



BRUNO PRESEZZI

CASTING SECTOR

DYNAPRIME CASTING LINE

Preliminary

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Nominal Power (kW) :

The rated power (P_n) is marked on most electrical appliances and equipment. In practice, the rated power is not always the power actually consumed by the receiver. For example, in the case of :

- An electric motor, the rated power (P_n) corresponds to the output power on its shaft. The input power consumed (P_a) is obviously greater.
- Fluorescent lamps and discharge lamps, which have a stabilising ballast, the rated power (P_n) indicated on the lamp (which is the power consumed by the lamp alone) is less than the input power (P_a).
- lamp alone) is less than the power consumed by the lamp and its ballast.

Note : Do not confuse rated power with operating power.

Absorbed Power (kW) :

The power absorbed (P_a) by a load (which may be a simple appliance) is obtained from its rated power.

Use or Apparent Power (in kVA) :

The power used is used to size the installation for the electricity supply contract.

In fact, not all receivers operate at the same time or at full load: simultaneity factors (k_s) and utilisation factors (k_u) are used to weight the maximum apparent power actually absorbed by each receiver and groups of receivers.

The power in use (P_{na}) is the arithmetic sum of these weighted apparent powers.

Factors / Coefficients :

Utilisation factor (k_u) : The normal operating regime of a receiver may be such that its power used (P_{na}) is less than its installed rated power, hence the concept of duty cycle.

This is true for equipment with motors likely to operate below their full load:

☐ For motors, this factor can be estimated at an average of 0.75.

☐ For lighting and heating, it will always be equal to 1.

☐ For sockets, it depends on their purpose.

Simultaneity factor (k_s): The loads in a given installation never operate simultaneously. There is always a certain degree of diversity, which is taken into account by using the simultaneity factor.

The simultaneity factor is the ratio, expressed as a numerical value or as a percentage, of the maximum power demand of a group of customers or a group of electrical appliances, over a given period, to the sum of the maximum individual power demands over the same period. In accordance with this definition, the value is always ≤ 1 and can be expressed as a percentage.

Diversity factor: inverse of the simultaneity factor. This means that it will always be ≥ 1 .

Note : in practice, the most commonly used term is the diversity factor, but it is used in place of the simultaneity factor. It will therefore always be ≤ 1 .

Distribution factor (k_d): The standard recommends taking into account this coefficient, which represents the simultaneity factor between switchboards and can be applied at the level of distribution circuits serving switchboards for terminal circuits other than heating and ventilation. In the absence of precise indications, the standard suggests the values below. In the case of a network characterised by a multi-stage tree structure, the k_d coefficient (to be determined for each change of stage) is applied at each change of stage back to the source from which the energy originates.

**Number of distribution
circuits :****Coeff Kd :**

1 à 4	1
5 à 9	0,75
10 à 14	0,56
15 à 19	0,48
20 à 24	0,43
25 à 29	0,40
30 à 34	0,38
35 à 39	0,37
40 à 49	0,36
≥50	0,34

Total power balance	Supply Voltage (V)	Type	Max. line current (A)	Ke	Cos j	Active power input (kW)	Absorbed reactive power (kVAR)	Apparent power input (kVA)
In = 40A	400,00	Three-phase	31,91	1,25	1,00	17,67	0,00	17,67

All motors supplied with a power rating of more than 10 kVA must be at least IE4; IES is a plus.

			Manufacturer data							Power ratings						
All Equipment	Manufacturer / Receiver reference	Motor start	Quantity	Nominal installed power (kW)	U (V)	Type	η	Cos	Current (A)	Absorbed power (kW)	Ku	Ks	Kd	Pna (kW)	Qna (kVAR)	Sna (kVA)
Dynaprime Left														7,33	0,00	7,33
Motor cover		Speed drive	1	0,60	400,00	Three-phase	0,90	1,00	0,96	0,67	1,00	1,00	1,00	0,67	0,00	0,67
Immersion Heater		SSR	1	6,00	400,00	Three-phase	0,90	1,00	9,63	6,67	1,00	1,00	1,00	6,67	0,00	6,67
Dynaprime Right														7,33	0,00	7,33
Motor cover		Speed drive	1	0,60	400,00	Three-phase	0,90	1,00	0,96	0,67	1,00	1,00	1,00	0,67	0,00	0,67
Immersion Heater		SSR	1	6,00	400,00	Three-phase	0,90	1,00	9,63	6,67	1,00	1,00	1,00	6,67	0,00	6,67
Auxiliaries														3,00	0,00	3,00
400 / 230 VAC Transformer 3kVA			1	2,94	400,00	Three-phase	0,98	1,00	4,34	3,00	1,00	1,00	1,00	3,00	0,00	3,00

Ke : Extension Factor

Ku : Usage factor

Pna : Active Power

Ks : Simultaneity factor

Qna : Reactive Power

Kd : Distribution factor

Sna : Apparent Power

Total power balance	Supply Voltage (V)	Type	Max. line current (A)	Ke	Cos j	Active power input (kW)	Absorbed reactive power (kVAR)	Apparent power input (kVA)
In = 80A	400,00	Three-phase	70,50	1,25	1,00	39,00	1,45	39,03

All motors supplied with a power rating of more than 10 kVA must be at least IE4; IES is a plus.

			Manufacturer data							Power ratings						
All Equipment	Manufacturer / Receiver reference	Motor start	Quantity	Nominal installed power (kW)	U (V)	Type	η	Cos	Current (A)	Absorbed power (kW)	Ku	Ks	Kd	Pna (kW)	Qna (kVAR)	Sna (kVA)
Casting Line														36,00	0,00	36,00
Heating Elements		SSR	9	4,00	400,00	Three-phase	1,00	1,00	5,78	4,00	1,00	1,00	1,00	36,00	0,00	36,00
Auxiliaries														3,00	1,45	3,33
400 / 230 VAC Transformer 3kVA		D.O.L	1	2,94	400,00	Three-phase	0,98	0,90	4,82	3,00	1,00	1,00	1,00	3,00	1,45	3,33
400 / 24 VDC Power supply		D.O.L	1	0,24	400,00	Two-phase	0,98	0,90	0,67	0,24	1,00	1,00	1,00	0,24	0,12	0,27

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Total power balance	Supply Voltage (V)	Type	Max. line current (A)	Ke	Cos j	Active power input (kW)	Absorbed reactive power (kVAR)	Apparent power input (kVA)
In = 40A	400,00	Three-phase	31,91	1,25	1,00	17,67	0,00	17,67

All motors supplied with a power rating of more than 10 kVA must be at least IE4; IES is a plus.

			Manufacturer data							Power ratings						
All Equipment	Manufacturer / Receiver reference	Motor start	Quantity	Nominal installed power (kW)	U (V)	Type	η	Cos	Current (A)	Absorbed power (kW)	Ku	Ks	Kd	Pna (kW)	Qna (kVAR)	Sna (kVA)
Dynaprime Left														7,33	0,00	7,33
Motor cover		Speed drive	1	0,60	400,00	Three-phase	0,90	1,00	0,96	0,67	1,00	1,00	1,00	0,67	0,00	0,67
Immersion Heater		SSR	1	6,00	400,00	Three-phase	0,90	1,00	9,63	6,67	1,00	1,00	1,00	6,67	0,00	6,67
Dynaprime Right														7,33	0,00	7,33
Motor cover		Speed drive	1	0,60	400,00	Three-phase	0,90	1,00	0,96	0,67	1,00	1,00	1,00	0,67	0,00	0,67
Immersion Heater		SSR	1	6,00	400,00	Three-phase	0,90	1,00	9,63	6,67	1,00	1,00	1,00	6,67	0,00	6,67
Auxiliaries														3,00	0,00	3,00
400 / 230 VAC Transformer 3kVA			1	2,94	400,00	Three-phase	0,98	1,00	4,34	3,00	1,00	1,00	1,00	3,00	0,00	3,00

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Total power balance	Supply Voltage (V)	Type	Max. line current (A)	Ke	Cos j	Active power input (kW)	Absorbed reactive power (kVAR)	Apparent power input (kVA)
In = 70A	400,00	Three-phase	63,28	1,25	1,00	35,00	1,45	35,03

All motors supplied with a power rating of more than 10 kVA must be at least IE4; IES is a plus.

			Manufacturer data							Power ratings						
All Equipment	Manufacturer / Receiver reference	Motor start	Quantity	Nominal installed power (kW)	U (V)	Type	η	Cos	Current (A)	Absorbed power (kW)	Ku	Ks	Kd	Pna (kW)	Qna (kVAR)	Sna (kVA)
Casting Line														32,00	0,00	32,00
Heating Elements		SSR	8	4,00	400,00	Three-phase	1,00	1,00	5,78	4,00	1,00	1,00	1,00	32,00	0,00	32,00
Auxiliaries														3,00	1,45	3,33
400 / 230 VAC Transformer 3kVA		D.O.L	1	2,94	400,00	Three-phase	0,98	0,90	4,82	3,00	1,00	1,00	1,00	3,00	1,45	3,33
400 / 24 VDC Power supply		D.O.L	1	0,24	400,00	Two-phase	0,98	0,90	0,67	0,24	1,00	1,00	1,00	0,24	0,12	0,27

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Total power balance	Supply Voltage (V)	Type	Max. line current (A)	Ke	Cos j	Active power input (kW)	Absorbed reactive power (kVAR)	Apparent power input (kVA)
In = 40A	400,00	Three-phase	31,91	1,25	1,00	17,67	0,00	17,67

All motors supplied with a power rating of more than 10 kVA must be at least IE4; IES is a plus.

			Manufacturer data							Power ratings						
All Equipment	Manufacturer / Receiver reference	Motor start	Quantity	Nominal installed power (kW)	U (V)	Type	η	Cos	Current (A)	Absorbed power (kW)	Ku	Ks	Kd	Pna (kW)	Qna (kVAR)	Sna (kVA)
Dynaprime Left														7,33	0,00	7,33
Motor cover		Speed drive	1	0,60	400,00	Three-phase	0,90	1,00	0,96	0,67	1,00	1,00	1,00	0,67	0,00	0,67
Immersion Heater		SSR	1	6,00	400,00	Three-phase	0,90	1,00	9,63	6,67	1,00	1,00	1,00	6,67	0,00	6,67
Dynaprime Right														7,33	0,00	7,33
Motor cover		Speed drive	1	0,60	400,00	Three-phase	0,90	1,00	0,96	0,67	1,00	1,00	1,00	0,67	0,00	0,67
Immersion Heater		SSR	1	6,00	400,00	Three-phase	0,90	1,00	9,63	6,67	1,00	1,00	1,00	6,67	0,00	6,67
Auxiliaries														3,00	0,00	3,00
400 / 230 VAC Transformer 3kVA			1	2,94	400,00	Three-phase	0,98	1,00	4,34	3,00	1,00	1,00	1,00	3,00	0,00	3,00

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Total power balance	Supply Voltage (V)	Type	Max. line current (A)	Ke	Cos j	Active power input (kW)	Absorbed reactive power (kVAR)	Apparent power input (kVA)
In = 60A	400,00	Three-phase	56,06	1,25	1,00	31,00	1,45	31,03

All motors supplied with a power rating of more than 10 kVA must be at least IE4; IES is a plus.

			Manufacturer data							Power ratings						
All Equipment	Manufacturer / Receiver reference	Motor start	Quantity	Nominal installed power (kW)	U (V)	Type	η	Cos	Current (A)	Absorbed power (kW)	Ku	Ks	Kd	Pna (kW)	Qna (kVAR)	Sna (kVA)
Casting Line														28,00	0,00	28,00
Heating Elements		SSR	7	4,00	400,00	Three-phase	1,00	1,00	5,78	4,00	1,00	1,00	1,00	28,00	0,00	28,00
Auxiliaries														3,00	1,45	3,33
400 / 230 VAC Transformer 3kVA		D.O.L	1	2,94	400,00	Three-phase	0,98	0,90	4,82	3,00	1,00	1,00	1,00	3,00	1,45	3,33
400 / 24 VDC Power supply		D.O.L	1	0,24	400,00	Two-phase	0,98	0,90	0,67	0,24	1,00	1,00	1,00	0,24	0,12	0,27

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Sna : Apparent Power

Total power balance	Supply Voltage (V)	Type	Max. line current (A)	Ke	Cos j	Active power input (kW)	Absorbed reactive power (kVAR)	Apparent power input (kVA)
In = 40A	400,00	Three-phase	31,91	1,25	1,00	17,67	0,00	17,67

All motors supplied with a power rating of more than 10 kVA must be at least IE4; IES is a plus.

			Manufacturer data							Power ratings						
All Equipment	Manufacturer / Receiver reference	Motor start	Quantity	Nominal installed power (kW)	U (V)	Type	η	Cos	Current (A)	Absorbed power (kW)	Ku	Ks	Kd	Pna (kW)	Qna (kVAR)	Sna (kVA)
Dynaprime Left														7,33	0,00	7,33
Motor cover		Speed drive	1	0,60	400,00	Three-phase	0,90	1,00	0,96	0,67	1,00	1,00	1,00	0,67	0,00	0,67
Immersion Heater		SSR	1	6,00	400,00	Three-phase	0,90	1,00	9,63	6,67	1,00	1,00	1,00	6,67	0,00	6,67
Dynaprime Right														7,33	0,00	7,33
Motor cover		Speed drive	1	0,60	400,00	Three-phase	0,90	1,00	0,96	0,67	1,00	1,00	1,00	0,67	0,00	0,67
Immersion Heater		SSR	1	6,00	400,00	Three-phase	0,90	1,00	9,63	6,67	1,00	1,00	1,00	6,67	0,00	6,67
Auxiliaries														3,00	0,00	3,00
400 / 230 VAC Transformer 3kVA			1	2,94	400,00	Three-phase	0,98	1,00	4,34	3,00	1,00	1,00	1,00	3,00	0,00	3,00

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Total power balance	Supply Voltage (V)	Type	Max. line current (A)	Ke	Cos j	Active power input (kW)	Absorbed reactive power (kVAR)	Apparent power input (kVA)
In = 80A	400,00	Three-phase	77,72	1,25	1,00	43,00	1,45	43,02

All motors supplied with a power rating of more than 10 kVA must be at least IE4; IES is a plus.

			Manufacturer data							Power ratings						
All Equipment	Manufacturer / Receiver reference	Motor start	Quantity	Nominal installed power (kW)	U (V)	Type	η	Cos	Current (A)	Absorbed power (kW)	Ku	Ks	Kd	Pna (kW)	Qna (kVAR)	Sna (kVA)
Casting Line														40,00	0,00	40,00
Heating Elements		SSR	10	4,00	400,00	Three-phase	1,00	1,00	5,78	4,00	1,00	1,00	1,00	40,00	0,00	40,00
Auxiliaries														3,00	1,45	3,33
400 / 230 VAC Transformer 3kVA		D.O.L	1	2,94	400,00	Three-phase	0,98	0,90	4,82	3,00	1,00	1,00	1,00	3,00	1,45	3,33
400 / 24 VDC Power supply		D.O.L	1	0,24	400,00	Two-phase	0,98	0,90	0,67	0,24	1,00	1,00	1,00	0,24	0,12	0,27

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