WEST Control Solutions

Relay – The Revolution Series

We are delivering Real Cost Benefits

- You pay only for what you need with Relay Modularity
- All in one solution – Solid State Relay, Controller & Fuse Protection
- No tools needed to program the unit, all configuration via the front keypad
- Designed for field-bus system
- CE & cUL Approved

WEST Control Solutions – Consolidated expertise

PMA: More than 80 years of automation engineering experience

Four internationally successful companies – PMA, WEST, CAL and Partlow – have combined their expertise under the "WEST Control Solutions" banner. As a premium brand, PMA Prozeß- und Maschinen- Automation GmbH represents more than 80 years of instrumentation and automation engineering experience. The core competence of the company is industrial automation engineering.

As a competent partner, WEST Control Solutions offers individual hardware and software solutions which are perfectly matched to each process and application area – from simple and powerful to flexible and multi-functional configurations. The offering also includes customer-specific controller solutions along with engineering support for special processes or the complete automation of plants and machinery.

Modern software tools and a full range of controllers designed for an extremely wide variety of tasks set new standards in application flexibility and guarantee an optimum price/performance ratio. This product strategy makes WEST Control Solutions one of the market leaders for digital temperature controllers.

Index

Why choose Relay?

A choice to be made!! We designed a superior product

With the market place becoming more competitive we had a choice to make. Design a product a little cheaper but possibly not as good, or design a new innovative product where its added value is clear for all to see. We chose the latter, in line with our long-term philosophy.

- Strong connection design between the block terminal and thyristor semiconductor connection allows for generous sizing.
- All the copper connections treated against oxidation.
- Rugged construction for electronic and plastic parts.
- Protection against over voltage.

No compromise.

- Heatsink and thyristor junctions generously sized to guarantee a long life for the thyristor unit.
- Units working at low junction thyristor temperature with 20% margin on max temperature

Have a closer look.

Open a PMA thyristor unit and any of our competitors, you will discover the difference and see why we can offer a longer life warranty (see below tab.)

Estimated Powercycles of AL wire bonded dies

	dT	Tj max \°C 100°C	110°C	120°C	130°C	140°C
Tj start \°C	80°C	248.000				
	70°C	320.200	110.000			
	60°C	464.000	145.500	51.100		
	50°C	782.000	216.000	69.100	24.800	
	40°C	1.600.000	372.000	105.000	34.100	12.500
SSR	30°C	4.800.000	793.000	184.000	52.500	17.500
Single Cycle	20°C	25.400.000	2.400.000	400.000	94.000	27.500
			12.800.000	1.200.000	209.000	50.000
				6.700.000	645.000	112.000
					3.600.000	353.000
						2.000.000

PMA — PMA predicted life working in Single Cycle.

PMA — PMA predicted life whith SSR Input and ZC Firing.

COMPETITORS — Predicted life of majority of competitors working at 130°C with SSR Input and ZC firing.

Save space = Save money

An innovative process solution that will dramatically save wiring & labour time.

With a reduction of 50% space, it's easy to save hundreds off the cabinet price. The difference between conventional mounting and Relay is shown on page 36.

Left Side (Traditional)
Mounted on the baseplate are a Fuse & Fuseholder, 40A Solid State Relay and a Current Transformer.

Right Side (Innovative)
Mounted on the same baseplate are two Relay 40A units, each having the same components as the traditional unit.
This simple example demonstrates a 50% saving of panel space.

The new Relay S family can be put together with little technical knowledge.

- SSR Solid State Relay with Zero Crossing.
- SSR Solid State Relay + Fuse & Fuse Holder.
- SSR Solid State Relay + Fuse & Fuse Holder + Current Transformer.
- Different versions with or without heatsink.
- Single and three phase thyristor units.

The new Relay M = Relay S + Drive M
The addition of Drive M transforms a simple unit into a sophisticated unit capable of the following additional features.

- Universal inputs accepting all standard signals.
- Universal firing including Zero Crossing, Burst Firing
- Single Cycle, Delayed Triggering and Phase Angle.
- Universal Feed Back (Voltage, Current and Power).
- RS485 Communication.

OPTIONS
- Heater Break Alarm for partial or total load failure.
  Thyristor short circuit failure.

Glossary

Zero Crossing ZC

ZC firing mode is used with the logic output from a temperature controller and so the thyristor operates like a contactor.
The cycle time is performed by the temperature controller.
Zero Crossing minimizes interferences as the thyristor unit switches ON-OFF at zero voltage.

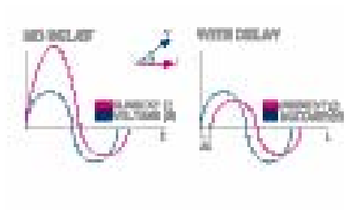
Soft Start + Burst Firing now availabe as an option.

Burst Firing BF

This firing is performed digitally within the thyristor unit at zero volts, producing no EMC interference. Analogue input is necessary for BF and the number of complete cycles must be specified for 50% power demand. This value can be between 1 and 255 complete cycles, determining the speed of firing. When 1 is specified, the firing mode becomes Single Cycle (SC).

Single Cycle SC

SC is the fastest zero crossing switching method. At 50% input signal, one cycle is ON and one cycle is OFF. At 75%, 3 cycles are ON and one cycle is OFF. If power demand is 76% the unit performs the same as for 75% but every time the unit switches ON the microprocessor divides 76/75 and memorises the ratio. When the sum is one the unit delivers one cycle more to the load. With this firing it is necessary to have analogue input.



Delayed Triggering DT

Used to switch the primary coil of transformers when coupled with normal resistive loads (not cold resistance) on the secondary, DT prevents the inrush current when zero voltage (ON-OFF) is used to switch the primary. The thyristor unit switches OFF when the load voltage is negative and switches ON only when positive with a pre-set delay for the first half cycle.

Phase Angle PA

PA controls the power to the load by allowing the thyristor to conduct for part of the AC supply cycle only. The morepower required, the more the conduction angle is advanced until virtually the whole cycle is conducting for 100% power. The load power can be adjusted from 0 to 100% as a function of the analogue input signal, normally determined by a temperature controller or potentiometer, PA is normally used with inductive loads.

Feedback/Control Mode

Supply voltage fluctuations changes the power to the load. To overcome this effect the voltage supplied to the load is measured and compared with the power demand from the controller. The error signal is used to automatically hold the power at the value requested.

Three types of control more are available:

- Voltage Control Mode, where the input signal is proportional to the voltage output (voltage f/b).
- Current Control Mode, where the input signal is proportional to the current output (current f/b).
- Power Control Mode, where the input signal is proportional to the power output (power f/b).
- As an option it is possible to transfer control mode from voltage to power via a simple digital command.

What our Customers want?

They want a positive experience with our total solution, not just a cheap price!

Knowledgeable Sales Team

We have a team of sales engineers focused on core business products only. An expert at no cost, not an engineer with a big catalogue and little product knowledge, will welcome customers. Easy access to engineers when you need a special performance project.

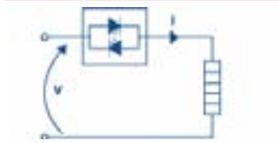
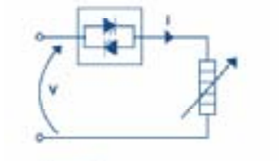
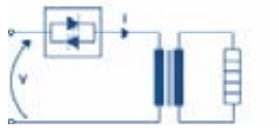
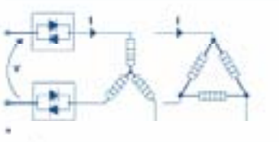
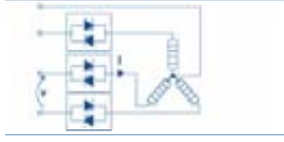
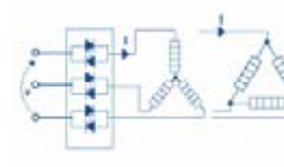
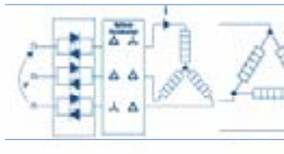
Fast Service

Excellent pre sales and after sales service including engineering support.

Easy to do business with us

Fast reaction to your enquiry, short lead times, timely production of order acknowledgement, invoices etc. Catalogues & manuals of all our products plus configuration software, available free of charge from our web-site.
Our people are always welcoming to our customers.

Application guide

APPLICATION GUIDE	LOAD TYPE	MODEL	CURRENT RANGE	N: OF UNITS	PHAS E CTRL
		Relay SSR	See. Pg. 15	1	1
		Relay S 1PH	30-210A	1	1
		Relay M 1PH	35-210A	1	1
		Relay CL	35-210A	1	1
	Molibdenum, Tungstenum, Superkanthal, Platinum, Quartz lamp infrared short waveform	Relay CL	35-210A	1	1
	Silicon carbide elements	Relay M 1PH	35-210A	1	1
		Relay CL	35-210A	1	1
	Transformers coupled with normal resistance	Relay M 1PH	35-210A	1	
	Transformers coupled with cold resistances (kanthal super)	Relay CL	35-210A	1	1
	Normal Resistance	Relay S 2PH	30-210A	1	2
		Relay M 2PH	30-210A	1	2
	Normal Resistance	Relay S 3PH	30-210A	1	3
		Relay M 3PH	30-210A	1	3
	Silicon carbide elements	PM3000E 3PH (1)	500A	1	3
		Relay M 3PH	30-210A	1	3
	Molibdenum, Tungstenum Super Kantal Platinum, Quartz lamp infrared short waveform (1)	PM3000E 3PH	500A	1	3
		MULTIDRIVE 3PH	25-2600A	1	3
	Three phase transformer (1)	PM3000E 3PH	25-500A	1	3
		MULTIDRIVE 3PH	25-2600A	1	3
	Three phase normal load resistance with open delta connection	Relay S 3PH	30-210A	1	3
		Relay M 3PH	30-210A	1	3
	Cold resistance	Relay CL	30-210A	3	3

SUGGESTED FIRING MODE FOR YOUR APPLICATIONS					OTHER FEATURES			SIZING		NOTE
ZC	SC	BF	BF Simply	S+BF	DT	PA	CL	Control	V	I	
●									V	$\frac{P}{V}$	For general resistance applications with low variations in temperature and age. For low inertia loads use Single Cycle (SC) or Phase Angle (PA).
●			●								
	●	●				●		V2			
						●		Vxl			
						●	●	V	V	$\frac{P}{V}$	These resistances change with temperature but have low variations with age. Starting current with cold elements can be 16 times nominal current (superkanthal). Infrared lamp short waveform can reach 8 time nominal current.
		●						V to Vxl	V	$\frac{P}{V}$	These resistances change value with temperature and age and value at the end of element life is 4 times the initial value. Constant power regulation is necessary with V to Vxl Transfer.
						●					
					●			V	V	$\frac{P}{Vcoø}$	Transformers and inductors have inrush current on start up. Phase Angle plus Soft Start and current limit are required. To switch the transformer ON-OFF, use DT firing that will automatically switch ON-OFF when current value is at zero.
						●	●	Vxl V2	V	$\frac{P}{Vcoø}$	Use Phase Angle + Current Limit
●									V	$\frac{P}{1.73V}$	Relay M-2PH is suitable to control resistive loads with delta or star connection without neutral.
		●						V2	V	$\frac{P}{1.73V}$	
●									V 1.73V	$\frac{P}{1.73V}$	Three phase load with star plus neutral connection must be cont-rolled on the three phases.
		●						V2			
						●		V to Vxl	V	$\frac{P}{1.73V}$	On three phase silicon carbide elements Vxl feedback is suggested to have a constant power control. This is necessary to compensate resistance change with temperature and age. Resistance value at the end of element life is 4 times the original value. With Relay M use BF firing and Power Limit.
		●									
						●	●	V			These resistances change with temperature but have low variations with age. Start up current with cold elements can be many times the nominal current value. In this caseit is necessary to use Phase Angle + Current Limit.
						●	●	V			
						●	●	V	V	$\frac{P}{1.73Vcoø}$	Three phase Multidrive and PM3000E are specially designed to drive three phase transformers coupled on secondary with normal or special resistive loads.
						●	●	V			
●			●						V	$\frac{P}{3V}$	Open delta can be driven by three phase unit.
		●									
						●	●	V	V	$\frac{P}{3V}$	

Product range

	PREVIOUS UNIT TYPE	Relay CL	Relay SSR	Relay S - 1PH	Relay S - 2PH	Relay S - 3PH	Relay M - 1PH	Relay M - 2PH	Relay M - 3PH	PM3000E-2PH	PM3000E-3PH	Powerstack 1PH	Powerstack 2PH	Powerstack 3PH
	ACTUAL UNIT TYPE	RCL	SSR	RS1	RS2	RS3	RM1	RM2	RM3	RE2	RE3	RD1	RD2	RD3
LOAD TYPE	Max voltage 480V	●	●	●	●	●	●	●	●	●	●	●	●	●
	Max voltage 600V	●	●	●	●	●	●	●	●	●	●	●	●	●
	Max voltage 690V	● > 280A					● >280A	● >280A	●>280A			●	●	●
	Single phase	●	●	●			●					●		
	3 phase load star no neutral or delta				●	●		●	●	●	●		●	●
	3 phase load star with neutral					●			●		●			●
	3 phase load open delta	●				●			●		●			●
INPUT TYPE	SSR 4:30VDC	●	●	●	●	●	●	●	●	●	●	●	●	●
	4:20 mA	●		0	0	0	●	●	●	●	●	●	●	●
	0:10 Vdc	●		0	0	0	●	●	●	●	●	●	●	●
	10K potentiometer	●					●	●	●	●	●	●	●	●
	Communication command	●					●	●	●	●	●	●	●	●
FIRING	Zero crossing		●	●	●	●	●	●	●	●	●			
	Single cycle						●					●		
	Burst firing			0 (4)	0 (4)	0 (4)	●	●	●	●	●	●	●	●
	Soft start + burst firing						●				●	●		●
	Phase angle	●					●				●	●		●
	Soft start + phase angle	●					●				●	●		●
	Delayed triggering + burst firing	●					●			●	●	●	●	●
CONTROL MODE	Voltage	●					●	●	●	●	●	●	●	●
	Square voltage	●					●					●		●
	Current	●					●				●	●		●
	Voltage X current (power)	●					●	●	●	●	●	●	●	●
	Voltage to power transfer	●					●				●	●		●
	External control mode										●	●		●
	Temperature controller													
OPTION	Internal current limit	● (1)									● (1)	● (1)		● (1)
	Heater break + thyristor short circuit	●	O	O	O	O	O	O	O	●	●	●	●	●
	Integrated fixed fuses	● > 40A	> 40A	● > 40A	● > 40A	● > 40A	● > 40A	● > 40A	● > 40A	●	●	●	●	●
	Fuse & fuse holder	=< 40A	=< 40A	=< 40A	=< 40A	=< 40A	=< 40A	=< 40A	=< 40A					
	Flat wiring terminal		O (2)	O (2)	O (2)	O (2)	O							
COMM.	RS485 with modbus protocol	●					●	●	●	●	●	●	●	●
	Profibus DP; can open ethernet	0					0	0	0	0	0	0	0	0
	Frontal key pad	●					●	●	●	●	●	●	●	●
	PC programmable + USB\TTL conv.	●					●	●	●	●	●	●	●	●
	Relay easy	●					●	●	●	●	●	●	●	●
CURRENT	CURRENT	SIZE	SIZE	SIZE	SIZE	SIZE	SIZE	SIZE	SIZE	SIZE	SIZE	SIZE	SIZE	SIZE
	25									S9	S9			
	30		SR0.SR1	SR3.SR6	SR4.SR7	SR5.SR8		SR10	SR11					
	35	SR9		SR3.SR6	SR4.SR7	SR5.SR8	SR9	SR10	SR11	S9	S9			S13
	40	SR9		SR3.SR6	SR4.SR7	SR5.SR8	SR9	SR10	SR11					
	45									S9	S9		S13	S13
	60	SR15		SR12	SR12	SR13	SR15	SR16	SR16					
	75									S9	S9		S13	S13
	90	SR15		SR12	SR12	SR13	SR15	SR16	SR16					
	100									S9	S11		S13	S13
	120	SR15		SR12	SR13	SR14	SR15	SR16	SR17					
	125									S9	S11		S13	S13
	150	SR15		SR12	SR13	SR14	SR15	SR16	SR17	S9	S11		S13	S13
	180	SR15		SR12	SR13	SR14	SR15	SR16	SR17					
	200									S10				
	210	SR15		SR12	SR13	SR14	SR15	SR16	SR17					
	225					S13			S13				S13	S13
	280	S9		S9	S10		S9	S10		S14	S13			
	300					S14			S14		S14		S14	S14
	350					S14			S14	S14	S14			S14
	400	S12		S12	S14	S14	S12	S14	S14	S14	S14		S14	S14
	450				S14	S14		S14	S14	S14	S14		S14	S14
	500	S12		S12	S14	S14	S12	S14	S14	S14	S14		S14	S14
	600	S12		S12	S14		S12	S14		S14			S14	S14
	700	S12		S12	S14		S12	S14						
	850											S14	S14	S15
	1000											S18	S16	S22
	1400											S19	S17	S25
	1500											S19	S17	S25
	1850											S20	S23	S26
	2000											S20	S23	S26
	2400											S21	S24	S27
	2700											S21	S24	S27

● Standard O Option (1) Phase Angle only (2) Flat wiring available as option ≤ 45A (4) 4-8-16 Cycles Simplified Burst Firing available with Analog Input only

Size and dimensions

SR0 H 97 x W 36 x D 32 - 0,12kg.

SR1 H 97 x W 36 x D 92 - 0,29kg.

SR2 H 121 x W 36 x D 87 - 0,27kg.

SR3 H 121 x W 36 x D 125 - 0,44kg.

SR4 H 121 x W 72 x D 125 - 0,88kg.

SR5 H 121 x W 108 x D 125 - 1,32kg.

SR6 H 121 x W 36 x D 185 - 0,61kg.

SR7 H 121 x W 72 x D 185 - 1,22kg.

SR8 H 121 x W 108 x D 185 - 1,83kg.

SR9 H 121 x W 72 x D 185 - 1,15kg.

SR10 H 121 x W 108 x D 185 - 1,76kg.

SR11 H 121 x W 144 x D 185 - 2,4kg.

SR12 H 269 x W 93 x D 170 - 3,4kg.

SR13 H 269 x W 186 x D 170 - 6,8kg.

SR14 H 269 x W 279 x D 170 - 10,2kg.

SR15 H 273 x W 93 x D 170 - 3,6kg.

SR16 H 273 x W 186 x D 170 - 7kg.

SR17 H 273 x W 279 x D 170 - 10,6kg.

S9 H 350 x W 116 x D 220 - 5,1kg

S10 H 350 x W 240 x D 230 - 11kg.

S11 H 440 x W 137x D 270 - 10,5kg.

S12 H 520 x W 137 x D 270 - 15kg.

S13 H 440 x W 262 x D 270 - 18kg.

S14 H 520 x W 262 x D 270 - 22,5kg.

S15 3PH H 520 x W 400 x D 270
43kg. (850A)

S16 2PH H 580 x W 400 x D 435
54kg. (1000A)
S17 2PH H 780 x W 400 x D 435
65kg. (1400A-1500A)

S18 1PH H 580 x W 263 x D 435
28kg. (1000A)
S19 1PH H 780 x W 263 x D 435
39kg. (1400A-1500A)
S20 1PH H 780 x W 263 x D 533
48kg. (2000A)
S21 1PH H 890 x W 263 x D 518
58kg. (2700A)

S22 3PH H 580 x W 525 x D 435 - 56kg. (1000A)
S23 2PH H 780 x W 525 x D 533 - 96kg. (1850A-2000A)
S24 2PH H 890 x W 525 x D 518 - 116kg. (2400A-2700A)
S25 3PH H 780 x W 525 x D 435 - 77 kg. (1500A)

S26 3PH H 790 x W 780 x D 533 - 144kg. (1850A-2000A)
S27 3PH H 790 x W 890 x D 518 - 174kg. (2400A-2700A)

Relay Family Configurator

- Windows based.
- Easy to use with recipe facility. Each thyristor unit can be configured in a matter of seconds.
- Possibility to configure the firing mode on line without powering down the unit.
- Look for you application and download the configuration software.

Relay CL

SIZE SR9

SIZE SR9

Technical Specification

- Dimensions: See size at page 6-7 and dimensions at page 8-9
- Load type: Normal resistive, infrared long, short and medium waveform, Silicon Carbide and cold resistance
- Inputs: 0-10V dc, 4-20mA, 10kpot, SSR, RS485
- Firing mode: Burst Firing, Single Cycle, Soft Start + Phase Angle, Delayed Triggering
- Operating temperature: 0 to 40° C without derating
- Control mode: V2, V Voltage, VxI Power and current I
- RS485 port. RTU Modbus Protocol
- Comply with EMC and cUL (Pending)
- Data sheet: More details on “Relay CL” bulletin

Option

- Current Transformer + HB

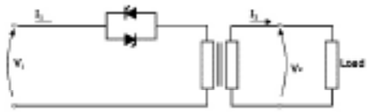
Thyristor Unit connected with Transformers

Relay CL has been specifically designed to drive transformers and has all the drive capability & techniques required, configurable from the front panel display.
Close examination of the transformer application needs to be made as the typical inrush current, when switched on. This over-current will have the result of fuse or thyristor failure.

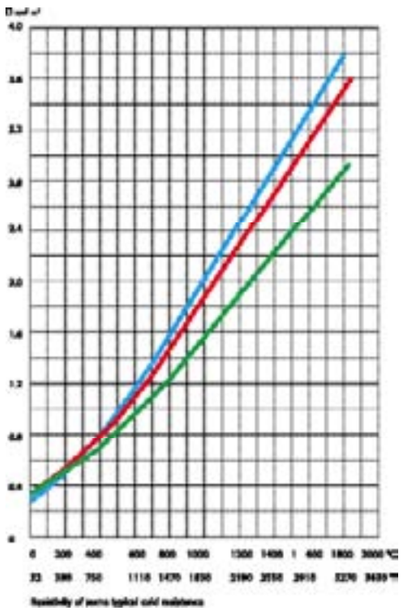
To avoid this peak current two techniques can be used:

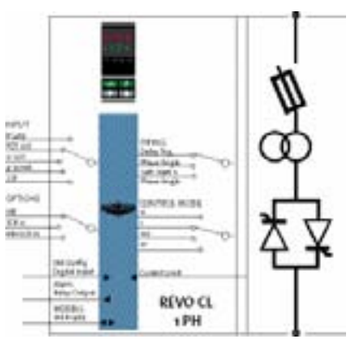
- Phase angle firing with soft start and current limit. This type of firing can be used with all types of loads.
- Normal resistance.
- Cold resistance (Example: Kanthall Super elements)
- Transformer coupled with normal or cold resistance.

- Burst firing using the Delay Triggering (DT) technique. To avoid magnetic circuit saturation, the thyristor unit will switch OFF when the load voltage is negative and switch ON again when positive. The unit also has an adjustable delay on voltage zero crossing. In this way it is possible to switch ON when current is zero.
  This Firing technique can only be used with normal resistance, where its resistive value remains constant with temperature variations.



The BIG advantage with Relay CL
Buy one unit and you remove all application risks, selecting Phase Angle or Delayed Triggering as required via frontal Key Pad.





Relay SSR
Relay S

Relay SSR and Relay S share the same electronics.

Relay SSR, available without the heat sink and designed for mounting on large custom-made heat sinks with water or air dissipated cooling. Suitable for hostile environments.

Relay S, is mounted on PMA heatsinks
Normally mounted inside the cabinet, two or three can be connected to give 2-3PH units suitable to drive 3 Phase Loads.

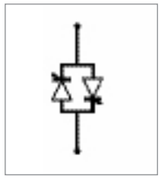
- Solid State Relay
- Zero Crossing Firing
- SSR or Analogue input
- Fuse and Fuse Holder
- Current Transformer

Relay SSR family

GENERAL FEATURES

Relay SSR SOLID STATE RELAY
This is the basic building block of the Relay Family, designed for modularity and configurability:

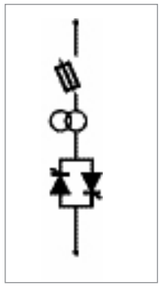
- Designed to replace contactors.
- Applicable for resistive loads and infrared lamps.
- Supply Voltage up to 480V or 600V AC.
- Three types available with different current values dependent on the heatsink used (see graph on right).
- Single phase formed by two thyristors in anti-parallel to provide a long life.
- Zero Crossing Firing.
- Logic input signal SSR 4:30V DC.
- LED indication of ON status.
- Constant current drain, independent of supply voltage.
- Built in over voltage protection with snubber network.
- IP20 protection.
- Fixing with standard types used for Solid State Relay.
- Comply with CE and cUL specification.



Relay SSR + FUSE & FUSE HOLDER
The quick-blow fuse & fuse holder is now included inside the Relay module, providing the following options:

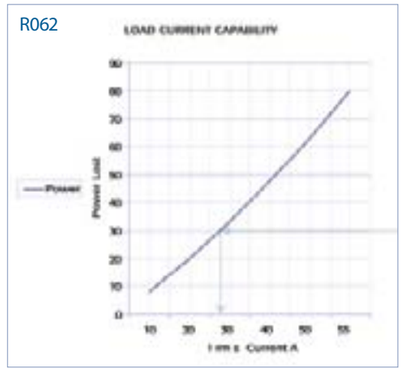
- Fuse & fuse holder 45A Max.
- Internal current transformer.
- Current transformer + HB alarm to diagnose partial or total load failure and short circuit on thyristors with automatic setting, relay alarm output and front LED indication.
- Analogue input 0-10V or 4-20mA.
- Front calibration command for HB alarm.
- Flat cable to connect a number of Relay units mounted side by side to reduce the wiring dramatically.

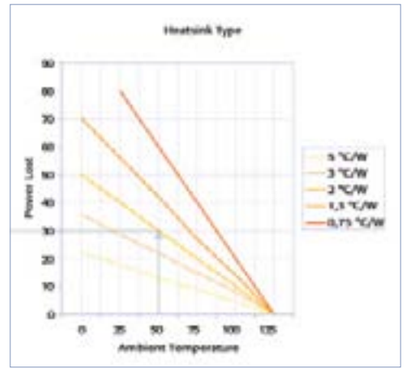
Machine makers use this Relay configuration and is normally mounted on large Heat sinks with external air or water-cooling.



Relay SUB ASSEMBLY
PMA also offers the sub assembly parts.
If for example you want to use a Relay SSR with a different heatsink than standard, this can be easily done but consideration must be made not to exceed the current of 45A. This is due to the high temperature created by the high power dissipation of the ultra-fast semiconductor fuse. If there is a need to go over 45A, the way to overcome the high power dissipation is to use an external ultra fast fuse & fuse holder but with a higher rating.

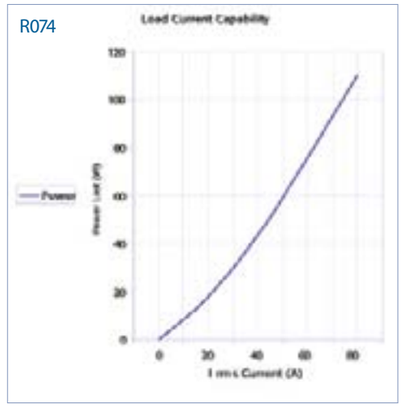
R062

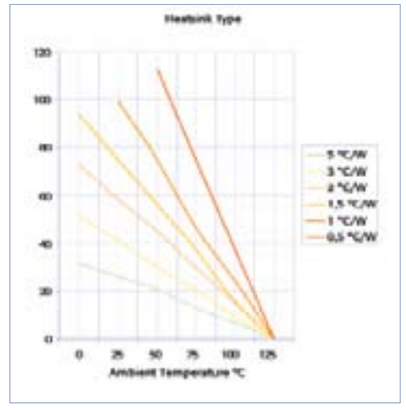




R062 MODULE Power Dissipation versus on state Current and ambient Temperature

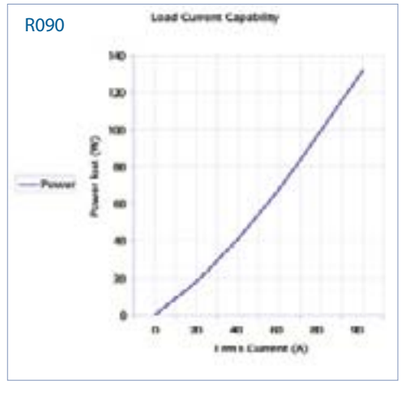
R074

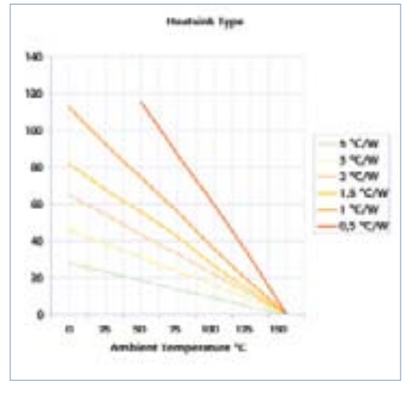




R074 MODULE Power Dissipation versus on state Current and ambient Temperature

R090





R090 MODULE Power Dissipation versus on state Current and ambient Temperature

Relay S

GENERAL FEATURES

Relay S is a family of thyristor units
suitable to drive single and three phase loads
- Suitable for resistive and infrared loads.
- Supply voltage up to 480V or 600V AC.
- From 30 to 210A.
- Fully isolated from the power.
- Each phase formed by two thyristors in anti-parallel to give long life .
- Zero Crossing Firing.
- Logic input signal SSR 4-30V DC.
- Constant current drain, independent of supply voltage.
- Analogue input 0-10V or 4-20mA, is available as an option.
- Side by side mounting.
- Special design for heatsink with high dissipation value.
- DIN base plate and bulk head for panel mounting.
- IP20 protection.
- Comply with CE and cUL specification.

Relay S 1-2-3PH · 30-35-40A
- Fully isolated from the power.
- ingle phase formed by two thyristors in anti-parallel to give long life.
- Zero Crossing Firing.
- Logic input signal SSR 4-30V DC.
- Constant current drain, independent of supply voltage.
- Side by side mounting.
- Special design for heatsink with high dissipation value.
- DIN base plate for panel mounting.

Relay S 1-2-3 PH + FUSE&FUSE HOLDER
30-35-40-60-90A

The fuse & fuse holder can be mounted on Relay S shown above. If internal fuse holder has been selected these additional features are available:
- Internal current transformer.
- Current transformer + HB alarm to diagnose partial or total load failure with automatic setting, relay alarm output and front LED indication. Front calibration command for HB alarm.
- Analogue input 0-10V or 4-20mA, is available as an option.
- Flat cable option to connect a number of Relay units with HB alarm or auxiliary power supply.

Relay S + INTEGRATED FUSES
120-150-180-210A

The fuse is integrated inside the unit and these additional features are available:
- Internal current transformer.
- Current transformer + HB alarm to diagnose partial or total load failure with automatic setting, relay alarm output and front LED indication. Front calibration command for HB alarm.
- Analogue input 0-10V or 4-20mA, is available as an option.
- Flat cable option to connect a number of Relay units with HB alarm or auxiliary power supply.

30-35-40A
1PH

30-35-40A
2PH

30-35-40A
3PH

30-35-40A
1PH

30-35-40A
2PH

30-35-40A
3PH

60-90A
1PH

60-90A
2PH

60-90A
3PH

120-150-180-210A
1PH

120-150-180-210A
2PH

120-150-180-210A
3PH

Relay M

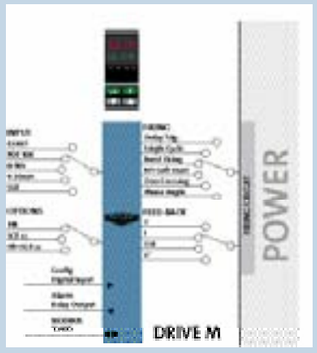
Relay M has been designed to meet the most demanding applications in a simple way.

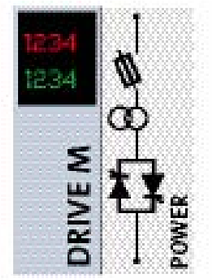
- Single and three phase thyristor units up to 210A
- Relay is a true universal unit where it is possible to select the control mode and firing type with the unit online and working. This allows the unit to establish starting and running strategy for power load management
- RS485 comm Modbus protocol and other standard bus protocols are available
- Dual front panel display that allows full configuration of the unit when a PC or PPC and configuration software are not available
- Front panel indication of current, voltage and power value plus all the other parameters at different security levels
- Selection of voltage and power control modes with added option of switching between the two modes during the process
- No special tools necessary for the engineer during start up or during any ongoing maintenance procedures, even the screwdriver can be left at home.

Relay M family

GENERAL FEATURES

- Single and three phase thyristor units up to 210A.
- RS485 comm, Modbus protocol as standard.
  Other field bus protocols available as option.
- Dual front panel display that allows full configuration of the unit plus indication of the voltage, current and power and all other parameters including diagnostic and fault messages.
- The unit can be configured via:
  - Front dual display and keypad.
  - RS485 communication using PC and configuration Software
  - USB/TTL port on front unit.
- Universal unit that can be configured as:
  - Inputs: SSR, 4-20mA, 0-10V, Potentiometer and RS485.
  - Firing: Single Cycle, Burst Firing, Delayed Triggering Phase Angle on single phase units.
- Control Mode: Voltage square and Power.
- Power limit adjustable via front display or via RS485.
- Indication of current for each phase on 3 phase units.
- Heater Break Alarm with built-in current transformers available as an option.
- RMS value can be set and displayed with 0,1% resolution.
- Two digital inputs include a standard enable input plus a configurable input selectable as:
  - Voltage to Power control transfer.
  - Automatic adjustment of HB alarm.
  - Local or Remote facility.
  - Instant power adjustment in local mode via front keypad & display.
  - Reset command for alarms.
- All of these features are available via RS485 as standard.
- One digital output configurable for:
  Thyristor in short circuit.
  - Heater Break alarm.
  - Thyristor in short circuit + Heater Break alarm.
- EMC and CE marked, cUL pending.

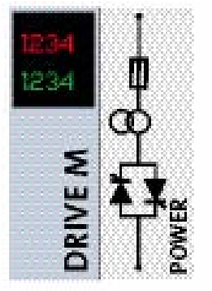




Relay M-1PH · 34-40-45A
- Single phase unit to control single phase loads up to 45A.
- Nominal current rated at 40°C ambient temperature.
- All features described in "GENERAL FEATURES" included as standard.
- Fuse and fuse holder included as a standard.
- Voltage Power Supply 480V or 600V AC.
- EMC and CE marked, cUL pending.

Relay M-2PH · 30-35-40A
- Two phase unit to control three phase loads up to 40A.
- Wired in delta or star without neutral.
- Voltage Power Supply 480V or 600V AC.
- Nominal current rated at 40°C ambient temperature.
- All features described in "GENERAL FEATURES" included as standard.
- Fuse and fuse holder included as standard.
- Firing: Burst Firing.
- EMC and CE marked, cUL pending.

Relay M-3PH · 30-35-40A
- Three phase unit to control three phase loads up to 40A.
- Wired in delta, star and star with neutral.
- Voltage Power Supply 480V or 600V AC.
- Nominal current rated at 40°C ambient temperature.
- All features described in "GENERAL FEATURES" included as standard.
- Fuse and fuse holder included as standard.
- Firing: Burst Firing.
- EMC and CE marked, cUL pending.



Relay M-1PH · 60-90-120-150-180-210A
- Single phase unit to control single phase loads up to 210A.
- Nominal current rated at 40°C ambient temperature.
- All features described in "GENERAL FEATURES" included as standard.
- Internal fixed fuses .5
- Voltage Power Supply 480V or 600V AC.
- MC and CE marked, cUL pending.

Relay M-2PH · 60-90-120-150-180-210A
- Two phase unit to control three phase loads up to 210A.
- Wired in delta or star without neutral.
- Voltage Power Supply 480V or 600V AC.
- Nominal current rated at 40°C ambient temperature.
- All features described in "GENERAL FEATURES" included as standard.
- Internal fixed fuses.
- Firing: Burst Firing.
- EMC and CE marked, cUL pending.

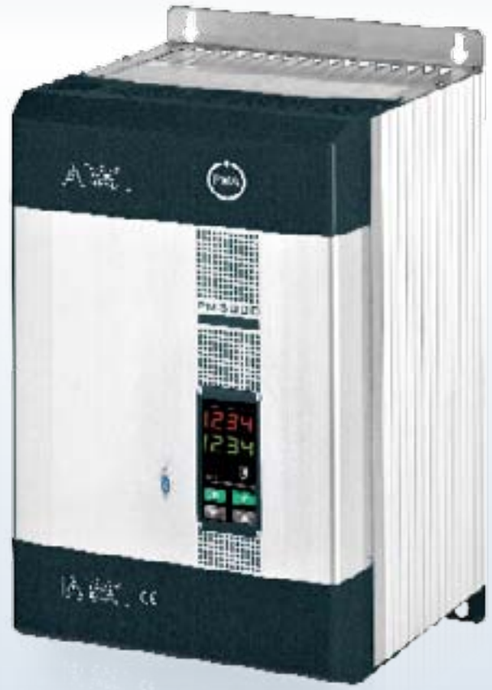
Relay M-3PH · 60-90-120-150-180-210A
- Three phase unit to control three phase loads up to 210A.
- Nominal current rated at 40°C ambient temperature.
- Voltage Power Supply 480V or 600V AC.
- All features described in "GENERAL FEATURES" included as standard.
- Internal fixed fuses.
- Firing: Burst Firing.
- EMC and CE marked, cUL pending.

PM3000

The PM3000 is specially developed to drive high power 2/3 Phase transformer loads where it is necessary to compensate resistance change. The PM3000 can drive resistive or transformer loads with delta or star connection without neutral wire.

- PM3000E is a full digital and universal Thyristor unit based on a verypowerful dedicated micro configurable via serial communication port for all inputs, firing modes, control modes and loads types.
- Integrated fixed fuses and all what is necessary to have a complete power control zone including current transformer and optional circuit board.
- Two leg switching three wires load star or delta connections.
- Suitable to drive resistive loads and three phase transformer.
- Frontal Key Pad to control the unit and to read power, current and voltage value.
- Universal Input signal with automatic zero/span calibration.
- Universal Firing modes, customer configurable via Rs485 comm. Modbus or communication port as Burst Firing, Single Cycle and Delayed Triggering.
- Power, voltage control mode.
- Unbalanced load and Heater Break Alarm.
- RS 485 port. Modbus protocol.
- Comply with EMC and
- IP20 Protection

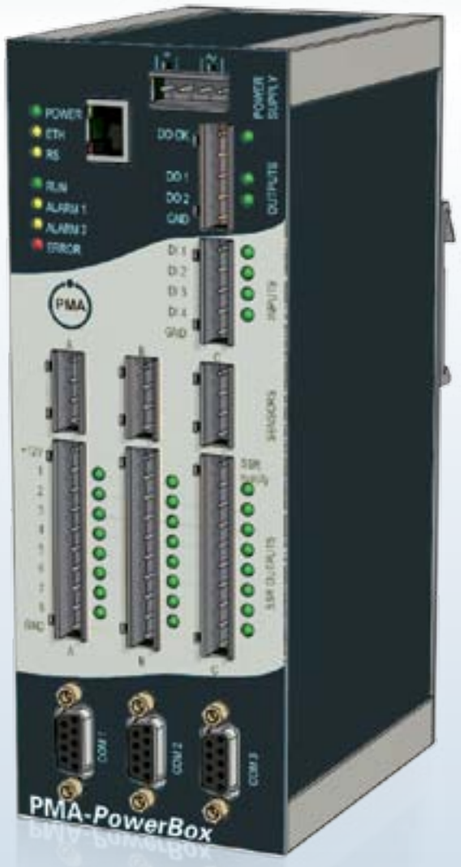
Powerstack



The Powerstack platform has been designed to extend up to 2700A, the one phase unit with fireing.

- MULTIDRIVE is a Full digital and universal Thyristor unit based on a very powerful dedicated micro configurable via serial communication port for all inputs, firing modes, control modes and loads types.
- Suitable to drive resistive, inductive, transformer and complex loads requiring current limit and power control mode.
- Frontal Key Pad standard to configure all the internal functions and parameters.
- Four Analog output configuirable
- Six Digital input
- Four realay output
- Universal Input signal with automatic zero/span calibration.
- Universal Firing modes, customer configurable via Key Pad or communication port as Burst Firing and Phase Angle.
- Universal Feed back modes
- Soft Start can be used in addition to Burst Firing and Phase Angle.
- Short circuit Thyristor and Heater Break Alarm.
- RS 485 port. Modbus protocol
- Comply with EMC
- IP20 Protection

PMA POWERBOX



Multiple zone heating-zone management

- Synchronization up to 24 zones up to 2000 Ampere
  - Elimination of harmonics
  - Prevention of power peaks
  - No flickering of the power line
  - Optimization of the real power factor
- Automatic load detection
- Smart Power Limitation

PMA - PowerBox

Heating load-optimization for multiple zones

The PMA PowerBox optimizes electrical multiple heating load systems by intelligent heating load management.
This powerful processing unit with special algorithm enables you to reduce enegy costs.
Synchronized simultaneous heating loads and individual capacity set free the potential to save energy (not just by simple power limiting but by intelligent synchronization of the electrical loads.

- Preventing power peaks
- Optimization of the efficiency factor to 1
- The instantaneous power is kept inside the supply limits
- The PowerBox prevents peak power before it begins
- Short amortization of the investment

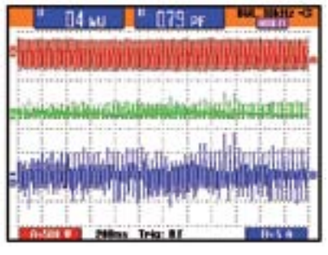
The concept of the PowerBox is little more costlier control unit in combination with cost-effective solid state relays.

Heating load management for multiple zones
- One push on the button is enough and within a few seconds the self-learning routine collects all process parameters.
- Adjust the maximum power allowed at the power limit.
- Simultaneous and fast wave control of 24 load circuits, 1-2 or 3 phase.
- One current sensor for 8 load zones
- Every control zone is administered separately
  - Calculation of instantaneous current (min/max), voltage, power...
  - Calculation of the load resistance for heater break control (HB).
  - Powermeter and current meter per zone.
  - Communication via TCP/IP and 3 serial interfaces.
  - Modbus, DeviceNet and Ethernet/IP are available as option (ModBus Master and Slave).

The load management strategy is very easy to use. The user does not need to study manuals, nor to have a knowledge about the divers synchronization methods. Just start in the “Easy mode”.
The power requests of the single loads are just read and written via interface to the PowerBox.

Oscilloscope grahpic demonstration:

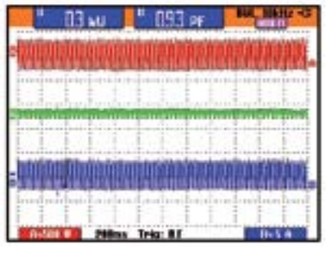
On going measurement on 12-zone system (Current on the power line, on the left without , on the right with synchronization)

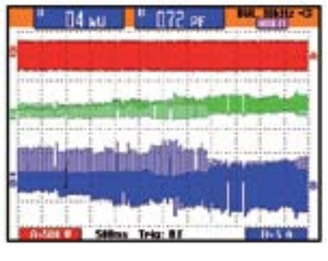


Voltage (power line)

Calculated power

Current (power line)

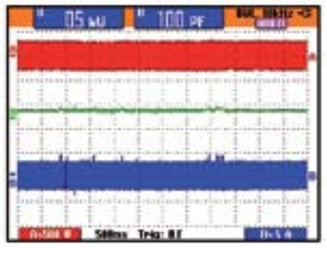




Voltage (power line)

Calculated power

Current (power line)



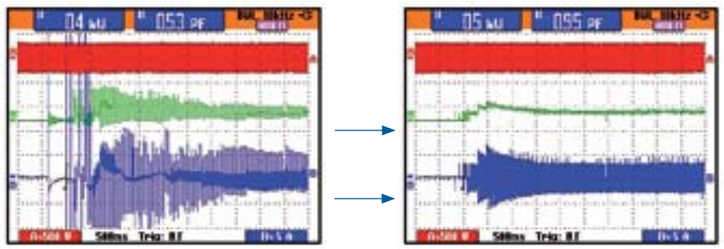
We guarantee your satisfaction and we help you to save time.

OLAS (Optimal Live Automatic Synchronisation) on all controlled zones allows the following features:

- The load current is almost sinusoidal
- Optimized timing of synchronization ensures the best possible effective power
- The instantaneous power is very close to the absolute mean value
- Elimination of harmonic waves
- Power saving by reducing of harmonic waves
- No mains flickering
- Optimized start-up behaviour for heating loads with low resistance to cold (e.g. short wave IR-radiators)

Oscilloscope grahpic demonstration:

Start-up behaviour during measurement 12 zone IR-radiators



without synchronisation

with synchronisation

Additional intelligent power limitation

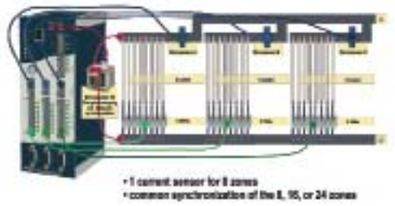
- The intelligent power limitation works together with the synchronization. If this function is activated, the PMA-PowerBox calculates the power in every half cycle in “real time” and controls the outputs for the next half cycle.
- If the total power is smaller than the power limit, all zones are triggered normal and every channel has acess to the full power.
- If the total power is larger than the power limit all zones are reduced equally proportional to the overload . Peak demands in the mains supply are avoided and as you do not exceed your capacity you do not have to pay for peak load.
- This function can be actived/deactivated anytime and the limit values can be adjusted during operation.

Conclusion:

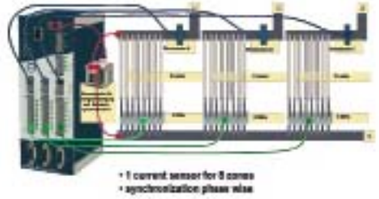
- Current measurement: one sensor for 8 zones up to 2000 Ampere
- The current calculation of the single zones already works from controller output of 2%
- Locally configurable digital in- and outputs are supplied for status signals or control functions
- The PMA-PowerBox is supplied via a one phase current transformer (24V AC/1A)
- The lots of parameters for the single connected loads calculated by the PMA-PowerBox are available via interface.

Applications and wiring variations

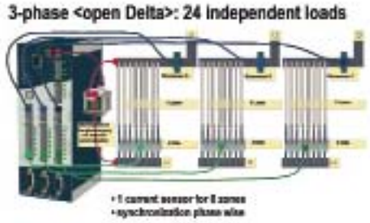
8, 16 or 24 1-phase loads



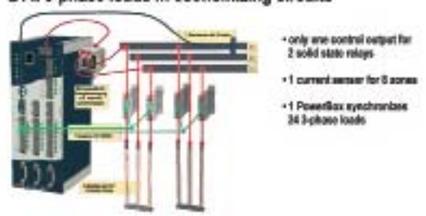
3-phase loads with "neutral", 24 independent loads



3-phase <open Delta>: 24 independent loads

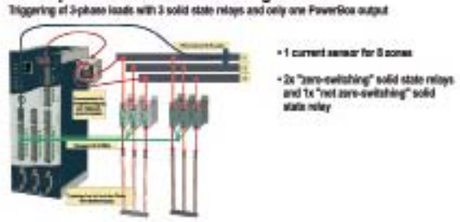


24 x 3-phase loads in economizing circuits

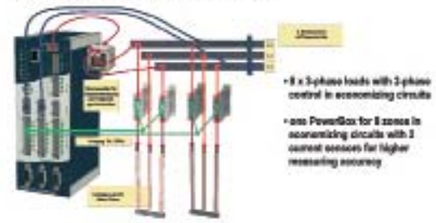


24 x 3-phase loads in economizing circuits

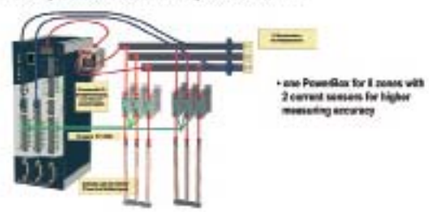
Triggering of 3-phase loads with 3 solid state relays and only one PowerBox output



Higher precision at 3-phase loads



8 x 3-phase loads with 2-phase control

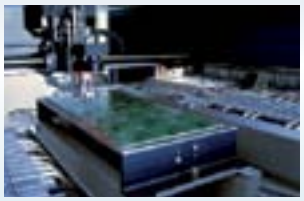


You can depend on us

The satisfaction of our customers is our number one priority. For this reason, WEST Control Solutions relies on a recognised quality management method in the sectors of production, development and sales. Furthermore, our ISO 9001 certification proves the adherence to international quality management standards. We are continuously working on optimising processes and increasing benefits for our customers. Profit from professional order processing, meticulous manufacturing, optimum quality control and the highest delivery reliability.

Order

Production



Quality control

Delivery on time

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