

JUMO GmbH & Co. KG

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JUMO Instrument Co. Ltd.

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JUMO Process Control, Inc.

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JUMO TYA HL303

Three-phase

Thyristor power controller

for control of resistive/inductive loads

The JUMO TYA HL303 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.

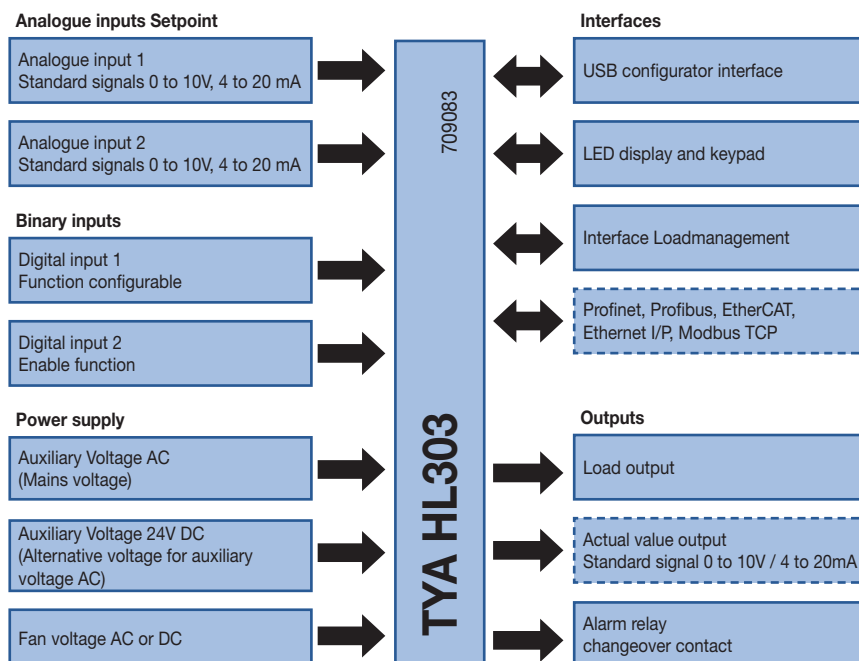
Intuitive operation is achieved via four buttons and an easy-to-read LED display that shows all relevant parameters. User-friendly setup software enables simple parameterisation via a USB interface.

The JUMO TYA HL303 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, U^2 , I, I^2 , 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



Block diagram



- 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, EtherCAT, EtherNet/IP, Modbus RTU/TCP

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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	Load in delta, Load in Star	
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 ² t 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	300	5250	15	73500	47÷70	1324	2500
400	24÷600	1200	1600	200	8000	15	150500	47÷70	1641	2500
450	24÷600	1200	1600	1000	17800	15	294000	47÷70	2096	2500
500	24÷600	1200	1600	1000	17800	15	294000	47÷70	2096	2500
600	24÷600	1200	1600	1000	17800	15	294000	47÷70	2655	3000
700	24÷600	1200	1600	1000	17800	15	294000	47÷70	3097	3000
800	24÷600	1200	1600	1000	15000	15	246400	47÷70	3540	3422

Output features 690V

Current	Nominal Voltage range (Ue)	Repetitive peak reverse voltage (Uimp)		Latching current	Max peak one cycle	Leakage current	Fuse I ² t 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	598	3000
150	24÷690	1600	1800	400	1900	15	27500	47÷70	594	3000
180	24÷690	1600	1800	400	1900	15	48400	47÷70	740	3000
210	24÷690	1600	1800	400	1900	15	84700	47÷70	898	3000
300	24÷690	1600	1800	400	1900	15	79750	47÷70	1324	3000
400	24÷690	1600	1800	200	7820	15	236500	47÷70	1641	3000
450	24÷690	1600	1800	200	7820	15	462000	47÷70	2096	2500
500	24÷690	1600	1800	200	7820	15	462000	47÷70	2096	3000
600	24÷690	1600	1800	200	7820	15	387200	47÷70	2655	3000
700	24÷690	1600	1800	200	7820	15	387200	47÷70	3097	3000
800	24÷690	1600	1800	200	7820	15	387200	47÷70	3540	3000

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Fan Specification 480-600V

Supply	Size		Number of fans (CE)	Number of fans (UL)
230Vac Standard	S14	450A	Two Fans - (16W x 2) 32W	Four Fans - (16W x 4) 64W
	S14	300A, 400A, 500A	Four Fans - (16W x 4) 64W	Four Fans - (16W x 4) 64W
	S17	600A, 700A, 800A	Six Fans - (16W x 6) 96W	Six Fans - (16W x 6) 96W
115Vac Option	S14	450A	Two Fans - (14W x 2) 28W	Four Fans - (14W x 4) 56W
	S14	300A, 400A, 500A	Four Fans - (14W x 4) 56W	Four Fans - (14W x 4) 56W
	S17	600A, 700A, 800A	Six Fans - (14W x 6) 84W	Six Fans - (14W x 6) 84W
24Vdc Option	S14	450A	Two Fans - (7W x 2) 14W	Four Fans - (7W x 4) 28W
	S14	300A, 400A, 500A	Four Fans - (7W x 4) 28W	Four Fans - (7W x 4) 28W
	S17	600A, 700A, 800A	Six Fans - (7W x 6) 42W	Six Fans - (7W x 6) 42W

Fan Specification 690V (CE only)

Supply	Size		Number of fans (CE)
230Vac Standard	S13	120A, 150A, 180A, 210A	Two Fans - (16W x 2) 32W
	S14	450A	Two Fans - (16W x 2) 32W
	S14	300A, 400A, 500A	Four Fans - (16W x 4) 64W
	S17	600A, 700A, 800A	Six Fans - (16W x 6) 96W
115Vac Option	S13	120A, 150A, 180A, 210A	Two Fans - (14W x 2) 28W
	S14	450A	Two Fans - (14W x 2) 28W
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24Vdc Option	S13	120A, 150A, 180A, 210A	Two Fans - (7W x 2) 14W
	S14	450A	Two Fans - (7W x 2) 14W
	S14	300A, 400A, 500A	Four Fans - (7W x 4) 28W
	S17	600A, 700A, 800A	Six Fans - (7W x 6) 42W

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
709083 __ 115 __ _	90:135V	100/120V	180:265V	200/208/220/230/240V
709083 __ 230 __ _	180:265V	200/208/220/230/240V	342:528V	380/400/415/440/480V
709083 __ 400 __ _	238:330V	277V	540:759V	600/690V
	Only Jumper JP3 is linked		Link Jumper JP1 + JP2	
709083 __ 480 __ _	342:528V	380/400/415/440/480V	180:265V	200/208/220/230/240V
709083 __ 600 __ _	540:759V	600V	238:330V	277V
709083 __ 690 __ _	540:759V	690V	238:330V	277V

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General features

Connections	- Star wiring with resistive load (control on three phases with JUMO TYA HL303) - Star wiring with resistive load + Neutral (control on three phases with JUMO TYA HL303) - Delta wiring with resistive load (control on three phases with JUMO TYA HL303) - Open Delta wiring with resistive load (control on three phases with JUMO TYA HL303)
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
Load types	Triangle, open Triangle, Star, Star + Netural
Control Mode (Feed-back)	- Quadratic Voltage Control U^2 - Voltage Control U - Current Control I - Power Control $P(U \cdot I)$ - 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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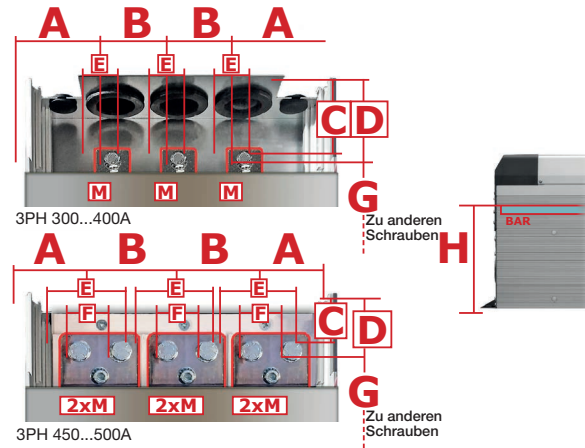
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Creepage distances

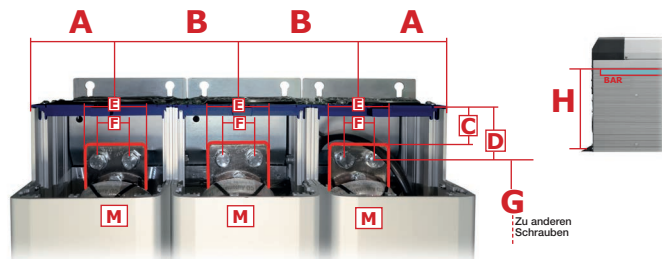
Bar dimensions (300÷500A)



Current	A	B	C	D	E	F	G	H	M
300A	71mm	60mm	45mm	57mm	30mm	-	350mm	174mm	M10
400A	71mm	60mm	45mm	57mm	30mm	-	350mm	174mm	M10
450A	54mm	76mm	21mm	37mm	66mm	35mm	390mm	165mm	M10
500A	54mm	76mm	21mm	37mm	66mm	35mm	390mm	165mm	M10

Bar dimensions 600...800A

Current	A	B	C	D	E	F	G	H	M
600A-800A	69mm	138mm	50mm	66mm	66mm	35mm	380mm	170mm	M10



Housing

PolymericV2

Maximum temperature of the heat sink

Factory Setting is an alarm at a temperature above 80°C

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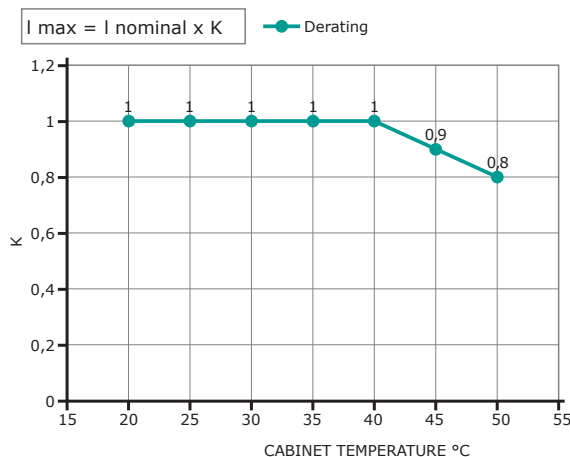
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CE	000
UL	When ordered as cUL listed, the device is a listed device according to Underwriters Laboratories. It has been tested according to ANSI / UL® 508 standards for industrial control panels and complies with CSA C22.2 # 14. Detailed information 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 709083-_-_-_-115 = Network voltage: 100/120V Transformer range 90:135V Order code 709083-_-_-_-230 = Network voltage: 200/208/220/230/240V Transformer range 180:265V Order code 709083-_-_-_-400 = Network voltage: 277 Transformer range 238:330V Order code 709083-_-_-_-480 = Network voltage: 380/400/415/440/480V Transformer range 342:528V Order code 709083-_-_-_-600 = Network voltage: 600V Transformer range 540:759V Order code 709083-_-_-_-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	262mm	440mm	270mm	18 Kg
300A÷500A		262mm	520mm	270mm	22 Kg
600A÷800A		411mm	560mm	270mm	51,6 Kg

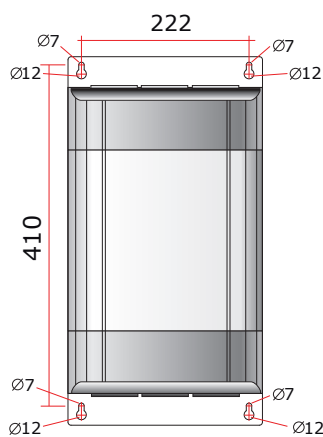
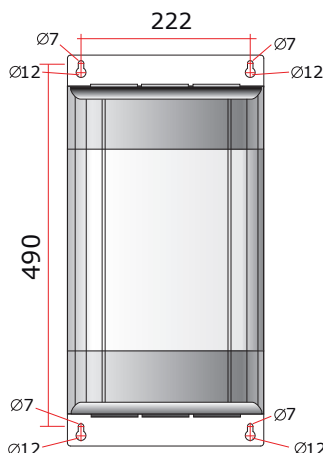
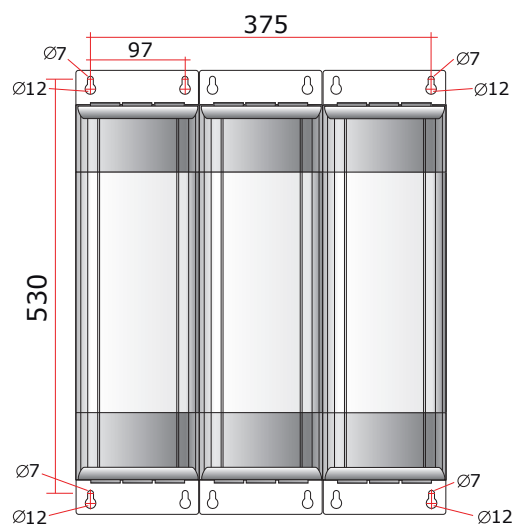
120A÷210A, only 690V
W 262mm - H 440mm - D 270mm
Weight 18 Kg



300A÷500A
W 262mm - H 520mm - D 270mm
Weight 22 Kg



600A÷800A
W 411mm - H 560mm - D 270mm
Weight 51,6 Kg

**120A÷210A (only 690V)****300A÷500A****600A÷800A**

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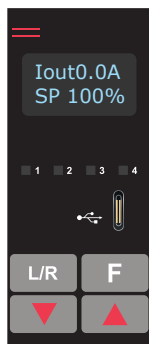
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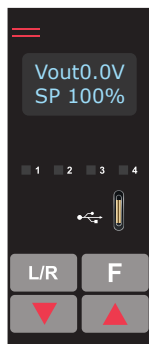


Control Panel

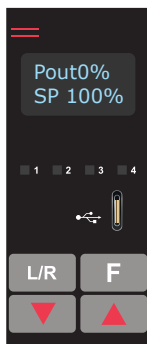
The Control Panel is placed on the front of the thyristor unit, on his display you can visualize the alarms, the input and output signals and all the configuration parameters.



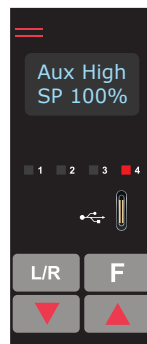
Output Current RMS



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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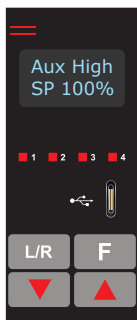
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Menu	Password	Parameter used to...
Operator	0	View measured values and basic settings including current, voltage and setpoint
Setup	2	Configure the power controller for the load
Adv Setup	10	Configure the operation and performance of the power controller 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		
709083									Basic type		
									Three 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		
									None		
									4 to 20mA		
									0 to 10V		
									Interface		
									None		
									Modbus RTU		
									PROFINET-IO-Device		
									PROFIBUS-DP		
									Ethernet (Modbus TCP)		
									Ethernet IP		

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			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		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 ² t at 500Vac* (A2 Sek)	Fuse I ² t at 660Vac* (A2 Sek)	Vac		
300A	FUFMM450	450	73500	105000	690	1	30072192
400A	FUFMM550	550	150500	215000	690	1	30072229
450A	FUFMM700	700	294000	420000	690	1	30072226
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 ² t at 500Vac* (A2 Sek)	Fuse I ² t at 660Vac* (A2 Sek)	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
300A	FUFMM400	400	72500	79750	690	1	30072194
400A	FUFMM550	550	215000	236500	690	1	30072229
450A	FUFMM700	700	420000	462000	690	1	30072226
500A	FUFMM700	700	420000	462000	690	1	30072226
600A	FUFMM450	900	352000	387200	690	2	30072192
700A	FUFMM450	900	352000	387200	690	2	30072192
800A	FUFMM550	1100	602000	860000	690	2	30072229