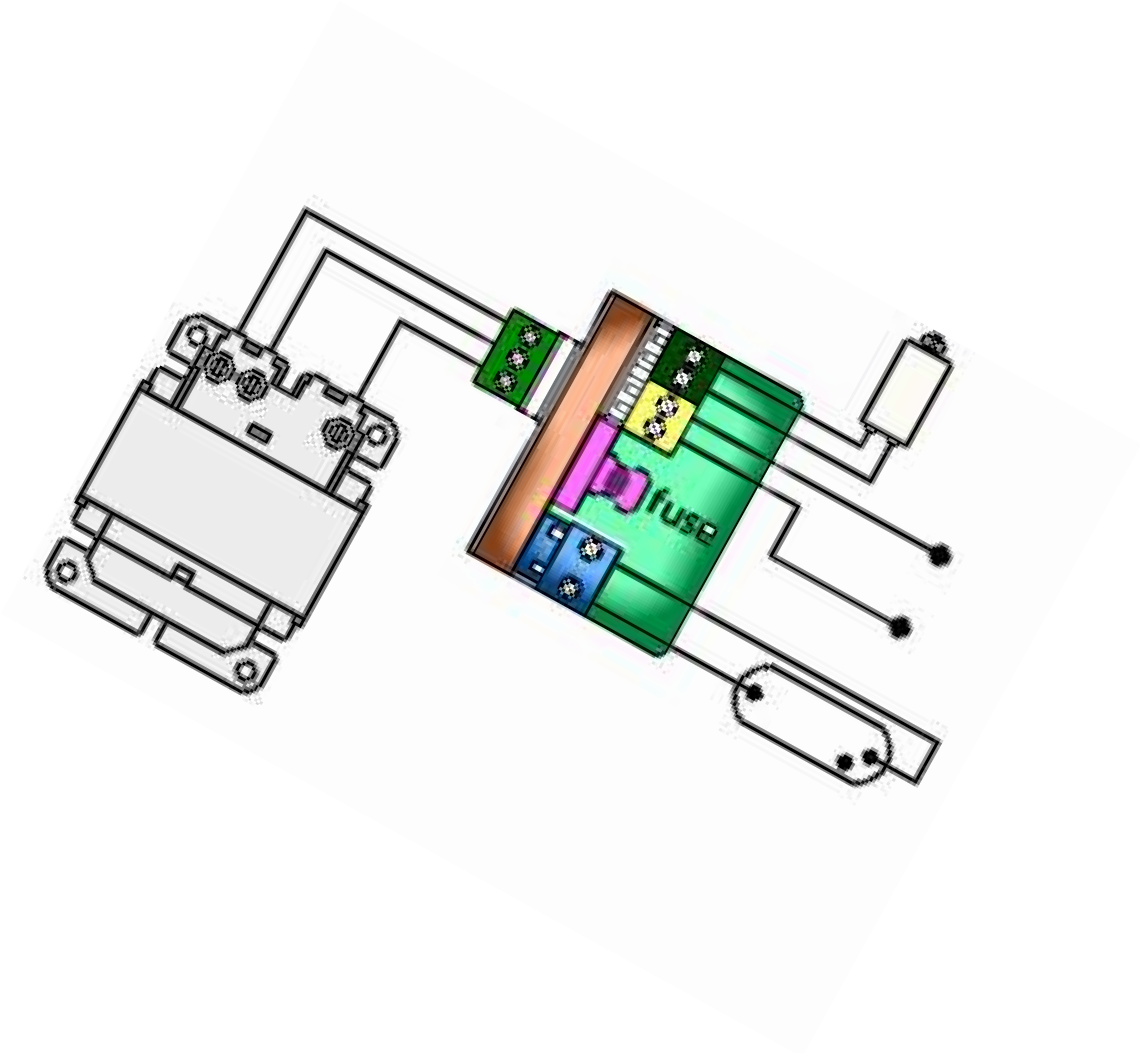
Energy Saving
In lighting field

Automatic Hybrid System

For HID lamps



03 2017 (UK)

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Introduction

Range of production

INTRODUCTION

The need to reduce pollution and costs of public spending is increasingly on the agenda and to that end, the whole world is developing energy solutions that lead to these results.

In the segment illumination light sources that exist, while ensuring optimum levels of brightness, enabling significant energy savings. The lamps that currently meet these requirements are classified as a gas discharge, and in particular lamps are called high-pressure sodium vapor (HPSV) and metal halide (MH). These lamps are joining the types LED.

Currently much of the Italian public lighting uses mercury vapor light source and a first step towards saving energy would be to replace them with other sources more efficiently.

This replacement bring, besides the reduction in consumption, the following benefits:

- Reduction of CO2 emissions in the environment (saving 1 kWh = 0.5 kg CO2 savings), this point is critical to public support for the attainment of the goals of reducing greenhouse gas emissions, as defined in climate energy package EEC 20-20-20 2008;
- Reduction in electricity costs

Similar economic benefits and environmental protection are achieved feeding sources HPSV and MH lamps with dimming systems.

In the following pages APF sets out its proposals, starting with simple but effective applications for these types of lamps, and is preparing proposals for the LED segment.

For a suitable choice of lamps dimmable systems, please consult the manuals of the manufacturers of lamps, in order to select the appropriate types.

The consultation itself is also useful in reference to the alleged life of the lamps, which in most cases it is declared and reaches to 30000 hours of operation. This fact becomes significant compared to the expected life of other light sources such as LED.

Energysavinglightingatnight

The switching on and off a lighting system at night are managed on the basis of the intensity of sunlight present at dusk and dawn.

Consequently the change on road off throughout the year, following the curve of the times of sunset and sunrise.

In contrast, the lighting needs, linked to attendance lit places (such as traffic along a road), remain constant throughout the year.

From the graph in fig. 1 it is evident that the intensity of traffic daily (week days and holidays) falls before 50% in time of between 22 and 06.

Significant energy savings can therefore be achieved through proper management of lighting at night in both public (roads, intersections, parks,…) and private (gardens, industrial areas,) making sure that the power reduction of a plant with reduced lighting requirements typical of the times at which attendance is low.

Several types of high pressure sodium lamps and metal halide lamp, you can control, so the savings can be made through bi-power systems or power-electronic hybrids that are switched to a reduced power at night, when the illumination that can be carried by operating at level of service. APF systems offer a command "Intelligent and flexible, " automatically adjusting power, without the presence of Line Rider, and adapting to all types of equipment (excluding systems with centralized controllers), switching systems using programmable or fixed.

The range of production"ENERGYSAVING"includes:

- Hybrid system with electromechanical ballast and electronic power switch coupled to programmable or fixed setting

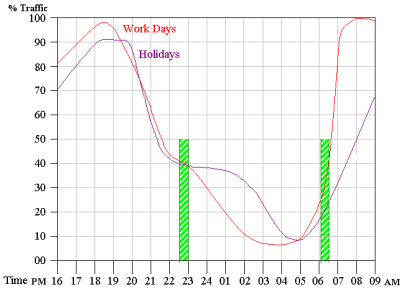


fig.1 Traffic frequentation

Operating characteristics

Each day the system through an internal timer measuring the total duration of power plant and provides the waiting time before switching. To obtain this time using an adaptive algorithm, that is able to maintain a constant, varying the total duration of the night, the switching time. How accurate can you get?

Because the algorithm is based on the annual solar cycle, are not perfectly symmetrical in opposite seasons, there are differences on the switching times in different seasons. Sun reported the situation to Italy this difference is maintained ± 20 minutes.

What happens to the return of summer or the sun?

Automatically switching time moves one hour following the displacement of the clock.

How to change the behaviour in different locations around the world?

For the configuration of the algorithm for calculating the operating system is universal.

Taking as reference the Italian switching latitudes there may be difference of up to ± 20 minutes using the system at the equator or near the polar circles.

What if one day the system is switched to a different time than expected?

In the event of a power plant run by Twilight early (due to bad weather conditions) the system will switch to a time earlier than the day before. In the following days, times when the power back to being normal, the system resumes normal operation.

Other abnormal situations may be:

-Power plant for a few hours during the day (due to extreme weather events).

The system switches to low power after the waiting time calculated (if the power is long enough), even though we are in broad daylight, days of operation remains unchanged.

-Plant shut down caused by interruption in the supply of energy.

The system, the return of energy, partly in conditions of full power even if was previously under-saving.

In the days after the system resumes normal operation.

These deviations from normal operation, however, provide a view of the effectiveness of safety and energy saving.

Installation instructions

The system works fine if the power plant is controlled by photoelectric switch or similar devices.

To ensure correct timing of switching is desirable to avoid testing of the phases of longer than 6 hours.

Otherwise the system realign its operation within 20 days after the first turn

70W - 400W HYBRID SYSTEM HI - HS Lamps

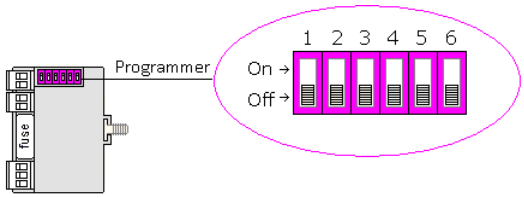
ON MAY 2011 THE SYSTEM HAD A RECOGNITION AT ECOHITECH AWARD 2011. IT IS THE MOST IMPORTANT RECOGNITION AWARD ANNUALLY TO COMPANIES THAT HAVE ACHIEVED SIGNIFICANT RESULTS IN TERMS OF ENVIRONMENTALLY FRIENDLY EXPLOITING INNOVATION TECHNOLOGIES

Nominal Power	W	70	100	150	250	400	
Total	W	82	113	167	275	433	
CONSUMPTION	kWh / year	328	452	668	1100	1732	
COST	€ / year	55,76	76,84	113,56	187	294,44	

Program Energy Saving START h22 (23 legal h) NO STOP		Calculated 4000 h / year with ENERGY SAVING ≈ 2930 h / year At the cost 0,17 € / kWh					
CONSUMPTION	kWh / year	243	338	492	775	1231	
		1070h x 82W + 2930h x 53W	1070h x 113W + 2930h x 74W	1070h x 167W + 2930h x 107W	1070h x 275W + 2930h x 164W	1070h x 433W + 2930h x 262W	
	€ / year	41,31	57,46	83,644	131,75	209,27	
SAVING	**kWh / year**	**85**	**114**	**176**	**325**	**501**	
	€ / year	**14,45**	**19,38**	**29,92**	**55,25**	**85,17**	
	%	**25,9**	**25,2**	**26,3**	**29,5**	**28,9**	
	Kg. CO2 / year	**42,5**	**57**	**88**	**162,5**	**250,5**	

Program **2324 - 7** START h 23 (00 legal h) STOP after 7 h		Calculated 4000 h / year with ENERGY SAVING ≈ 2350 h / year At the cost 0,17 € / kWh					
CONSUMPTION	kWh / year	260	360	527	839	1330	
		1650h x 82W + 2350h x 53W	1650h x 113W + 2350h x 74W	1650h x 167W + 2350h x 107W	1650h x 275W + 2350h x 164W	1650h x 433W + 2350h x 262W	
	€ / year	44,2	61,2	89,59	142,63	226,1	
SAVING	**kWh / year**	**68**	**92**	**141**	**261**	**402**	
	€ / year	**11,56**	**15,64**	**23,97**	**44,37**	**68,34**	
	%	**20,7**	**20,4**	**21,1**	**23,8**	**23,2**	
	Kg. CO2 / year	**34**	**46**	**70,5**	**130,5**	**201**	

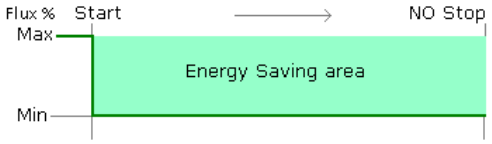
50W – 400W HYBRID SYSTEM HI - HS Lamps

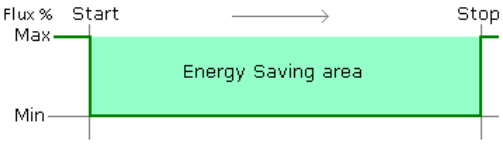


** Factory setting 000000 - START 22 h / NO STOP

Dip-Switch N° 3 / 4 attivano l'ora START : (h) 22 / 23 / 00 / 01 - Dip-Switch N° 5 / 6 attivano l'ora STOP : (h) 05 / 06 / 07 / NO

NB- Con l'ora legale l'orario di commutazione si sposta automaticamente di un'ora





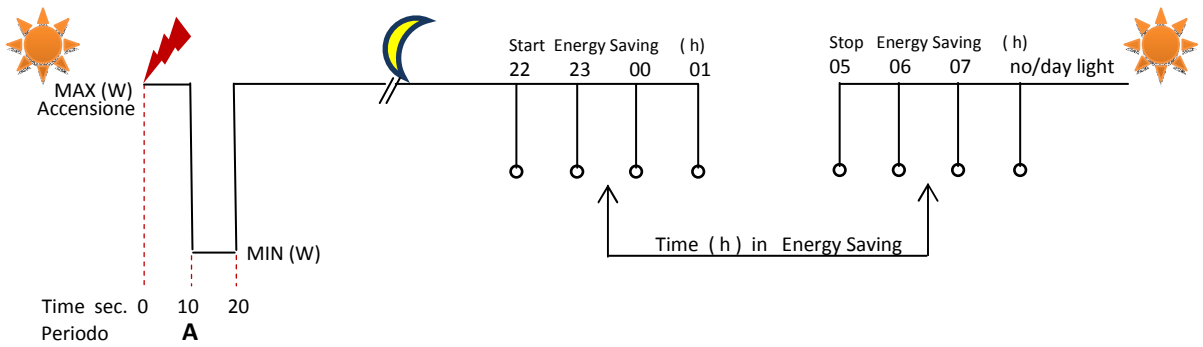
SETTING 1 2 3 4 5 6	Start h	Stop h	Saving ≈ h / year
**	22	No stop	2930
	23		2550
	00		2180
	01		1830
	22	07	2850
	23		2450
	00		2080
	01		1720
	22	06	2750
	23		2350
	00		1980
	01		1620
	22	05	2350
	23		2000
	00		1620
	01		1260
	POTENZA MINIMA FISSA		
	POTENZA MASSIMA FISSA		

Dip-Switch N° 1 : in posizione ON attiva Potenza fissa
Dip-Switch N° 2 : seleziona la potenza

Besides the programmable characteristics , the Energy Saving Systems are able to execute :

- Manual or automatic remote control
- Change-over control test in factory

The A cycle allows to test unlimited times at the lighting fittings manufacturer . Every test has to take no more than 6 hours . After the first night working , this function is cancelled .



HYBRID SYSTEM

Every energy saving system , both programmable or fixed , can vary some parameters by means of a centralized remote control , by sending a defined number of sequences and impulses on the power line .

Manual Control

Without any further control , a switch on and off sequence is to be given during the day before the night concerned by the change .

For operations: test, Energy saving Stop to set a fixed power (max/min), reset, the timing of the sequences (230V ± 10%) must be

On	Off	On	Off
5 - 10sec	>5 sec	5 - 10sec	>5 sec

and the number of ignition:

- 3 for System checking test
- 4 for Setting for 1 day in maximum power
- 6 for Setting for 7 day in maximum power
- 8 for Setting for 1 day in minimum power
- 10 for Setting for 7 day in minimum power

Daylight saving time adjustment (230V ± 10%) must be:

On	Off	On	Off
1 5 - 20sec	>5 sec	15 - 20sec	>5 sec

and the number of ignition:

- 4 for Legal time alignment
- 6 for Solar time alignment

CANCELLATION OF REMOTE PROGRAMMING - "ON" = N° 12 t = 5 – 10sec + N° 1 t = > 30 sec - "OFF " t > 5 sec.

We advise not to use the manual control too often in order to avoid useless switch on and off of lamps , caused by the impulses sequence of power line.

Programmable Automatic Control

Sequences are given automatically thanks to a control panel .

By this means it is possible to exclude the starting working program.

Besides easiness and flexibility , the voltage value is less than 150V avoiding useless switch on and off of the lamp.

There are two kinds of remote control panel.

1- With selector for the above mentioned functions (automatic sequence)
2- With yearly programmatore allowing a daily , weekly and monthly selection and fixing the working in maximum or minimum power .
3-

The aim is to fit the system with the various seasons and their different needs . In some part of the year , a working with minimum power has to be preferred while in some others , a working with maximum power . Advantages are safety , saving and pollution prevention .

By means of the control panel , it is possible to program in place or thanks to a transferred program with USB support

. Apart from the program , a push-button will allow the automatic test of the whole system reporting the correct working .

Technical and dimensional characteristic will follow in the shortest time .

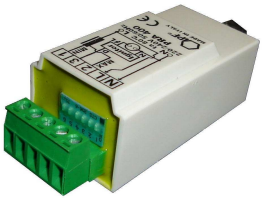
70W - 400W
Ballasts
HI - HS Lamps

ENERGY SAVING

Intelligent Power Switch PRA 400 / PRA 1 400

220 - 240V 50/60Hz

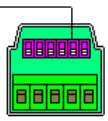
CE
class I
IP 20
tc -30 +80°C



Reference	Standard
Safety	EN 61347-1 EN 61347-2-11
Immunity	61547

PR A 400
Cod. 580000PRA

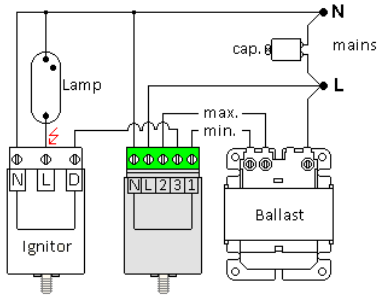
Programmer



- ✓ Automatic PROGRAMMABILE Power Switch
  - Start Energy Saving (h) 22 / 23 / 00 / 01
  - Stop Energy Saving (h) 05 / 06 / 07 / NO
  - Energy saving Stop to set a fixed power (max/min)
- ✓ Manual or Programmable Remote Control, it can vary some parameters by means of a centralized operation in order to allow:
  - Verification test
  - Daylight saving time adjustment
  - Setting 1 or 7 days for maximun or minimum power
  - reset

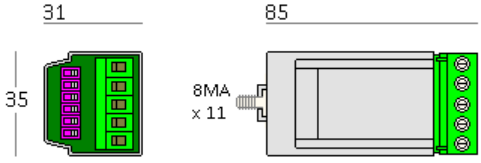
PR A 1 400
Cod. 58000PRA1

- ✓ Automatic Power Switch
  - Start Energy Saving (h) 23 (00 legal h)
  - Energy Saving stop after max. 7 h
- ✓ Manual or Programmable Remote Control, it can vary some parameters by means of a centralized operation in order to allow:
  - Verification test
  - Daylight saving time adjustment
  - Setting 1 or 7 days for maximun or minimum power
  - reset



Lamp nominal W	EEI A2 APF Electromagnetic ballasts				Superimposed	HPF Capacitor		
	Type	Wattage mains max	min	Saving	Timed ignitor	250Vl ± 10% µF	A (in)	λ ≥
70 (0,98A)	SAPIM VT 70/50.3	82	53	29	PWE 400	11	0,40	
100 (1,20A)	SAPIM VT 100/70.3	113	74	39	PWE 400	12,5	0,54	
150 (1,80A)	SAPIM VT 150/100.3 R5 TP	167	107	60	PWE 400	18	0,80	0,9
250 (3,00A)	SAPIM 250/150.3 TP	275	170	105	PWE 400	32	1,35	
400 (4,40A)	SAPIM 400/250.3 TP	433	268	165	PWE 400	45	2,10	

Separating Screw terminals 0,5 - 2,5mm² - (peso Kg 0,18)



70W - 400W
Ballasts
HI - HS Lamps

ENERGY SAVING

IPS - Intelligent Power Switch with Ignitor

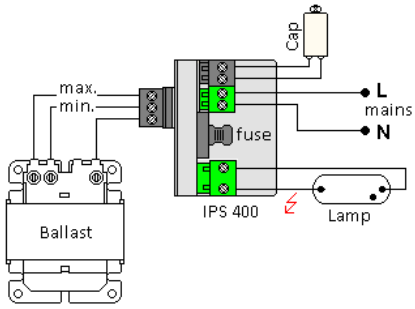
220 - 240V 50/60Hz

CE
class I
IP 20
tc -30 +80°C

Reference	Standard
Safety	EN 61347-1
	EN 61347-2-1
	EN 61347-2-11
Performance	EN 60927
R.F.I. Emissions	EN 55015
Immunity	61547

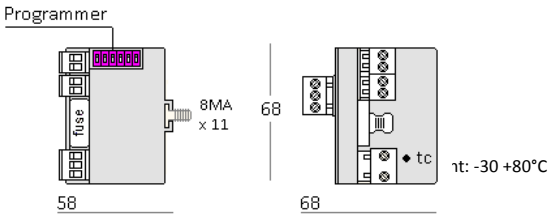
IPS 400 03
Cod. 580000IPS

- ✓ Replaceable fuse — Ø 5 x 20mm 10A 250V T
- ✓ Timed digital Safety ignitor — 3,5...4,5 kV 200 pF PULSE WATCH - Time self stopping 19min
- ✓ Automatic PROGRAMMABLE Power Switch — (See table pag. 4 PRA 400)
  - Start Energy Saving (h) 22 / 23 / 00 / 01
  - Stop Energy Saving (h) 05 / 06 / 07 / NO
  - Energy saving Stop to set a fixed power (max/min)
- ✓ Manual or Programmable Remote Control, it can vary some parameters by means of a centralized operation in order to allow:
  - Verification test
  - Daylight saving time adjustment
  - Setting 1 or 7 days for maximun or minimum power
  - reset



Lamp nominal W	EEI A2 APF Electromagnetic ballasts				Superimposed	HPF Capacitor		
	Type	Wattage mains max	min	Saving	Timed ignitor	250Vl ± 10% µF	A (in)	λ ≥
70 (0,98A)	SAPIM VT 70/50.3	82	53	29	Incorporato	11	0,40	
100 (1,20A)	SAPIM VT 100/70.3	113	74	39	Incorporato	12,5	0,54	
150 (1,80A)	SAPIM VT 150/100.3 R5 TP	167	107	60	Incorporato	18	0,80	0,90
250 (3,00A)	SAPIM 250/150.3 TP	275	170	105	Incorporato	32	1,35	
400 (4,40A)	SAPIM 400/250.3 TP	433	268	165	Incorporato	45	2,10	

Separating Screw terminals 0,5 – 2,5mm² - (peso Kg 0,18)



70W - 150W
Ballasts

HI - HS Lamps

ENERGY SAVING

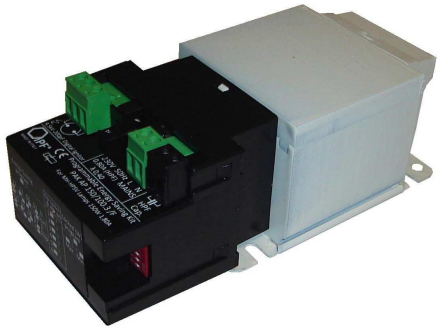
HYBRID BI-LEVEL **PAK**

230V 50Hz

CE

class I IP 20

tw 130°C

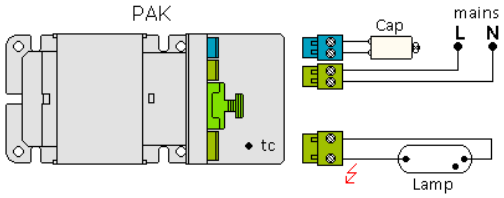


100% Ballast Calibration				Igntor value		HPF Capacitor	
lamp			(±3%)	kV PEAK		λ ≥ 0,90	
W	A	ZΩ	VZ	min	max	µF (250V)	A
70	0,98	199	195	3,5	4,5	11	0,40
100	1,20	158	189	3,5	4,5	12,5	0,54
150	1,80	106	191	3,5	4,5	18	0,80

Reference standard	
Safety	EN 61347-1
	EN 61347-2-9
Performance	EN 60923
Harmonic limit	EN 61000-3-2

PAK including:

- ✓ Low losses ballast, conform to ErP – EUP — tw 130 °C
- ✓ Replaceable fuse — Ø 5 x 20mm 10A 250V T
- ✓ Timed digital Safety ignitor — 3,5…4,5 kV 200 pF PULSE WATCH - Time self stopping 19min
- ✓ Automatic PROGRAMMABLE Power Switch — (See table pag. 4 PRA 400)
  - Start Energy Saving (h) 22 / 23 / 00 / 01
  - Stop Energy Saving (h) 05 / 06 / 07 / NO
  - Energy saving Stop to set a fixed power (max/min)
- ✓ Manual or Programmable Remote Control, it can vary some parameters by means of a centralized operation in order to allow:
  - Verification test
  - Daylight saving time adjustment
  - Setting 1 or 7 days for maximun or minimum power
  - reset

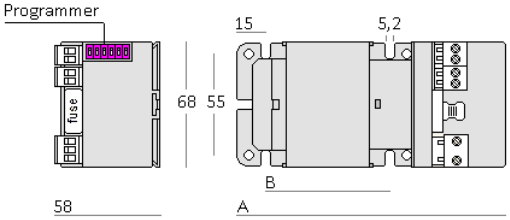


tc point: -30 +80°C

Lamp nominal W	Wattage mains W max	min	Saving	Ballasts Characteristics Δt K	λ	class EEI	PAK PRODUCTION RANGE Type	cod.	appr.
70 (0,98A)	82	53	29	75/60	0,36	A2	PAKAP 70 / 50.3 / F	457535PAP	ENEC 03
100 (1,20A)	113	74	39	70/55	0,41	A2	PAKAP 100 / 70.3 / F	451735PAP	ENEC 03
150 (1,80A)	167	107	60	75/60	0,40	A2	PAKAP 150 / 100.3 / F	451135PAP	ENEC 03
Production range for Lamps HPSV with Internal Ignitor									
50 (0,53A)	60	39	21	65/45	0,34	A2	PAKAP 50 / 35.3 / EF	455335PAE	
70 (0,98A)	82	53	29	75/60	0,36	A2	PAKAP 70 / 50.3 / EF	455335PAE	

Separating Screw terminals 0,5 – 2,5mm²

W	A	B	Kg
70	130	61	1,30
100	140	61	1,30
150	185	92	2,30



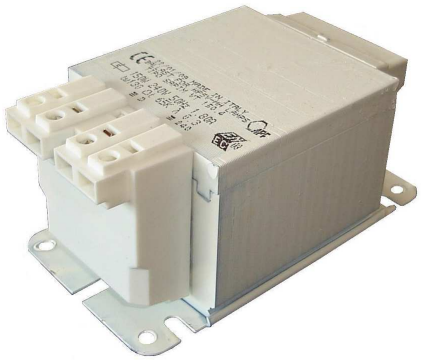
70W - 400W
Ballasts
HI - HS Lamps

ENERGY SAVING

ELECTROMECHANICAL BI-LEVEL BALLAST

230V 50Hz

CE
class I IP 20
tw 130°C



lamp W	100% Ballast Calibration Calibration A	ZΩ	VZ (±3%)	HPF Capacitor λ ≥ 0,90 µF (250V)	A
70	0,98	199	195	11	0,40
100	1,20	158	189	12,5	0,54
150	1,80	106	191	18	0,80
250	3,00	64	192	32	1,35
400	4,40	43,6	192	45	2,10

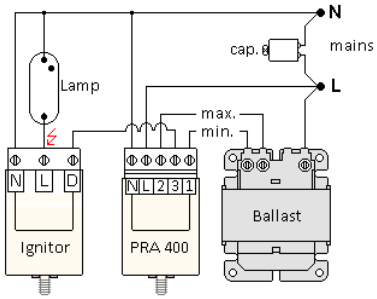
REFERENCE STANDARD	Safety	EN 61347-1	EN 61347-2-9
	Performance	EN 60923	
	Harmonic Limits	EN 61000-3-2	

Sapim - Low losses BI-LEVEL ballast, conform to ErP – EUP tw 130 °C

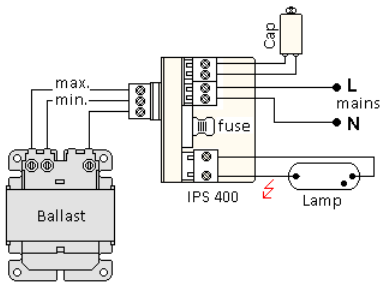
Lamp nominal W	Wattage mains W max	min	Saving	Ballasts Characteristics Δt K	λ	class EEI	THERMAL PROTECTOR BALLAST RANGE Type	cod.	appr.
70 (0,98A)	82	53	29	75/60	0,36	A2	SAPIM VT 70/50.3	457535V29	03
100 (1,20A)	113	74	39	70/55	0,41	A2	SAPIM VT 100/70.3	451735V00	03
150 (1,80A)	167	107	60	75/60	0,40	A2	SAPIM VT 150/100.3 R5TP	451135V60	03
250 (3,00A)	275	170	105	75/55	0,40	A2	SAPIM 250/150.3 TP	402135000	03
400 (4,40A)	433	268	165	75/65	0,45	A2	SAPIM 400/250.3 TP	404235000	03

Wiring diagram (70 - 400W)

Coupling with: PRA 400 / PRA 1 400 Automatic Power-switch
+ 3,5 - 4,5 kV superimposed digital Ignitor PWF 400

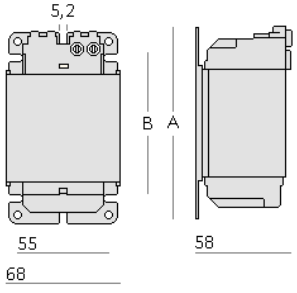


Coupling with: IPS 400 Automatic Power-switch



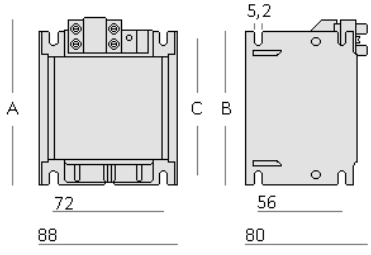
Dimensions

W	A	B	Kg
70	90	61	1,25
100	90	61	1,25
150	122	92	2,07



Screw terminals 1,0 - 2,5mm²

W	A	B	C	Kg
250	110	100	80	1,25
400	135	125	110	1,25



70W - 150W
Control Gear
HI - HS Lamps

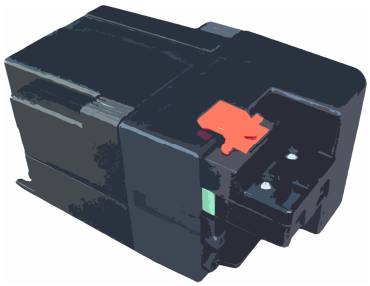
ENERGY SAVING

QUICK MINI BASYC BI-LEVEL

230V 50Hz

IP 40

ta -30 +60°C
tw 130°C

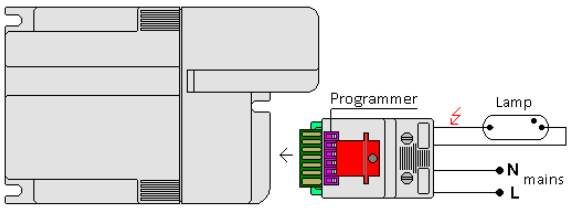


100% Ballast Calibration				mains
lamp			(±3%)	λ ≥ 0,90
W	A	ZΩ	VZ	A
70	0,98	199	195	0,40
100	1,20	158	189	0,54
150	1,80	106	191	0,80

Reference Standard				
Safety	EN 60922	EN 61347-1	EN 61347-2-9	EN 61347-2-1
Performance	EN 60923	EN 60927		
Harmonic limit	EN 61000-3-2		R.F.I. Emissions	EN 55015
Immunity	EN 61547		Flicker	EN 61000-3-3

QUICK MINI BASYC including:

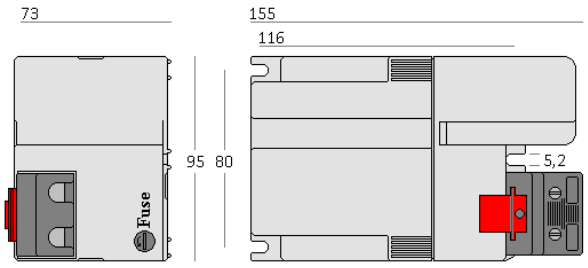
- ✓ Low losses ballast, conform to ErP – EUP — tw 130 °C
- ✓ HPF Capacitor — λ ≥ 0,90
- ✓ Replaceable fuse — Ø 5 x 20mm 10A 250V T
- ✓ Timed digital Safety ignitor — 3,5…4,5 kV 200 pF PULSE WATCH - Time self stopping 19min
- ✓ Automatic PROGRAMMABLE Power Switch — (See table pag. 4 PRA 400)
  - Start Energy Saving (h) 22 / 23 / 00 / 01
  - Stop Energy Saving (h) 05 / 06 / 07 / NO
  - Energy saving Stop to set a fixed power (max/min)
- ✓ Manual or Programmable Remote Control, it can vary some parameters by means of a centralized operation in order to allow:
  - Verification test
  - Daylight saving time adjustment
  - Setting 1 or 7 days for maximun or minimum power
  - reset



Lamp nominal W	Wattage mains W max	W min	Saving	Ballasts Characteristics ta °C	λ	class EEI	PAK PRODUCTION RANGE Type	cod.	appr.
70 (0,98A)	82	53	29	60	0,36	A2	MB APC 70.3 Q / F	207530APC	03
100 (1,20A)	113	74	39	60	0,41	A2	MB APC 100.3 Q / F	201730APC	03
150 (1,80A)	167	107	60	60	0,40	A2	MB APC 150.3 Q / F	201130APC	03

Screw separable connector 1… 4,0mm² (cable 9 – 11mm)
The connector allow the replacement of the control gear (hybrid or electronic) while maintaining the original programming or changing

W	Kg
70	2,10
100	2,15
150	2,75



250W 400W
Control Gear
HI - HS Lamps

ENERGY SAVING

QUICK GF BASYC BI-LEVEL

230V 50Hz

IP 40

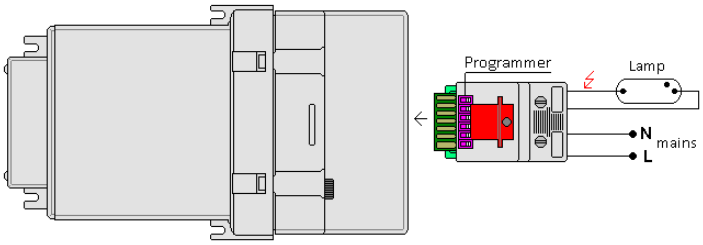
ta -30 +60°C
tw 130°C

100% Ballast Calibration				mains
lamp			(±3%)	λ ≥ 0,90
W	A	ZΩ	VZ	A
250	3,00	64	192	1,35
400	4,40	43,6	192	2,10

Reference Standard				
Safety	EN 60922	EN 61347-1	EN 61347-2-9	EN 61347-2-1
Performance	EN 60923	EN 60927		
Harmonic limit	EN 61000-3-2		R.F.I. Emissions	EN 55015
Immunity	EN 61547		Flicker	EN 61000-3-3

QUICK GF BASYC including:

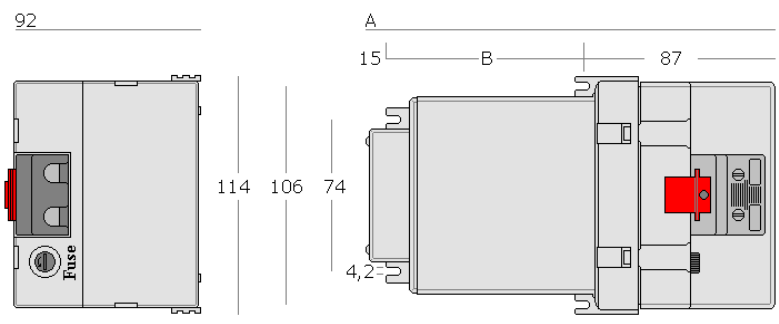
- ✓ Low losses ballast, conform to ErP – EUP — tw 130 °C
- ✓ HPF Capacitor — λ ≥ 0,90
- ✓ Replaceable fuse — Ø 5 x 20mm 10A 250V T
- ✓ Timed digital Safety ignitor — 3,5…4,5 kV 200 pF PULSE WATCH - Time self stopping < 20 min
- ✓ Automatic PROGRAMMABLE Power Switch
  - Start Energy Saving (h) 22 / 23 / 00 / 01
  - Stop Energy Saving (h) 05 / 06 / 07 / NO STOP
  - Energy saving Stop to set a fixed power (max/min)
- ✓ Manual or Programmable Remote Control, it can vary some parameters by means of a centralized operation in order to allow:
  - Verification test
  - Daylight saving time adjustment
  - Setting 1 or 7 days for maximun or minimum power
  - reset



Lamp nominal W	Wattage mains W			Ballasts Characteristics losses W	ta °C	λ	class EEI	PAK PRODUCTION RANGE Type	cod.
	max	min	Saving						
250 (3,00A)	275	167	108	24,5	60	0,40	A2	MB GF APC 250.3 Q / F	202130APC
400 (4,40A)	433	268	165	33	60	0,45	A2	MB GF APC 400.3 Q / F	204230APC

Screw separable connector 1… 4,0mm² (cable 9 – 11mm)
The connector allow the replacement of the control gear (hybrid or electronic) while maintaining the original programming or changing

W	A	B	Kg
250	197	95	3,80
400	222	120	5,10



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