps bar | ρ kg/dm ³ |
|---------|--------|-----------|------------------------------|---------|--------|-----------|------------------------------|---------|--------|-----------|------------------------------|
| 0 | 273,15 | 0,00611 | 0,9998 | 55 | 328,15 | 0,15741 | 0,9857 | 120 | 393,15 | 1,9854 | 0,9429 |
| 1 | 274,15 | 0,00657 | 0,9999 | 56 | 329,15 | 0,16511 | 0,9852 | 122 | 395,15 | 2,1145 | 0,9412 |
| 2 | 275,15 | 0,00706 | 0,9999 | 57 | 330,15 | 0,17313 | 0,9846 | 124 | 397,15 | 2,2504 | 0,9396 |
| 3 | 276,15 | 0,00758 | 0,9999 | 58 | 331,15 | 0,18147 | 0,9842 | 126 | 399,15 | 2,3933 | 0,9379 |
| 4 | 277,15 | 0,00813 | 1,0000 | 59 | 332,15 | 0,19016 | 0,9837 | 128 | 401,15 | 2,5435 | 0,9362 |
| 5 | 278,15 | 0,00872 | 1,0000 | 60 | 333,15 | 0,1992 | 0,9832 | 130 | 403,15 | 2,7013 | 0,9346 |
| 6 | 279,15 | 0,00935 | 1,0000 | 61 | 334,15 | 0,2086 | 0,9826 | 132 | 405,15 | 2,867 | 0,9328 |
| 7 | 280,15 | 0,01001 | 0,9999 | 62 | 335,15 | 0,2184 | 0,9821 | 134 | 407,15 | 3,041 | 0,9311 |
| 8 | 281,15 | 0,01072 | 0,9999 | 63 | 336,15 | 0,2286 | 0,9816 | 136 | 409,15 | 3,223 | 0,9294 |
| 9 | 282,15 | 0,01147 | 0,9998 | 64 | 337,15 | 0,2391 | 0,9811 | 138 | 411,15 | 3,414 | 0,9276 |
| 10 | 283,15 | 0,01227 | 0,9997 | 65 | 338,15 | 0,2501 | 0,9805 | 140 | 413,15 | 3,614 | 0,9258 |
| 11 | 284,15 | 0,01312 | 0,9997 | 66 | 339,15 | 0,2615 | 0,9799 | 145 | 418,15 | 4,155 | 0,9214 |
| 12 | 285,15 | 0,01401 | 0,9996 | 67 | 340,15 | 0,2733 | 0,9793 | 155 | 428,15 | 5,433 | 0,9121 |
| 13 | 286,15 | 0,01497 | 0,9994 | 68 | 341,15 | 0,2856 | 0,9788 | 160 | 433,15 | 6,181 | 0,9073 |
| 14 | 287,15 | 0,01597 | 0,9993 | 69 | 342,15 | 0,2984 | 0,9782 | 165 | 438,15 | 7,008 | 0,9024 |
| 15 | 288,15 | 0,01704 | 0,9992 | 70 | 343,15 | 0,3116 | 0,9777 | 170 | 443,15 | 7,920 | 0,8973 |
| 16 | 289,15 | 0,01817 | 0,9990 | 71 | 344,15 | 0,3253 | 0,9770 | 175 | 448,15 | 8,924 | 0,8921 |
| 17 | 290,15 | 0,01936 | 0,9988 | 72 | 345,15 | 0,3396 | 0,9765 | 180 | 453,15 | 10,027 | 0,8869 |
| 18 | 291,15 | 0,02062 | 0,9987 | 73 | 346,15 | 0,3543 | 0,9760 | 185 | 458,15 | 11,233 | 0,8815 |
| 19 | 292,15 | 0,02196 | 0,9985 | 74 | 347,15 | 0,3696 | 0,9753 | 190 | 463,15 | 12,551 | 0,8760 |
| 20 | 293,15 | 0,02337 | 0,9983 | 75 | 348,15 | 0,3855 | 0,9748 | 195 | 468,15 | 13,987 | 0,8704 |
| 21 | 294,15 | 0,24850 | 0,9981 | 76 | 349,15 | 0,4019 | 0,9741 | 200 | 473,15 | 15,550 | 0,8647 |
| 22 | 295,15 | 0,02642 | 0,9978 | 77 | 350,15 | 0,4189 | 0,9735 | 205 | 478,15 | 17,243 | 0,8588 |
| 23 | 296,15 | 0,02808 | 0,9976 | 78 | 351,15 | 0,4365 | 0,9729 | 210 | 483,15 | 19,077 | 0,8528 |
| 24 | 297,15 | 0,02982 | 0,9974 | 79 | 352,15 | 0,4547 | 0,9723 | 215 | 488,15 | 21,060 | 0,8467 |
| 25 | 298,15 | 0,03166 | 0,9971 | 80 | 353,15 | 0,4736 | 0,9716 | 220 | 493,15 | 23,198 | 0,8403 |
| 26 | 299,15 | 0,03360 | 0,9968 | 81 | 354,15 | 0,4931 | 0,9710 | 225 | 498,15 | 25,501 | 0,8339 |
| 27 | 300,15 | 0,03564 | 0,9966 | 82 | 355,15 | 0,5133 | 0,9704 | 230 | 503,15 | 27,976 | 0,8273 |
| 28 | 301,15 | 0,03778 | 0,9963 | 83 | 356,15 | 0,5342 | 0,9697 | 235 | 508,15 | 30,632 | 0,8205 |
| 29 | 302,15 | 0,04004 | 0,9960 | 84 | 357,15 | 0,5557 | 0,9691 | 240 | 513,15 | 33,478 | 0,8136 |
| 30 | 303,15 | 0,04241 | 0,9957 | 85 | 358,15 | 0,5780 | 0,9684 | 245 | 518,15 | 36,523 | 0,8065 |
| 31 | 304,15 | 0,04491 | 0,9954 | 86 | 359,15 | 0,6011 | 0,9678 | 250 | 523,15 | 39,776 | 0,7992 |
| 32 | 305,15 | 0,04753 | 0,9951 | 87 | 360,15 | 0,6249 | 0,9671 | 255 | 528,15 | 43,246 | 0,7916 |
| 33 | 306,15 | 0,05029 | 0,9947 | 88 | 361,15 | 0,6495 | 0,9665 | 260 | 533,15 | 46,943 | 0,7839 |
| 34 | 307,15 | 0,05318 | 0,9944 | 89 | 362,15 | 0,6749 | 0,9658 | 265 | 538,15 | 50,877 | 0,7759 |
| 35 | 308,15 | 0,05622 | 0,9940 | 90 | 363,15 | 0,7011 | 0,9652 | 270 | 543,15 | 55,058 | 0,7678 |
| 36 | 309,15 | 0,05940 | 0,9937 | 91 | 364,15 | 0,7281 | 0,9644 | 275 | 548,15 | 59,496 | 0,7593 |
| 37 | 310,15 | 0,06274 | 0,9933 | 92 | 365,15 | 0,7561 | 0,9638 | 280 | 553,15 | 64,202 | 0,7505 |
| 38 | 311,15 | 0,06624 | 0,9930 | 93 | 366,15 | 0,7849 | 0,9630 | 285 | 558,15 | 69,186 | 0,7415 |
| 39 | 312,15 | 0,06991 | 0,9927 | 94 | 367,15 | 0,8146 | 0,9624 | 290 | 563,15 | 74,461 | 0,7321 |
| 40 | 313,15 | 0,07375 | 0,9923 | 95 | 368,15 | 0,8453 | 0,9616 | 295 | 568,15 | 80,037 | 0,7223 |
| 41 | 314,15 | 0,07777 | 0,9919 | 96 | 369,15 | 0,8769 | 0,9610 | 300 | 573,15 | 85,927 | 0,7122 |
| 42 | 315,15 | 0,08198 | 0,9915 | 97 | 370,15 | 0,9094 | 0,9602 | 305 | 578,15 | 92,144 | 0,7017 |
| 43 | 316,15 | 0,09639 | 0,9911 | 98 | 371,15 | 0,9430 | 0,9596 | 310 | 583,15 | 98,70 | 0,6906 |
| 44 | 317,15 | 0,09100 | 0,9907 | 99 | 372,15 | 0,9776 | 0,9586 | 315 | 588,15 | 105,61 | 0,6791 |
| 45 | 318,15 | 0,09582 | 0,9902 | 100 | 373,15 | 1,0133 | 0,9581 | 320 | 593,15 | 112,89 | 0,6669 |
| 46 | 319,15 | 0,10086 | 0,9898 | 102 | 375,15 | 1,0878 | 0,9567 | 325 | 598,15 | 120,56 | 0,6541 |
| 47 | 320,15 | 0,10612 | 0,9894 | 104 | 377,15 | 1,1668 | 0,9552 | 330 | 603,15 | 128,63 | 0,6404 |
| 48 | 321,15 | 0,11162 | 0,9889 | 106 | 379,15 | 1,2504 | 0,9537 | 340 | 613,15 | 146,05 | 0,6102 |
| 49 | 322,15 | 0,11736 | 0,9884 | 108 | 381,15 | 1,3390 | 0,9522 | 350 | 623,15 | 165,35 | 0,5743 |
| 50 | 323,15 | 0,12335 | 0,9880 | 110 | 383,15 | 1,4327 | 0,9507 | 360 | 633,15 | 186,75 | 0,5275 |
| 51 | 324,15 | 0,12961 | 0,9876 | 112 | 385,15 | 1,5316 | 0,9491 | 370 | 643,15 | 210,54 | 0,4518 |
| 52 | 325,15 | 0,13613 | 0,9871 | 114 | 387,15 | 1,6362 | 0,9476 | 374,15 | 647,30 | 221,20 | 0,3154 |
| 53 | 326,15 | 0,14293 | 0,9862 | 116 | 389,15 | 1,7465 | 0,9460 | | | | |
| 54 | 327,15 | 0,15002 | 0,9862 | 118 | 391,15 | 1,8628 | 0,9445 | | | | |

G-at_nps_h_a_sc

TABLE OF FLOW RESISTANCE IN 100 m OF STRAIGHT CAST IRON PIPELINE (HAZEN-WILLIAMS FORMULA C=100)

| FLOW RATE | | NOMINAL DIAMETER in mm and INCHES | | | | | | | | | | | | | | | | | | | |
|-------------------|-------|-----------------------------------|------|-------|--------|--------|------|--------|-------|------|------|------|------|-------|------|------|------|------|--|--|--|
| m ³ /h | l/min | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 175 | 200 | 250 | 300 | 350 | 400 | | | |
| | | 1/2" | 3/4" | 1" | 1 1/4" | 1 1/2" | 2 | 2 1/2" | 3" | 4" | 5" | 6" | 7" | 8" | 10" | 12" | 14" | 16" | | | |
| 0,6 | 10 | v | 0,94 | 0,53 | 0,34 | 0,21 | 0,13 | | | | | | | | | | | | | | |
| | | hr | 16 | 3,94 | 1,33 | 0,40 | 0,13 | | | | | | | | | | | | | | |
| 0,9 | 15 | v | 1,42 | 0,80 | 0,51 | 0,31 | 0,20 | | | | | | | | | | | | | | |
| | | hr | 33,9 | 8,35 | 2,82 | 0,85 | 0,29 | | | | | | | | | | | | | | |
| 1,2 | 20 | v | 1,89 | 1,06 | 0,68 | 0,41 | 0,27 | 0,17 | | | | | | | | | | | | | |
| | | hr | 57,7 | 14,21 | 4,79 | 1,44 | 0,49 | 0,16 | | | | | | | | | | | | | |
| 1,5 | 25 | v | 2,36 | 1,33 | 0,85 | 0,52 | 0,33 | 0,21 | | | | | | | | | | | | | |
| | | hr | 87,2 | 21,5 | 7,24 | 2,18 | 0,73 | 0,25 | | | | | | | | | | | | | |
| 1,8 | 30 | v | 2,83 | 1,59 | 1,02 | 0,62 | 0,40 | 0,25 | | | | | | | | | | | | | |
| | | hr | 122 | 30,1 | 10,1 | 3,05 | 1,03 | 0,35 | | | | | | | | | | | | | |
| 2,1 | 35 | v | 3,30 | 1,86 | 1,19 | 0,73 | 0,46 | 0,30 | | | | | | | | | | | | | |
| | | hr | 162 | 40,0 | 13,5 | 4,06 | 1,37 | 0,46 | | | | | | | | | | | | | |
| 2,4 | 40 | v | | 2,12 | 1,36 | 0,83 | 0,53 | 0,34 | 0,20 | | | | | | | | | | | | |
| | | hr | | 51,2 | 17,3 | 5,19 | 1,75 | 0,59 | 0,16 | | | | | | | | | | | | |
| 3 | 50 | v | | 2,65 | 1,70 | 1,04 | 0,66 | 0,42 | 0,25 | | | | | | | | | | | | |
| | | hr | | 77,4 | 26,1 | 7,85 | 2,65 | 0,89 | 0,25 | | | | | | | | | | | | |
| 3,6 | 60 | v | | 3,18 | 2,04 | 1,24 | 0,80 | 0,51 | 0,30 | | | | | | | | | | | | |
| | | hr | | 108 | 36,6 | 11,0 | 3,71 | 1,25 | 0,35 | | | | | | | | | | | | |
| 4,2 | 70 | v | | 3,72 | 2,38 | 1,45 | 0,93 | 0,59 | 0,35 | | | | | | | | | | | | |
| | | hr | | 144 | 48,7 | 14,6 | 4,93 | 1,66 | 0,46 | | | | | | | | | | | | |
| 4,8 | 80 | v | | 4,25 | 2,72 | 1,66 | 1,06 | 0,68 | 0,40 | | | | | | | | | | | | |
| | | hr | | 185 | 62,3 | 18,7 | 6,32 | 2,13 | 0,59 | | | | | | | | | | | | |
| 5,4 | 90 | v | | | 3,06 | 1,87 | 1,19 | 0,76 | 0,45 | 0,30 | | | | | | | | | | | |
| | | hr | | | 77,5 | 23,3 | 7,85 | 2,65 | 0,74 | 0,27 | | | | | | | | | | | |
| 6 | 100 | v | | | 3,40 | 2,07 | 1,33 | 0,85 | 0,50 | 0,33 | | | | | | | | | | | |
| | | hr | | | 94,1 | 28,3 | 9,54 | 3,22 | 0,90 | 0,33 | | | | | | | | | | | |
| 7,5 | 125 | v | | | 4,25 | 2,59 | 1,66 | 1,06 | 0,63 | 0,41 | | | | | | | | | | | |
| | | hr | | | 142 | 42,8 | 14,4 | 4,86 | 1,36 | 0,49 | | | | | | | | | | | |
| 9 | 150 | v | | | | 3,11 | 1,99 | 1,27 | 0,75 | 0,50 | 0,32 | | | | | | | | | | |
| | | hr | | | | 59,9 | 20,2 | 6,82 | 1,90 | 0,69 | 0,23 | | | | | | | | | | |
| 10,5 | 175 | v | | | | 3,63 | 2,32 | 1,49 | 0,88 | 0,58 | 0,37 | | | | | | | | | | |
| | | hr | | | | 79,7 | 26,9 | 9,07 | 2,53 | 0,92 | 0,31 | | | | | | | | | | |
| 12 | 200 | v | | | | 4,15 | 2,65 | 1,70 | 1,01 | 0,66 | 0,42 | | | | | | | | | | |
| | | hr | | | | 102 | 34,4 | 11,6 | 3,23 | 1,18 | 0,40 | | | | | | | | | | |
| 15 | 250 | v | | | | 5,18 | 3,32 | 2,12 | 1,26 | 0,83 | 0,53 | 0,34 | | | | | | | | | |
| | | hr | | | | 154 | 52,0 | 17,5 | 4,89 | 1,78 | 0,60 | 0,20 | | | | | | | | | |
| 18 | 300 | v | | | | | 3,98 | 2,55 | 1,51 | 1,00 | 0,64 | 0,41 | | | | | | | | | |
| | | hr | | | | | 72,8 | 24,6 | 6,85 | 2,49 | 0,84 | 0,28 | | | | | | | | | |
| 24 | 400 | v | | | | | 5,31 | 3,40 | 2,01 | 1,33 | 0,85 | 0,54 | 0,38 | | | | | | | | |
| | | hr | | | | | 124 | 41,8 | 11,66 | 4,24 | 1,43 | 0,48 | 0,20 | | | | | | | | |
| 30 | 500 | v | | | | | 6,63 | 4,25 | 2,51 | 1,66 | 1,06 | 0,68 | 0,47 | | | | | | | | |
| | | hr | | | | | 187 | 63,2 | 17,6 | 6,41 | 2,16 | 0,73 | 0,30 | | | | | | | | |
| 36 | 600 | v | | | | | 5,10 | 3,02 | 1,99 | 1,27 | 0,82 | 0,57 | 0,42 | | | | | | | | |
| | | hr | | | | | 88,6 | 24,7 | 8,98 | 3,03 | 1,02 | 0,42 | 0,20 | | | | | | | | |
| 42 | 700 | v | | | | | 5,94 | 3,52 | 2,32 | 1,49 | 0,95 | 0,66 | 0,49 | | | | | | | | |
| | | hr | | | | | 118 | 32,8 | 11,9 | 4,03 | 1,36 | 0,56 | 0,26 | | | | | | | | |
| 48 | 800 | v | | | | | 6,79 | 4,02 | 2,65 | 1,70 | 1,09 | 0,75 | 0,55 | | | | | | | | |
| | | hr | | | | | 151 | 42,0 | 15,3 | 5,16 | 1,74 | 0,72 | 0,34 | | | | | | | | |
| 54 | 900 | v | | | | | 7,64 | 4,52 | 2,99 | 1,91 | 1,22 | 0,85 | 0,62 | | | | | | | | |
| | | hr | | | | | 188 | 52,3 | 19,0 | 6,41 | 2,16 | 0,89 | 0,42 | | | | | | | | |
| 60 | 1000 | v | | | | | 5,03 | 3,32 | 2,12 | 1,36 | 0,94 | 0,69 | 0,53 | | | | | | | | |
| | | hr | | | | | 63,5 | 23,1 | 7,79 | 2,63 | 1,08 | 0,51 | 0,27 | | | | | | | | |
| 75 | 1250 | v | | | | | 6,28 | 4,15 | 2,65 | 1,70 | 1,18 | 0,87 | 0,66 | | | | | | | | |
| | | hr | | | | | 96,0 | 34,9 | 11,8 | 3,97 | 1,63 | 0,77 | 0,40 | | | | | | | | |
| 90 | 1500 | v | | | | | 7,54 | 4,98 | 3,18 | 2,04 | 1,42 | 1,04 | 0,80 | | | | | | | | |
| | | hr | | | | | 134 | 48,9 | 16,5 | 5,57 | 2,29 | 1,08 | 0,56 | | | | | | | | |
| 105 | 1750 | v | | | | | 8,79 | 5,81 | 3,72 | 2,38 | 1,65 | 1,21 | 0,93 | | | | | | | | |
| | | hr | | | | | 179 | 65,1 | 21,9 | 7,40 | 3,05 | 1,44 | 0,75 | | | | | | | | |
| 120 | 2000 | v | | | | | 6,63 | 4,25 | 2,72 | 1,89 | 1,39 | 1,06 | 0,68 | | | | | | | | |
| | | hr | | | | | 83,3 | 28,1 | 9,48 | 3,90 | 1,84 | 0,96 | 0,32 | | | | | | | | |
| 150 | 2500 | v | | | | | 8,29 | 5,31 | 3,40 | 2,36 | 1,73 | 1,33 | 0,85 | | | | | | | | |
| | | hr | | | | | 126 | 42,5 | 14,3 | 5,89 | 2,78 | 1,45 | 0,49 | | | | | | | | |
| 180 | 3000 | v | | | | | | | | 6,37 | 4,08 | 2,83 | 2,08 | 1,59 | 1,02 | 0,71 | | | | | |
| | | hr | | | | | | | | 59,5 | 20,1 | 8,26 | 3,90 | 2,03 | 0,69 | 0,28 | | | | | |
| 210 | 3500 | v | | | | | | | | 7,43 | 4,76 | 3,30 | 2,43 | 1,86 | 1,19 | 0,83 | | | | | |
| | | hr | | | | | | | | 79,1 | 26,7 | 11,0 | 5,18 | 2,71 | 1,01 | 0,38 | | | | | |
| 240 | 4000 | v | | | | | | | | 8,49 | 5,44 | 3,77 | 2,77 | 2,12 | 1,36 | 0,94 | | | | | |
| | | hr | | | | | | | | 101 | 34,2 | 14,1 | 6,64 | 3,46 | 1,17 | 0,48 | | | | | |
| 300 | 5000 | v | | | | | | | | | 6,79 | 4,72 | 3,47 | 2,65 | 1,70 | 1,18 | | | | | |
| | | hr | | | | | | | | | 51,6 | 21,2 | 10,0 | 5,23 | 1,77 | 0,73 | | | | | |
| 360 | 6000 | v | | | | | | | | | 8,15 | 5,66 | 4,16 | 3,18 | 2,04 | 1,42 | | | | | |
| | | hr | | | | | | | | | 72,3 | 29,8 | 14,1 | 7,33 | 2,47 | 1,02 | | | | | |
| 420 | 7000 | v | | | | | | | | | | 6,61 | 4,85 | 3,72 | 2,38 | 1,65 | 1,21 | | | | |
| | | hr | | | | | | | | | | 39,6 | 18,7 | 9,75 | 3,29 | 1,35 | 0,64 | | | | |
| 480 | 8000 | v | | | | | | | | | | 7,55 | 5,55 | 4,25 | 2,72 | 1,89 | 1,39 | | | | |
| | | hr | | | | | | | | | | 50,7 | 23,9 | 12,49 | 4,21 | 1,73 | 0,82 | | | | |
| 540 | 9000 | v | | | | | | | | | | 8,49 | 6,24 | 4,78 | 3,06 | 2,12 | 1,56 | 1,19 | | | |
| | | hr | | | | | | | | | | 63,0 | 29,8 | 15,5 | 5,24 | 2,16 | 1,02 | 0,53 | | | |

FLOW RESISTANCE

TABLE OF FLOW RESISTANCE IN BENDS, VALVES AND GATES

The flow resistance is calculated using the equivalent pipeline length method according to the table below:

| ACCESSORY TYPE | DN | | | | | | | | | | | |
|--------------------|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 | 250 | 300 |
| | Equivalent pipeline length (m) | | | | | | | | | | | |
| 45° bend | 0,2 | 0,2 | 0,4 | 0,4 | 0,6 | 0,6 | 0,9 | 1,1 | 1,5 | 1,9 | 2,4 | 2,8 |
| 90° bend | 0,4 | 0,6 | 0,9 | 1,1 | 1,3 | 1,5 | 2,1 | 2,6 | 3,0 | 3,9 | 4,7 | 5,8 |
| 90° smooth bend | 0,4 | 0,4 | 0,4 | 0,6 | 0,9 | 1,1 | 1,3 | 1,7 | 1,9 | 2,8 | 3,4 | 3,9 |
| Union tee or cross | 1,1 | 1,3 | 1,7 | 2,1 | 2,6 | 3,2 | 4,3 | 5,3 | 6,4 | 7,5 | 10,7 | 12,8 |
| Gate | - | - | - | 0,2 | 0,2 | 0,2 | 0,4 | 0,4 | 0,6 | 0,9 | 1,1 | 1,3 |
| Non return valve | 1,1 | 1,5 | 1,9 | 2,4 | 3,0 | 3,4 | 4,7 | 5,9 | 7,4 | 9,6 | 11,8 | 13,9 |

G-a-pcv_a_th

The table is valid for the Hazen Williams coefficient $C = 100$ (cast iron pipework). For steel pipework, multiply the values by 1.41. For stainless steel, copper and coated cast iron pipework, multiply the values by 1.85.

When the **equivalent pipeline length** has been determined, the flow resistance is obtained from the table of flow resistance.

The values given are guideline values which are bound to vary slightly according to the model, especially for gate valves and non-return valves, for which it is a good idea to check the values supplied by the manufacturers.

VOLUMETRIC CAPACITY

| Litres per minute l/min | Cubic metres per hour m ³ /h | Cubic feet per hour ft ³ /h | Cubic feet per minute ft ³ /min | Imp. gal. per minute Imp. gal./min | US gal. per minute Us gal./min |
|-------------------------------|---|--|--|--|--------------------------------------|
| 1,000 | 0,0600 | 2,1189 | 0,0353 | 0,2200 | 0,2642 |
| 16,6667 | 1,000 | 35,3147 | 0,5886 | 3,6662 | 4,4029 |
| 0,4719 | 0,0283 | 1,000 | 0,0167 | 0,1038 | 0,1247 |
| 28,3168 | 1,6990 | 60,0000 | 1,000 | 6,2288 | 7,4805 |
| 4,5461 | 0,2728 | 9,6326 | 0,1605 | 1,000 | 1,2009 |
| 3,7854 | 0,2271 | 8,0208 | 0,1337 | 0,8327 | 1,000 |

PRESSURE AND HEAD

| Newton per square metre N/m ² | kilo Pascal kPa | bar bar | Pound force per square inch psi | metre of water m H ₂ O | millimetre of mercury mm Hg |
|--|--------------------|----------------------|---------------------------------------|---|-----------------------------------|
| 1,000 | 0,0010 | 1 x 10 ⁻⁵ | 1.45 x 10 ⁻⁴ | 1.02 x 10 ⁻⁴ | 0,0075 |
| 1000,0000 | 1,000 | 0,0100 | 0,1450 | 0,1020 | 7,5006 |
| 1 x 10 ⁵ | 100,0000 | 1,000 | 14,5038 | 10,1972 | 750,0638 |
| 6894,7570 | 6,8948 | 0,0689 | 1,000 | 0,7031 | 51,7151 |
| 9806,6500 | 9,8067 | 0,0981 | 1,4223 | 1,000 | 73,5561 |
| 133,3220 | 0,1333 | 0,0013 | 0,0193 | 0,0136 | 1,000 |

LENGTH

| millimetre mm | centimetre cm | metre m | inch in | foot ft | yard yd |
|------------------|------------------|--------------|--------------|--------------|--------------|
| 1,000 | 0,1000 | 0,0010 | 0,0394 | 0,0033 | 0,0011 |
| 10,0000 | 1,000 | 0,0100 | 0,3937 | 0,0328 | 0,0109 |
| 1000,0000 | 100,0000 | 1,000 | 39,3701 | 3,2808 | 1,0936 |
| 25,4000 | 2,5400 | 0,0254 | 1,000 | 0,0833 | 0,0278 |
| 304,8000 | 30,4800 | 0,3048 | 12,0000 | 1,000 | 0,3333 |
| 914,4000 | 91,4400 | 0,9144 | 36,0000 | 3,0000 | 1,000 |

VOLUME

| cubic metre m ³ | litre litro | millilitre ml | imp. Gallon imp. gal. | US gallon US gal. | cubic foot ft ³ |
|-------------------------------|----------------|---------------------|--------------------------|--------------------------|-------------------------------|
| 1,000 | 1000,0000 | 1 x 10 ⁶ | 219,9694 | 264,1720 | 35,3147 |
| 0,0010 | 1,000 | 1000,0000 | 0,2200 | 0,2642 | 0,0353 |
| 1 x 10 ⁻⁶ | 0,0010 | 1,000 | 2.2 x 10 ⁻⁴ | 2.642 x 10 ⁻⁴ | 3.53 x 10 ⁻⁵ |
| 0,0045 | 4,5461 | 4546,0870 | 1,000 | 1,2009 | 0,1605 |
| 0,0038 | 3,7854 | 3785,4120 | 0,8327 | 1,000 | 0,1337 |
| 0,0283 | 28,3168 | 28316,8466 | 6,2288 | 7,4805 | 1,000 |

G-at_pp-en_a_sc

FURTHER PRODUCT SELECTION AND DOCUMENTATION

Xylect



Xylect is pump solution selection software with an extensive online database of product information across the entire Lowara, and Vogel range of pumps and related products, with multiple search options and helpful project management facilities. The system holds up-to-date product information on thousands of products and accessories.

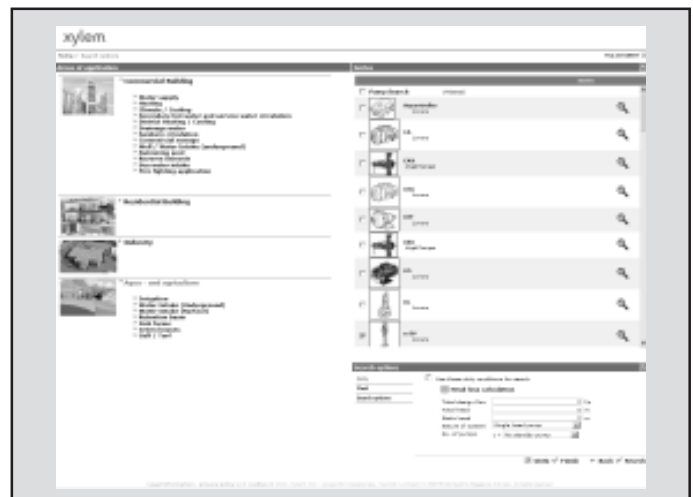
The possibility to search by applications and the detailed information output given makes it easy to make the optimal selection without having detailed knowledge about the Lowara and Vogel products.

The search can be made by:

- Application
- Product type
- Duty point

Xylect gives a detailed output:

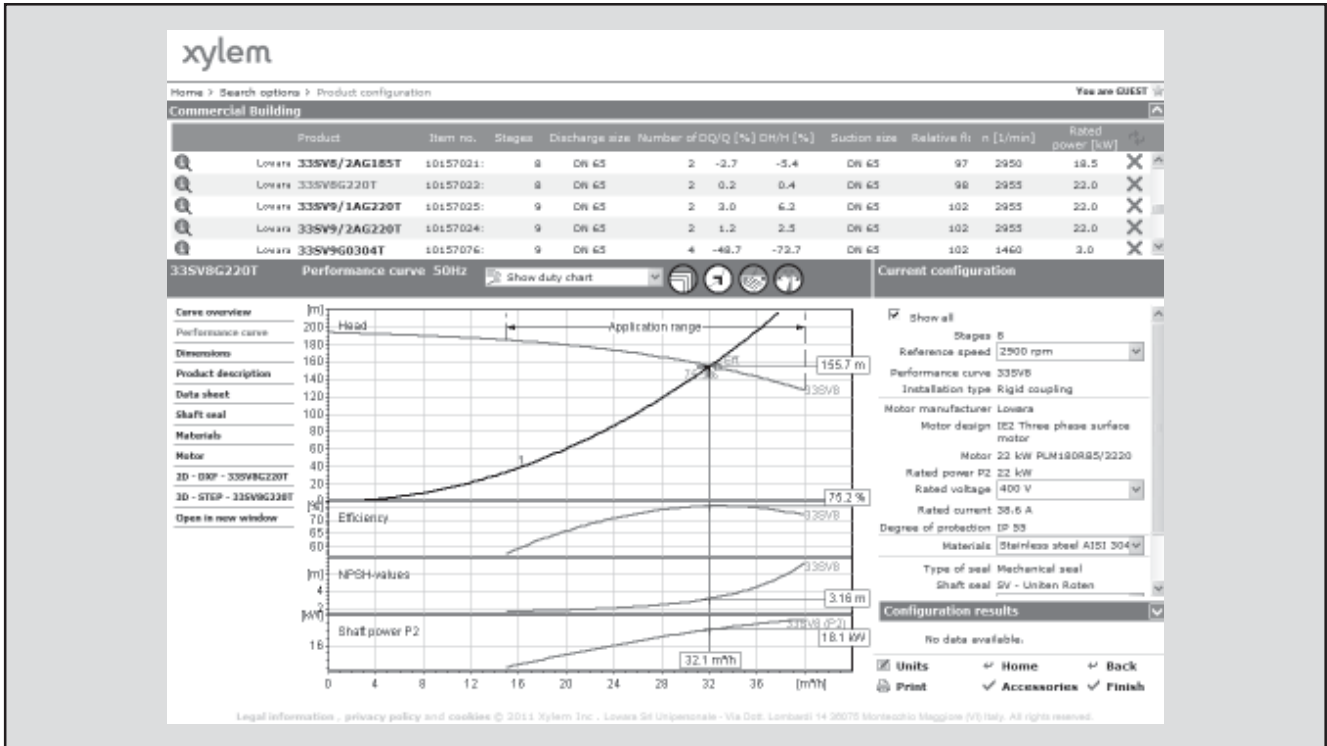
- List with search results
- Performance curves (flow, head, power, efficiency, NPSH)
- Motor data
- Dimensional drawings
- Options
- Data sheet printouts
- Document downloads incl dxf files



The search by application guides users not familiar with the product range to the right choice.

FURTHER PRODUCT SELECTION AND DOCUMENTATION

Xylect



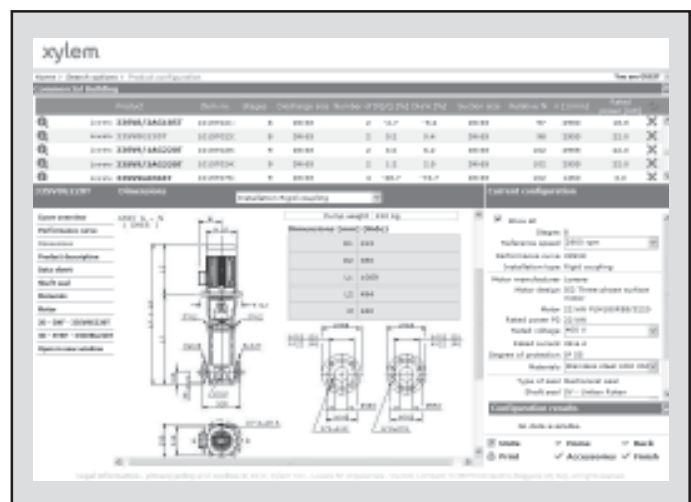
The detailed output makes it easy to select the optimal pump from the given alternatives.

The best way to work with Xylect is to create a personal account. This makes it possible to:

- Set own standard units
- Create and save projects
- Share projects with other Xylect users

Every user has a My Xylect space, where all projects are saved.

For more information about Xylect please contact our sales network or visit www.xylect.com.



Dimensional drawings appear on the screen and can be downloaded in dxf format.

Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're 12,000 people unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

For more information on how Xylem can help you, go to xylem.com.



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