JUMO GmbH & Co. KG
Delivery address: Mackenrodstraße 14
36039 Fulda, Germany
Postal address: 36039 Fulda, Germany
Phone: +49 661 6003-0
Fax: +49 661 6003-607
Email: mail@jumo.net
Internet: www.jumo.net

JUMO Instrument Co. Ltd.
JUMO House
Temple Bank, Riverway
Harlow, Essex, CM20 2DY, UK
Phone: +44 1279 63 55 33
Fax: +44 1279 62 50 29
Email: sales@jumo.co.uk
Internet: www.jumo.co.uk

JUMO Process Control, Inc.
6733 Myers Road
East Syracuse, NY 13057, USA
Phone: +1 315 437 5866
Fax: +1 315 437 5860
Email: info.us@jumo.net
Internet: www.jumousa.com

JUMO TYA HL301
One-phase
Thyristor power controller
for control of resistive/inductive loads

The JUMO TYA HL301 is a state-of-the-art, microprocessor-controlled power controller designed for the precise control of resistive and resistive-inductive loads, including transformers. It can be used in star, delta and open delta connections.

Intuitive operation is achieved via four buttons and an easy-to-read LED display that shows all relevant parameters. User-friendly setup software enables simple parameterisation via a USB interface.

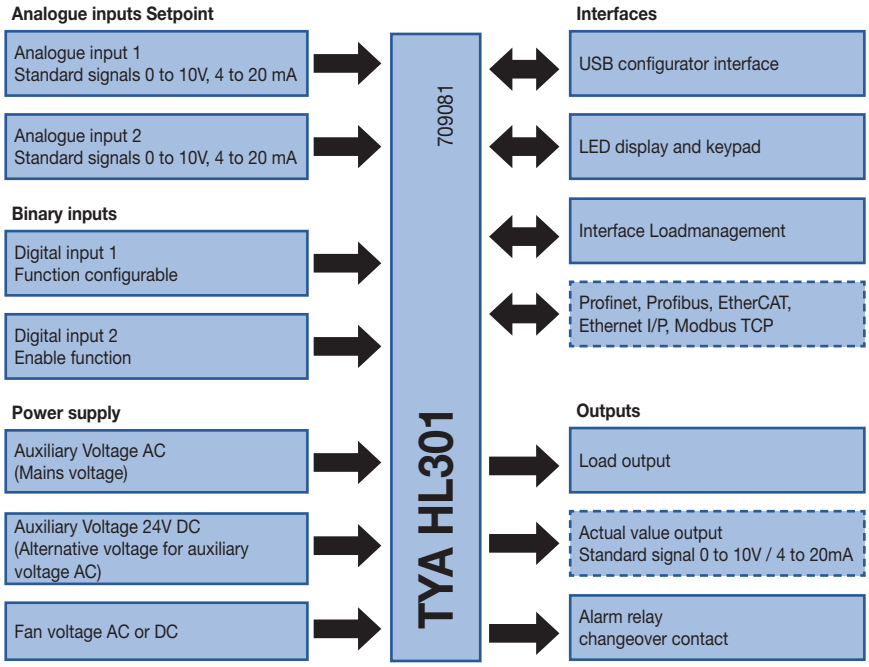
The JUMO TYA HL301 supports both phase angle control and pulse group operation, making it ideal for applications with transformer loads. It has an integrated semiconductor fuse and offers various control modes (U, U², I, I², P control) for stabilisation in the event of mains voltage fluctuations and resistance changes.

For seamless integration into various control systems, the power controller series is optionally available with a wide range of fieldbus protocols. Functions such as an optional base load specification and an adjustable soft start to minimise inrush currents increase flexibility and efficiency

- LED display with info line
- Simple configuration of the device via plain text display
- Setup programme for configuration via USB interface
- Wizard for commissioning support
- Top-bottom wiring
- Soft start function
- Phase control operation
- Pulse group operation
- Alpha start for transformer loads
- Fast half-wave control for IR emitters
- Protection class IP20
- Integrated diagnostic systems, e.g. rotating field detection
- Options:

  Partial load break monitoring
  Current limitation
  Energy meter
  Process data recording
  Mains load optimisation through load management
  UL 508 approval for models up to 700A and 600V
  UL approval for models with 800A and 600V
  PROFINET I/O, PROFIBUS, EterCAT, EtherNet/IP, Modbus RTU/TCP

Block diagram



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Technical data

Current / Voltage / Potentiometer / Binary input / Fieldbus / / Setup software

Power Supply	Operating voltage: 480V +10% max -10% min; 600V +10% max -10% min 690V +10% max -10% min	
Load	Single Phase Load	
Digital input	4÷30Vdc 5mA Max (ON ≥4Vdc OFF <1Vdc) 0,5Hz max	
Analog input V	0÷10Vdc Impedence 15 kΩ	
Analog input A	0÷20mA Impedence 100 Ω	
	4÷20mA Impedence 100 Ω	
Potentiometer	10 kΩ min	
Logic input	SSR input: 4÷30Vdc 5mA Max (ON >4Vdc / OFF <1Vdc) duty cycle min. 100 ms max 3Hz If the Fast Enable input is activated, the triggering of the phase angle is automatically selected.	

Output features 480-600V

Current	Nominal Voltage range (Ue)	Repetitive peak reverse voltage (Uimp)		Latching current	Max peak one cycle	Leakage current	Fuse I^2t value Suggested A2s (at 500V)	Frequency range	Power loss Thyristor + Fuse	Isolation Voltage (Ui)
(A)	(V)	(480V)	(600V)	(mAeff)	(10 msec.) (A)	(mAeff)	tp= 10msec	(Hz)	I =Inom (W)	(Vac)
300	24÷600	1200	1600	200	7800	15	73500	47÷70	443	3000
400	24÷600	1200	1600	200	7800	15	150500	47÷70	547	3000
500	24÷600	1200	1600	1000	17800	15	246400	47÷70	591	2500
600	24÷600	1200	1600	1000	17800	15	246400	47÷70	832	2500
700	24÷600	1200	1600	1000	15000	15	246400	47÷70	945	2500
800	24÷600	1200	1600	1000	15000	15	246400	47÷70	1144	3422

Output features 690V

Current	Nominal Voltage range (Ue)	Repetitive peak reverse voltage (Uimp)		Latching current	Max peak one cycle	Leakage current	Fuse I^2t value Suggested A2s (at 500V)	Frequency range	Power loss Thyristor + Fuse	Isolation Voltage (Ui)
(A)	(V)	(480V)	(690V)	(mAeff)	(10 msec.) (A)	(mAeff)	tp= 10msec	(Hz)	I =Inom (W)	(Vac)
120	24÷690	1600	1800	600	1900	15	16940	47÷70	200	3000
150	24÷690	1600	1800	400	1900	15	27500	47÷70	205	3000
180	24÷690	1600	1800	400	1900	15	48400	47÷70	235	3000
210	24÷690	1600	1800	400	1900	15	84700	47÷70	304	3000
400	24÷690	1600	1800	200	7820	15	236500	47÷70	547	3000
500	24÷690	1600	1800	2000	15500	15	462000	47÷70	591	3000
600	24÷690	1600	1800	2000	15500	15	387200	47÷70	832	3000
700	24÷690	1600	1800	2000	15500	15	387200	47÷70	945	3000
800	24÷690	1200	1800	200	7820	15	387200	47÷70	1144	3000

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Fan Specification 480-600V

Supply	Size		Number of fans (CE)	Number of fans (UL)
230Vac Standard	S12	300A, 400A, 500A, 600A	One Fan - 16W	Two Fans - (16W x 2) 32W
	S12	700A	Two Fans - (16W x 2) 32W	Two Fans - (16W x 2) 32W
	S15	800A	Two Fans - (16W x 2) 32W	Two Fans - (16W x 2) 32W
115Vac Option	S12	300A, 400A, 500A, 600A	One Fan - 14W	Two Fans - (14W x 2) 28W
	S12	700A	Two Fans - (14W x 2) 28W	Two Fans - (14W x 2) 28W
	S13	800A	Two Fans - (14W x 2) 28W	Two Fans - (14W x 2) 28W
24Vdc Option	S12	300A, 400A, 500A, 600A	One Fan - 7W	Two Fans - (7W x 2) 14W
	S12	700A	Two Fans - (7W x 2) 14W	Two Fans - (7W x 2) 14W
	S15	800A	Two Fans - (7W x 2) 14W	Two Fans - (7W x 2) 14W

Fan Specification 690V (CE only)

Supply	Size		Number of fans (CE)
230Vac Standard	S11	120A,150A,180A, 210A	One Fan - 16W
	S12	400A, 500A, 600A	One Fan - 16W
	S12	700A	Two Fans - (16W x 2) 32W
	S15	800A	Two Fans - (16W x 2) 32W
115Vac Option	S11	120A,150A,180A, 210A	One Fan - 14W
	S12	400A, 500A, 600A	One Fan - 14W
	S12	700A	Two Fans - (14W x 2) 28W
	S15	800A	Two Fans - (14W x 2) 28W
24Vdc Option	S11	120A,150A,180A, 210A	One Fan - 7W
	S12	400A, 500A, 600A	One Fan - 7W
	S12	700A	Two Fans - (7W x 2) 14W
	S15	800A	Two Fans - (7W x 2) 14W

Supply the electronic board

The JUMO TYA thyristor unit, to work, requires a voltage supply for the electronic boards. The Max consumption is 10VA. The voltage supply for the electronic boards is configured in line with customer requirements that are defined in the Order Code. The Order Code is written on the identification label

Terminal M1	Description
18	Voltage Supply for Electronic Boards (Auxiliary Voltage)
19	Not Used
20	Voltage Supply for Electronic Boards (Auxiliary Voltage)

If it is necessary to change the value of the auxiliary supply voltage, move the jumpers as shown in the table below.

The range of the auxiliary voltage that can be set depends on the transformer mounted on the board.

Order Code	As ordered		Change to	
	Jumper JP1 + JP2 are linked		Link only Jumper JP3	
	Transformer range	Line voltage	Transformer range	Line voltage
709081 _ _ 115 _ _ _	90:135V	100/120V	180:265V	200/208/220/230/240V
709081 _ _ 230 _ _ _	180:265V	200/208/220/230/240V	342:528V	380/400/415/440/480V
709081 _ _ 400 _ _ _	238:330V	277V	540:759V	600/690V
	Only Jumper JP3 is linked		Link Jumper JP1 + JP2	
709081 _ _ 480 _ _ _	342:528V	380/400/415/440/480V	180:265V	200/208/220/230/240V
709081 _ _ 600 _ _ _	540:759V	600V	238:330V	277V
709081 _ _ 690 _ _ _	540:759V	690V	238:330V	277V

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General features

Connections	• Single phase wiring with resistive load (with JUMO TYA HL301) • Single phase wiring with inductive load (withJUMO TYA HL301) • Open Delta wiring with resistive load (with 3 X JUMO TYA HL301)
Firing type	1. Zero Crossing Switching 2. Single Cycle Operation 3. BF - Burst Firing 4. Soft Start with Burst Firing - S + BF 5. PA - Phase Angle Control 6. Soft Start with Phase Angle Control 7. Burst Firing with Delayed Ignition Timing 8. Half cycle
Load types	Single phase
Control Mode (Feed-back)	• Quadratic Voltage Control U^2 • Voltage Control U • Current Control I • Power Control P(U*I) • Quadratic Current Control I^2 • No Control – Open Loop. The input is proportional to the firing angle (α). • External Control (0÷10V, 4÷20mA, 0÷20mA)
Electrical connection	Up to 120 A -> M8 Screw From 300 to 800A -> Wiring the power busbar with M10 screw
Operating conditions	Installation Location: Do not install in locations with direct sunlight, conductive dust, corrosive gas, vibrations, water, or salty environments. Altitude: All specifications apply up to 1000m altitude. For higher altitudes, the maximum load current is reduced by 2% for every 100m above 1000m. Pollution Degree: Up to Pollution Degree 2 (IEC 60947-1 6.1.3.2)
EMV	EN60947-1 2007 +A1 2011, A2 2014 EN60497-4-3: 2014
Interference emission	EN60947-4-3: 2014 Group 1 Class A emissions
Interference immunity	EN60947-4-3: 2014 Industrial Immunity
Industrial electromagnetic environment	IEC 61326-1
Protection class	IP 20 EN 60529
Surrounding temperature range	Ambient Temperature: 0...40°C (32...104°F) up to the rated current. Above 40°C (104°F), refer to the derating curve (max 50°C).
Storage temperature range	Storage Temperature: -25°C...70°C (-13°F...158°F)
Application height	Altitude: All specifications apply up to 1000m altitude. For higher altitudes, the maximum load current is reduced by 2% for every 100m above 1000m.
Cooling	Forced convection with installed fan
Climate resistance	Humidity: 5 - 95% relative humidity, non-condensing and non-freezing
Installation position	The power controller must be mounted vertically
Test voltage	EN60947-3-4: 2020

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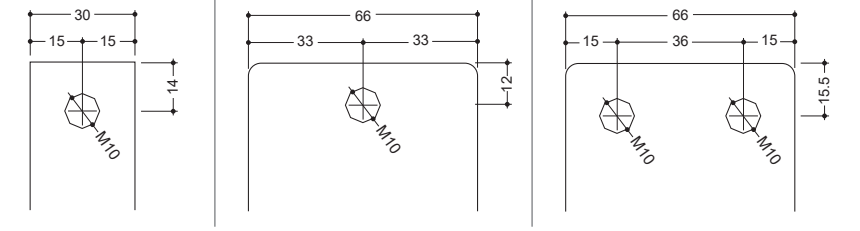
Creepage distances	Bar dimensions (300÷800A) **1PH 300A** **1PH 400A** **1PH 500-800A** 
Housing	PolymericV2
Maximum temperature of the heat sink	Factory Setting is an alarm at a temperature above 80°C

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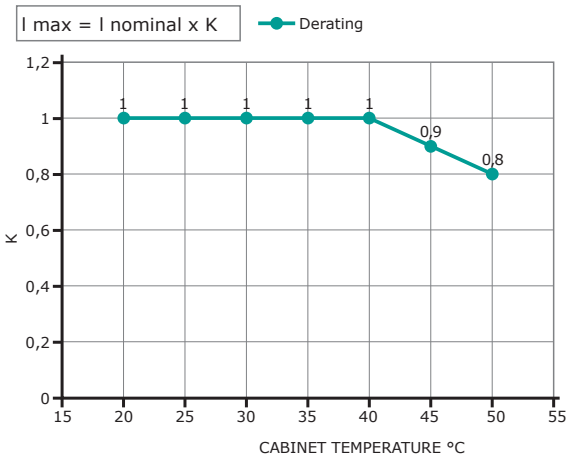
CE	000
UL	When ordered as cUL listed, the device is a listed device according to Underwriters Laboratories. It has been tested according to ANSI / UL® 508 standards for industrial control panels and complies with CSA C22.2 # 14. Detailed information can be found in file E231578 at www.ul.com.

Measuring accuracy

Load voltage	±2% FS
Load current	±2% FS - The maximum load current decreases by 2% for every 100 meters above 1000 meters.
Power	±5% FS
Load resistance	±5% FS
Analog Input	±0.5% FS
Main Voltage	The voltage varies depending on the product and is shown in the image below.



For higher cabinet temperature (more than 50°C) contact the producer of the unit

Operation at ambient operating temperature above 40°C not covered by UL®

Load Current / Ambient temperature

Operating voltage	480V +10% max -10% min; 600V +10% max -10% min 690V +10% max -10% min
Power consumption of the electronics max. 8VA	Order code 709081-_- _ _ _ -115 = Network voltage:100/120V Transformer range 90:135V Order code 709081-_- _ _ _ -230 = Network voltage: 200/208/220/230/240V Transformer range 180:265V Order code 709081-_- _ _ _ -400 = Network voltage: 277 Transformer range 238:330V Order code 709081-_- _ _ _ -480 = Network voltage: 380/400/415/440/480V Transformer range 342:528V Order code 709081-_- _ _ _ -600 = Network voltage: 600V Transformer range 540:759V Order code 709081-_- _ _ _ -690 = Network voltage: 690V Transformer range 540:759V
Load current / installation altitude	Altitude: All specifications apply up to 1000m altitude. For higher altitudes, the maximum load current is reduced by 2% for every 100m above 1000m.

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Sizes / dimensions

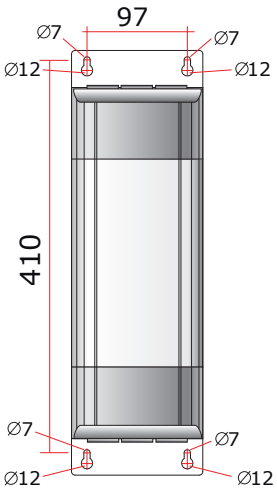
Current	Voltage	W	H	D	Weight (Kg)
120A÷210A	690V only	137mm	440mm	270mm	10,5 Kg
300A÷700A		137mm	520mm	270mm	15 Kg
800A		137mm	560mm	270mm	17,2 Kg

120A÷210A, only 690V
W 137mm - H 440mm - D 270mm
Weight 10,5 Kg

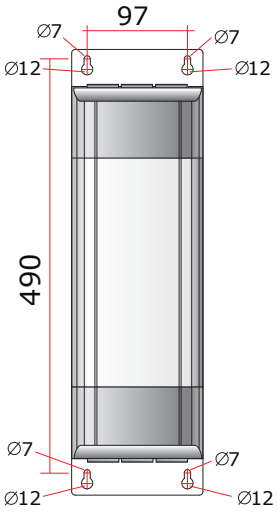
300A÷700A
W 137mm - H 520mm - D 270mm
Weight 15 Kg

800A
W 137mm - H 560mm - D 270mm
Weight 17,2 Kg

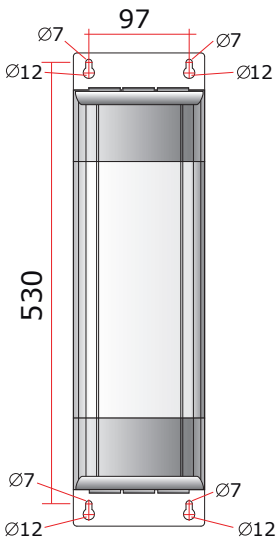
120A÷210A (only 690V)



300A÷700A



800A



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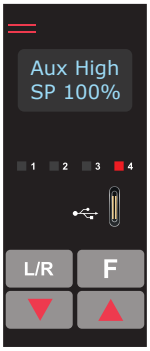
Control Panel

The Control Panel is placed on the front of the thyristor unit, on his display you can visualize the alarms,the input and output signals and all the configuration parameters.

Output Current RMS

Output Voltage (RMS)

Output Power (Average)



Alarms

On the home page the keys are used as follows:

Press...		to...
F	Function	Scroll through the parameters on the home page
L/R	Local/Remote	Switch between local and remote set point for power demand
▲	Up	Increment power demand set point when set to local
▼	Down	Decrement power demand set point when set to local
F + L/R		Press and hold for about two seconds to access the menus

To view the status parameters:

Press Function F once to advance from one parameter to the next

To set the set point locally:

Press Local/Remote L/R (Note: indicator 1 flashes steadily when set point is set locally)

Use Down ▼ or Up ▲ to set the local set point.

Menu navigation

The menus are accessible using the control panel keypad and display.

To access a menu and edit a setting:

1. Press and hold Local/Remote and Function together L/R + F until the upper display flashes Menu.
2. Press Up ▲ to choose the menu. (Press down ▼ if you overshoot the menu you want).
3. Press function F to advance to the password prompt.
4. Use up ▲ and/or down ▼ to set the password (see the table).
5. Press function F to enter the password and advance to the first parameter of the menu.
6. Press Up ▲ to advance to the next parameter and repeat to reach the desired parameter.
7. Press function F to start editing the parameter. The parameter name flashes in the upper display.
8. Use Up ▲ and/or down ▼ to edit the parameter setting.
9. Press function F to enter the new setting. The parameter name stops flashing.
10. Press and hold local/remote and function together L/R + F for about two seconds to exit the menus.

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Menu	Password	Parameter used to...
Operator	0	View measured values and basic settings including current, voltage and setpoint
Setup	2	Configure the power controller for the load
Adv Setup	10	Configure the operation and performance of the power controller in the application
Hardware	5	Configure the functions of the analog and digital inputs and outputs, and the re-transmission parameters
Comm	3	Configure field bus communicating parameters
Monitoring	0	View measured and calculated values and other read-only parameters

Control Panel Led

The four indicators on the control panel show the general state of the power controller.

1	Local/Remote	Flashing	Power output set locally or via communications
		Off	Power output set remotely (via analog input)
2	Enable	On	Output enabled
		Off	Output disabled
3	Communications	Flashing	Active communications
4	Alarm	Flashing	Active alarm
		Off	No alarm

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Order Code

Basic type	Config.	Load current	Main voltage	Analog output	Fieldbus	Datalogging & Bluetooth	Fan voltage	UL	Description		
									Basic type		
709081									Single phase thyristor power controller		
									Version		
	0								Standard with default settings		
	1								Customer-specific hardware specifications		
	2								Customer-specific software specifications		
									Load current		
		120							AC 120 A		Available only for 690V Version
		150							AC 150 A		
		180							AC 180 A		
		210							AC 210 A		
		300							AC 300 A		
		400							AC 400 A		
		500							AC 500 A		
		600							AC 600 A		
		700							AC 700 A		
		800							AC 800 A		
									Main voltage		
			115						AC 115 V		
			230						AC 230 V		
			400						AC 400 V		
			480						AC 480 V		
			600						AC 600 V		
			690						AC 690 V		
									Output		
				000					None		
				005					4 to 20mA		
				040					0 to 10V		
									Interface		
					00				None		
					54				Modbus RTU		
					63				PROFINET-IO-Device		
					64				PROFIBUS-DP		
					85				Ethernet (Modbus TCP)		
					86				Ethernet IP		

JUMO GmbH & Co. KG
Delivery address: Mackenrodstraße 14
36039 Fulda, Germany
Postal address: 36039 Fulda, Germany
Phone: +49 661 6003-0
Fax: +49 661 6003-607
Email: mail@jumo.net
Internet: www.jumo.net

JUMO Instrument Co. Ltd.
JUMO House
Temple Bank, Riverway
Harlow, Essex, CM20 2DY, UK
Phone: +44 1279 63 55 33
Fax: +44 1279 62 50 29
Email: sales@jumo.co.uk
Internet: www.jumo.co.uk

JUMO Process Control, Inc.
6733 Myers Road
East Syracuse, NY 13057, USA
Phone: +1 315 437 5866
Fax: +1 315 437 5860
Email: info.us@jumo.net
Internet: www.jumousa.com

			Function extensions	Current Limit	Partial load failure monitoring	Communication via Bluetooth	Datalogger	Energy meter	
00			None						
01			Energy meter					X	
02			Datalogger				X		
03			Datalogger +…				X	X	
04			Communication via Bluetooth			X			
05			Communication +…			X		X	
06			Communication +…			X	X		
07			Communication +…			X	X	X	
08			Partial load failure monitoring		X				
09			Partial load failure monitoring + …		X			X	
10			Partial load failure monitoring + …		X		X		
11			Partial load failure monitoring + …		X		X	X	
12			Partial load failure monitoring + …		X	X			
13			Partial load failure monitoring + …		X	X		X	
14			Partial load failure monitoring + …		X	X	X		
15			Partial load failure monitoring + …		X	X	X	X	
16			Current Limit	X					
17			Current Limit + …	X				X	
18			Current Limit + …	X			X		
19			Current Limit + …	X			X	X	
20			Current Limit + …	X		X			
21			Current Limit + …	X		X		X	
22			Current Limit + …	X		X	X		
23			Current Limit + …	X		X	X	X	
24			Current Limit + …	X	X				
25			Current Limit + …	X	X			X	
26			Current Limit + …	X	X		X		
27			Current Limit + …	X	X		X	X	
28			Current Limit + …	X	X	X			
29			Current Limit + …	X	X	X		X	
30			Current Limit + …	X	X	X	X		
31			Current Limit + …	X	X	X	X	X	
			Fan voltage						
	1		AC 115 V						
	2		AC 230 V						
	3		DC 24 V						
			Certificate						
		000	CE						
		061	UL 508	Not available for 690V units					

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Scope of delivery

1 Quick guide
1 Thyristor power controller in the ordered version

Accessories

Article	Material number
USB cable 2.0, A to C plug, 3m	30073383

Spareparts

Super-fast semiconductor fuses for short-circuit protection of thyristors (not for line protection).
Please note that some models require multiple fuses for protection.

Size	200 kARMS Symmetrical A.I.C					Quantity for each phase	Material number
115V, 230V, 400V, 480V	Fuse Code	Total Current (A_{RMS})	Fuse I^2t at 500Vac* (A2s)	Fuse I^2t at 660Vac* (A2s)	Vac		
300A	FUFM350	350	73500	105000	690	1	30072444
400A	FUFMM550	550	150500	215000	690	1	30072229
500A	FUFMM700	700	294000	420000	690	1	30072226
600A	FU2055920.250	1000	246400	352000	690	4	30072232
700A	FU2055920.250	1000	246400	352000	690	4	30072232
800A	FUFMM550	1100	602000	860000	690	2	30072229

Size	200 kARMS Symmetrical A.I.C					Quantity for each phase	Material number
690V	Fuse Code	Total Current (A_{RMS})	Fuse I^2t at 500Vac* (A2s)	Fuse I^2t at 660Vac* (A2s)	Vac		
120A	FU2055920.160	160	15400	16940	690	1	30072235
150A	FU2055920.200	200	25000	27500	690	1	30072234
180A	FU2055920.250	250	44000	48400	690	1	30072232
210A	FU2055920.315	315	77000	84700	690	1	30072233
400A	FUFMM550	550	215000	236500	690	1	30072229
500A	FUFMM700	700	420000	462000	690	1	30072226
600A	FU2055920.250	1000	352000	387200	690	4	30072232
700A	FU2055920.250	1000	352000	387200	690	4	30072232
800A	FUFMM550	1100	602000	860000	690	2	30072229