

# Power factor correction modules

## 50 Hz network

## 400/415 V network voltage

## Varpact Classic power factor correction modules

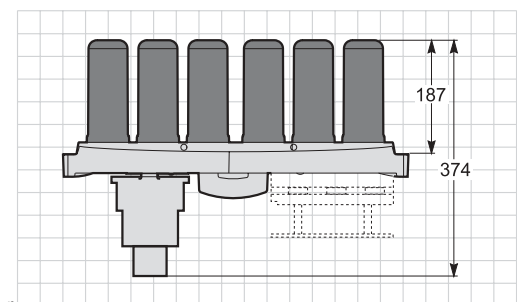
Varpact power factor correction module form a prewired automatic compensation subassembly designed for fixing in stand-alone cubicles or inside Main Low Voltage Switchboard.



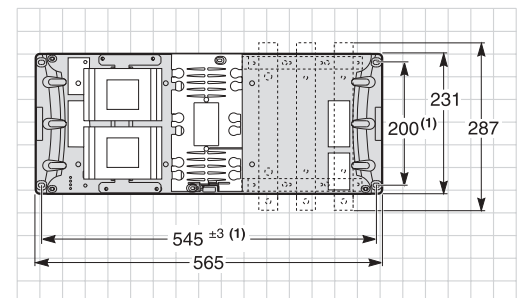
Varpact Classic "with cable connection".



Varpact Classic B "with busbar connection".



Varpact Classic and Classic B dimensions.



(1) Fixing point.

### Varpact Classic

For no polluted network (Gh/Sn ≤ 15 %)

Varpact "with cable connection"			
400 V (kvar)	Step	Reference	Weight (kg)
12.5	Single	51775	9
25	Single	51776	10
30	Single	51777	10
40	Single	51778	10
45	Single	51779	12
50	Single	51780	12
60	Single	51781	13
80	Single	51719	14
90	Single	51782	14.5
100	Single	51783	14.5
120	Single	51784	16
6.25 + 12.5	Double	51785	10.5
12.5 + 12.5	Double	51786	10.5
10 + 20	Double	51787	10.5
15 + 15	Double	51788	10.5
20 + 20	Double	51789	10.7
15 + 30	Double	51790	10.7
30 + 30	Double	51791	13.7
20 + 40	Double	51792	13.7
25 + 50	Double	51793	14.5
30 + 60	Double	51794	14.5
40 + 40	Double	51795	14.5
45 + 45	Double	51729	15.5
50 + 50	Double	51796	16
40 + 80	Double	51797	16
60 + 60	Double	51798	16

Varpact B "with busbar connection"			
400 V (kvar)	Step	Reference	Weight (kg)
12.5	Single	51950	12
25	Single	51951	13
30	Single	51952	13
40	Single	51953	13
45	Single	51954	15
50	Single	51977	15
60	Single	51978	16
80	Single	51967	17
90	Single	51979	17.5
100	Single	51980	17.5
120	Single	51981	19
6.25 + 12.5	Double	51982	13.5
12.5 + 12.5	Double	51983	13.5
10 + 20	Double	51984	13.5
15 + 15	Double	51985	13.5
20 + 20	Double	51986	13.7
15 + 30	Double	51987	13.7
30 + 30	Double	51988	16.7
20 + 40	Double	51989	16.7
25 + 50	Double	51990	17.5
30 + 60	Double	51991	17.5
40 + 40	Double	51992	17.5
45 + 45	Double	51970	18.5
50 + 50	Double	51993	19
40 + 80	Double	51994	19
60 + 60	Double	51995	19

# Power factor correction modules

## 50 Hz network

### 400/415 V network voltage

#### Varpact Classic power factor correction modules

#### Technical data

- capacitor rated voltage: 415 V, three phase 50 Hz
- capacitance value tolerance: -5, +10 %
- insulation level:
  - 0.69 kV
  - withstand 50 Hz, 1 min: 3 kV
- maximum permissible overcurrent: 30 % max. (400 V)
- maximum permissible overvoltage: 10 % (8 hours over 24 hours as in IEC 60831)
- ambient temperature around the capacitor bank (electrical room):
  - maximum temperature: 40 °C
  - average temperature over 24 hours: 35 °C
  - average annual temperature: 25 °C
  - minimum temperature: -5 °C
- busbar withstand I<sub>sc</sub> : 35 kA
- losses:
  - with cable connection: ≤ 1.9 W/kvar (maximum current)
  - with busbar connection: ≤ 2,3 W/kvar (maximum current)
- degree of protection: accidentals front face direct contact protection device
- colour: RAL 7016
- standards: IEC 60439-1, EN 60439-1, IEC 61921.

Accessories		Ref.
<b>Connection module</b>		
With fixing kit (600, 650, 700, 800 wide cubicle)		52800
<b>Fastening crosspieces</b>		
Set of 2 crosspieces		51670
<b>Extension pieces</b>		
For Prisma Plus cubicle W = 650 mm		51635
For universal cubicle W = 700 mm		51637
For universal cubicle W = 800 mm		51639
<b>Circuit breaker protection</b>		<b>Maximum reactive power</b>
Additional circuit breaker 60/63 A protection kit	Until 30 kvar	51626
Additional circuit breaker 100 A protection kit	From 31 to 50 kvar	51627
Additional circuit breaker 160 A protection kit	From 51 to 80 kvar	51628
Additional circuit breaker 250 A protection kit	From 81 to 120 kvar	51629

#### Installation

- horizontal fixing in functional and universal cubicles, 400 and 500 mm deep
  - in cubicle W = 600 mm using fastening crosspieces
  - in cubicle W = 650, 700 and 800 mm using fastening crosspieces and extension pieces
- vertical fastening every 300 mm (maximum 5 modules) directly to cubicle uprights using sliding crosspieces or to intermediate upright support
- control circuit power supply: 230 V, 50 Hz.

# Power factor correction modules

## 50 Hz network

### 400/415 V network voltage

#### Varpact Comfort power factor correction modules

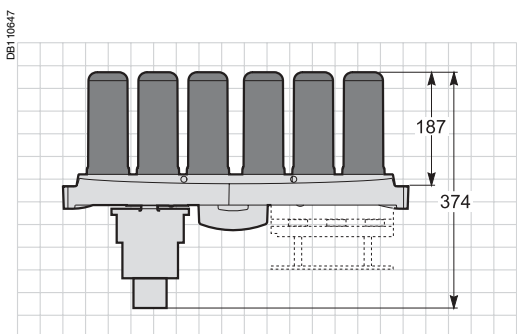
Varpact power factor correction module form a prewired automatic compensation subassembly designed for fixing in stand-alone cubicles or inside Main Low Voltage Switchboard.



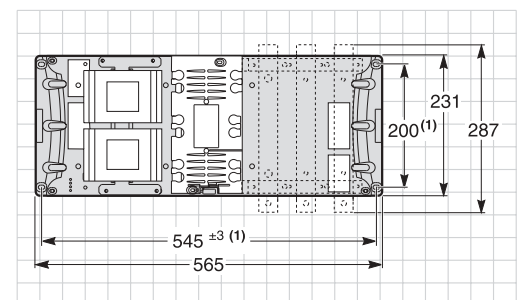
Varpact Comfort "with cable connection".



Varpact Comfort B "with busbar connection".



Varpact Comfort and Comfort B dimensions.



(1) Fixing point.

#### Varpact Comfort

For polluted network (15 % < Gh/Sn ≤ 25 %)

Varpact "with cable connection"			
400 V (kvar)	Step	Reference	Weight (kg)
15	Single	51801	9
20	Single	51803	10
25	Single	51805	10
30	Single	51807	10
35	Single	51809	12
45	Single	51811	12
60	Single	51813	13
70	Single	51816	14.5
90	Single	51817	15
15 + 15	Double	51818	10
15 + 30	Double	51819	12.7
15 + 45	Double	51820	13.7
30 + 30	Double	51821	14.5
30 + 60	Double	51822	16.5
45 + 45	Double	51823	16.5

Varpact B "with busbar connection"			
400 V (kvar)	Step	Reference	Weight (kg)
15	Single	51740	12
20	Single	51741	13
25	Single	51742	13
30	Single	51743	13
35	Single	51744	15
45	Single	51745	15
60	Single	51746	16
70	Single	51747	17.5
90	Single	51748	18
15 + 15	Double	51749	13
15 + 30	Double	51750	15.7
15 + 45	Double	51751	16.7
30 + 30	Double	51752	17.5
30 + 60	Double	51753	19.5
45 + 45	Double	51754	19.5

# Power factor correction modules

## 50 Hz network

### 400/415 V network voltage

### Varpact Comfort power factor correction modules

#### Technical data

- capacitor rated voltage: 480 V, three-phase 50 Hz
- capacitance value tolerance: -5, +10 %
- insulation level:
  - 0.69 kV
  - withstand 50 Hz, 1 min: 3 kV
- maximum permissible overcurrent: 50 % max. (400 V)
- maximum permissible overvoltage: 10 % (8 hours over 24 hours as in IEC 60831)
- ambient temperature around the capacitor bank (electrical room):
  - maximum temperature: 40 °C
  - average temperature over 24 hours: 35 °C
  - average annual temperature: 25 °C
  - minimum temperature: -5 °C
- busbar withstand I<sub>sc</sub> : 35 kA
- losses:
  - with cable connection: ≤ 2 W/kvar (maximum current)
  - with busbar connection: ≤ 2,4 W/kvar (maximum current)
- degree of protection: accidentals front face direct contact protection device
- colour: RAL 7016
- standards: IEC 60439-1, EN 60439-1, IEC 61921.

Accessories		Ref.
<b>Connection module</b>		
With fixing kit (600, 650, 700, 800 wide cubicle)		52800
<b>Fastening crosspieces</b>		
Set of 2 crosspieces		51670
<b>Extension pieces</b>		
For Prisma Plus cubicle W = 650 mm		51635
For universal cubicle W = 700 mm		51637
For universal cubicle W = 800 mm		51639
<b>Circuit breaker protection</b>	<b>Maximum reactive power</b>	
Additional circuit breaker 60/63 A protection kit	Until 30 kvar	51626
Additional circuit breaker 100 A protection kit	From 31 to 50 kvar	51627
Additional circuit breaker 160 A protection kit	From 51 to 80 kvar	51628
Additional circuit breaker 250 A protection kit	From 81 to 120 kvar	51629

#### Installation

- horizontal fixing in functional and universal cubicles, 400 and 500 mm deep
  - in cubicle W = 600 mm using fastening crosspieces
  - in cubicle W = 650, 700 and 800 mm using fastening crosspieces and extension pieces
- vertical fastening every 300 mm (maximum 5 modules) directly to cubicle uprights using sliding crosspieces or to intermediate upright support
- control circuit power supply: 230 V, 50 Hz.

# Power factor correction modules 50 Hz network

400/415 V network voltage

Varpact Harmony power factor correction modules

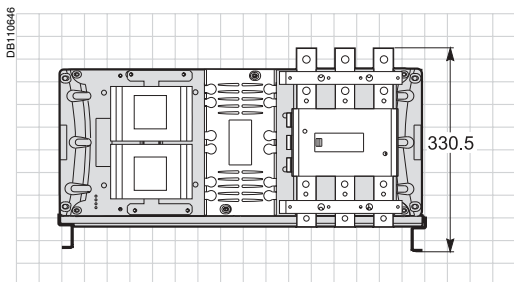
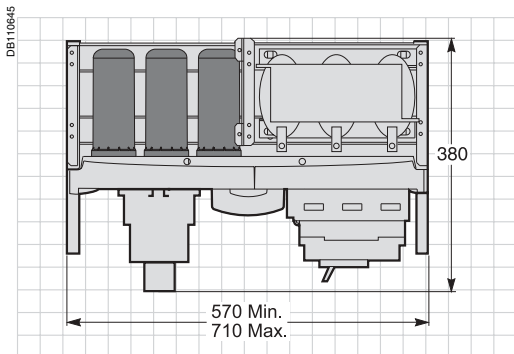
Varpact power factor correction module form a prewired automatic compensation subassembly designed for fixing in stand-alone cubicles or inside Main Low Voltage Switchboard.



Varpact Harmony "with cable connection".



Varpact Harmony B "with busbar connection".



Varpact Harmony dimensions.

## Varpact Harmony

For highly polluted network (25 % < Gh/Sn ≤ 50 %)

Varpact "with cable connection"				
Tuning order	400 V (kvar)	Step	Ref.	Weight (kg)
2.7 (135 Hz)	6.25 + 6.25	Double	51916	23
	6.25 + 12.5	Double	51917	31.5
	12.5 + 12.5	Double	51918	38.5
	12.5	Single	51919	23.5
	25	Single	51920	35.5
3.8 (190 Hz)	50	Single	51921	46.5
	6.25 + 6.25	Double	51925	21.5
	6.25 + 12.5	Double	51926	30
	12.5 + 12.5	Double	51927	37
	12.5	Single	51928	22
4.3 (215 Hz)	25	Single	51929	34
	50	Single	51930	45
	6.25 + 6.25	Double	51934	21.5
	6.25 + 12.5	Double	51935	30
	12.5 + 12.5	Double	51936	37
	12.5	Single	51937	22
	25	Single	51938	34
	50	Single	51939	45

Varpact B "with busbar connection"				
Tuning order	400 V (kvar)	Step	Ref.	Weight (kg)
2.7 (135 Hz)	6.25 + 6.25	Double	51757	26
	6.25 + 12.5	Double	51759	34.5
	12.5 + 12.5	Double	51761	41.5
	12.5	Single	51763	26.5
	25	Single	51765	38.5
3.8 (190 Hz)	50	Single	51767	49.5
	6.25 + 6.25	Double	51653	24.5
	6.25 + 12.5	Double	51654	33
	12.5 + 12.5	Double	51655	40
	12.5	Single	51656	25
4,3 (215 Hz)	25	Single	51657	37
	50	Single	51658	48
	6.25 + 6.25	Double	51501	24.5
	6.25 + 12.5	Double	51503	33
	12.5 + 12.5	Double	51505	40
	12.5	Single	51509	25
	25	Single	51511	37
	50	Single	51512	48

# Power factor correction modules

## 50 Hz network

### 400/415 V network voltage

#### Varpact Harmony power factor correction modules

#### Technical data

- capacitor rated voltage: 480 V, three-phase 50 Hz
- tuning order: 2.7 (135 Hz) - 3.8 (190 Hz) - 4.3 (215 Hz)
- capacitance value tolerance: -5, +10 %
- insulation level:
  - 0.69 kV
  - withstand 50 Hz, 1 min : 3 kV
- maximum permissible overloads:

Tuning order	2.7 (135 Hz)	3.8 (190 Hz)	4.3 (215 Hz)
Overcurrent (max)	12 % under 400 V	19 % under 400 V	30 % under 400 V
Overvoltage	10 % (8 hours over 24 hours as in IEC 60831)		

- ambient temperature around the capacitor bank (electrical room):
  - maximum temperature: 40 °C
  - average temperature over 24 hours: 35 °C
  - average annual temperature: 25 °C
  - minimum temperature: -5 °C
- busbar withstand I<sub>sc</sub> : 35 kA
- losses: ≤ 8 W/kvar
- degree of protection: accidentals front face direct contact protection device
- colour: RAL 7016
- standard: IEC 60439-1, EN 60439-1, IEC 61921.

Accessories	Ref.
<b>Connection module</b>	
With fixing kit (600, 650, 700, 800 wide cubicle)	52800

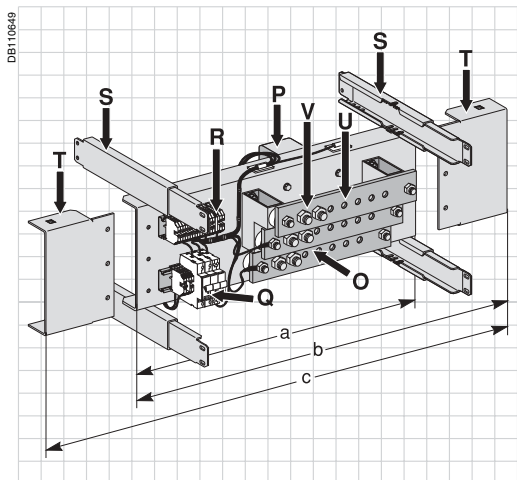
#### Installation

- horizontal fixing in functional and universal cubicles, 400 and 500 mm deep, fixing in cubicle W = 650, 700 and 800 mm using fastening crosspieces supplied
- vertical fixing every 300 mm (maximum 5 modules) directly to cubicle uprights using sliding crosspieces or to intermediate upright support
- control circuit power supply: 230 V, 50 Hz.



# Power factor correction modules 50 Hz network 400/415 V network voltage

Accessories for Varpact power factor correction modules



Connection module IP00

- a: cubicle L = 600
- b: cubicle L = 650 or 700
- c: cubicle L = 800

## Connection module

(Ref. 52800)

It is used to connect:

- the power and control cables for the power factor correction module contactors (maximum five power factor correction modules)
- the cubicle supply cables.

It is supplied with:

- 4 crosspieces
  - 2 extension pieces
  - 3 power connection bars (800 A max.), marked L1, L2, L3
  - P Voltage transformer supplying the contactor coils 400/230 V, 250 VA
  - Q Control circuit safety fuses
  - R Contactor control distribution terminal block
  - S Sliding crosspieces for mounting in cubicles 400 and 500 mm deep
  - T Extension pieces for mounting in cubicles 650, 700 or 800 mm wide
  - U Power factor correction module connection: 5 holes Ø10 per phase
  - V Customer's incoming cable connection: 2 x M12 bolts per phase.
- To make it easier to connect the supply cables, we recommended that the connection module be installed at least 20 cm from the ground.

4



2 fastening crosspieces (ref. 51670)

## Fastening crosspieces for Varpact Classic and Comfort

(Ref. 51670)

Specially designed horizontal crosspieces allow easy installation of the power factor correction modules in all types of functional and universal cubicles 400 ou 500 mm deep.

The crosspieces automatically ensure that the module is positioned correctly at the right depth and maintain a distance of 55 mm between the modules. The crosspieces are sold in pairs and must be ordered separately.



Extension pieces for cubicles

- W = 650 (ref. 51635)
- W = 700 (ref. 51637)
- W = 800 (ref. 51639)

## Extension pieces for cubicles W = 700 and W = 800 with Varpact Classic and Comfort

(Ref. 51637 et 51639)

They are used to extend the power factor correction modules for use in cubicles 700 and 800 mm wide.

The extension pieces are supplied with the 4 screws required to attach them to the module.

## Extension pieces for Prisma Plus cubicle W = 650 with Varpact Classic and Comfort

(Ref. 51635)

It allows the module to be attached directly to the Prisma Plus cubicle uprights.

The extension piece is supplied with the 4 screws required to attach it to the module.

# Power factor correction modules 50 Hz network 400/415 V network voltage

Accessories for Varpact power factor correction module



Circuit breaker kit

### Circuit breaker kit for Varpact Classic and Comfort

(Ref. 51626, 51627, 51628 et 51629)

It allows to ensure individual and visible circuit breaking of each capacitor steps.

### Retrofit kit

(Ref. 51617, 51619 and 51633)

Set of pieces using for installation and connection of Varpact in functional and universal existing cubicles. It is necessary to choose a Varpact module and to order separately associated retrofit kit.

Retrofit kit	Ref.
For P400 power factor correction module	51617
For P400 DR power factor correction module	51619
For Rectimat 2 capacitor bank in cubicle standard and H type	51633



Retrofit kit

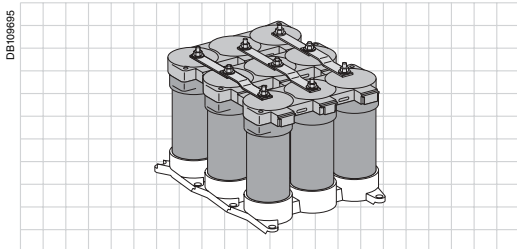


# Capacitors 50 Hz network 230 V network voltage Varplus<sup>2</sup>

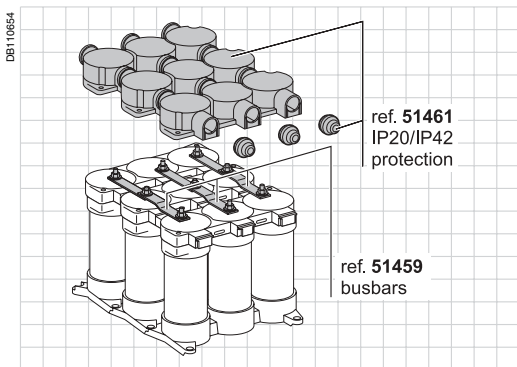
Varplus<sup>2</sup> modular capacitors allow by their different assembly combination to cover many power ratings (kvar) depending on the voltage (V), frequency (Hz) and harmonic pollution level of the network.



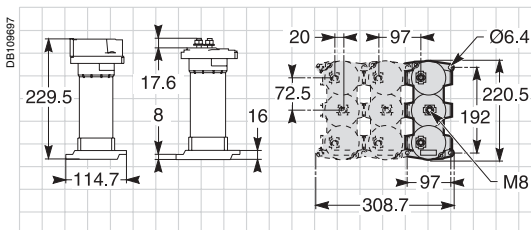
Varplus<sup>2</sup> IP00.



Example of Varplus<sup>2</sup> IP00 assembly.



Varplus<sup>2</sup> accessories.



Weight of Varplus<sup>2</sup> 2.1 kg.

## Slightly polluted network (Gh/Sn ≤ 15 %)

Varplus <sup>2</sup>	
230 V (kvar)	Ref.
2.5	51301
5	51303
6.5	51305
7.5	51307
10	51309
Assembly advised	
15	2 x 51307
20	2 x 51309
30	3 x 51309
40	4 x 51309

Maximum mechanical assembly: 4 capacitors and 40 kvar.  
Assembly > 40 kvar: see conditions to respect in Varplus<sup>2</sup> user manual.

## Polluted network (15 % < Gh/Sn ≤ 25 %)

Same capacitors can be used.

## Highly polluted network (25 % < Gh/Sn ≤ 50 %)

Same capacitors can be used with detuned reactor.

## Technical data

- HQ protection system built into each single phase element
- high current fault protection by HRC cartridge fuse
- low current fault protection by combination of single phase internal overpressure device with the HRC fuse
- capacitance value tolerance: -5, +10 %
- insulation level:
  - withstand 50 Hz 1 minute: 4 kV
  - impulse wave withstand 1.2/50 μs: 15 kV
- voltage test: 2.15 Un (rated voltage) for 10 s
- maximum permissible overloads at service voltage network as per IEC 60831 1/2:
  - current: 30 % permanently
  - voltage: 10 % (8 hours over 24 hours)
- with internally fitted discharge resistors: residual voltage less than 50 V in 1 minute
- total losses: less than 0.5 Watt/kvar (discharge resistors included)
- temperature class D (+55 °C):
  - maximum: 55 °C
  - average over 24 hours: 45 °C
  - average over 1 year: 35 °C
  - minimum: -25 °C
- colour:
  - elements RAL 9005
  - base and cover RAL 7030
- standards: IEC 60831 1/2, CSA 22-2 N°190, UL 810
- execution: indoor
- protection:
  - IP00 without cover
  - IP20 or IP42 see accessories
- no earth connection is needed
- terminals: 3 M8 rods allowing 360° cable connection (without cover).

Accessories for Varplus <sup>2</sup>	
	Ref.
1 set of 3-phase copper bars for connection and assembly of 2 and 3 capacitors	51459
1 set of protective cover (IP20) and cable glands (IP42) for 1, 2 and 3 capacitors	51461

## Installation

All positions are convenient except vertical one with connecting terminals upside down. Fixing holes for M6 screws.  
A kit to replace Varplus by Varplus<sup>2</sup> is available (ref. 51298)



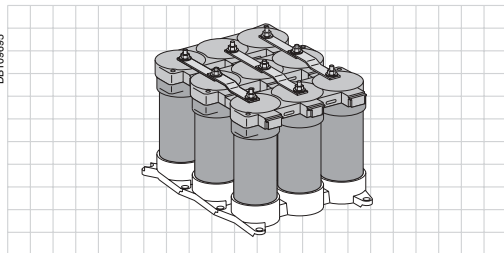


# Capacitors 50 Hz network 400/415 V network voltage Varplus<sup>2</sup> capacitors

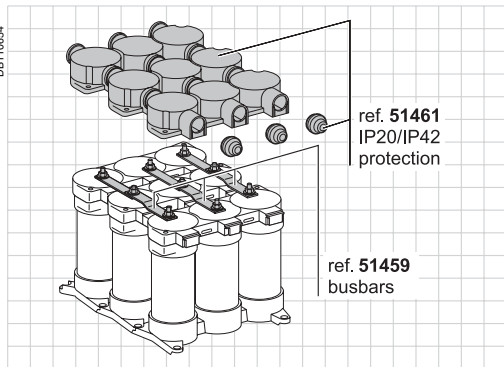
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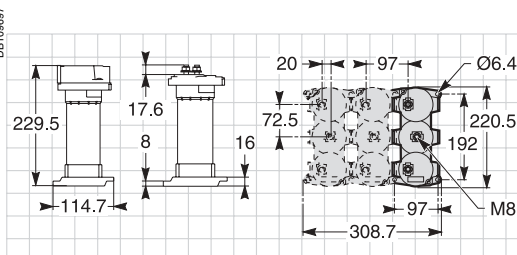
Varplus<sup>2</sup> IP00.



Example of Varplus<sup>2</sup> IP00 assembly.



Varplus<sup>2</sup> accessories.



Weight of Varplus<sup>2</sup> 2.1 kg.

## Highly polluted network (25 % < Gh/Sn ≤ 50 %)

Capacitors rated 480 V will be used with detuned reactor.

### Varplus<sup>2</sup>

Usefull powers Tuning order	400 V (kvar)	415 V (kvar)	Rated values		Ref.
			440 V (kvar)	480 V (kvar)	
2.7 (135 Hz - 13.7 %)	6.5	7	6.7	8	51337
	12.5	13.5	13	15.5	51331
	<b>Assembly advised</b>				
	25	27			2 x 51331
	50	54			2 x 51335 + 51333

Maximum mechanical assembly: 4 capacitors and 50/54 kvar 400/415 V.  
Assembly > 50 kvar: see conditions to respect in Varplus<sup>2</sup> user manual.

Usefull powers Tuning order	400 V (kvar)	415 V (kvar)	Rated values		Ref.
			440 V (kvar)	480 V (kvar)	
3.8 (190 Hz - 6.92 %) ou 4.3 (215 Hz - 5.4 %)	6.5	7	7.6	9	51327
	7.75	8.25	8.8	10.4	51329
	10	11	11.8	14	51345
	12.5	13.5	14.3	17	51333
	16.5	17.75	19.1	22.7	51335
<b>Assembly advised</b>					
	25	27			2 x 51333
	30	31.25			51333 + 51335
	50	53.25			3 x 51335

Usefull powers Tuning order	400 V (kvar)	415 V (kvar)	Rated values		Ref.
			440 V (kvar)	480 V (kvar)	
3.8 (190 Hz - 6.92 %) ou 4.3 (215 Hz - 5.4 %)	6.5	7	7.6	9	51327
	7.75	8.25	8.8	10.4	51329
	10	11	11.8	14	51345
	12.5	13.5	14.3	17	51333
	16.5	17.75	19.1	22.7	51335
<b>Assembly advised</b>					
	25	27			2 x 51333
	30	31.25			51333 + 51335
	50	53.25			3 x 51335

Maximum mechanical assembly: 4 capacitors and 65 kvar 400/415 V.  
Assembly > 65 kvar: see conditions to respect in Varplus<sup>2</sup> user manual.

## Technical data

- capacitor rated voltage: 480 V, 3-phase 50 Hz
- HQ protection system built into each single phase element
- high current fault protection by HRC cartridge fuse
- low current fault protection by combination of single phase internal overpressure device with the HRC fuse
- capacitance value tolerance: -5, +10 %
- insulation level:
  - withstand 50 Hz 1 minute: 4 kV
  - impulse wave withstand 1.2/50 μs: 15 kV
- voltage test: 2.15 Un (rated voltage) for 10 s
- maximum permissible overloads at service voltage network as per IEC 60831 1/2:
  - current: 30 % permanently
  - voltage: 10 % (8 hours over 24 hours)
- with internally fitted discharge resistors: residual voltage less than 50 V in 1 minute
- total losses: less than 0.5 Watt/kvar (discharge resistors included)
- temperature class D (+55 °C):
  - maximum: 55 °C
  - average over 24 hours: 45 °C
  - average over 1 year: 35 °C
  - minimum: -25 °C
- colour:
  - elements RAL 9005
  - base and cover RAL 7030
- standards: IEC 60831 1/2, CSA 22-2 No190, UL 810
- execution: indoor
- protection:
  - IP00 without cover
  - IP20 or IP42 see accessories
- no earth connection is needed
- terminals: 3 M8 rods allowing 360° cable connection (without cover).

Accessories for Varplus <sup>2</sup>	Ref.
1 set of 3-phase copper bars for connection and assembly of 2 and 3 capacitors	51459
1 set of protective cover (IP20) and cable glands (IP42) for 1, 2 and 3 capacitors	51461

## Installation

All positions are convenient except vertical one with connecting terminals upside down. Fixing holes for M6 screws.

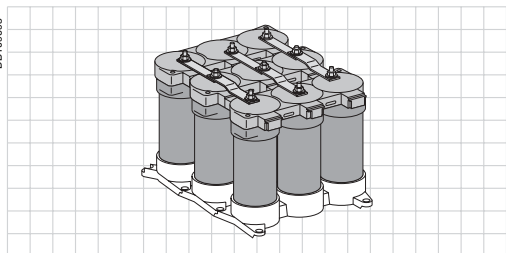
A kit to replace Varplus by Varplus<sup>2</sup> is available (ref. 51298).

# Capacitors 50 Hz network 525 V network voltage Varplus<sup>2</sup> capacitors

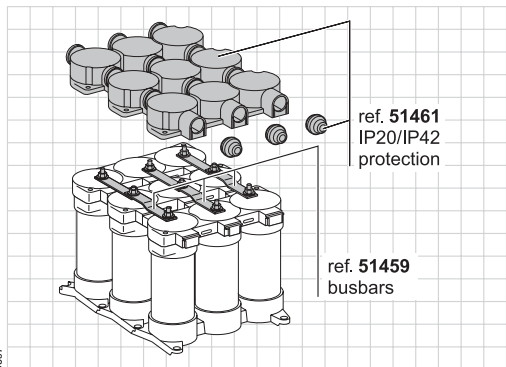
Varplus<sup>2</sup> modular capacitors allow by their different assembly combination to cover many power ratings (kvar) depending on the voltage (V), frequency (Hz) and harmonic pollution level of the network.



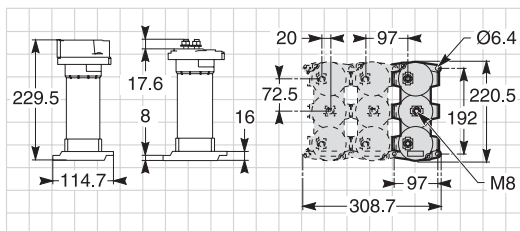
Varplus<sup>2</sup> IP00.



Example of Varplus<sup>2</sup> IP00 assembly.



Varplus<sup>2</sup> accessories.



Weight of Varplus<sup>2</sup> 2.1 kg.

## Slightly polluted network (Gh/Sn ≤ 15 %)

Varplus <sup>2</sup>		
Usefull powers	Rated values	Ref.
480 V (kvar)	525 V (kvar)	
12.5	15	51383
Usefull powers	Rated values	Ref.
525 V (kvar)	550 V (kvar)	
10.5	11.5	51351
12.3	13.5	51353
16.4	18	51357
Assembly advised		
21	23	2 x 51351
24.6	27	2 x 51353
32.8	36	2 x 51357
49.2	54	3 x 51357
59.7		3 x 51357 + 51351
	59	2 x 51351 + 51357
65.6	72	4 x 51357

Maximum mechanical assembly: 4 capacitors and 66/72 kvar 525/550 V.  
Assembly > 66 kvar: see conditions to respect in Varplus<sup>2</sup> user manual.

## Polluted and highly polluted network (15 % < Gh/Sn ≤ 50 %)

Capacitors rated 690 V will be used with detuned reactor 190/215 Hz, 135 Hz tuning order on request.

## Technical data

- capacitor rated voltage: 550 V, 3-phase 50 Hz for slightly polluted network
- HQ protection system built into each single phase element
- high current fault protection by HRC cartridge fuse
- low current fault protection by combination of single phase internal overpressure device with the HRC fuse
- capacitance value tolerance: -5, +10 %
- insulation level:
  - withstand 50 Hz 1 minute: 4 kV
  - impulse wave withstand 1.2/50 µs: 15 kV
- voltage test: 2.15 Un (rated voltage) for 10 s
- maximum permissible overloads at service voltage network as per IEC 60831 1/2:
  - current: 30 % permanently
  - voltage: 10 % (8 hours over 24 hours)
- with internally fitted discharge resistors: residual voltage less than 50 V in 1 minute
- total losses: less than 0.5 Watt/kvar (discharge resistors included)
- temperature class D (+55 °C):
  - maximum: 55 °C
  - average over 24 hours: 45 °C
  - average over 1 year: 35 °C
  - minimum: -25 °C
- colour:
  - elements RAL 9005
  - base and cover RAL 7030
- standards: IEC 60831 1/2, CSA 22-2 N°190, UL 810
- execution: indoor
- protection:
  - IP00 without cover
  - IP20 or IP42 see accessories
- no earth connection is needed
- terminals: 3 M8 rods allowing 360° cable connection (without cover).

## Accessories for Varplus<sup>2</sup>

	Ref.
1 set of 3-phase copper bars for connection and assembly of 2 and 3 capacitors	51459
1 set of protective cover (IP20) and cable glands (IP42) for 1, 2 and 3 capacitors	51461

## Installation

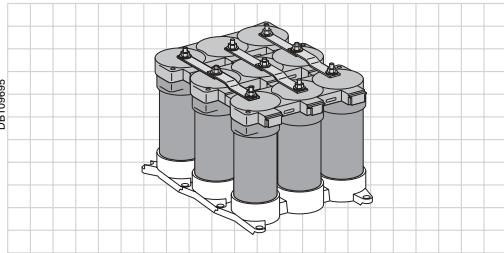
All positions are convenient except vertical one with connecting terminals upside down. Fixing holes for M6 screw.  
A kit to replace Varplus by Varplus<sup>2</sup> is available (ref. 51298).

# Capacitors 50 Hz network 690 V network voltage Varplus<sup>2</sup> capacitors

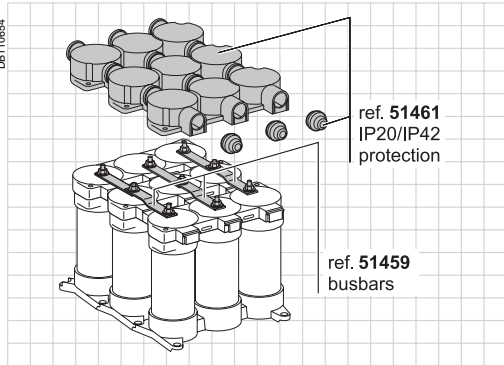
Varplus<sup>2</sup> modular capacitors allow by their different assembly combination to cover many power ratings (kvar) depending on the voltage (V), frequency (Hz) and harmonic pollution level of the network.



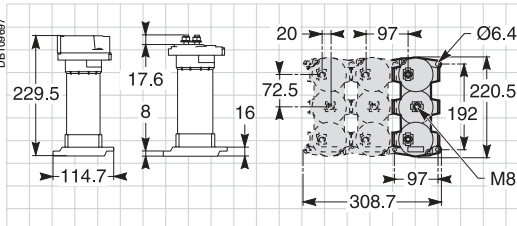
Varplus<sup>2</sup> IP00.



Example of Varplus<sup>2</sup> IP00 assembly.



Varplus<sup>2</sup> accessories.



Weight of Varplus<sup>2</sup> 2.1 kg.

## Slightly polluted network (Gh/Sn ≤ 15 %)

Varplus <sup>2</sup>	
690 V (kvar)	Ref.
11	51359
14.6	51361
16.6	51363
Assembly advised	
22	2 x 51359
33.2	2 x 51363
43.8	3 x 51361
58.4	4 x 51361
60.8	3 x 51363 + 51359
66.4	4 x 51363

Maximum mechanical assembly: 4 capacitors and 67 kvar.  
Assembly > 67 kvar: see conditions to respect in Varplus<sup>2</sup> user manual.

## Polluted and highly polluted network (15 % < Gh/Sn ≤ 50 %) On request.

### Technical data

- capacitor rated voltage: 690 V, 3-phase 50 Hz
- HQ protection system built into each single phase element
- high current fault protection by HRC cartridge fuse
- low current fault protection by combination of single phase internal overpressure device with the HRC fuse
- capacitance value tolerance: -5, +10 %
- insulation level:
  - withstand 50 Hz 1 minute: 4 kV
  - impulse wave withstand 1.2/50 μs: 15 kV
- voltage test: 2.15 Un (rated voltage) for 10 s
- maximum permissible overloads at service voltage network as per IEC 60831 1/2:
  - current: 30 % permanently
  - voltage: 10 % (8 hours over 24 hours)
- with internally fitted discharge resistors: residual voltage less than 50 V in 1 minute
- total losses: less than 0.5 Watt/kvar (discharge resistors included)
- temperature class D (+55 °C):
  - maximum: 55 °C
  - average over 24 hours: 45 °C
  - average over 1 year: 35 °C
  - minimum: -25 °C
- colour:
  - elements RAL 9005
  - base and cover RAL 7030
- standards: IEC 60831 1/2, CSA 22-2 N°190, UL 810
- execution: indoor
- protection:
  - IP00 without cover
  - IP20 or IP42 see accessories
- no earth connection is needed
- terminals: 3 M8 rods allowing 360° cable connection (without cover).

Accessories for Varplus <sup>2</sup>	Ref.
1 set of 3-phase copper bars for connection and assembly of 2 and 3 capacitors	51459
1 set of protective cover (IP20) and cable glands (IP42) for 1, 2 and 3 capacitors	51461

### Installation

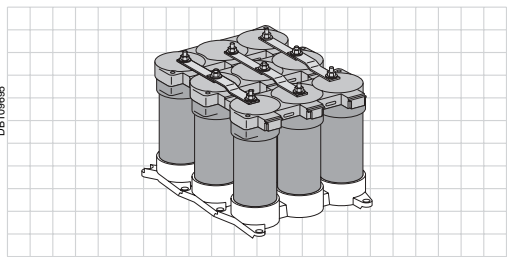
All positions are convenient except vertical one with connecting terminals upside down. Fixing holes for M6 screws.  
A kit to replace Varplus by Varplus<sup>2</sup> is available (ref. 51298).

# Capacitors 60 Hz network 230/240 V network voltage Varplus<sup>2</sup> capacitors

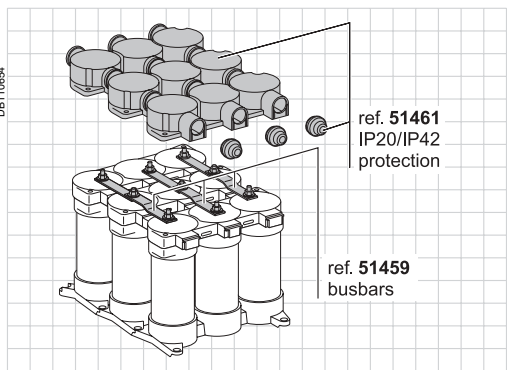
Varplus<sup>2</sup> modular capacitors allow by their different assembly combination to cover many power ratings (kvar) depending on the voltage (V), frequency (Hz) and harmonic pollution level of the network.



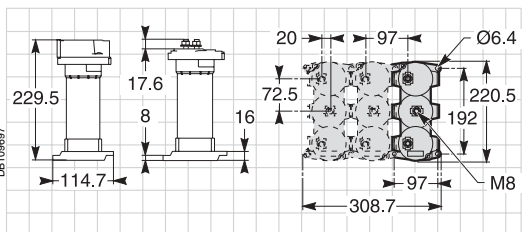
Varplus<sup>2</sup> IP00.



Example of Varplus<sup>2</sup> IP00 assembly.



Varplus<sup>2</sup> accessories.



Weight of Varplus<sup>2</sup> 2.1 kg.

## Slightly polluted network (Gh/Sn ≤ 15 %)

Varplus <sup>2</sup>		
230 V (kvar)	240 V (kvar)	Ref.
3	3	51301
6	6.5	51303
8	8.5	51305
9	10	51307
12	13	51309
Assembly advised		
18	20	2 x 51307
24	26	2 x 51309
36	39	3 x 51309

Maximum mechanical assembly: 4 capacitors and 40 kvar.  
Assembly > 40 kvar: see conditions to respect in Varplus<sup>2</sup> user manual.

## Polluted network (15 % < Gh/Sn ≤ 25 %)

Same capacitors can be used.

## Highly polluted network (25 % < Gh/Sn ≤ 50 %)

Same capacitors can be used with detuned reactor.

## Technical data

- HQ protection system built into each single phase element
- high current fault protection by HRC cartridge fuse
- low current fault protection by combination of single phase internal overpressure device with the HRC fuse
- capacitance value tolerance: -5, +10 %
- insulation level:
  - withstand 60 Hz 1 minute: 4 kV
  - impulse wave withstand 1.2/50 μs: 15 kV
- voltage test: 2.15 Un (rated voltage) for 10 s
- maximum permissible overloads at service voltage network as per IEC 60831 1/2:
  - current: 30 % permanently
  - voltage: 10 % (8 hours over 24 hours)
- with internally fitted discharge resistors: residual voltage less than 50 V in 1 minute
- total losses: less than 0.5 Watt/kvar (discharge resistors included)
- temperature class D (+55 °C):
  - maximum: 55 °C
  - average over 24 hours: 45 °C
  - average over 1 year: 35 °C
  - minimum: -25 °C
- colour:
  - elements RAL 9005
  - base and cover RAL 7030
- standards: IEC 60831 1/2, CSA 22-2 N°190, UL 810
- execution: indoor
- protection:
  - IP00 without cover
  - IP20 or IP42 see accessories
- no earth connection is needed
- terminals: 3 M8 rods allowing 360° cable connection (without cover).

Accessories for Varplus <sup>2</sup>	Ref.
1 set of 3-phase copper bars for connection and assembly of 2 and 3 capacitors	51459
1 set of protective cover (IP20) and cable glands (IP42) for 1, 2 and 3 capacitors	51461

## Installation

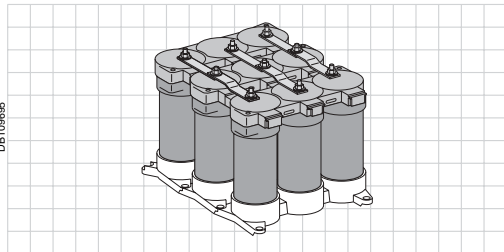
All positions are convenient except vertical one with connecting terminals upside down. Fixing holes for M6 screws.  
A kit to replace Varplus by Varplus<sup>2</sup> is available (ref. 51298).

# Capacitors 60 Hz network 400/415 V network voltage Varplus<sup>2</sup> capacitors

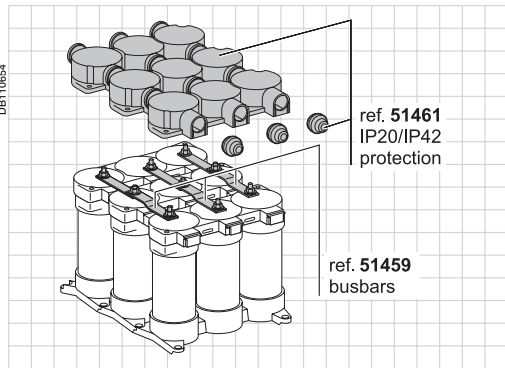
Varplus<sup>2</sup> modular capacitors allow by their different assembly combination to cover many power ratings (kvar) depending on the voltage (V), frequency (Hz) and harmonic pollution level of the network.



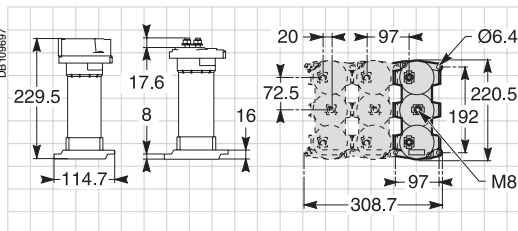
Varplus<sup>2</sup> IP00.



Example of Varplus<sup>2</sup> IP00 assembly.



Varplus<sup>2</sup> accessories.



Weight of Varplus<sup>2</sup> 2.1 kg.

## Slightly polluted network (Gh/Sn ≤ 15 %)

Varplus <sup>2</sup>		
400 V (kvar)	415 V (kvar)	Ref.
6	6.25	51311
7.5	8	51313
9	9	51315
12	13	51317
15	16	51319
18	19	51321
Assembly advised		
24	26	2 x 51317
30	32	2 x 51319
36	38	2 x 51321
45	48	3 x 51319
54	57	3 x 51321
60	64	4 x 51319

Maximum mechanical assembly: 4 capacitors and 65 kvar.  
Assembly > 65 kvar: see conditions to respect in Varplus<sup>2</sup> user manual.

## Technical data

- capacitor rated voltage: 415 V, 3-phase 60 Hz
- HQ protection system built into each single phase element
- high current fault protection by HRC cartridge fuse
- low current fault protection by combination of single phase internal overpressure device with the HRC fuse
- capacitance value tolerance: -5, +10 %
- insulation level:
  - withstand 60 Hz 1 minute: 4 kV
  - impulse wave withstand 1.2/50 μs: 15 kV
- voltage test: 2.15 Un (rated voltage) for 10 s
- maximum permissible overloads at service voltage network as per IEC 60831 1/2:
  - current: 30 % permanently
  - voltage: 10 % (8 hours over 24 hours)
- with internally fitted discharge resistors: residual voltage less than 50 V in 1 minute
- total losses: less than 0.5 Watt/kvar (discharge resistors included)
- temperature class D (+55 °C):
  - maximum: 55 °C
  - average over 24 hours: 45 °C
  - average over 1 year: 35 °C
  - maximum: -25 °C
- colour:
  - elements RAL 9005
  - base and cover RAL 7030
- standards: IEC 60831 1/2, CSA 22-2 N°190, UL 810
- execution: indoor
- protection:
  - IP00 without cover
  - IP20 or IP42 see accessories
- no earth connection is needed
- terminals: 3 M8 rods allowing 360° cable connection (without cover).

Accessories for Varplus <sup>2</sup>	Ref.
1 set of 3-phase copper bars for connection and assembly of 2 and 3 capacitors	51459
1 set of protective cover (IP20) and cable glands (IP42) for 1, 2 and 3 capacitors	51461

## Installation

All positions are convenient except vertical one with connecting terminals upside down. Fixing holes for M6 screws.  
A kit to replace Varplus by Varplus<sup>2</sup> is available (ref. 51298).

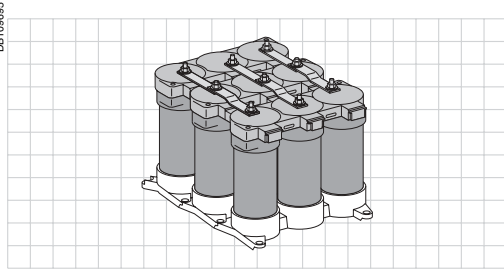


# Capacitors 60 Hz network 400/415 V network voltage Varplus<sup>2</sup> capacitors

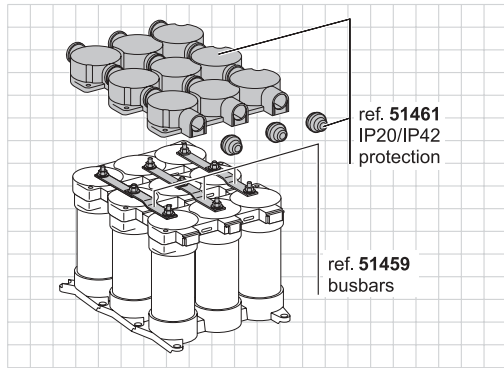
Varplus<sup>2</sup> modular capacitors allow by their different assembly combination to cover many power ratings (kvar) depending on the voltage (V), frequency (Hz) and harmonic pollution level of the network.



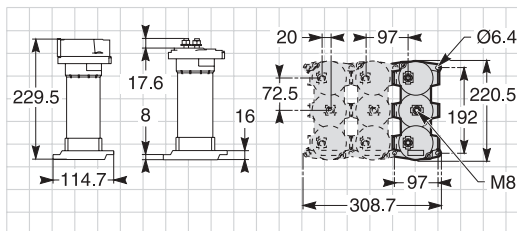
Varplus<sup>2</sup> IP00.



Example of Varplus2 IP00 assembly.



Varplus<sup>2</sup> accessories.



Weight of Varplus<sup>2</sup> 2.1 kg.

## Highly polluted network (25 % < Gh/Sn ≤ 50 %)

Capacitors rated 480 V will be used with detuned reactor.

Varplus <sup>2</sup>					
Usefull powers Tuning order	400 V (kvar)	415 V (kvar)	Rated values		Ref.
			440 V (kvar)	480 V (kvar)	
2.7 (135 Hz - 13.7 %)	7.75	8.25	8	9,6	51337
	15	16.25	15.6	18.6	

**Assembly advised**  
Maximum mechanical assembly: 4 capacitors and 60/65 kvar 400/415 V.  
Assembly > 60 kvar: see conditions to respect in Varplus<sup>2</sup> user manual.

Usefull powers Tuning order	400 V (kvar)	415 V (kvar)	Rated values		Ref.
			440 V (kvar)	480 V (kvar)	
3.8 (190 Hz - 6.92 %) or 4.3 (215 Hz - 5.4 %)	7.75	8.3	9.1	10.8	51327
	9.25	10	10.5	12.5	
	12	13	14.1	16.8	51345
	15	16	17.1	20.4	51333
	20		22.9		51335

**Assembly advised**  
Maximum mechanical assembly: 4 capacitors and 60/65 kvar 400/415 V.  
Assembly > 60 kvar: see conditions to respect in Varplus<sup>2</sup> user manual.

## Technical data

- capacitor rated voltage: 480 V, 3-phase 60 Hz
- HQ protection system built into each single phase element
- high current fault protection by HRC cartridge fuse
- low current fault protection by combination of single phase internal overpressure device with the HRC fuse
- capacitance value tolerance: -5, +10 %
- insulation level:
  - withstand 60 Hz 1 minute: 4 kV
  - impulse wave withstand 1.2/50 μs: 15 kV
- voltage test: 2.15 Un (rated voltage) for 10 s
- maximum permissible overloads at service voltage network as per IEC 60831 1/2:
  - current: 30 % permanently
  - voltage: 10 % (8 hours over 24 hours)
- with internally fitted discharge resistors: residual voltage less than 50 V in 1 minute
- total losses: less than 0.5 Watt/kvar (discharge resistors included)
- temperature class D (+55 °C):
  - maximum: 55 °C
  - average over 24 hours: 45 °C
  - average over 1 year: 35 °C
  - minimum: -25 °C
- colour:
  - elements: RAL 9005
  - base and cover: RAL 7030
- standards: IEC 60831 1/2, CSA 22-2 No190, UL 810
- execution: indoor
- protection:
  - IP00 without cover
  - IP20 or IP42 see accessories
- no earth connection is needed
- terminals: 3 M8 rods allowing 360° cable connection (without cover).

Accessories for Varplus <sup>2</sup>	Ref.
1 set of 3-phase copper bars for connection and assembly of 2 and 3 capacitors	51459
1 set of protective cover (IP20) and cable glands (IP42) for 1, 2 and 3 capacitors	51461

## Installation

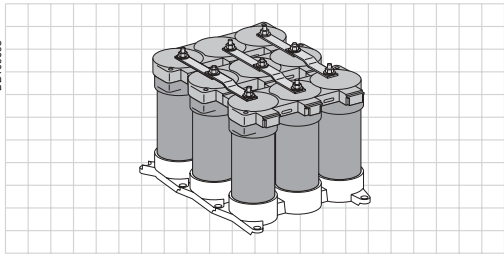
All positions are convenient except vertical one with connecting terminals upside down. Fixing holes for M6 screws.  
A kit to replace Varplus by Varplus<sup>2</sup> is available (ref. 51298).

# Capacitors 60 Hz network 440 V network voltage Varplus<sup>2</sup> capacitors

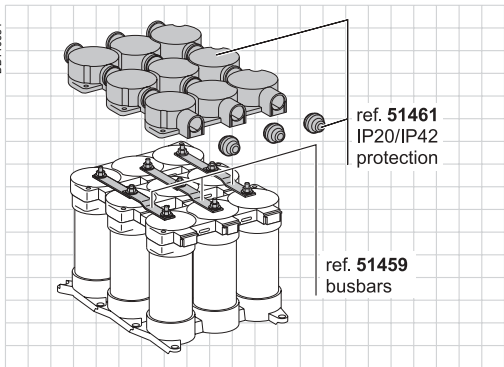
Varplus<sup>2</sup> modular capacitors allow by their different assembly combination to cover many power ratings (kvar) depending on the voltage (V), frequency (Hz) and harmonic pollution level of the network.



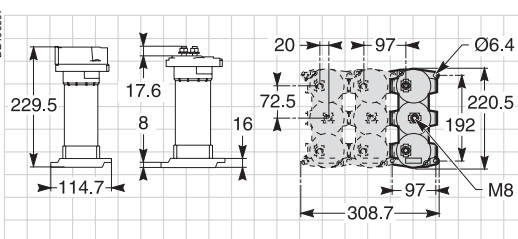
Varplus<sup>2</sup> IP00.



Example of Varplus<sup>2</sup> IP00 assembly.



Varplus<sup>2</sup> accessories.



Weight of Varplus<sup>2</sup> 2.1 kg.

## Slightly polluted and polluted network (Gh/Sn ≤ 25 %)

Varplus <sup>2</sup>		
440 V (kvar)	480 V (kvar)	Ref.
7.3	8.6	51325
9.1	10.8	51327
10.9	13	51329
15.4	18.4	51331
16.9	20.2	51333
22.4		51335
Assembly advised		
30.8	36.8	2 x 51331
44.8		2 x 51335
50.7	60.6	3 x 51333
60.2		2 x 51335 + 51331
67.2		3 x 51335
76.3		3 x 51335 + 51327

Maximum mechanical assembly: 4 capacitors and 76 kvar 440/480 V.  
Assembly > 76 kvar: see conditions to respect in Varplus<sup>2</sup> user manual.

## Highly polluted network (25 % < Gh/Sn ≤ 50 %)

Capacitors rated 550 V will be used with detuned reactor (see page 480 V - 60 Hz).

### Technical data

- capacitor rated voltage: 480 V, 3-phase 60 Hz for slightly polluted network
- HQ protection system built into each single phase element
- high current fault protection by HRC cartridge fuse
- low current fault protection by combination of single phase internal overpressure device with the HRC fuse
- capacitance value tolerance: -5, +10 %
- insulation level:
  - withstand 60 Hz 1 minute: 4 kV
  - impulse wave withstand 1.2/50 μs: 15 kV
- voltage test: 2.15 Un (rated voltage) for 10 s
- maximum permissible overloads at service voltage network as per IEC 60831 1/2:
  - current: 30 % permanently
  - voltage: 10 % (8 hours over 24 hours)
- with internally fitted discharge resistors: residual voltage less than 50 V in 1 minute
- total losses: less than 0.5 Watt/kvar (discharge resistors included)
- temperature class D (+55 °C):
  - maximum: 55 °C
  - average over 24 hours: 45 °C
  - average over 1 year: 35 °C
  - maximum: -25 °C
- colour:
  - elements: RAL 9005
  - base and cover: RAL 7030
- standards: IEC 60831 1/2, CSA 22-2 N°190, UL 810
- execution: indoor
- protection:
  - IP00 without cover
  - IP20 or IP42 see accessories
- no earth connection is needed
- terminals: 3 M8 rods allowing 360° cable connection (without cover).

Accessories for Varplus <sup>2</sup>	Ref.
1 set of 3-phase copper bars for connection and assembly of 2 and 3 capacitors	51459
1 set of protective cover (IP20) and cable glands (IP42) for 1, 2 and 3 capacitors	51461

### Installation

All positions are convenient except vertical one with connecting terminals upside down. Fixing holes for M6 screws.

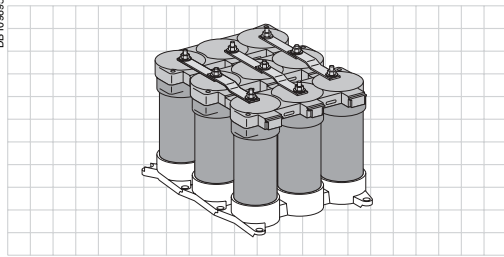
A kit to replace Varplus by Varplus<sup>2</sup> is available (ref. 51298).

# Capacitors 60 Hz network 480 V network voltage Varplus<sup>2</sup> capacitors

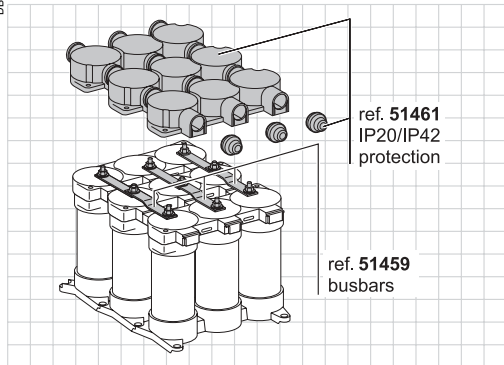
Varplus<sup>2</sup> modular capacitors allow by their different assembly combination to cover many power ratings (kvar) depending on the voltage (V), frequency (Hz) and harmonic pollution level of the network.



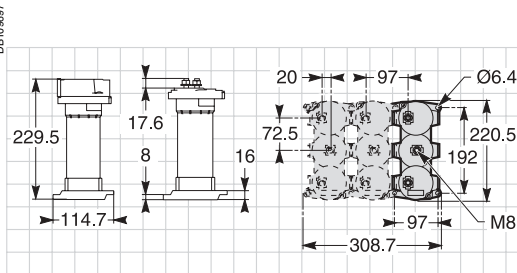
Varplus<sup>2</sup> IP00.



Example of Varplus<sup>2</sup> IP00 assembly.



Varplus<sup>2</sup> accessories.



Weight of Varplus<sup>2</sup> 2.1 kg.

## Slightly polluted and polluted network (Gh/Sn ≤ 25 %)

Varplus <sup>2</sup>		
Usefull powers 480 V (kvar)	Rated values 550 V (kvar)	Ref.
10.5	14	51351
12.5	16.5	51353
15	19.5	51383
16.5	21.5	51357
Assembly advised		
21	28	2 x 51351
25	33	2 x 51353
33	43	2 x 51357
43.5		2 x 51357 + 51351
49.5	64.5	3 x 51357
60		3 x 51357 + 51351
66	86	4 x 51357

Maximum mechanical assembly: 4 capacitors and 66/86 kvar 480/550 V.  
Assembly > 66 kvar: see conditions to respect in Varplus<sup>2</sup> user manual.

## Highly polluted network (25 % < Gh/Sn ≤ 50 %)

Same capacitors will be used with detuned reactors.

### Technical data

- capacitor rated voltage: 550 V, 3-phase 60 Hz
- HQ protection system built into each single phase element
- high current fault protection by HRC cartridge fuse
- low current fault protection by combination of single phase internal overpressure device with the HRC fuse
- capacitance value tolerance: -5, +10 %
- insulation level:
  - withstand 60 Hz 1 minute: 4 kV
  - impulse wave withstand 1.2/50 μs: 15 kV
- voltage test: 2.15 Un (rated voltage) for 10 s
- maximum permissible overloads at service voltage network as per IEC 60831 1/2:
  - current: 30 % permanently
  - voltage: 10 % (8 hours over 24 hours)
- with internally fitted discharge resistors: residual voltage less than 50 V in 1 minute
- total losses: less than 0.5 Watt/kvar (discharge resistors included)
- temperature class D (+55 °C):
  - maximum: 55 °C
  - average over 24 hours: 45 °C
  - average over 1 year: 35 °C
  - maximum: -25 °C
- colour:
  - elements: RAL 9005
  - base and cover: RAL 7030
- standards: IEC 60831 1/2, CSA 22-2 N°190, UL 810
- execution: indoor
- protection:
  - IP00 without cover (option)
  - IP20 or IP42 see accessories
- no earth connection is needed
- terminals: 3 M8 rods allowing 360° cable connection (without cover).

Accessories for Varplus <sup>2</sup>	Ref.
1 set of 3-phase copper bars for connection and assembly of 2 and 3 capacitors	51459
1 set of protective cover (IP20) and cable glands (IP42) for 1, 2 and 3 capacitors	51461

### Installation

All positions are convenient except vertical one with connecting terminals upside down. Fixing holes for M6 screws.

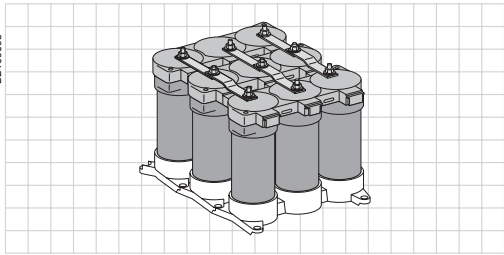
A kit to replace Varplus by Varplus<sup>2</sup> is available (ref. 51298).

# Capacitors 60 Hz network 600 V network voltage Varplus<sup>2</sup> capacitors

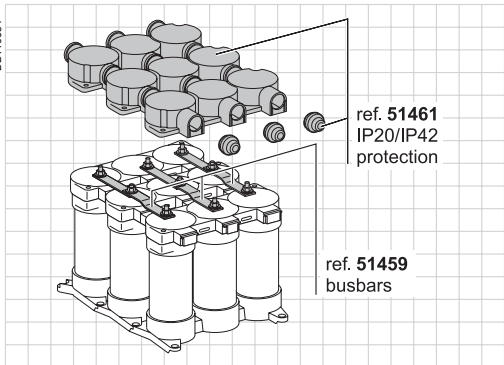
Varplus<sup>2</sup> modular capacitors allow by their different assembly combination to cover many power ratings (kvar) depending on the voltage (V), frequency (Hz) and harmonic pollution level of the network.



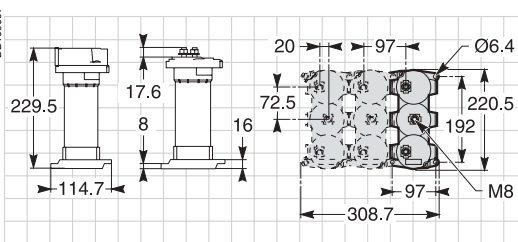
Varplus<sup>2</sup> IP00.



Example of Varplus<sup>2</sup> IP00 assembly.



Varplus<sup>2</sup> accessories.



Weight of Varplus<sup>2</sup> 2.1 kg.

## Slightly polluted and polluted network (Gh/Sn ≤ 25 %)

Varplus <sup>2</sup>		
600 V (kvar)	690 V (kvar)	Ref.
10	13.3	51359
13.5	17.6	51361
15	20	51363
Assembly advised		
20	26.6	2 x 51359
30	40	2 x 51363
40.5	52.8	3 x 51361
54		4 x 51361
	60	3 x 51363
60	80	4 x 51363

Maximum mechanical assembly: 4 capacitors and 60/80 kvar 600/690 V.  
Assembly > 60 kvar: see conditions to respect in Varplus<sup>2</sup> user manual.

## Highly polluted network (25 % < Gh/Sn ≤ 50 %)

On request for association with detuned reactors.

### Technical data

- capacitor rated voltage: 690 V, 3-phase 60 Hz
- HQ protection system built into each single phase element
- high current fault protection by HRC cartridge fuse
- low current fault protection by combination of single phase internal overpressure device with the HRC fuse
- capacitance value tolerance: -5, +10 %
- insulation level:
  - withstand 60 Hz 1 minute: 4 kV
  - impulse wave withstand 1.2/50 μs: 15 kV
- voltage test: 2.15 Un (rated voltage) for 10 s
- maximum permissible overloads at service voltage network as per IEC 60831 1/2:
  - current: 30 % permanently
  - voltage: 10 % (8 hours over 24 hours)
- with internally fitted discharge resistors: residual voltage less than 50 V in 1 minute
- total losses: less than 0.5 Watt/kvar (discharge resistors included)
- temperature class D (+55 °C):
  - maximum: 55 °C
  - average over 24 hours: 45 °C
  - average over 1 year: 35 °C
  - maximum: -25 °C
- colour:
  - elements: RAL 9005
  - base and cover: RAL 7030
- standards: IEC 60831 1/2, CSA 22-2 N°190, UL 810
- execution: indoor
- protection:
  - IP00 without cover
  - IP20 or IP42 see accessories
- no earth connection is needed
- terminals: 3 M8 rods allowing 360° cable connection (without cover).

Accessories for Varplus <sup>2</sup>	Ref.
1 set of 3-phase copper bars for connection and assembly of 2 and 3 capacitors	51459
1 set of protective cover (IP20) and cable glands (IP42) for 1, 2 and 3 capacitors	51461

### Installation

All positions are convenient except vertical one with connecting terminals upside down. Fixing holes for M6 screws.  
A kit to replace Varplus by Varplus<sup>2</sup> is available (ref. 51298).

**Characteristics**

The detuned reactors (DR) are designed to protect the capacitors and prevent amplification of the harmonics present on the network.



Detuned reactor.

**Detuned reactor for 400 V - 50 Hz network  
Tuning order: 4.3 (215 Hz)**

Power restored by the assembly reactor-capacitor	L (mH)	I <sub>1</sub> (A)	Power losses (W)	Ref.
6.25 kvar/400 V - 50 Hz	4.71	9	100	51573
12.5 kvar/400 V - 50 Hz	2.37	17.9	150	52404
25 kvar/400 V - 50 Hz	1.18	35.8	200	52405
50 kvar/400 V - 50 Hz	0.592	71.7	320	52406
100 kvar/400 V - 50 Hz	0.296	143.3	480	52407

**Tuning order: 3.8 (190 Hz)**

Power restored by the assembly reactor-capacitor	L (mH)	I <sub>1</sub> (A)	Power losses (W)	Ref.
6.25 kvar/400 V - 50 Hz	6.03	9.1	100	51568
12.5 kvar/400 V - 50 Hz	3	18.2	150	52352
25 kvar/400 V - 50 Hz	1.5	36.4	200	52353
50 kvar/400 V - 50 Hz	0.75	72.8	300	52354
100 kvar/400 V - 50 Hz	0.37	145.5	450	51569

**Tuning order: 2.7 (135 Hz)**

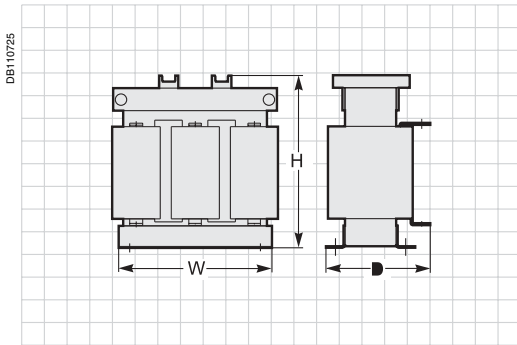
Power restored by the assembly reactor-capacitor	L (mH)	I <sub>1</sub> (A)	Power losses (W)	Ref.
6.25 kvar/400 V - 50 Hz	12.56	9.3	100	51563
12.5 kvar/400 V - 50 Hz	6.63	17.6	150	51564
25 kvar/400 V - 50 Hz	3.14	37.2	200	51565
50 kvar/400 V - 50 Hz	1.57	74.5	400	51566
100 kvar/400 V - 50 Hz	0.78	149	600	51567

**Characteristics**

- three-phase, dry, magnetic circuit, impregnated
- cooling: natural
- degree of protection: IP00
- insulation class: H
- standards: IEC 60289, EN 60289
- rated voltage: 400/415 V three-phase 50 Hz
- tuning order (relative impedance): 4.3 (5.4 %); 3.8 (6.9 %); 2.7 (13.7 %)
- inductance tolerance per phase: - 5, +5 %
- maximum constant current:  $I_{mp} = \sqrt{[(1, 1 \cdot I_1)^2 + I_3^2 + I_5^2 + I_7^2 + I_{11}^2]}$
- $I_{mp} = 1.31 \cdot I_1$  for 4.3 tuning
- $I_{mp} = 1.19 \cdot I_1$  for 3.8 tuning
- $I_{mp} = 1.12 \cdot I_1$  for 2.7 tuning
- harmonic current spectrum

As a % of the current of the fundamental (I <sub>1</sub> )	Tuning order 4.3	Tuning order 3.8	Tuning order 2.7
Current I <sub>3</sub>	2 %	3 %	6 %
Current I <sub>5</sub>	69 %	44 %	17 %
Current I <sub>7</sub>	19 %	13 %	6 %
Current I <sub>11</sub>	6 %	5 %	2 %

- insulation level: 1.1 kV
- thermal withstand I<sub>sc</sub>: 25 x I<sub>e</sub>, 2 x 0.5 second
- dynamic withstand: 2.2 I<sub>sc</sub> (peak value)
- dielectric test 50 Hz between windings and windings/earth: 3.3 kV, 1 min
- thermal protection restored on terminal block 250 V AC, 2 A.

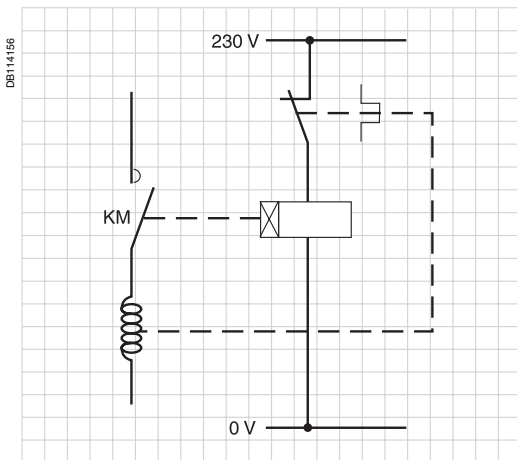


Detuned reactor.

### Operating conditions

- use: indoor
- storage temperature -40 °C, +60 °C
- relative humidity in operation: 20 to 80 %
- saline mist withstand: 250 hours
- operating temperature/altitude:

Altitude (m)	Minimum (°C)	Maximum (°C)	Highest average over any period of:	
			1 year	24 hours
1000	0	55	40	50
> 1000, ≤ 2000	0	50	35	45



Normally closed dry contact.

### Installation

- forced ventilation required (see chapter 6 page 47)
- vertical detuned reactor winding for better heat dissipation
- electrical connection:
  - to a screw terminal block for 6.25 and 12.5 kvar detuned reactors
  - to a drilled pad for 25, 50 and 100 kvar detuned reactors
- 480 V capacitors must be used with the detuned reactors in the case of a 400/415 V, 50 Hz network.



As the detuned reactor is fitted with thermal protection, it is imperative that the normally closed dry contact be used to disconnect the step in the event of overheating (see drawing at left).

### Dimensions

#### Tuning order: 4.3 (215 Hz)

Power restored by the detuned reactor/capacitor assembly	Fixing centre distance (mm)	Maximum dimensions (mm)			Weight (kg)
		H	W	D	
6.25 kvar/400 V - 50 Hz	110 x 87	230	200	140	8.6
12.5 kvar/400 V - 50 Hz	205 x 110	230	245	140	12
25 kvar/400 V - 50 Hz	205 x 110	230	240	140	18.5
50 kvar/400 V - 50 Hz	(1)	270	260	160	25
100 kvar/400 V - 50 Hz	205 x 120	330	380	220	42

#### Tuning order: 3.8 (190 Hz)

Power restored by the detuned reactor/capacitor assembly	Fixing centre distance (mm)	Maximum dimensions (mm)			Weight (kg)
		H	W	D	
6.25 kvar/400 V - 50 Hz	110 x 87	230	200	140	8.5
12.5 kvar/400 V - 50 Hz	205 x 110	230	245	140	10
25 kvar/400 V - 50 Hz	205 x 110	230	240	140	18
50 kvar/400 V - 50 Hz	(1)	270	260	160	27
100 kvar/400 V - 50 Hz	205 x 120	330	380	220	42

#### Tuning order: 2.7 (135 Hz)

Power restored by the detuned reactor/capacitor assembly	Fixing centre distance (mm)	Maximum dimensions (mm)			Weight (kg)
		H	W	D	
6.25 kvar/400 V - 50 Hz	110 x 87	230	200	140	9
12.5 kvar/400 V - 50 Hz	205 x 110	230	245	145	13
25 kvar/400 V - 50 Hz	205 x 110	230	240	140	22
50 kvar/400 V - 50 Hz	(1)	270	260	160	32
100 kvar/400 V - 50 Hz	205 x 120	330	380	220	57

(1) 205 x 120 or 205 x 130 mm.

### Detuned reactor / capacitor / contactor combination tables

Maximum temperature 40 °C and maximum altitude 2000 m

480 V capacitors			fr = 135 Hz		
Qc 400 V	Qc 480 V	Capacitor ref.	DR ref.	Specific contactors	Standard contactors
6.25 kvar	8 kvar	51337 x 1	51563 x 1	LC1-DFK11M7 x 1	LC1D12 x 1
12.5 kvar	15.5 kvar	51331 x 1	51564 x 1	LC1-DFK11M7 x 1	LC1D25 x 1
25 kvar	31 kvar	51331 x 2	51565 x 1	LC1-DMK11M7 x 1	LC1D38 x 1
50 kvar	62 kvar	51335 x 2 + 51333	51566 x 1	LC1-DWK12M7 x 1	LC1D95 x 1
100 kvar	124 kvar	51335 x 4 + 51333 x 2	51567 x 1	-	LC1D115 x 1

480 V capacitors			fr = 215 Hz	fr = 190 Hz		
Qc 400 V	Qc 480 V	Capacitor ref.	DR ref.	DR ref.	Specific contactors	Standard contactors
6.25 kvar	9 kvar	51327 x 1	51573 x 1	51568 x 1	LC1-DFK11M7 x 1	LC1D12 x 1
12.5 kvar	17 kvar	51333 x 1	52404 x 1	52352 x 1	LC1-DFK11M7 x 1	LC1D25 x 1
25 kvar	34 kvar	51333 x 2	52405 x 1	52353 x 1	LC1-DMK11M7 x 1	LC1D38 x 1
50 kvar	68 kvar	51335 x 3	52406 x 1	52354 x 1	LC1-DWK12M7 x 1	LC1D95 x 1
100 kvar	136 kvar	51335 x 6	52407 x 1	51569 x 1	-	LC1D115 x 1

Maximum temperature 50 °C and maximum altitude 1000 m  
(see chapter 6 page 48)

550 V capacitors			fr = 135 Hz		
Qc 400 V	Qc 550 V	Capacitor ref.	DR ref.	Specific contactors	Standard contactors
6.25 kvar	10,5 kvar	51363 x 1	51563 x 1	LC1-DFK11M7 x 1	LC1D12 x 1
12.5 kvar	21 kvar	51363 x 2	51564 x 1	LC1-DGK11M7 x 1	LC1D25 x 1
25 kvar	40,5 kvar	51353 x 3	51565 x 1	LC1-DPK11M7 x 1	LC1D40 x 1
50 kvar	81 kvar	3 x 51357 + 2 x 51353	51566 x 1	LC1-DWK12M7 x 1	LC1D95 x 1
100 kvar	162 kvar	9 x 51357	51567 x 1		LC1F185 x 1

550 V capacitors			fr = 215 Hz	fr = 190 Hz		
Qc 400 V	Qc 550V	Capacitor ref.	DR ref.	DR ref.	Specific contactors	Standard contactors
6.25 kvar	11.5 kvar	51351 x 1	51573 x 1	51568 x 1	LC1-DFK11M7 x 1	LC1D12 x 1
12.5 kvar	23 kvar	51351 x 2	52404 x 1	52352 x 1	LC1-DGK11M7 x 1	LC1D25 x 1
25 kvar	46 kvar	1 x 51357 + 2 x 51353	52405 x 1	52353 x 1	LC1-DPK11M7 x 1	LC1D40 x 1
50 kvar	90 kvar	5 x 51357	52406 x 1	52354 x 1	LC1-DWK12M7 x 1	LC1D95 x 1
100 kvar	180 kvar	10 x 51357	52407 x 1	51569 x 1		LC1F185 x 1

**Note:** LC1D contactors not incorporating a preinstalled resistor can be used with detuned reactors.  
The inductance of the detuned reactor limits the energising current to a value that can be accepted by the contactor.

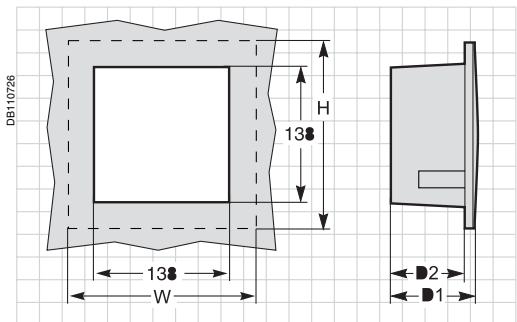
The Varlogic N controllers permanently measure the reactive power of the installation and control connection and disconnection of capacitor steps in order to obtain the required power factor.



Varlogic NR6/NR12



Varlogic NRC12



Varlogic NR6, NR12, NRC12

### Technical data

#### ■ general data

- operating temperature: 0...60 °C
- storage temperature: -20° C...60 °C
- colour: RAL 7016
- standard:
  - EMC: IEC 61326
  - electrical: IEC/EN 61010-1.
- panel mounting
- mounting on 35 mm DIN rail (EN 50022)
- protection class in panel mounting:
  - front face: IP41
  - rear face: IP20.
- display:
  - NR6, NR12 type: backlighted screen 65 x 21 mm
  - NRC12 type: backlighted graphic screen 55 x 28 mm.
  - languages: English, French, German, Portuguese, Spanish
- alarm contact
- temperature internal probe
- separate contact to control fan inside the power factor correction bank
- access to the history of alarm.

#### ■ inputs

- phase to phase or phase to neutral connection
- insensitive to CT polarity
- insensitive to phase rotation polarity
- current input:
  - NR6, NR12 type: CT... X/5 A
  - NRC12 type: CT... X/5 A et X/1 A.

#### ■ outputs

- potential free output contacts:
  - AC : 1 A/400 V, 2 A/250 V, 5 A/120 V
  - DC : 0,3 A/110 V, 0,6 A/60 V, 2 A/24 V.

#### ■ settings and parameters

- target cos φ setting: 0,85 ind...0,9 cap
- possibility of a dual cos φ target (type NRC12)
- manual or automatic parameter setting of the power factor controller
- choice of different stepping programs:
  - linear
  - normal
  - circular
  - optimal.
- main step sequences:
  - 1.1.1.1.1.1
  - 1.2.2.2.2.2
  - 1.2.3.4.4.4
  - 1.1.2.2.2.2
  - 1.2.3.3.3.3
  - 1.2.4.4.4.4
  - 1.1.2.3.3.3
  - 1.2.4.8.8.8
- personalized sequences for NRC12 type
- delay between 2 successive switch on of a same step:
  - NR6, NR12 type: 10 ... 600 s
  - NRC12 type: 10 ... 900 s
- step configuration programming (fixed/auto/disconnected) (NRC12 type)
- 4 quadrant operation for generator application (NRC12 type)
- manual control for operating test.

### Dimensions

Varlogic N	Dimensions (mm)				Weight (kg)
	H	L	P1	P2	
Varlogic NR6/NR12	150	150	70	60	1
Varlogic NRC12	150	150	80	70	1

Type	Number of step output contacts	Supply voltage (V) network 50-60 Hz	Measuring voltage (V)	ref.
NR6	6	110-220/240-380/415	110-220/240-380/415	52448
NR12	12	110-220/240-380/415	110-220/240-380/415	52449
NRC12	12	110-220/240-380/415	110-220/240-380/415-690	52450

Varlogic N accessories	ref.
Communication RS485 Modbus set for NRC12	52451
Temperature external probe for NRC12 type. In addition to internal probe, allows measurement at the hottest point inside the capacitor bank. Better tuning of alarm and/or disconnection level.	52452

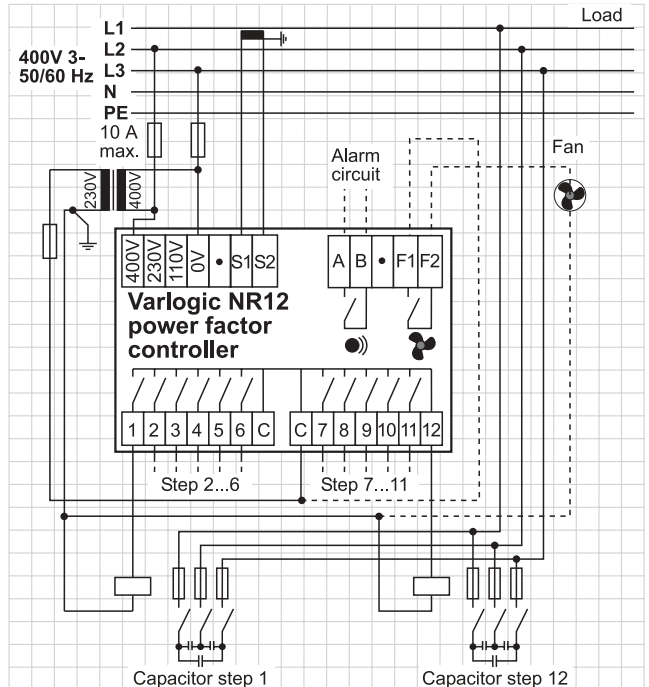
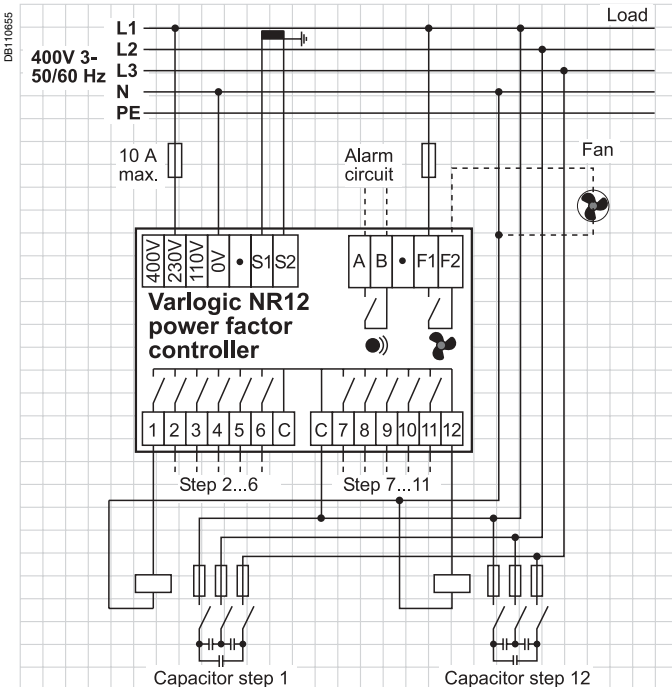
Information supplied	NR6/NR12	NRC12
Cos φ	■	■
Connected steps	■	■
Switching cycles and connected time counter	■	■
Step configuration (fixed step, auto, disconnected)	■	■
Step output status (capacitance loss monitoring)	■	■
Network technical data: load and reactive currents, voltage, powers (S, P, Q)	■	■
Ambient temperature inside the cubicle	■	■
Total voltage harmonic distortion THD (U)	■	■
Total current harmonic distortion THD (I)	■	■
Capacitor current overload Irms/I <sub>1</sub>	■	■
Voltage and current harmonic spectrum (orders 3, 5, 7, 11, 13)	■	■
History of alarms	■	■

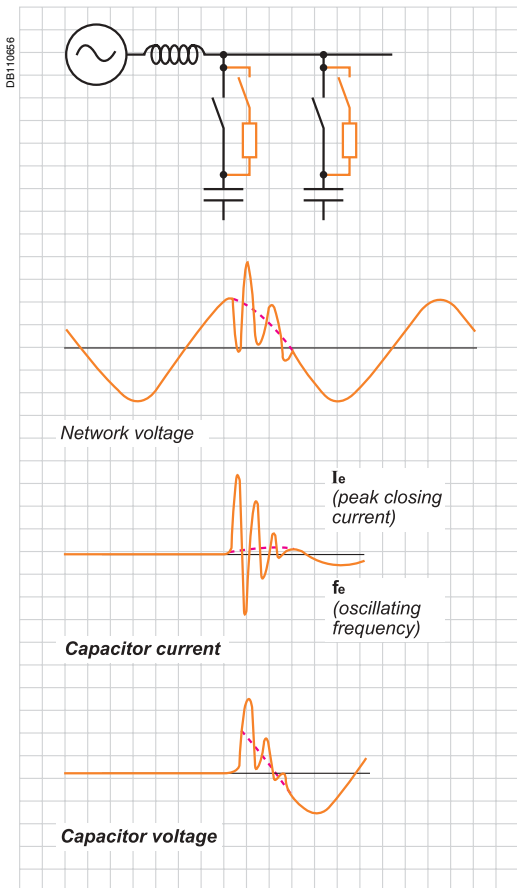
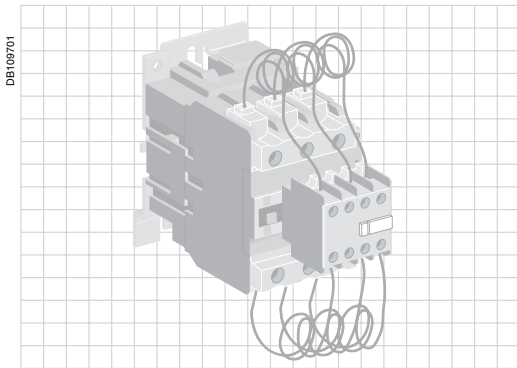
Alarms	Threshold	Action	NR6/NR12	NRC12
Low power factor		message and alarm contact	■	■
Hunting (unstable regulation)		message and alarm contact disconnection (2)	■	■
Abnormal cos φ	< 0.5 ind or 0.8 cap	message and alarm contact	■	■
Overcompensation		message and alarm contact	■	■
Overcurrent	> 115 % I <sub>1</sub>	message and alarm contact	■	■
Voltage low	< 80 % U <sub>o</sub> within 1 s	message and alarm contact disconnection (2)	■	■
Overvoltage	> 110 % U <sub>o</sub>	message and alarm contact disconnection (2)	■	■
Overtemperature	θ ≥ θ <sub>o</sub> (θ <sub>o</sub> = 50 °C max)(1) θ ≥ θ <sub>o</sub> - 15 °C	message and alarm contact fan switch disconnection (2)	■	■
Total harmonic distortion	> 7 % (1)	message and alarm contact disconnection (2)	■	■
Capacitor current overload (Irms/I <sub>1</sub> )	> 1.5 (1)	message and alarm contact disconnection (2)	■	■
Capacitor capacitance loss	- 25 %	message and alarm contact disconnection (2)	■	■
Low current	< 2,5 %	message	■	■
High current	> 115 %	message	■	■
Under voltage	5 % U <sub>o</sub>	message	■	■

U<sub>o</sub>: input voltage (measurement)

(1): alarm threshold values can be modified according to the installation

(2): capacitor steps are automatically reconnected after fault clearance and a safety delay





### General

Capacitor control is accompanied by transient operating conditions resulting from the capacitor load which, amongst other things, generates a very high overcurrent equivalent to a short-circuit of short duration. The use of standard contactors may compromise the safety of persons and installations.

### Telemecanique contactors for capacitor control

The LC1-D•K contactors are specially designed for capacitor control. They are fitted with a contact block allowing the current to pass on closing and with damping resistors limiting the current on energisation. This technology, which is unique, has been patented.

### Personal safety

The contactors cannot be operated manually.

The contactors are fitted with covers for protection against direct contact.

### Safety of installations

The damping resistors are disconnected after the capacitor current energising peak. A faulty contactor pole therefore does not allow the permanent current to flow through the resistor and prevents it from burning.

### Simplicity and durability

LC1-D•K contactors are a ready-to-use solution that does not require the installation of shock coils.

Their durability is far greater than that of conventional solutions (300,000 operating cycles at 400 V).



**If specific contactors cannot be used to control the capacitors, then energising current limiting reactors must be used. Please consult the contactor manufacturer.**

**Note:** LC1D contactors not incorporating a preinstalled resistor can be used with detuned reactors.

The inductance of the detuned reactor limits the energising current to a value that can be accepted by the contactor.

References and maximum power ratings <sup>(1)</sup>							
Power ratings temp. ≤ 55 °C			Instantaneous auxiliary contacts		Tightening torque on end-piece	Basic reference no. to which the control voltage reference no. should be added <sup>(2)</sup>	Weight
220 V	400 V	660 V	 	L	Nm		kg
240 V	440 V	690 V					
kvar	kvar	kvar					
6.5	12.5	18	1	1	1.2	LC1-DFK11**	0.43
				2	1.2	LC1-DFK02**	0.43
6.5	15	24	1	1	1.7	LC1-DGK11**	0.45
				2	1.7	LC1-DGK02**	0.45
10	20	30	1	1	1.9	LC1-DLK11**	0.6
				2	1.9	LC1-DLK02**	0.6
15	25	36	1	1	2.5	LC1-DMK11**	0.63
				2	2.5	LC1-DMK02**	0.63
20	30	48	1	2	5	LC1-DPK12**	1.3
25	40	58	1	2	5	LC1-DTK12**	1.3
40	60	92	1	2	9	LC1-DWK12**	1.65

(1) The power values in the above table are valid for the following conditions:

Prospective peak energising current	LC1-D*K	200 In
Maximum rate	LC1-DKF/DKG/DLK/DMK/DPK	240 operating cycles/hour
	LC1-DTK/DWK	100 operating cycles/hour
Electrical durability at nominal load	LC1-DKF/DKG/DLK/DMK/DPK	400 V 300000 operating cycles
	LC1-DTK/DWK	690 V 300000 operating cycles

(2) Control circuit voltage (\*\*):

<b>Tension (V)</b>	<b>110</b>	<b>220</b>	<b>230</b>	<b>240</b>	<b>380</b>	<b>400</b>	<b>415</b>
50/60 Hz	F7	M7	P7	U7	Q7	V7	N7

Other voltages: contact us.