

# CS-R 60 Hz



Submersible motors  
Motores sumergidos



| kW   | 4"CS-R<br>1~ | 4"CS-R<br>3~ | 6"CS-R<br>3~ | 8"CS-R<br>3~ | 10"CS-R<br>3~ | kW   |
|------|--------------|--------------|--------------|--------------|---------------|------|
| 0,37 | •            | •            |              |              |               | 0,37 |
| 0,55 | •            | •            |              |              |               | 0,55 |
| 0,75 | •            | •            |              |              |               | 0,75 |
| 1,1  | •            | •            |              |              |               | 1,1  |
| 1,5  | •            | •            |              |              |               | 1,5  |
| 2,2  | •            | •            |              |              |               | 2,2  |
| 3    |              | •            |              |              |               | 3    |
| 4    |              | •            | •            |              |               | 4    |
| 5,5  |              | •            | •            |              |               | 5,5  |
| 7,5  |              | •            | •            |              |               | 7,5  |
| 9,2  |              |              | •            |              |               | 9,2  |
| 11   |              |              | •            |              |               | 11   |
| 13   |              |              | •            |              |               | 13   |
| 15   |              |              | •            |              |               | 15   |
| 18,5 |              |              | •            |              |               | 18,5 |
| 22   |              |              | •            |              |               | 22   |
| 26   |              |              | •            |              |               | 26   |
| 30   |              |              | •            | •            |               | 30   |
| 37   |              |              | •            | •            |               | 37   |
| 45   |              |              | •            | •            |               | 45   |
| 51   |              |              |              | •            |               | 51   |
| 59   |              |              |              | •            |               | 59   |
| 66   |              |              |              | •            |               | 66   |
| 75   |              |              |              | •            | •             | 75   |
| 92   |              |              |              | •            | •             | 92   |
| 110  |              |              |              | •            | •             | 110  |
| 132  |              |              |              |              | •             | 132  |
| 150  |              |              |              |              | •             | 150  |

4.93.325-60Hz

## Construction

The 4" motors have a special food grade dielectric fluid that gives a better lubricant effect, increasing the life of all moving parts and the copper wires.

The 6", 8", 10" motors are in a water bath with the wire being coated with polyvinyl chloride.

## Operating conditions

| Motor  | P2         | Max. Liquid temperature | Cooling minimum flow velocity | Max. starts per hou |
|--------|------------|-------------------------|-------------------------------|---------------------|
| 4CS-R  | all types  | 35 °C                   | 0,1 m/s                       | 30                  |
| 6CS-R  | 4÷15 kW    | 40 °C                   | 0,5 m/s                       | 20                  |
|        | 18,5÷30 kW | 35 °C                   | 0,5 m/s                       | 20                  |
|        | 37 kW      | 30 °C                   | 0,5 m/s                       | 20                  |
|        | 45 kW      | 35 °C                   | 0,5 m/s                       | 15                  |
| 8CS-R  | 30÷45 kW   | 30 °C                   | 0,2 m/s                       | 10                  |
|        | 51 kW      | 30 °C                   | 0,2 m/s                       | 8                   |
|        | 59÷75 kW   | 30 °C                   | 0,5 m/s                       | 8                   |
|        | 92÷110 kW  | 30 °C                   | 0,5 m/s                       | 6                   |
| 10CS-R | all types  | 25 °C                   | 0,15 m/s                      | 6                   |

## Operation data

2-pole induction motor, 60 Hz (n = 3450 1/min).

Sized for connection to the pumps according to NEMA Standards.

Standard voltages:

- single-phase 110 V up to 0,75 kW for 4" motors;  
220 V up to 2,2 kW for 4" motors.
- three-phase 220 V, 380 V, 440 V, 460 V, for 4" motors.
- three-phase 380 V, 440 V, 460 V; 380/660 V for 6-8-10" motors.

Voltage tolerance: ±10%.

Recommended type of starting for powers from 7.5 kW:

star/delta, soft start, impedance starting, autotransformer.

Insulation class:

- class F for 4" motors,
- class E for 6" motors, PVC for I-6" (I-6" 45 kW A (PE2+PA)).
- PVC for 8", 10"

Protection IP 68.

Installation below water level: 200 m for 4", 150 m for 6", 500 m for 8,10"

Motor suitable operation with frequency converter (with suitable filter dv/dt).

Horizontal installation (6" 37-45kW, 8" 92kW excluded)

Continuous duty.

## Materiales

| Components     | 4"   |  |
|----------------|--|--|
| External frame | Cr-Ni steel AISI 304L  |  |
| Motor flange   | Cast iron with cataphoresis treatment and protected with a Cr-Ni steel AISI 304 cover. |  |
| Shaft end      | Cr-Ni steel AISI 304   |  |
| Thrust bearing | Oil wetted   |  |
| Components     | 6", 8", 10" standard   | 6", 8", 10" AISI 316                     |
| External frame | Cr-Ni steel AISI 304 (Steel AISI 316 for 6")   | Cr-Ni-Mo steel AISI 316                  |
| Motor flange   | Cast iron GJL 250 EN 1561 (Cast iron G 25 EN 1561 for 8,10")                           | Cr-Ni-Mo steel AISI 316                  |
| Shaft end      | Cr steel AISI 431 (Steel AISI 630 for 10")   | Duplex 1.4462 (Steel AISI 630 for 8,10") |
| Thrust bearing | Brass pads   | Brass pads                               |

## Special features on request

- Other voltage.
- Higher liquid temperature.
- PT100 temperature sensor
- PE2 / PA class Y (90°C) winding insulation
- Cooling jackets
- Special coupling flange

## Ejecución

Los motores 4" tienen un fluido dieléctrico especial de tipo alimentación que garantiza un mayor efecto lubricante aumentando la duración de todas las partes en movimiento y de los cables de cobre.

Los motores 6", 8" Y 10" se hallan en baño de agua, y los cables están revestidos con cloruro de polivinilo.

## Limites de empleo

| Motores | P2         | Temperatura. del agua hasta | Refrigeración: velocidad mínima del caudal | Arranques por hora maximos |
|---------|------------|-----------------------------|--|----------------------------|
| 4CS-R   | todos      | 35 °C                       | 0,1 m/s                                    | 30                         |
| 6CS-R   | 4÷15 kW    | 40 °C                       | 0,5 m/s                                    | 20                         |
|         | 18,5÷30 kW | 35 °C                       | 0,5 m/s                                    | 20                         |
|         | 37 kW      | 30 °C                       | 0,5 m/s                                    | 20                         |
|         | 45 kW      | 35 °C                       | 0,5 m/s                                    | 15                         |
| 8CS-R   | 30÷45 kW   | 30 °C                       | 0,2 m/s                                    | 10                         |
|         | 51 kW      | 30 °C                       | 0,2 m/s                                    | 8                          |
|         | 59÷75 kW   | 30 °C                       | 0,5 m/s                                    | 8                          |
|         | 92÷110 kW  | 30 °C                       | 0,5 m/s                                    | 6                          |
| 10CS-R  | todos      | 25 °C                       | 0,15 m/s                                   | 6                          |

## Datos de ejercicio

Motor a inducción 2 polos, 60 Hz (n = 3450 1/min).

Dimensiones para el acoplamiento a la bomba según NEMA Standard.

Tensiones de alimentación:

- monofásicos 110 V - hasta 0,75 kW para motores de 4";  
220 V - hasta 2,2 kW para motores de 4".
- trifásicos 220 V, 380 V, 440 V, 460 V, para motores de 4".
- trifásicos 380 V, 440 V, 460 V; 380/660, para motores de 6-8-10".

Variación de tensión: ±10%.

Tipo de arranque aconsejado para potencias desde 7.5 kW:

estrella/triángulo, soft start, o con impedancia.

Aislamiento clase:

- clase F para motore 4"
- clase E para motore 6", PVC para I-6" (I-6" 45 kW A (PE2+PA)).
- PVC para 8", 10"

Protección IP 68.

Installation below water level: 200 m for 4", 150 m for 6", 500 m for 8,10"

Motor preparado al funcionamiento con convertidor de frecuencia (con filtro adecuado dv/dt).

Instalación horizontal (excluidos 6" 37-45kW, 8" 92kW)

Servicio continuo.

## Materiales

| Componentes      | 4"  |                                      |
|------------------|---|--------------------------------------|
| Carcasa exterior | Acero Cr-Ni AISI 304L   |                                      |
| Motor flange     | Hierro fundido con tratamiento de cataforesis y protegido con tapa de acero Cr-Ni AISI 304. |                                      |
| Eje              | Acero Cr-Ni AISI 304  |                                      |
| Cojinete axial   | en baño de aceite   |                                      |
| Componentes      | 6", 8", 10" standard  | 6", 8", 10" AISI 316                 |
| Carcasa exterior | Acero Cr-Ni AISI 304 (Acero AISI 316 parar 6")  | Acero Cr-Ni-Mo AISI 316              |
| Motor flange     | Hierro GJL 250 EN 1561 (Hierro G 25 EN 1561 para 8,10")                                     | Acero Cr-Ni-Mo AISI 316              |
| Eje              | Acero Cr AISI 431 (AISI 630 para 10")   | Duplex 1.4462 (AISI 630 para 8, 10") |
| Cojinete de tope | Latón Patines oscilantes  | Latón Patines oscilantes             |

## Ejecuciones especiales bajo demanda

- Otras tensiones.
- Para agua con temperatura más elevada.
- Sonda térmica PT100
- Aislamiento del devanado PE2 / PA clase Y (90°C)
- Camisa de refrigeración
- Brida de acoplamiento especial



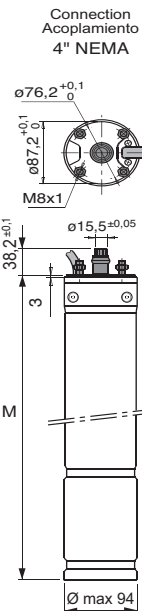
## Dimensions and weights, Dimensiones y pesos

### 4"CS - 1 ~

| Type            | P2   |      | M<br>mm | Weight<br>Peso<br>kg |
|-----------------|------|------|---------|----------------------|
|                 | kW   | HP   |         |                      |
| 4CS-R 0,37MC-60 | 0,37 | 0,5  | 327     | 7,2                  |
| 4CS-R 0,55MC-60 | 0,55 | 0,75 | 362     | 7,2                  |
| 4CS-R 0,75MC-60 | 0,75 | 1    | 402     | 8,45                 |
| 4CS-R 1,1MC-60  | 1,1  | 1,5  | 447     | 10,2                 |
| 4CS-R 1,5MC-60  | 1,5  | 2    | 467     | 11,65                |
| 4CS-R 2,2MC-60  | 2,2  | 3    | 517     | 14,9                 |

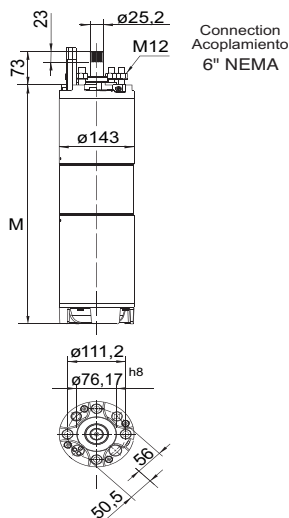
### 4"CS - 3 ~

| Type            | P2   |      | M<br>mm | Weight<br>Peso<br>kg |
|-----------------|------|------|---------|----------------------|
|                 | kW   | HP   |         |                      |
| 4CS-R 0,37TC-60 | 0,37 | 0,5  | 331,4   | 7,2                  |
| 4CS-R 0,55TC-60 | 0,55 | 0,75 | 331,4   | 7,2                  |
| 4CS-R 0,75TC-60 | 0,75 | 1    | 356,4   | 8,45                 |
| 4CS-R 1,1TC-60  | 1,1  | 1,5  | 371,4   | 9,35                 |
| 4CS-R 1,5TC-60  | 1,5  | 2    | 396,4   | 10,2                 |
| 4CS-R 2,2TC-60  | 2,2  | 3    | 436,5   | 11,65                |
| 4CS-R 3TC-60    | 3    | 4    | 450     | 12,1                 |
| 4CS-R 4TC-60    | 4    | 5,5  | 505     | 15,1                 |
| 4CS-R 5,5TC-60  | 5,5  | 7,5  | 589     | 19,8                 |
| 4CS-R 7,5TC-60  | 7,5  | 10   | 800,2   | 28,95                |



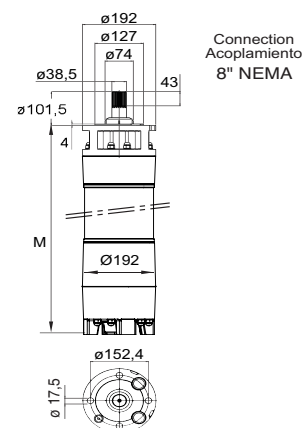
### 6"CS-R - 3 ~

| Type          | P2   |      | M<br>mm | Weight<br>Peso<br>kg |
|---------------|------|------|---------|----------------------|
|               | kW   | HP   |         |                      |
| 6CS-R 4-60    | 4    | 5,5  | 570     | 34,6                 |
| 6CS-R 5,5-60  | 5,5  | 7,5  | 615     | 39,6                 |
| 6CS-R 7,5-60  | 7,5  | 10   | 670     | 44,4                 |
| 6CS-R 9,2-60  | 9,2  | 12,5 | 700     | 47,7                 |
| 6CS-R 11-60   | 11   | 15   | 715     | 52                   |
| 6CS-R 13-60   | 13   | 17,5 | 750     | 56                   |
| 6CS-R 15-60   | 15   | 20   | 790     | 59,8                 |
| 6CS-R 18,5-60 | 18,5 | 25   | 830     | 64,2                 |
| 6CS-R 22-60   | 22   | 30   | 920     | 74,5                 |
| 6CS-R 26-60   | 26   | 35   | 1055    | 89,3                 |
| 6CS-R 30-60   | 30   | 40   | 1165    | 101,9                |
| 6CS-R 37-60   | 37   | 50   | 1245    | 111                  |
| 6CS-R 45-60   | 45   | 60   | 1322    | 123,3                |



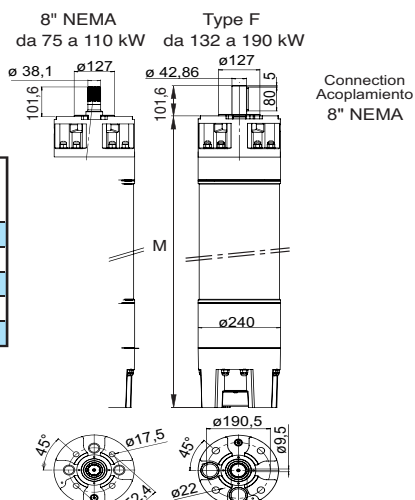
### 8"CS-R - 3 ~

| Type         | P2  |     | M<br>mm | Weight<br>Peso<br>kg |
|--------------|-----|-----|---------|----------------------|
|              | kW  | HP  |         |                      |
| 8CS-R 30-60  | 30  | 40  | 1060    | 143                  |
| 8CS-R 37-60  | 37  | 50  | 1115    | 155                  |
| 8CS-R 45-60  | 45  | 60  | 1195    | 172                  |
| 8CS-R 51-60  | 51  | 70  | 1290    | 192                  |
| 8CS-R 59-60  | 59  | 80  | 1395    | 210                  |
| 8CS-R 66-60  | 66  | 90  | 1430    | 219                  |
| 8CS-R 75-60  | 75  | 100 | 1500    | 235                  |
| 8CS-R 92-60  | 92  | 125 | 1685    | 265                  |
| 8CS-R 110-60 | 110 | 150 | 1760    | 283                  |



### 10"CS-R - 3 ~

| Type          | P2  |     | M<br>mm | Weight<br>Peso<br>kg |
|---------------|-----|-----|---------|----------------------|
|               | kW  | HP  |         |                      |
| 10CS-R 75-60  | 75  | 100 | 1292    | 280                  |
| 10CS-R 92-60  | 92  | 125 | 1422    | 318                  |
| 10CS-R 110-60 | 110 | 150 | 1642    | 380                  |
| 10CS-R 132-60 | 132 | 180 | 1712    | 403                  |
| 10CS-R 150-60 | 150 | 200 | 1762    | 420                  |



## Cable

| Motor 220V - 60Hz - 1~ | Sezione                     | Lunghezza |
|------------------------|-----------------------------|-----------|
| 4CS-R 0,37 ÷ 2,2 kW    | 4 x 1,5 mm <sup>2</sup>     | 1,7 m     |
| Motor 380V - 60Hz - 3~ | Sezione                     | Lunghezza |
| 4CS-R 0,37 ÷ 3 kW      | 4 x 1,5 mm <sup>2</sup>     | 1,7 m     |
| 4CS-R 4 ÷ 7,5 kW       | 4 x 2 mm <sup>2</sup>       | 2,7 m     |
| 6CS-R 4 ÷ 11 kW        | 3 x (1x2,5) mm <sup>2</sup> | 3,5 m     |
| 6CS-R 13 ÷ 22 kW       | 3 x (1x4) mm <sup>2</sup>   | 3,5 m     |
| 6CS-R 26 - 30 kW       | 3 x (1x6) mm <sup>2</sup>   | 3,5 m     |
| 6CS-R 37 - 45 kW       | 3 x (1x10) mm <sup>2</sup>  | 4,5 m     |
| 8CS-R 30 ÷ 45 kW       | 3 x (1x16) mm <sup>2</sup>  | 4 m       |
| 8CS-R 51 ÷ 92 kW       | 3 x (1x25) mm <sup>2</sup>  | 4 m       |
| 8CS-R 110 kW           | 3 x (1x35) mm <sup>2</sup>  | 4 m       |
| 10CS 75 kW             | 3x(1x35) mm <sup>2</sup>    | 4 m       |
| 10CS 92 kW             | 3x(1x50) mm <sup>2</sup>    | 4 m       |
| 10CS 110 ÷ 150 kW      | 3x(1x70) mm <sup>2</sup>    | 4 m       |

## Cable

| Motor 220V - 60Hz - 1~ | Sección                     | Longitud |
|------------------------|-----------------------------|----------|
| 4CS-R 0,37 ÷ 2,2 kW    | 4 x 1,5 mm <sup>2</sup>     | 1,7 m    |
| Motor 380V - 60Hz - 3~ | Sección                     | Longitud |
| 4CS-R 0,37 ÷ 3 kW      | 4 x 1,5 mm <sup>2</sup>     | 1,7 m    |
| 4CS-R 4 ÷ 7,5 kW       | 4 x 2 mm <sup>2</sup>       | 2,7 m    |
| 6CS-R 4 ÷ 11 kW        | 3 x (1x2,5) mm <sup>2</sup> | 3,5 m    |
| 6CS-R 13 ÷ 22 kW       | 3 x (1x4) mm <sup>2</sup>   | 3,5 m    |
| 6CS-R 26 - 30 kW       | 3 x (1x6) mm <sup>2</sup>   | 3,5 m    |
| 6CS-R 37 - 45 kW       | 3 x (1x10) mm <sup>2</sup>  | 4,5 m    |
| 8CS-R 30 ÷ 45 kW       | 3 x (1x16) mm <sup>2</sup>  | 4 m      |
| 8CS-R 51 ÷ 92 kW       | 3 x (1x25) mm <sup>2</sup>  | 4 m      |
| 8CS-R 110 kW           | 3 x (1x35) mm <sup>2</sup>  | 4 m      |
| 10CS 75 kW             | 3x(1x35) mm <sup>2</sup>    | 4 m      |
| 10CS 92 kW             | 3x(1x50) mm <sup>2</sup>    | 4 m      |
| 10CS 110 ÷ 150 kW      | 3x(1x70) mm <sup>2</sup>    | 4 m      |

## Cooling jacket - Camisa de refrigeración

When the submersible motor is installed :

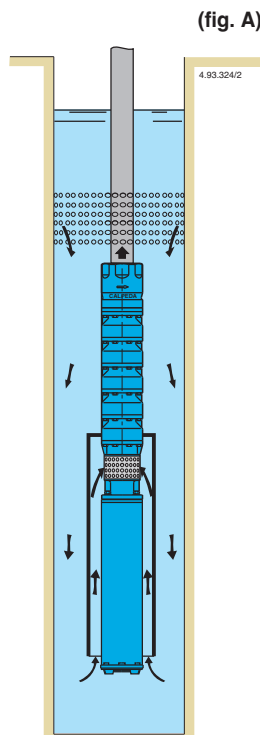
- below the well inlet points (**picture A**);
- in tanks, lakes, basins, etc... (**pictures B and C**)

an external jacket must be installed to create a cooling flow around the motor. Only in this way a safe operation can be assured avoiding any overheating which can damage the motor.

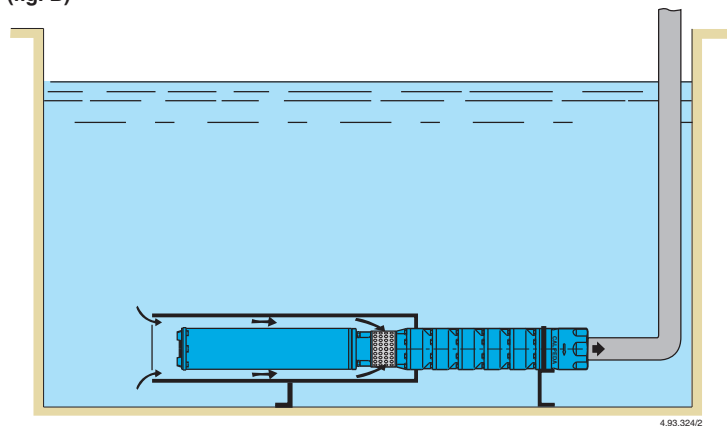
Cuando el motor sumergible está instalado :

- bajo los puntos de pozos de entrada (**fig. A**);
- en tanques, lagos, embalses, etc... (**fig. B y C**)

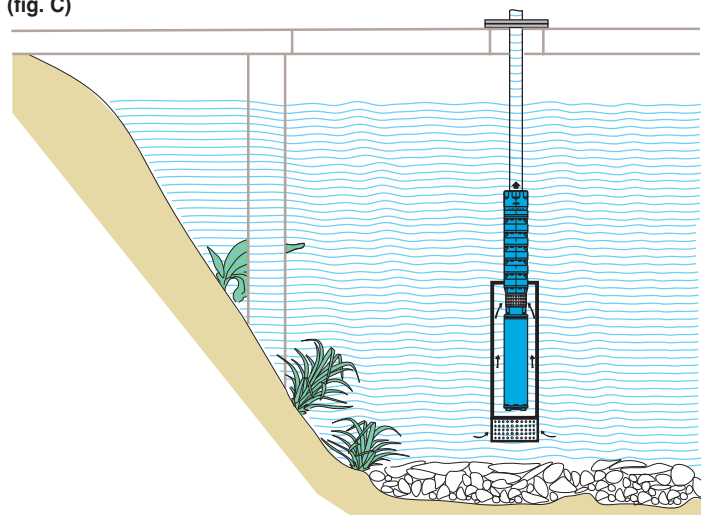
debe instalarse una camisa externa para crear un flujo refrigerante alrededor del motor. Tan solo de esta forma puede asegurarse una operación sin riesgos, evitando cualquier sobrecalentamiento que pudiera dañar el motor.



(fig. B)



(fig. C)



## Maximum length of electric cables - Máxima longitud de los cables eléctricos

| AMP.         | 220 V - 60 Hz 1~   |     |     |     |     |
|--------------|--|-----|-----|-----|-----|
|              | 1 four-wires cable - cable cuatripolar 4 x ....mm <sup>2</sup> |     |     |     |     |
|              | 1,5  | 2,5 | 4   | 6   | 10  |
| cables max m |  |     |     |     |     |
| 2            | 142  | 235 |     |     |     |
| 4            | 71   | 117 | 188 |     |     |
| 6            | 47   | 78  | 126 | 188 |     |
| 8            | 35   | 59  | 94  | 141 | 230 |
| 10           | 28   | 47  | 75  | 113 | 184 |
| 12           | 24   | 39  | 63  | 94  | 153 |
| 14           | 20   | 34  | 54  | 81  | 131 |
| 16           | 18   | 29  | 47  | 71  | 115 |
| 18           |  | 26  | 42  | 63  | 102 |
| 20           |  | 23  | 38  | 57  | 92  |
| 25           |  |     | 30  | 45  | 73  |
| 30           |  |     | 25  | 38  | 61  |

| AMP.         | 110 V - 60 Hz 1~   |     |    |    |     |
|--------------|--|-----|----|----|-----|
|              | 1 four-wires cable - cable cuatripolar 4 x ....mm <sup>2</sup> |     |    |    |     |
|              | 1,5  | 2,5 | 4  | 6  | 10  |
| cables max m |  |     |    |    |     |
| 2            | 68   | 112 |    |    |     |
| 4            | 34   | 56  | 90 |    |     |
| 6            | 23   | 37  | 60 | 90 |     |
| 8            | 17   | 28  | 45 | 68 | 110 |
| 10           | 14   | 22  | 36 | 54 | 88  |
| 12           | 11   | 19  | 30 | 45 | 73  |
| 14           | 10   | 16  | 26 | 39 | 63  |
| 16           | 8  | 14  | 23 | 34 | 55  |
| 18           |  | 12  | 20 | 30 | 49  |
| 20           |  | 11  | 18 | 27 | 44  |
| 25           |  |     | 14 | 22 | 35  |
| 30           |  |     | 12 | 18 | 29  |

## Direct-starting - Arranque directo

| AMP.         | 380 V - 60 Hz 3~   |     |     |     |     |     |     |     |                                  |     |     |     |     |     |     |  |
|--------------|--|-----|-----|-----|-----|-----|-----|-----|----------------------------------|-----|-----|-----|-----|-----|-----|--|
|              | 1 four-wires cable - cable cuatripolar 4 x ....mm <sup>2</sup> |     |     |     |     |     |     |     | 4 cables 1 x ....mm <sup>2</sup> |     |     |     |     |     |     |  |
|              | 1,5  | 2,5 | 4   | 6   | 10  | 16  | 25  | 35  | 50                               | 70  | 95  | 120 | 150 | 185 | 240 |  |
| cables max m |  |     |     |     |     |     |     |     |                                  |     |     |     |     |     |     |  |
| 2            | 271  | 448 |     |     |     |     |     |     |                                  |     |     |     |     |     |     |  |
| 4            | 135  | 224 | 360 |     |     |     |     |     |                                  |     |     |     |     |     |     |  |
| 6            | 90   | 149 | 240 | 359 |     |     |     |     |                                  |     |     |     |     |     |     |  |
| 8            | 68   | 112 | 180 | 270 |     |     |     |     |                                  |     |     |     |     |     |     |  |
| 10           | 54   | 90  | 144 | 216 |     |     |     |     |                                  |     |     |     |     |     |     |  |
| 12           | 45   | 75  | 120 | 180 | 292 |     |     |     |                                  |     |     |     |     |     |     |  |
| 14           | 39   | 64  | 103 | 154 | 250 |     |     |     |                                  |     |     |     |     |     |     |  |
| 16           | 34   | 56  | 90  | 135 | 219 |     |     |     |                                  |     |     |     |     |     |     |  |
| 18           |  | 50  | 80  | 120 | 195 | 304 |     |     |                                  |     |     |     |     |     |     |  |
| 20           |  | 45  | 72  | 108 | 175 | 274 |     |     |                                  |     |     |     |     |     |     |  |
| 25           |  |     | 58  | 86  | 140 | 219 | 336 |     |                                  |     |     |     |     |     |     |  |
| 30           |  |     | 48  | 72  | 117 | 182 | 280 |     |                                  |     |     |     |     |     |     |  |
| 35           |  |     |     | 62  | 100 | 156 | 240 | 324 |                                  |     |     |     |     |     |     |  |
| 40           |  |     |     | 54  | 88  | 137 | 210 | 284 |                                  |     |     |     |     |     |     |  |
| 45           |  |     |     |     | 78  | 122 | 187 | 252 |                                  |     |     |     |     |     |     |  |
| 50           |  |     |     |     | 70  | 109 | 168 | 227 | 292                              |     |     |     |     |     |     |  |
| 60           |  |     |     |     |     | 91  | 140 | 189 | 243                              |     |     |     |     |     |     |  |
| 70           |  |     |     |     |     | 78  | 120 | 162 | 208                              | 283 |     |     |     |     |     |  |
| 80           |  |     |     |     |     |     | 105 | 142 | 182                              | 248 |     |     |     |     |     |  |
| 90           |  |     |     |     |     |     | 93  | 126 | 162                              | 220 | 282 |     |     |     |     |  |
| 100          |  |     |     |     |     |     | 84  | 114 | 146                              | 198 | 254 |     |     |     |     |  |
| 110          |  |     |     |     |     |     |     | 103 | 133                              | 180 | 231 | 274 |     |     |     |  |
| 120          |  |     |     |     |     |     |     | 95  | 122                              | 165 | 212 | 252 | 290 |     |     |  |
| 130          |  |     |     |     |     |     |     |     | 112                              | 153 | 195 | 232 | 268 |     |     |  |
| 140          |  |     |     |     |     |     |     |     | 104                              | 142 | 182 | 216 | 248 | 287 |     |  |
| 150          |  |     |     |     |     |     |     |     | 97                               | 132 | 169 | 201 | 232 | 268 |     |  |
| 160          |  |     |     |     |     |     |     |     | 91                               | 124 | 159 | 189 | 217 | 251 | 293 |  |
| 170          |  |     |     |     |     |     |     |     | 86                               | 117 | 149 | 178 | 205 | 236 | 276 |  |
| 180          |  |     |     |     |     |     |     |     | 81                               | 110 | 141 | 168 | 193 | 223 | 260 |  |
| 190          |  |     |     |     |     |     |     |     | 77                               | 104 | 134 | 159 | 183 | 212 | 247 |  |
| 200          |  |     |     |     |     |     |     |     | 73                               | 99  | 127 | 151 | 174 | 201 | 234 |  |
| 220          |  |     |     |     |     |     |     |     | 90                               | 116 | 137 | 158 | 183 | 213 |     |  |
| 240          |  |     |     |     |     |     |     |     | 83                               | 106 | 126 | 145 | 167 | 195 |     |  |
| 260          |  |     |     |     |     |     |     |     |                                  | 98  | 116 | 134 | 155 | 180 |     |  |
| 280          |  |     |     |     |     |     |     |     |                                  | 91  | 108 | 124 | 144 | 167 |     |  |
| 300          |  |     |     |     |     |     |     |     |                                  | 85  | 101 | 116 | 134 | 156 |     |  |

| AMP.         | 220 V - 60 Hz 3~   |     |     |     |     |     |     |     |                                  |     |     |     |     |     |  |
|--------------|--|-----|-----|-----|-----|-----|-----|-----|----------------------------------|-----|-----|-----|-----|-----|--|
|              | 1 four-wires cable - cable cuatripolar 4 x ....mm <sup>2</sup> |     |     |     |     |     |     |     | 4 cables 1 x ....mm <sup>2</sup> |     |     |     |     |     |  |
|              | 1,5  | 2,5 | 4   | 6   | 10  | 16  | 25  | 35  | 50                               | 70  | 95  | 120 | 150 |     |  |
| cables max m |  |     |     |     |     |     |     |     |                                  |     |     |     |     |     |  |
| 2            | 157  | 259 |     |     |     |     |     |     |                                  |     |     |     |     |     |  |
| 4            | 78   | 130 | 208 |     |     |     |     |     |                                  |     |     |     |     |     |  |
| 6            | 52   | 86  | 139 | 208 |     |     |     |     |                                  |     |     |     |     |     |  |
| 8            | 39   | 65  | 104 | 156 | 254 |     |     |     |                                  |     |     |     |     |     |  |
| 10           | 31   | 52  | 83  | 125 | 203 |     |     |     |                                  |     |     |     |     |     |  |
| 12           | 26   | 43  | 69  | 104 | 169 |     |     |     |                                  |     |     |     |     |     |  |
| 14           | 22   | 37  | 59  | 89  | 145 | 226 |     |     |                                  |     |     |     |     |     |  |
| 16           | 20   | 32  | 52  | 78  | 127 | 198 |     |     |                                  |     |     |     |     |     |  |
| 18           |  | 29  | 46  | 69  | 113 | 176 |     |     |                                  |     |     |     |     |     |  |
| 20           |  | 26  | 42  | 62  | 101 | 158 | 243 |     |                                  |     |     |     |     |     |  |
| 25           |  |     | 33  | 50  | 81  | 127 | 194 |     |                                  |     |     |     |     |     |  |
| 30           |  |     | 28  | 42  | 68  | 106 | 162 | 219 |                                  |     |     |     |     |     |  |
| 35           |  |     |     | 36  | 58  | 91  | 139 | 188 |                                  |     |     |     |     |     |  |
| 40           |  |     |     |     | 31  | 51  | 79  | 121 | 164                              | 211 |     |     |     |     |  |
| 45           |  |     |     |     |     | 45  | 70  | 108 | 146                              | 188 |     |     |     |     |  |
| 50           |  |     |     |     |     | 41  | 63  | 97  | 131                              | 169 | 230 |     |     |     |  |
| 60           |  |     |     |     |     |     | 53  | 81  | 110                              | 141 | 191 |     |     |     |  |
| 70           |  |     |     |     |     |     | 45  | 69  | 94                               | 121 | 164 | 210 |     |     |  |
| 80           |  |     |     |     |     |     |     | 61  | 82                               | 106 | 144 | 184 | 218 |     |  |
| 90           |  |     |     |     |     |     |     | 54  | 73                               | 94  | 128 | 163 | 194 |     |  |
| 100          |  |     |     |     |     |     |     | 49  | 66                               | 84  | 115 | 147 | 175 | 201 |  |
| 110          |  |     |     |     |     |     |     |     | 60                               | 77  | 104 | 134 | 159 | 183 |  |
| 120          |  |     |     |     |     |     |     |     | 55                               | 70  | 96  | 123 | 146 | 168 |  |
| 130          |  |     |     |     |     |     |     |     |                                  | 65  | 88  | 113 | 134 | 155 |  |
| 140          |  |     |     |     |     |     |     |     |                                  | 60  | 82  | 105 | 125 | 144 |  |
| 150          |  |     |     |     |     |     |     |     |                                  | 56  | 77  | 98  | 117 | 134 |  |
| 160          |  |     |     |     |     |     |     |     |                                  | 53  | 72  | 92  | 109 | 126 |  |
| 170          |  |     |     |     |     |     |     |     |                                  | 50  | 68  | 87  | 103 | 118 |  |
| 180          |  |     |     |     |     |     |     |     |                                  | 47  | 64  | 82  | 97  | 112 |  |
| 190          |  |     |     |     |     |     |     |     |                                  | 44  | 60  | 77  | 92  | 106 |  |
| 200          |  |     |     |     |     |     |     |     |                                  | 42  | 57  | 74  | 87  | 101 |  |
| 220          |  |     |     |     |     |     |     |     |                                  |     | 52  | 67  | 79  | 92  |  |
| 240          |  |     |     |     |     |     |     |     |                                  |     | 48  | 61  | 73  | 84  |  |
| 260          |  |     |     |     |     |     |     |     |                                  |     |     | 57  | 67  | 77  |  |
| 280          |  |     |     |     |     |     |     |     |                                  |     |     | 53  | 62  | 72  |  |
| 300          |  |     |     |     |     |     |     |     |                                  |     |     | 49  | 58  | 67  |  |

Voltage drop 3%.  
 Maximum ambient temperature + 30 °C.  
 Caída de tensión 3%.  
 Máxima temperatura ambiente + 30 °C.



## Maximum length of electric cables - Máxima longitud de los cables eléctricos

### Star-delta starting - Máxima longitud de los cables eléctricos

| AMP. | 220/380 V - 60 Hz 3~  |     |    |    |     |     |     |                                     |     |     |     |     |     |  |
|------|---|-----|----|----|-----|-----|-----|-------------------------------------|-----|-----|-----|-----|-----|--|
|      | 2 four-wires cable - cable cuatripolar<br>4 x ....mm <sup>2</sup> |     |    |    |     |     |     | 7 cables<br>1 x ....mm <sup>2</sup> |     |     |     |     |     |  |
|      | 1,5   | 2,5 | 4  | 6  | 10  | 16  | 25  | 35                                  | 50  | 70  | 95  | 120 | 150 |  |
|      | cavi - cables - câbles - cables max m                             |     |    |    |     |     |     |                                     |     |     |     |     |     |  |
| 30   | 18  | 30  | 48 | 72 | 117 | 183 |     |                                     |     |     |     |     |     |  |
| 35   |   | 26  | 41 | 62 | 100 | 157 |     |                                     |     |     |     |     |     |  |
| 40   |   | 22  | 36 | 54 | 88  | 137 |     |                                     |     |     |     |     |     |  |
| 45   |   | 20  | 32 | 48 | 78  | 122 | 187 |                                     |     |     |     |     |     |  |
| 50   |   |     | 29 | 43 | 70  | 110 | 168 |                                     |     |     |     |     |     |  |
| 60   |   |     |    | 36 | 59  | 91  | 140 | 190                                 |     |     |     |     |     |  |
| 70   |   |     |    | 31 | 50  | 78  | 120 | 162                                 | 209 |     |     |     |     |  |
| 80   |   |     |    |    | 44  | 69  | 105 | 142                                 | 183 |     |     |     |     |  |
| 90   |   |     |    |    | 39  | 61  | 93  | 126                                 | 162 |     |     |     |     |  |
| 100  |   |     |    |    |     | 55  | 84  | 114                                 | 146 | 199 |     |     |     |  |
| 110  |   |     |    |    |     | 50  | 76  | 103                                 | 133 | 181 |     |     |     |  |
| 120  |   |     |    |    |     | 46  | 70  | 95                                  | 122 | 166 |     |     |     |  |
| 130  |   |     |    |    |     | 42  | 65  | 87                                  | 112 | 153 | 196 |     |     |  |
| 140  |   |     |    |    |     |     | 60  | 81                                  | 104 | 142 | 182 |     |     |  |
| 150  |   |     |    |    |     |     | 56  | 76                                  | 97  | 132 | 170 |     |     |  |
| 160  |   |     |    |    |     |     | 53  | 71                                  | 91  | 124 | 159 | 189 |     |  |
| 170  |   |     |    |    |     |     | 49  | 67                                  | 86  | 117 | 150 | 178 |     |  |
| 180  |   |     |    |    |     |     |     | 63                                  | 81  | 110 | 141 | 168 |     |  |
| 190  |   |     |    |    |     |     |     | 60                                  | 77  | 105 | 134 | 159 | 183 |  |
| 200  |   |     |    |    |     |     |     |                                     | 73  | 99  | 127 | 151 | 174 |  |
| 220  |   |     |    |    |     |     |     |                                     |     | 90  | 116 | 137 | 158 |  |
| 240  |   |     |    |    |     |     |     |                                     |     | 83  | 106 | 126 | 145 |  |
| 260  |   |     |    |    |     |     |     |                                     |     | 76  | 98  | 116 | 134 |  |
| 280  |   |     |    |    |     |     |     |                                     |     | 71  | 91  | 108 | 124 |  |
| 300  |   |     |    |    |     |     |     |                                     |     | 66  | 85  | 101 | 116 |  |

| AMP. | 380/660 V - 60 Hz 3~  |     |    |     |     |     |     |                                     |     |     |     |     |     |  |
|------|---|-----|----|-----|-----|-----|-----|-------------------------------------|-----|-----|-----|-----|-----|--|
|      | 2 four-wires cable - cable cuatripolar<br>4 x ....mm <sup>2</sup> |     |    |     |     |     |     | 7 cables<br>1 x ....mm <sup>2</sup> |     |     |     |     |     |  |
|      | 1,5   | 2,5 | 4  | 6   | 10  | 16  | 25  | 35                                  | 50  | 70  | 95  | 120 | 150 |  |
|      | cavi - cables - câbles - cables max m                             |     |    |     |     |     |     |                                     |     |     |     |     |     |  |
| 30   | 31  | 52  | 83 | 124 | 202 | 316 |     |                                     |     |     |     |     |     |  |
| 35   |   | 44  | 71 | 107 | 173 | 270 |     |                                     |     |     |     |     |     |  |
| 40   |   | 39  | 62 | 93  | 152 | 237 |     |                                     |     |     |     |     |     |  |
| 45   |   |     | 55 | 83  | 135 | 210 | 323 |                                     |     |     |     |     |     |  |
| 50   |   |     | 50 | 75  | 121 | 189 | 290 |                                     |     |     |     |     |     |  |
| 60   |   |     |    | 62  | 101 | 158 | 242 | 327                                 |     |     |     |     |     |  |
| 70   |   |     |    | 53  | 87  | 135 | 207 | 281                                 |     |     |     |     |     |  |
| 80   |   |     |    |     | 76  | 118 | 182 | 246                                 | 316 |     |     |     |     |  |
| 90   |   |     |    |     | 67  | 105 | 161 | 218                                 | 280 |     |     |     |     |  |
| 100  |   |     |    |     | 61  | 95  | 145 | 196                                 | 252 | 343 |     |     |     |  |
| 110  |   |     |    |     | 55  | 86  | 132 | 179                                 | 229 | 312 |     |     |     |  |
| 120  |   |     |    |     |     | 79  | 121 | 164                                 | 210 | 286 |     |     |     |  |
| 130  |   |     |    |     |     | 73  | 112 | 151                                 | 194 | 264 | 338 |     |     |  |
| 140  |   |     |    |     |     |     | 104 | 140                                 | 180 | 245 | 314 |     |     |  |
| 150  |   |     |    |     |     |     | 97  | 131                                 | 168 | 229 | 293 |     |     |  |
| 160  |   |     |    |     |     |     | 91  | 123                                 | 158 | 214 | 275 | 326 |     |  |
| 170  |   |     |    |     |     |     |     | 116                                 | 148 | 202 | 259 | 307 |     |  |
| 180  |   |     |    |     |     |     |     | 109                                 | 140 | 191 | 244 | 290 |     |  |
| 190  |   |     |    |     |     |     |     | 103                                 | 133 | 181 | 231 | 275 | 317 |  |
| 200  |   |     |    |     |     |     |     |                                     | 126 | 172 | 220 | 261 | 301 |  |
| 220  |   |     |    |     |     |     |     |                                     |     | 156 | 200 | 237 | 274 |  |
| 240  |   |     |    |     |     |     |     |                                     |     | 143 | 183 | 218 | 251 |  |
| 260  |   |     |    |     |     |     |     |                                     |     |     | 169 | 201 | 231 |  |
| 280  |   |     |    |     |     |     |     |                                     |     |     | 157 | 187 | 215 |  |
| 300  |   |     |    |     |     |     |     |                                     |     |     | 147 | 174 | 201 |  |

- Against short-circuits and overloads to the electric pumps system we advise to follow the usually applied normative.
- To avoid a possible dry working of the electric pump in is better to install a level control.
- In order to avoid overheatings, voltage drops above 3%, we advise to use suitable starting motors systems.
- All the cable wave to respect the usually applied normative and to present excellent insulation characteristics.

The tables show the maximum length of the cable depending on the current absorbed by the motor and the cross section area of the cable, at different voltages.

The maximum voltage drop equal to 3%, cable temperature of 80°C, water installation similar to air installation at a temperature of 30°C.

- Contra los cortocircuitos y sobrecargas en el sistema de bombas eléctricas se aconseja seguir la normativa general aplicada.
- Para evitar un posible funcionamiento en seco de la bomba eléctrica en es mejor instalar un control de nivel.
- Con el fin de evitar sobrecalentamientos, la tensión drops encima del 3%, le recomendamos el uso de sistemas de motores de partida adecuados.
- Todo cable debe respetar la normativa existente y características óptimas de aislamiento.

Las tablas muestran la longitud máxima del cable en función de la corriente absorbida por el motor y el área de la sección transversal del cable, en diferentes voltajes.

La caída de tensión máxima a 3%, temperatura del cable de 80 °C, la instalación de agua similar a la instalación de aire a una temperatura de 30 °C.

## Choice of electric cable by calculation

For dimensioning the phase cross section area for the submersible motor need the following information:

- V: Rated voltage (V)
- I: Motor current (A)
- L: Length of cable (km)
- $\cos \varphi$ : power factor
- Ambient temperature ( $^{\circ}\text{C}$ )

The choice of the minimum cross section area of the phase conductor is determined by the rated motor current and the values reported in Table 1.

Table 1

| Type of cable*    | Cable cross section<br>mm <sup>2</sup> | Maximum cable current     |                           | Resistance<br>R at 80°C<br>ohm/km <sup>4)</sup> | Reactance<br>X at 60Hz<br>ohm/km <sup>4)</sup> |       |
|-------------------|--|---------------------------|---------------------------|---|--|-------|
|                   |  | 1 Ader<br>A <sup>1)</sup> | 2 Ader<br>A <sup>2)</sup> |   |  |       |
| four-wires cable  | 1.5                                    | 18                        |                           | 15  | 15.1   | 0,170 |
| four-wires cable  | 2.5                                    | 24                        |                           | 20  | 9.08   | 0,157 |
| four-wires cable  | 4                                      | 32                        |                           | 27  | 5.63   | 0,145 |
| four-wires cable  | 6                                      | 41                        |                           | 35  | 3.73   | 0,138 |
| four-wires cable  | 10                                     | 57                        |                           | 48  | 2.27   | 0,124 |
| four-wires cable  | 16                                     | 76                        |                           | 65  | 1.43   | 0,118 |
| four-wires cable  | 25                                     | 96                        |                           | 82  | 0.91   | 0,116 |
| four-wires cable  | 35                                     |                           | 119                       | 101   | 0.65   | 0,113 |
| single-wire cable | 50                                     |                           | 167                       | 142   | 0.473  | 0,145 |
| single-wire cable | 70                                     |                           | 216                       | 184   | 0.328  | 0,139 |
| single-wire cable | 95                                     |                           | 264                       | 224   | 0.236  | 0,142 |
| single-wire cable | 120                                    |                           | 308                       | 262   | 0.188  | 0,136 |
| single-wire cable | 150                                    |                           | 356                       | 303   | 0.153  | 0,134 |
| single-wire cable | 185                                    |                           | 409                       | 348   | 0.123  | 0,131 |
| single-wire cable | 240                                    |                           | 485                       | 412   | 0.094  | 0,132 |

<sup>1)</sup> IEC 60364-5-52:2009 Tab.B52.4 / C

<sup>2)</sup> IEC 60364-5-52:2009 Tab.B52.6

<sup>3)</sup> 1)x0,85 IEC 60364-5-52:2009 Tab.B52.17 ITEM2

<sup>4)</sup> UNEL 35023-70

\* Up to 35 mm<sup>2</sup> sections four-wire cable are used, from 50 mm<sup>2</sup> single core cables are recommended as well. Tab.1

The maximum current of the cables listed in Table 1 are for ambient temperature of 30 °C.

When the temperature is different, the maximum current of the cables should be corrected by a factor given in Table 2.

Table 2 (IEC 60364-5-52:2009 Tab.B.52.14)

| Ambient Temperature °C | 10   | 15   | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60  |
|------------------------|------|------|------|------|----|------|------|------|------|------|-----|
| Correction factor      | 1,22 | 1,17 | 1,12 | 1,06 | 1  | 0,94 | 0,87 | 0,79 | 0,71 | 0,61 | 0,5 |

The cross section area of the phase conductor is chosen by checking the voltage drop along the line, through the following equation:

$$DU\% = 1,73 \cdot I \cdot L \cdot (R \cdot \cos \varphi + X \cdot \sin \varphi) / (V \cdot 1000)$$

DU% the voltage drop should not be greater than 3%

R, X = cable resistance and reactance in ohms/km (indicated in Table 1)

$$\sin \varphi = \sqrt{1 - (\cos \varphi)^2}$$

In case of star / delta starting the rated current of the motor should be divided by 1.73.

Determination of minimal sections of the protective conductor PE.

Table 3 (CEI 64-8:2007 Tab.54F)

| Phase cross section area<br>S<br>mm <sup>2</sup> | PE cross section area<br>S <sub>PE</sub><br>mm <sup>2</sup> |
|--|---|
| S ≤ 16   | S   |
| 16 < S ≤ 25                                      | 16  |
| S > 25   | S/2   |



## Cálculo de la sección del cable eléctrico

Para dimensionar el área de sección del cable para el motor sumergible necesitará la siguiente información:

- V: Tensión nominal (V)
- I: Corriente del motor (A)
- L: Longitud del cable (km)
- cos : factor de potencia
- Temperatura ambiente (° C)

La elección del área de la sección mínima del cable se determina por la corriente nominal del motor y los valores reportados en la Tabla 1.

Table 1

| Tipo de cable*    | Sección del cable<br>mm <sup>2</sup> | Corriente máxima de cable |                           | Resistencia<br>R at 80°C<br>ohm/km <sup>4)</sup> | Reactancia<br>X at 60Hz<br>ohm/km <sup>4)</sup> |       |
|-------------------|--------------------------------------|---------------------------|---------------------------|--|---|-------|
|                   |                                      | 1 Ader<br>A <sup>1)</sup> | 2 Ader<br>A <sup>2)</sup> |  |   |       |
| four-wires cable  | 1.5                                  | 18                        |                           | 15   | 15.1  | 0,170 |
| four-wires cable  | 2.5                                  | 24                        |                           | 20   | 9.08  | 0,157 |
| four-wires cable  | 4                                    | 32                        |                           | 27   | 5.63  | 0,145 |
| four-wires cable  | 6                                    | 41                        |                           | 35   | 3.73  | 0,138 |
| four-wires cable  | 10                                   | 57                        |                           | 48   | 2.27  | 0,124 |
| four-wires cable  | 16                                   | 76                        |                           | 65   | 1.43  | 0,118 |
| four-wires cable  | 25                                   | 96                        |                           | 82   | 0.91  | 0,116 |
| four-wires cable  | 35                                   |                           | 119                       | 101  | 0.65  | 0,113 |
| single-wire cable | 50                                   |                           | 167                       | 142  | 0.473   | 0,145 |
| single-wire cable | 70                                   |                           | 216                       | 184  | 0.328   | 0,139 |
| single-wire cable | 95                                   |                           | 264                       | 224  | 0.236   | 0,142 |
| single-wire cable | 120                                  |                           | 308                       | 262  | 0.188   | 0,136 |
| single-wire cable | 150                                  |                           | 356                       | 303  | 0.153   | 0,134 |
| single-wire cable | 185                                  |                           | 409                       | 348  | 0.123   | 0,131 |
| single-wire cable | 240                                  |                           | 485                       | 412  | 0.094   | 0,132 |

<sup>1)</sup> IEC 60364-5-52:2009 Tab.B52.4 / C

<sup>2)</sup> IEC 60364-5-52:2009 Tab.B52.6

<sup>3)</sup> 1)x0,85 IEC 60364-5-52:2009 Tab.B52.17 ITEM2

<sup>4)</sup> UNEL 35023-70

\* Cable de hasta 35 mm<sup>2</sup> secciones de cuatro hilos se utilizan, de 50 mm<sup>2</sup> se recomiendan cables unipolares como muestra la Tabla.1

La corriente máxima de los cables que aparecen en la Tabla 1 son para temperatura ambiente de 30 ° C.

Cuando la temperatura es diferente, la corriente máxima de los cables tiene que ser corregido por un factor de corrección en la Tabla 2

Tabla 2 (IEC 60364-5-52:2009 Tab.B.52.14)

| Temperatura ambiente °C | 10   | 15   | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60  |
|-------------------------|------|------|------|------|----|------|------|------|------|------|-----|
| Factor de corrección    | 1,22 | 1,17 | 1,12 | 1,06 | 1  | 0,94 | 0,87 | 0,79 | 0,71 | 0,61 | 0,5 |

El área de la sección del cable se elige mediante la comprobación de la caída de tensión a lo largo de la línea, a través de la ecuación siguiente:

$$DU\% = 1,73 \cdot I \cdot L \cdot (R \cdot \cos \varphi + X \cdot \sin \varphi) / (V \cdot 1000)$$

DU% la caída de tensión no debe ser superior al 3%

R, X = resistencia del cable y la reactancia en ohmios / km (indicado en la Tabla 1)

$$\sin \varphi = \sqrt{1 - (\cos \varphi)^2}$$

En caso de arranque estrella/triángulo (y) la corriente nominal del motor se divide por 1,73

Determinación de las secciones mínimas del conductor de protección PE

Tabla 3 (CEI 64-8:2007 Tab.54F)

| Sección transversal de la Fase<br>S<br>mm <sup>2</sup> | Área de sección transversal<br>PE<br>mm <sup>2</sup> |
|--|--|
| S ≤ 16   | S  |
| 16 < S ≤ 25  | 16   |
| S > 25   | S/2  |

# NCE 60 Hz



Heating and conditioning  
Calefacción y climatización





## NCE EI pag. 404

Energy saving circulating pumps  
*Circuladoras electrónicas de bajo consumo energético*



## NCE EL pag. 439

Energy saving circulating pumps for solar systems  
*Circuladoras para placas solares de bajo consumo energético*



## NCE H pag. 409

Energy saving circulating pumps  
*Circuladoras electrónicas de bajo consumo energético*



## NCE ES pag. 444

Energy saving circulating pumps for sanitary hot water  
*Circuladoras de agua caliente sanitaria de bajo consumo energético*



## NCED H pag. 409

Energy saving circulating twin pumps  
*Circuladoras gemelas de bajo consumo energético*



## NCE PS pag. 449

Energy saving circulating pumps for sanitary hot water  
*Circuladoras de agua caliente sanitaria de bajo consumo energético*



## NCE HF pag. 417

Energy saving circulating pumps with flanges  
*Circuladoras de bajo consumo energético embridadas*



## NCS3 pag. 454

Circulating pumps for sanitary hot water  
*Circuladoras de agua caliente sanitaria*



## NCED HF pag. 417

Energy saving circulating twin pumps with flanges  
*Circuladoras gemelas de bajo consumo energético embridadas*



## NC3 pag. 458

Three speeds circulating pumps with threaded ports  
*Bombas de circulación de 3 velocidades roscadas*



## NCE HQF pag. 425

Energy saving circulating pumps with flanges  
*Circuladoras de bajo consumo energético embridadas*



## NCED HQF pag. 436

Energy saving circulating twin pumps with flanges  
*Circuladoras gemelas de bajo consumo energético embridadas*

## STANDARD OPERATING MODE IN CIRCULATING PUMPS

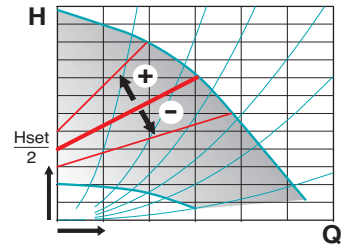


### Proportional pressure curve

In the proportional pressure operating mode the pump changes the working pressure in-line with the flow demand of the system.

This operating mode is mainly used in:

- two pipe heating systems with thermostatic valves,
- systems with long pipelines;
- systems with high head losses.

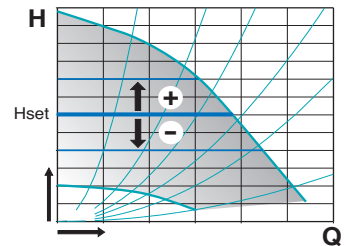


### Constant pressure curve

In the constant pressure operating mode, the pump, keeps the pressure constant when the demand for water changes.

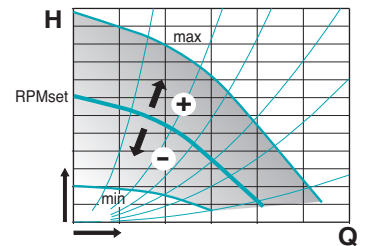
This operating mode is mainly used in:

- two pipe heating systems with thermostatic valves and low head losses
- underfloor heating systems with thermostatic valves;
- one pipe heating systems with thermostatic valves.



### Constant speed curve

In this operating mode the pump works as a traditional pump with a constant curve, the operating curve can be chosen by the user within a range of curves.



## MODALIDAD DE FUNCIONAMIENTO ESTANDAR EN LOS CIRCULADORES ELECTRÓNICOS

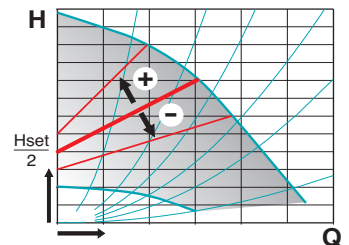


### Curva de presión proporcional

El modo de funcionamiento con las curvas de presión proporcional varía la presión de funcionamiento en función de la solicitud de flujo.

Este modo se utiliza principalmente en:

- Los sistemas de calefacción de 2 tubos con válvulas termostáticas,
- Los sistemas con tuberías muy largas;
- Los sistemas con grandes pérdidas.

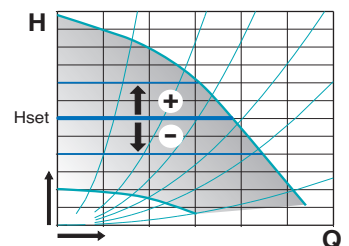


### Curva de presión constante

El modo de funcionamiento con las curvas a presión constante mantiene la presión de trabajo constante, incluso en presencia de cambios en la demanda de flujo.

Este modo se utiliza principalmente en:

- Los sistemas de calefacción de dos tubos con válvulas termostáticas con pequeñas pérdidas.
- Sistemas de calefacción por suelo radiante con válvulas termostáticas.
- Los sistemas de una tubería con válvulas termostáticas.



### Curva de velocidad fija

En este modo, las funciones del circulador con una curva constante, la curva de funcionamiento se pueden configurar por el usuario dentro de un rango de curvas.

