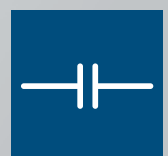




POWER FACTOR CORRECTION SOLUTIONS  
FOR FAST CHANGING ELECTRIC LOADS

# LV POWER FACTOR CORRECTION SYSTEMS THYRISTOR SWITCHED



**GENERAL SALES CONDITIONS**  
downloadable from our website



# ABOUT ORTEA



Founded in 1969, ORTEA SpA is a leading company in manufacturing and engineering Power Quality solutions.

Fifty years in the business and ongoing technical research have made of ORTEA SpA a competitive and technologically advanced company.

Close co-operation between design, production and marketing enables to meet the requirements of a constantly growing number of customers.

Beside standard production, ORTEA SpA can be extremely flexible in developing and manufacturing special equipment according to User's specification. All this thanks to the experience gained over many years of applied technological development. Such development includes IT tools that enable the technical staff to elaborate electrical and mechanical designs for each "custom product" on a quick and cost-effective basis.

The ORTEA SpA products are installed and working in a large number of countries, and, thanks to strategically positioned offices and distributors, guarantee rapid and competent support.



# QUALITY CERTIFIED



The belief that product quality and Customer satisfaction are the core of a modern organisation, led to the implementation of a certified Company Managing System.

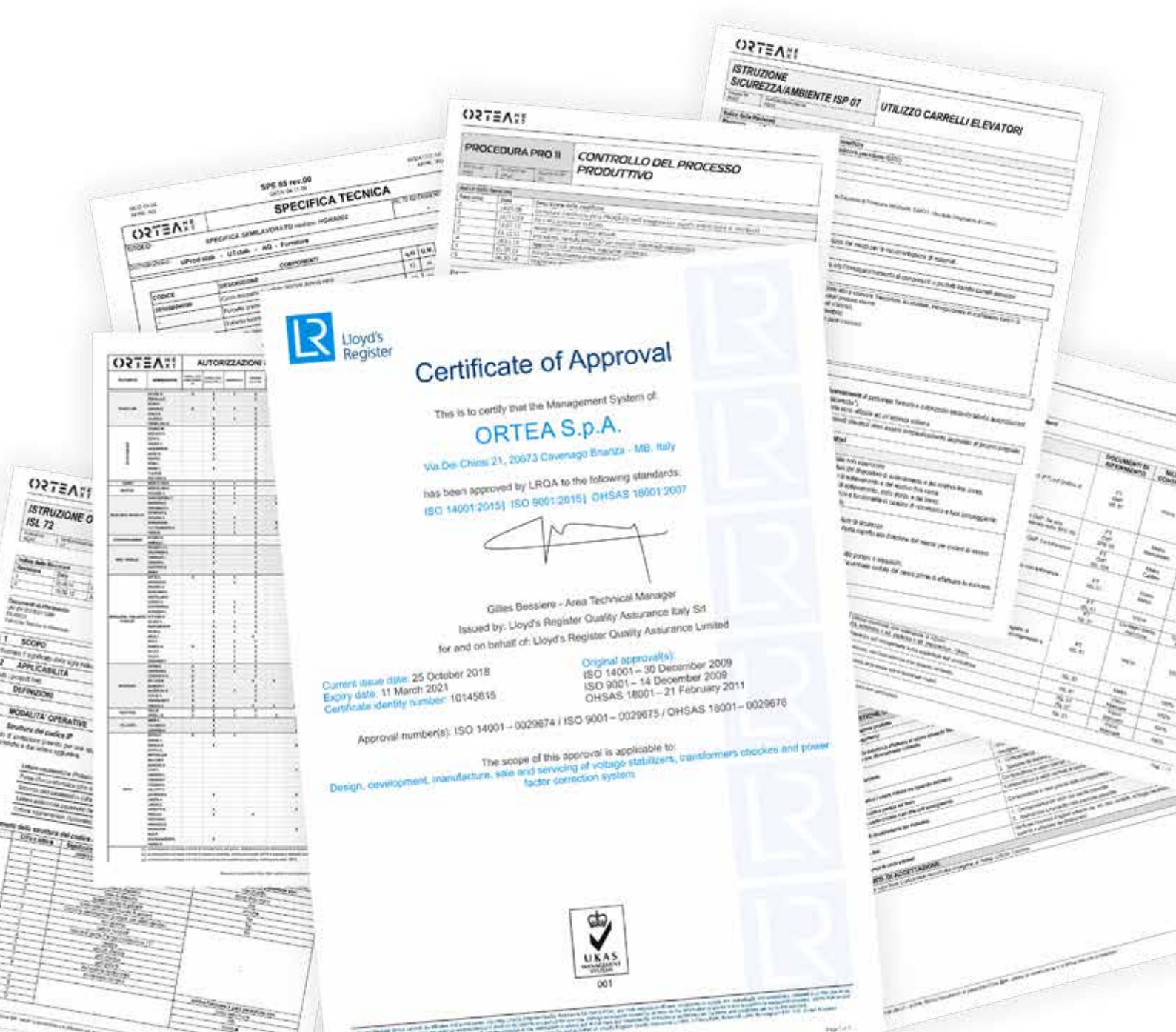
A modern Company that wants to accept the challenge of today's business scenario cannot do so without conforming to standardized organizational criteria.

Customer satisfaction, product quality and responsible occupational practices are the basis on which the Company's activities can be consolidated. ORTEA SpA understood this a long time ago: the first ISO 9001 approval dates back to 1996.

Today ORTEA SpA Integrated Managing System is approved by Lloyd's Register according to the main Standards:

- ISO9001 (Quality management systems).
- ISO14001 (Environmental management systems).
- OHSAS18001 (Occupational health & safety management systems).

This means that ORTEA SpA can ensure that its performance is optimized in terms of internal process management, commitment towards environmental issues and attention to health & safety at work within the frame of a single Managing System.



# ORTEA POWER QUALITY SOLUTIONS

Companies are more and more sensitive to Power Quality issues because they can cause troubles and damages to equipments and processes, up to interrupting the production cycle.

ORTEA SpA, with his brands ORTEA, ICAR and ENERSOLVE, offers a unique range of products and services for Power Quality and Energy Efficiency of low voltage electrical networks: voltage stabilisers, sag compensator, power factor correction systems, transformers and active harmonic filters.

VOLTAGE VARIATION

VOLTAGE STABILISERS



SAGs/DIPs

SAG COMPENSATOR



EXCESSIVE REACTIVE POWER

POWER FACTOR CORRECTION SYSTEMS



UNPROTECTED LOADS

LV TRANSFORMERS



HARMONIC POLLUTION

ACTIVE HARMONIC FILTERS



WASTE OF ENERGY

ENERGY EFFICIENCY  
SMART DEVICES





## EXPERIENCE

Founded in 1969, ORTEA SpA has gained experience and know-how that enabled continuous growth and evolution. This never-ending process has allowed the Company to assume a leading role worldwide in designing and manufacturing Power Quality solutions.



## RELIABILITY

Thanks also to its long-established Quality System, ORTEA SpA can ensure the production of reliable and long lasting products, each one of them accurately tested.



## FLEXIBILITY

In addition to the standard production, the extremely flexible organization of ORTEA SpA is able to develop and manufacture cost-effective special equipment based on the Customer's specification.



## QUALITY

Aiming at providing for the best quality, the manufacturing process includes checks during production and detail test sessions for each equipment. The certified Integrated Managing System ensures the control of every manufacturing phase, starting from checking the components at reception and ending with the best package in relation to the transport type.



## RESEARCH & DEVELOPMENT

ORTEA SpA constantly collaborates with Universities and Business Partners in the research and development of new products and new technologies.



## SYNERGY

By working together, marketing, design, production and after-sales service allow the Company to meet the necessities set forth by an increasingly globalised and competitive market.



## EXPERTISE

ORTEA SpA pre- and after-sales organization is able to intervene quickly, analyzing the problems and providing the correct solution.



## CUSTOMER SERVICE

The continuous monitoring and analysis of requests and claims carried out by the after-sales service enables the improvement the quality of both products and service to the Customer.

# THYRISTOR SWITCHED POWER FACTOR CORRECTION BENEFITS

In steady growing number of plants there are loads, even of great power, characterized by fast load variations. For example extruders, mixers, banbury, mills, crushers, cranes, bridge wagons, elevators, ski lifts, robots, compressors, presses...

For these types of loads, the power factor correction with thyristor switches guarantees adequate response speed, and is able to perform very high number of operations, as required by a PFC system widely used in these applications without problems (up to several million electrical operations).

The traditional contactor switched banks is too slow, and is unable to correct the power factor in an effective and timely way.

Moreover, the thyristor switch allow the minimization of the current and voltage transients consequent to the switching on and disconnection maneuvers: this peculiarity is particularly appreciated in those plants where a high level of power quality must be maintained (hospitals, military plants, companies with high digitalization processes). A further positive feature of the thyristor switched banks is the reduced maintenance: the absence of moving mechanical parts, typical of the contactors, guarantees a much longer life. This feature is also particularly useful in environments with the presence of conductive dust, which in the long term puts the moving parts of the contactors in crisis.

Lastly, thyristor switched banks ensure high noiselessness during their operation, this is particularly indicated when the panel must be installed near manned environments (banks, data centers, theaters, cinemas, libraries, schools, laboratories; but also panels installed in production departments close to the staff workstations).



## Limits of the traditional contactor switched banks

- Limited speed and maneuver frequency (reconnection time more than 30s).
- Electric switching on and off transients characterized respectively by overcurrents and overvoltages.
- More demanding maintenance.
- Number of operations not suitable for loads with high speed of variation.

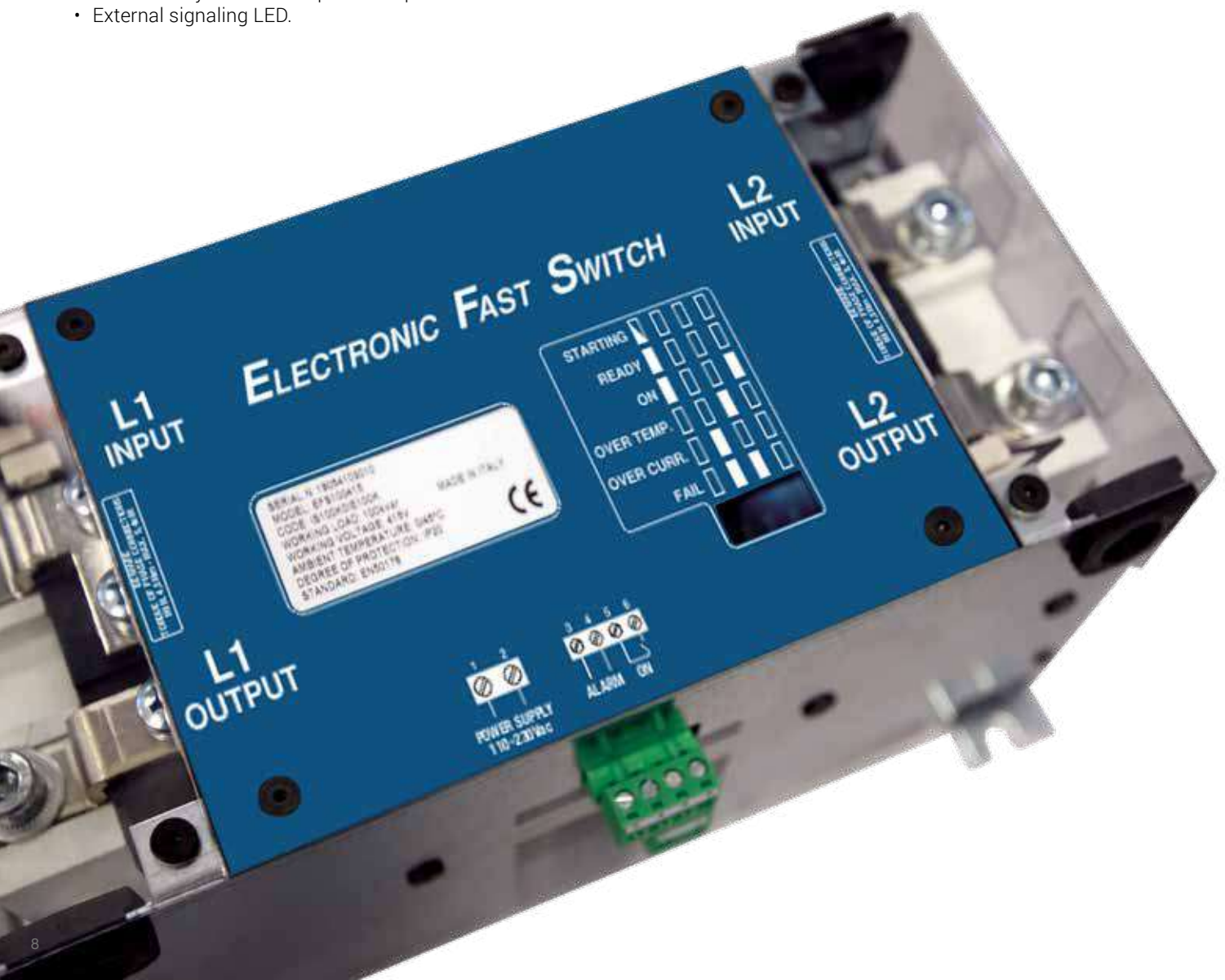
## Benefits of the Electronic Fast Switches

- High-speed reactive power availability (about 60ms to switch on the whole cap bank reactive power).
- No peak current on capacitors during steps operation.
- No peak voltage on capacitors during steps disconnection.
- Power Quality improvement: thanks to the more timely compensation, the voltage drops are reduced both in depth and in duration.

# GENERAL FEATURES OF ELECTRONIC FAST SWITCHES

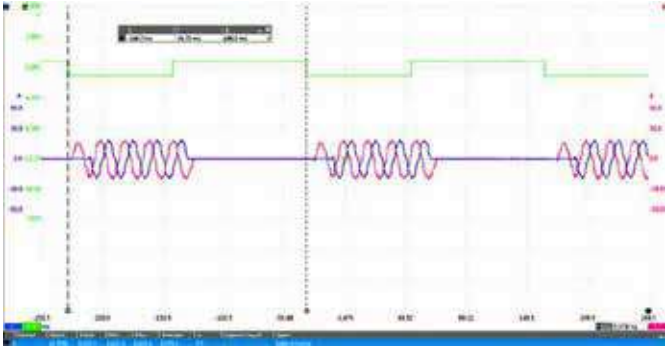
The electronic fast switches used on board the ICAR Power Factor Correction banks are designed and manufactured in house.

- Electronic Fast Switch speed: 20ms ON / 20ms OFF.
- Capacitors Banks Switching speed: 0,12s ON / 0,12s OFF.
- Continuous duty cycle.
- Built in over current protection: while the current overcomes the threshold the switch opens until the current becomes normal.
- Made in Italy with all European components.
- External signaling LED.





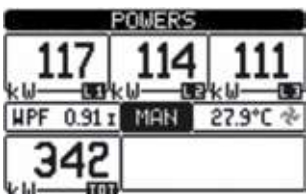
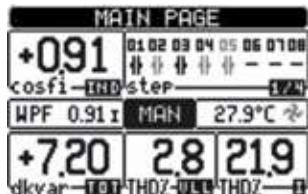
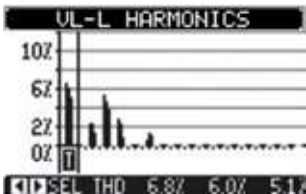
## Electronic fast switches: continuous duty cycle at maximum frequency



The image shows the switching speed of the static inserter at maximum continuous operating frequency: the cyclical ON-OFF status change (green line) requires only 120ms.

## Reactive power factor controller RPC 8BGA

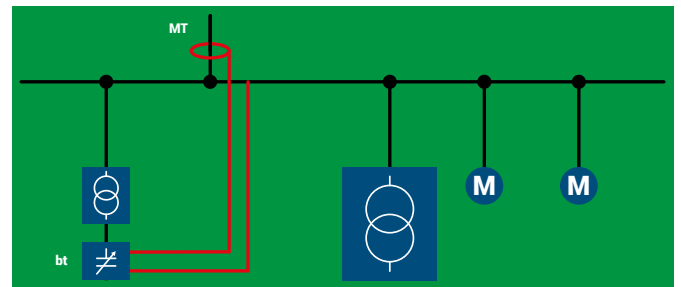
The RPC 8BGA reactive power factor controller, equipped with the STR4NO expansion module, manages the power factor correction equipment and, at the same time, guarantees a wide number of measurements both of the fundamental electrical parameters (I, V, P, f, etc) than those aimed at Power Quality monitoring (THDI, THDV, harmonic spectrum, etc). Connected to three external CTs, it becomes a real added multimeter. It is also able to remotely communicate on-board information via LAN or RS485.



## Special applications

The thyristor switched power factor correction systems can be interesting to solve particular plant matters, for example to realize extra-rapid MV PFC solutions. This can be useful for reactive power compensation of MV loads which due to their nature cannot be compensated with automatic MV Capacitor Banks (motors with close starts, for example) that have reaction times in the order of several minutes. Or to fix upstream fast loads LV when there are excessive problems in the LV network, for example high voltage harmonic distortions.

In this case, the below solution can be adopted, where the voltage and current signals comes from the MV side, point where the power factor shall be corrected, and to use a step up transformer in between to provide the reactive power to the network.



The step up transformer shall be designed with technical features (vector group, work induction, apparent power, vcc%) defined by ORTEA technical support.

### A real case

Our customer is a large company specialized in the molding of large steel elements (shafts, disks, flanges, mallets, hooks, etc.) with a monthly production of about 100 tons of finished product.

The priority loads are the presses: two 1000t, a 1600t, a 2500t, a 4000t, a 6300t. Other important loads present in the plant are saws, electro-scalers, minor presses. All utilities characterized by high electricity consumption (the company has a total committed power of about 6MW), low power factor (the average monthly  $\cos\phi$  is around 0.65), marked non-linearity with a consequent impact on the Power Quality of the energy electric (current distortion in the bt sections: THD up to about 70%; voltage distortion in the bt sections: THD up to 12%) and high speed of the work cycle (typically the presses have work cycles with a timing of a few seconds) which does not allow for power factor correction on the MV side.



The solution, after dialoguing with the customer, is a LV power factor correction system, connected to the MV network via a dedicated LV/MV step up transformer.

The PFC system is detuning type, the actuation contactors are electronic static switches able to arm / disarm all the power on board in less than 100ms.

Thanks to these components, the power factor correction system is able to compensate the load very quickly, even when the most rapid utilities are in operation.

For the customer this solution was particularly interesting also due to the substantially zero impact that its installation and activation had on the existing cabins.

On board capacitors technology:

-  High gradient metallized polypropylene
-  High gradient metallized polypropylene plus

Available solutions

Main technical characteristics

Common technical characteristics

CHAPTER 2

## HPIO

Automatic PFC system

**MICROmatic - MINImatic - MIDImatic - MULTImatic**

U <sub>e</sub>	U <sub>n</sub>	U <sub>max</sub> *	f	T <sub>HD</sub> %	T <sub>HD</sub> %**
415V	415V	455V	50Hz	≤12%	≤50%

\* Maximum admissible value according to IEC 60831-1.  
\*\* Attention: in this conditions of load network harmonic amplification phenomena is possible.

### Technical characteristics

**Rated operational voltage** U<sub>e</sub>=400-415V

**Rated frequency** 50Hz

**Max current overload in (bank)** 1,3 In

**Max current overload in (capacitors @40°C)**  
 1,3 In (continuous)  
 2 In (x380s every 60 minutes)  
 3 In (x150s every 60 minutes)  
 4 In (x70s every 60 minutes)  
 5 In (x45s every 60 minutes)

**Max overload Vn (banks)** 1,1xU<sub>n</sub>

**Max overload Vn (capacitors)** 3xU<sub>n</sub> (per 1 minute)

**Insulation voltage** 690V

**Temperature class (bank)** -5/+40°C

**Temperature class (capacitors)** -25/+55°C

**Discharge device** mounted on each bank

**Installation** indoor

### Service

continuous

**Internal connection** delta

**Operation devices** capacitors contactors (AC6b)

**Total losses** ~2W/kvar

**Inner surface finish** zinc passivation

**Standards (bank)** IEC 61439-1/2, IEC 61921

**Standards (capacitors)** IEC 60831-1/2

### Generalities

- Zink-passivated metallic enclosure painted with epoxidic dust paint, colour RAL 7035.
- Auxiliary transformer to separate power and auxiliary circuit parts (110V).
- Load-break switch with door interlock.
- Special contactors with damping resistors to limit capacitors inrush current (AC6b).
- FS17 450/750V self-extinguish cable according to EN 50525 - EN 50575 - EN 50575/A1.
- Microprocessor Power Factor Correction relay.
- CRM25 single phase self-healing metallized polypropylene capacitor with U<sub>n</sub>=415V rated voltage.

Part number	Power [kvar]		Steps U <sub>e</sub> =400V	Electrical steps number	Banks		LBS <sup>1</sup> [A]	I <sub>sc</sub> <sup>2</sup> [kA]	PFC % <sup>3</sup>	Weight [kg]	Dimensions (see chap. 6)		
	U <sub>e</sub> =415V	U <sub>e</sub> =400V			[kvar]	[A]					[kg]	[P3X]	[IP4X]
<b>MICROmatic</b>													
ICDAKF214050652	14	12,6	1,8-3,6-7,2	7	1,8-3,6-7,2	63	50	SLGA	12	49	-	-	
ICDAKF22050652	20	18	3,6-7,2-14,4	5	3,6-7,2-14,4	80	50	SLGA	13	49	-	-	
ICDAKF22050652	22	19,8	1,8-3,6-2x7,2	11	1,8-3,6-2x7,2	80	50	SLGA	16	50	-	-	
ICDAKF228050652	28	25,2	3,6-7,2-14,4	7	3,6-7,2-14,4	80	50	SLGA	14	49	-	-	
ICDAKF23050652	30	27	1,8-3,6-7,2-14,4	15	1,8-3,6-7,2-14,4	80	50	SLGA	17	50	-	-	
ICDAKF236050652	36	32,4	3,6-2x7,2-14,4	9	3,6-2x7,2-14,4	100	50	SLGA	18	50	-	-	
ICDAKF238050652	38	34,2	1,8-3,6-2x7,2-14,4	19	1,8-3,6-2x7,2-14,4	100	50	SLGA	20	50	-	-	
ICDAKF244050652	44	39,6	3,6-7,2-2x14,4	11	3,6-7,2-2x14,4	100	50	SLGA	22	50	-	-	
ICDAKF252050652	52	46,8	3,6-7,2-14,4-21,6	13	3,6-2x7,2-2x14,4	125	50	SLGA	24	50	-	-	
ICDAKF260050652	60	54	3,6-7,2-14,4-28,8	15	3,6-7,2-3x14,4	125	50	SLGA	26	50	-	-	
ICDAKF272050652	72	64,8	7,2-2x14,4-28,8	9	7,2-4x14,4	160	50	SLGA	28	50	-	-	
ICDAKF280050652	80	75	7,5-15-22,5-30	10	7,5	250	9	SLGA	41	55	-	60	
ICDAKF3112050652	112	105	7,5-15-22,5-2x30	14	30x7,5	250	9	SLGA	47	56	-	60	
ICDAKF3136050652	136	125	7,5-15-22,5-30-52,5	17	52,5-7,5	315	9	SLGA	51	56	-	60	
ICDAKF316050652	160	150	15-30-45-60	10	2x7,5	315	9	SLGA	54	56	-	60	
ICDAKF3192050652	192	180	15-30-60-75	12	30-2x7,5	400	9	SLGA	60	57	-	60	
ICDAKF3216050652	216	200	15-30-60-90	13	52,5-2x7,5	500	9	SLGA	65	57	-	60	
ICDAKF324050652	240	225	15-30-60-120	15	3x7,5	500	9	SLGA	69	57	-	60	
ICDAKF327550884	275	255	15-2x30-3x60	17	105-150	630	25	BLGA	170	64	-	-	
ICDAKF332050884	320	300	2x30-4x60	10	2x150	800	30	BLGA	185	64	-	-	
ICDAKF340050884	400	375	2x30-4x75	10	75-2x150	800	30	BLGA	200	64	-	-	
ICDAKF348050884	480	450	2x45-4x90	10	3x150	1000	30	BLGA	220	64	-	-	
ICDAKF32050700	320	300	2x30-4x60	10	2x150	800	50	BBGA	190	-	72	75	
ICDAKF340050700	400	375	2x37,5-4x75	10	75-2x150	1050	50	BBGA	210	-	72	75	
ICDAKF348050700	480	450	2x45-4x90	10	3x150	1250	50	BBGA	230	-	72	75	
ICDAKF356050700	560	525	2x52,5-4x105	10	75-3x150	1250	50	BBGA	270	-	74	81	
ICDAKF364050700	640	600	2x60-4x120	10	4x150	2x600	50	BBGA	420	-	92	83	
ICDAKF372050700	720	675	2x67,5-4x135	10	75-4x150	2x1250	50	BBGA	500	-	92	83	
ICDAKF380050700	800	750	2x75-4x150	10	6x150	2x1250	50	BBGA	520	-	92	83	
ICDAKF388050700	880	825	2x82,5-4x165	10	75-5x150	2x1250	50	BBGA	560	-	92	83	
ICDAKF396050700	960	900	2x90-4x180	10	6x150	2x1250	50	BBGA	580	-	92	83	
ICDAKF410450700	1040	975	2x97,5-4x195	10	75-6x150	2x1250	50	BBGA	620	-	94	85	
ICDAKF41250700	1120	1050	2x105-4x210	10	2x75-6x150	2x1250	50	BBGA	660	-	94	85	

1. M/LT<sub>max</sub> of several columns have a disconnector and a cable entry for each column. See page 22.  
2. Other values upon request. For MICROmatic and MIDImatic series short-circuit withstand current conditioned by the upstream protective device.  
3. For part numbers contact ORTEA SpA.

ICAR 33

## Detuned thyristor switched automatic PFC system

### MULTImatic

U <sub>e</sub>	U <sub>N</sub>	U <sub>MAX</sub> *	f	THDI <sub>R</sub> %	I <sub>250Hz</sub> %**	THDV <sub>R</sub> %	f <sub>D</sub>
400-415V	550V	600V	50Hz	100%	≤25%	≤6%	180Hz

\* Maximum admissible value according to IEC 60831-1.

\*\* Percent current of 5th harmonic.

### Generalities

- Zink-passivated metallic enclosure painted with epossidic dust paint, colour RAL 7035.
- Auxiliary transformer to separate power and auxiliary circuit parts (110V).
- Load-break switch with door interlock.
- Thyristor switches (SCR).
- FS17 450/750V self-extinguish cable according to EN 50525 - EN 50575 - EN 50575/A1.
- Microprocessor Power Factor Correction relay.
- Control and protection multimeter MCP5, integrated in 8BGA controller.
- CRM25 single phase self-healing metallized polypropylene capacitor with U<sub>N</sub>=550V rated voltage.
- Three phase detuning choke with tuning frequency f<sub>D</sub>=180Hz (N=3.6-p%=7.7%).
- Switch time of all available reactive power: about 60 milliseconds.

### Technical characteristics

<b>Rated operational voltage</b>	U <sub>e</sub> =400-415V
<b>Rated frequency</b>	50Hz
<b>Max current overload In (bank)</b>	1,3 In
<b>Max current overload In (capacitors @40°C)</b>	1,3 In (continuous) 2 In (x380s every 60 minutes) 3 In (x150s every 60 minutes) 4 In (x70s every 60 minutes) 5 In (x45s every 60 minutes)
<b>Max overload Vn (bank)</b>	1,1xU <sub>e</sub>
<b>Max overload Vn (capacitors)</b>	3xU <sub>N</sub> (for 1 minute)
<b>Insulation voltage</b>	690V
<b>Temperature class (bank)</b>	-5/+40°C
<b>Temperature class (capacitors)</b>	-25/+55°C
<b>Discharge device</b>	mounted on each bank
<b>Installation</b>	indoor
<b>Service</b>	continuous
<b>Internal connection</b>	delta
<b>Operation devices</b>	thyristor switches
<b>Total losses</b>	~ 6W/kvar
<b>Inner surface finish</b>	zinc passivation
<b>Standards (bank)</b>	IEC 61439-1/2, IEC 61921
<b>Standards (capacitors)</b>	IEC 60831-1/2

	Part number	Power [kvar]		Steps U <sub>e</sub> =400V	Electrical steps number	Banks [kvar]	LBS <sup>1</sup> [A]	I <sub>cc</sub> <sup>2</sup> [kA]	PFC relay	Weight [kg]	Dimensions	
		U <sub>e</sub> =415V	U <sub>e</sub> =400V								IP4X	IP55 <sup>3</sup>
MULTImatic	IU7AFF310050786	<b>107</b>	<b>100</b>	20-2x40	5	20-2x40	250	17	8BGA	220	72	75
	IU7AFF312050786	<b>128</b>	<b>120</b>	40-80	3	40-80	250	17	8BGA	260	72	75
	IU7AFF314050786	<b>150</b>	<b>140</b>	20-40-80	7	20-40-80	400	25	8BGA	300	72	75
	IU7AFF316050786	<b>171</b>	<b>160</b>	2x40-80	4	2x40-80	400	25	8BGA	325	72	75
	IU7AFF320050786	<b>214</b>	<b>200</b>	40-2x80	5	40-2x80	630	25	8BGA	365	72	75
	IU7AFF324050786	<b>257</b>	<b>240</b>	2x40-2x80	6	2x40-2x80	630	25	8BGA	385	74	82
	IU7AFF328050786	<b>300</b>	<b>280</b>	40-3x80	7	40-3x80	630	25	8BGA	415	74	82
	IU7AFF332050786	<b>342</b>	<b>320</b>	2x40-80-160	8	2x40-3x80	800	50	8BGA	445	70	76
	IU7AFF336050786	<b>385</b>	<b>360</b>	40-2x80-160	9	40-4x80	800	50	8BGA	475	70	76
	IU7AFF340050786	<b>428</b>	<b>400</b>	2x40-4x80	10	2x40-4x80	1250	50	8BGA	505	71	77
	IU7AFF344050786	<b>471</b>	<b>440</b>	40-80-2x160	11	40-5x80	1250	50	8BGA	775	71	77
	IU7AFF348050786	<b>516</b>	<b>480</b>	2x80-2x160	6	6x80	1250	50	8BGA	800	71	77
	IU7AFF356050786	<b>599</b>	<b>560</b>	80-3x160	7	7x80	2x800	50	8BGA	860	94	86
	IU7AFF364050786	<b>685</b>	<b>640</b>	2x80-3x160	8	8x80	2x800	50	8BGA	920	94	86
	IU7AFF372050786	<b>770</b>	<b>720</b>	80-4x160	9	9x80	2x1250	50	8BGA	980	90	96
	IU7AFF380050786	<b>856</b>	<b>800</b>	2x80-4x160	10	10x80	2x1250	50	8BGA	1040	90	96
IU7AFF388050786	<b>942</b>	<b>880</b>	80-5x160	11	11x80	2x1250	50	8BGA	1100	91	95	
IU7AFF396050786	<b>1032</b>	<b>960</b>	2x80-3x160-320	12	12x80	2x1250	50	8BGA	1160	91	95	

1. MULTImatic of several columns have a disconnecter and a cable entry for each column. See page 22.

2. Other values upon request.

3. For part numbers contact ORTEA SpA.

## Detuned thyristor switched automatic PFC system

### MULTImatic

U <sub>e</sub>	U <sub>N</sub>	U <sub>MAX</sub> *	f	THDI <sub>R</sub> %	I <sub>250Hz</sub> %**	THDV <sub>R</sub> %	f <sub>D</sub>
400-415V	550V	600V	50Hz	100%	>25%	≤6%	135Hz

\* Maximum admissible value according to IEC 60831-1.

\*\* Percent current of 5th harmonic.

### Generalities

- Zink-passivated metallic enclosure painted with epossidic dust paint, colour RAL 7035.
- Auxiliary transformer to separate power and auxiliary circuit parts (110V).
- Load-break switch with door interlock.
- Thyristor switches (SCR).
- FS17 450/750V self-extinguish cable according to EN 50525 - EN 50575 - EN 50575/A1.
- Microprocessor Power Factor Correction relay.
- Control and protection multimeter MCP5, integrated in 8BGA controller.
- CRM25 single phase self-healing metallized polypropylene capacitor with U<sub>N</sub>=550V rated voltage.
- Three phase detuning choke with tuning frequency f<sub>D</sub>=135Hz (N=2.7-p%=13.7%).
- Switch time of all available reactive power: about 60 milliseconds.

### Technical characteristics

<b>Rated operational voltage</b>	U <sub>e</sub> =400-415V
<b>Rated frequency</b>	50Hz
<b>Max current overload I<sub>n</sub> (bank)</b>	1,3 I <sub>n</sub> 1,3 I <sub>n</sub> (continuous) 2 I <sub>n</sub> (x380s every 60 minutes) 3 I <sub>n</sub> (x150s every 60 minutes) 4 I <sub>n</sub> (x70s every 60 minutes) 5 I <sub>n</sub> (x45s every 60 minutes)
<b>Max current overload I<sub>n</sub> (capacitors @40°C)</b>	
<b>Max overload V<sub>n</sub> (bank)</b>	1,1xU <sub>e</sub>
<b>Max overload V<sub>n</sub> (capacitors)</b>	3xU <sub>N</sub> (for 1 minute)
<b>Insulation voltage</b>	690V
<b>Temperature class (bank)</b>	-5/+40°C
<b>Temperature class (capacitors)</b>	-25/+55°C
<b>Discharge device</b>	mounted on each bank
<b>Installation</b>	indoor
<b>Service</b>	continuous
<b>Internal connection</b>	delta
<b>Operation devices</b>	thyristor switches
<b>Total losses</b>	~ 8W/kvar
<b>Inner surface finish</b>	zinc passivation
<b>Standards (bank)</b>	IEC 61439-1/2, IEC 61921
<b>Standards (capacitors)</b>	IEC 60831-1/2

	Part number	Power [kvar]		Steps U <sub>e</sub> =400V	Electrical steps number	Banks [kvar]	LBS <sup>1</sup> [A]	I <sub>cc</sub> <sup>2</sup> [kA]	PFC relay	Weight [kg]	Dimensions	
		U <sub>e</sub> =415V	U <sub>e</sub> =400V								IP4X	IP55 <sup>3</sup>
MULTImatic	IU7JFF260050872	<b>65</b>	<b>60</b>	20-40	3	20-40	250	17	8BGA	260	72	75
	IU7JFF310050872	<b>107</b>	<b>100</b>	20-2x40	5	20-2x40	250	17	8BGA	300	72	75
	IU7JFF314050872	<b>150</b>	<b>140</b>	20-3x40	7	20-3x40	400	25	8BGA	350	74	82
	IU7JFF318050872	<b>194</b>	<b>180</b>	20-2x40-80	9	20-4x40	400	25	8BGA	380	70	73
	IU7JFF322050872	<b>237</b>	<b>220</b>	20-5x40	11	20-5x40	630	25	8BGA	400	71	77
	IU7JFF324050872	<b>257</b>	<b>240</b>	2x40-2x80	6	6x40	630	25	8BGA	420	71	77
	IU7JFF328050872	<b>300</b>	<b>280</b>	40-3x80	7	7x40	2x400	25	8BGA	670	94	85
	IU7JFF332050872	<b>342</b>	<b>320</b>	2x40-3x80	8	8x40	2x400	25	8BGA	700	94	85
	IU7JFF336050872	<b>385</b>	<b>360</b>	40-4x80	9	9x40	2x630	25	8BGA	725	90	96
	IU7JFF340050872	<b>428</b>	<b>400</b>	2x40-4x80	10	10x40	2x630	25	8BGA	760	90	96
	IU7JFF344050872	<b>471</b>	<b>440</b>	40-5x80	11	11x40	2x630	25	8BGA	780	91	95
	IU7JFF348050872	<b>516</b>	<b>480</b>	2x40-3x80-160	12	12x40	2x630	25	8BGA	800	91	95

1. MULTImatic of several columns have a disconnecter and a cable entry for each column. See page 22.

2. Other values upon request.

3. For part numbers contact ORTEA SpA.

## Detuned thyristor switched automatic PFC system

### MULTImatic

U <sub>e</sub>	U <sub>N</sub>	U <sub>MAX</sub> *	f	THD <sub>R</sub> %	I <sub>250Hz</sub> %**	THDV <sub>R</sub> %	f <sub>D</sub>
400V	460V	500V	50Hz	100%	≤25%	≤6%	180Hz

\* Maximum admissible value according to IEC 60831-1.

\*\* Percent current of 5th harmonic.

### Generalities

- Zink-passivated metallic enclosure painted with epossidic dust paint, colour RAL 7035.
- Auxiliary transformer to separate power and auxiliary circuit parts (110V).
- Load-break switch with door interlock.
- Thyristor switches (SCR).
- FS17 450/750V self-extinguish cable according to EN 50525 - EN 50575 - EN 50575/A1.
- Microprocessor Power Factor Correction relay.
- Control and protection multimeter MCP5, integrated in 8BGA controller.
- CRM25 single phase self-healing metallized polypropylene capacitor with increased thickness and U<sub>N</sub>=460V rated voltage.
- Three phase detuning choke with tuning frequency f<sub>D</sub>=180Hz (N=3.6-p%=7.7%).
- Switch time of all available reactive power: about 60 milliseconds.

### Technical characteristics

<b>Rated operational voltage</b>	U <sub>e</sub> =400V
<b>Rated frequency</b>	50Hz
<b>Max current overload I<sub>n</sub> (bank)</b>	1,3 I <sub>n</sub> 1,3 I <sub>n</sub> (continuous) 2 I <sub>n</sub> (x500s every 60 minutes) 3 I <sub>n</sub> (x180s every 60 minutes) 4 I <sub>n</sub> (x90s every 60 minutes) 5 I <sub>n</sub> (x50s every 60 minutes)
<b>Max current overload I<sub>n</sub> (capacitors @40°C)</b>	
<b>Max overload V<sub>n</sub> (bank)</b>	1,1xU <sub>e</sub>
<b>Max overload V<sub>n</sub> (capacitors)</b>	3xU <sub>N</sub> (for 1 minute)
<b>Insulation voltage</b>	690V
<b>Temperature class (bank)</b>	-5/+40°C
<b>Temperature class (capacitors)</b>	-25/+70°C
<b>Discharge device</b>	mounted on each bank
<b>Installation</b>	indoor
<b>Service</b>	continuous
<b>Internal connection</b>	delta
<b>Operation devices</b>	thyristor switches
<b>Total losses</b>	~ 6W/kvar
<b>Inner surface finish</b>	zinc passivation
<b>Standards (bank)</b>	IEC 61439-1/2, IEC 61921
<b>Standards (capacitors)</b>	IEC 60831-1/2

	Part number	Power U <sub>e</sub> =400V	Steps U <sub>e</sub> =400V	Electrical steps number	Banks	LBS <sup>1</sup>	I <sub>cc</sub> <sup>2</sup>	PFC relay	Weight	Dimensions	
		[kvar]			[kvar]	[A]	[kA]		[kg]	IP4X	IP55 <sup>3</sup>
MULTImatic	IU5VFF275050786	<b>75</b>	25-50	3	25-50	250	17	8BGA	260	72	75
	IU5VFF312550786	<b>125</b>	25-2x50	5	25-2x50	400	25	8BGA	300	72	75
	IU5VFF317550786	<b>175</b>	25-3x50	7	25-3x50	400	25	8BGA	350	74	81
	IU5VFF322550786	<b>225</b>	25-2x50-100	9	25-4x50	630	25	8BGA	380	70	76
	IU5VFF327550786	<b>275</b>	25-5x50	11	25-5x50	630	25	8BGA	400	71	77
	IU5VFF330050786	<b>300</b>	2x50-2x100	6	6x50	800	50	8BGA	420	71	77
	IU5VFF335050786	<b>350</b>	50-3x100	7	7x50	2x630	25	8BGA	670	94	85
	IU5VFF340050786	<b>400</b>	2x50-3x100	8	8x50	2x630	25	8BGA	700	94	85
	IU5VFF345050786	<b>450</b>	50-4x100	9	9x50	2x630	25	8BGA	725	90	96
	IU5VFF350050786	<b>500</b>	2x50-4x100	10	10x50	2x630	25	8BGA	760	90	96
	IU5VFF355050786	<b>550</b>	50-5x100	11	11x50	2x800	50	8BGA	780	91	95
	IU5VFF360050786	<b>600</b>	2x50-3x100-200	12	12x50	2x800	50	8BGA	800	91	95

1. MULTImatic of several columns have a disconnector and a cable entry for each column. See page 22.

2. Other values upon request.

3. For part numbers contact ORTEA SpA.

## Detuned thyristor switched automatic PFC system

### MULTImatic

U <sub>e</sub>	U <sub>N</sub>	U <sub>MAX</sub> *	f	THD <sub>I<sub>R</sub></sub> %	I <sub>250Hz</sub> %**	THD <sub>V<sub>R</sub></sub> %	f <sub>D</sub>
400V	550V	600V	50Hz	100%	>25%	≤6%	135Hz

\* Maximum admissible value according to IEC 60831-1.

\*\* Percent current of 5th harmonic.

### Generalities

- Zink-passivated metallic enclosure painted with eposidic dust paint, colour RAL 7035.
- Auxiliary transformer to separate power and auxiliary circuit parts (110V).
- Load-break switch with door interlock.
- Thyristor switches (SCR).
- FS17 450/750V self-extinguish cable according to EN 50525 - EN 50575 - EN 50575/A1.
- Microprocessor Power Factor Correction relay.
- Control and protection multimeter MCP5, integrated in 8BGA controller.
- CRM25 single phase self-healing metallized polypropylene capacitor with increased thickness and U<sub>N</sub>=550V rated voltage.
- Three phase detuning choke with tuning frequency f<sub>D</sub>=135Hz (N=2.7-p%=13.7%).
- Switch time of all available reactive power: about 60 milliseconds.

### Technical characteristics

<b>Rated operational voltage</b>	U <sub>e</sub> =400V
<b>Rated frequency</b>	50Hz
<b>Max current overload I<sub>n</sub> (bank)</b>	1,3 I <sub>n</sub> 1,3 I <sub>n</sub> (continuous) 2 I <sub>n</sub> (x500s every 60 minutes) 3 I <sub>n</sub> (x180s every 60 minutes) 4 I <sub>n</sub> (x90s every 60 minutes) 5 I <sub>n</sub> (x50s every 60 minutes)
<b>Max current overload I<sub>n</sub> (capacitors @40°C)</b>	
<b>Max overload V<sub>n</sub> (bank)</b>	1,1xU <sub>e</sub>
<b>Max overload V<sub>n</sub> (capacitors)</b>	3xU <sub>N</sub> (for 1 minute)
<b>Insulation voltage</b>	690V
<b>Temperature class (bank)</b>	-5/+40°C
<b>Temperature class (capacitors)</b>	-25/+70°C
<b>Discharge device</b>	mounted on each bank
<b>Installation</b>	indoor
<b>Service</b>	continuous
<b>Internal connection</b>	delta
<b>Operation devices</b>	thyristor switches
<b>Total losses</b>	~ 8W/kvar
<b>Inner surface finish</b>	zinc passivation
<b>Standards (bank)</b>	IEC 61439-1/2, IEC 61921
<b>Standards (capacitors)</b>	IEC 60831-1/2

	Part number	Power U <sub>e</sub> =400V	Steps U <sub>e</sub> =400V	Electrical steps number	Banks	LBS <sup>1</sup>	I <sub>cc</sub> <sup>2</sup>	PFC relay	Weight	Dimensions	
		[kvar]			[kvar]	[A]	[kA]			[kg]	IP4X
MULTImatic	IU5LFF260050872	<b>60</b>	20-40	3	20-40	250	17	8BGA	260	72	75
	IU5LFF310050872	<b>100</b>	20-2x40	5	20-2x40	250	17	8BGA	300	72	75
	IU5LFF314050872	<b>140</b>	20-3x40	7	20-3x40	400	25	8BGA	350	74	81
	IU5LFF318050872	<b>180</b>	20-4x40	9	20-2x40-80	400	25	8BGA	380	70	76
	IU5LFF322050872	<b>220</b>	20-5x40	11	20-5x40	630	25	8BGA	400	71	77
	IU5LFF324050872	<b>240</b>	2x40-2x80	6	6x40	630	25	8BGA	420	71	77
	IU5LFF328050872	<b>280</b>	40-3x80	7	7x40	2x400	25	8BGA	670	94	86
	IU5LFF332050872	<b>320</b>	2x40-3x80	8	8x40	2x400	25	8BGA	700	94	86
	IU5LFF336050872	<b>360</b>	40-4x80	9	9x40	2x630	25	8BGA	725	90	96
	IU5LFF340050872	<b>400</b>	2x40-4x80	10	10x40	2x630	25	8BGA	760	90	96
	IU5LFF344050872	<b>440</b>	40-5x80	11	11x40	2x630	25	8BGA	780	91	95
	IU5LFF348050872	<b>480</b>	2x40-3x80-160	12	12x40	2x630	25	8BGA	800	91	95

1. MULTImatic of several columns have a disconnecter and a cable entry for each column. See page 22.

2. Other values upon request.

3. For part numbers contact ORTEA SpA.

# DIMENSIONS

This page shows the total dimensions, for a first evaluation of the space occupied in the cabin. The dimensions in the table include (where present) handles, exchangers, turrets, etc.

	dimensional number	Dimensions [mm]		
		W	D	H
MULTImatic	<b>70</b>	610	670	2160
	<b>71</b>	610	670	2360
	<b>72</b>	610	670	1760
	<b>73</b>	610	670	2160
	<b>74</b>	610	670	1960
	<b>75</b>	610	777	1760
	<b>76<sup>1</sup></b>	822	670	2160
	<b>77<sup>1</sup></b>	822	670	2360
	<b>78<sup>2</sup></b>	610	777	2360
	<b>80</b>	822	670	1760
	<b>81<sup>2</sup></b>	610	777	1960
	<b>82<sup>1</sup></b>	822	670	1960
	<b>83<sup>2</sup></b>	1220	777	1760
	<b>84<sup>3</sup></b>	1432	777	1760
	<b>85<sup>2</sup></b>	1220	777	1960
	<b>86<sup>3</sup></b>	1432	777	1960
	<b>90</b>	1220	670	2160
	<b>91</b>	1220	670	2360
	<b>92</b>	1220	670	1760
	<b>93</b>	1220	777	2160
	<b>94</b>	1220	670	1960
	<b>95<sup>3</sup></b>	1432	777	2360
	<b>96<sup>3</sup></b>	1432	777	2160
	<b>98<sup>2</sup></b>	1202	777	2360
	<b>101</b>	1830	670	2160
	<b>102</b>	1830	670	2360
<b>103<sup>3</sup></b>	2042	777	2160	
<b>104<sup>3</sup></b>	2042	777	2360	

1. Leave 250mm of free air on each side (consult us).

2. Leave 250mm of free air behind (consult us).

3. Leave 250mm of free air both on the back and on each side (consult us).



Companies are more and more sensitive to Power Quality issues because they can cause troubles and damages to equipments.

Our Power Quality solutions:

**VOLTAGE STABILISERS**  
**SAG COMPENSATOR**  
**LV TRANSFORMERS**  
**PFC SYSTEMS**  
**ACTIVE HARMONIC FILTERS**  
**ENERGY EFFICIENCY SMART DEVICES**



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