HF-Performer III

Electronic ballasts for TL5 lamps

Product Description

- Sustainable and most energy efficient, slim, high frequency electronic ballast for TL5 fluorescent lamps

Product Features and Benefits

- Energy efficient CELMA A2 BAT
- ENEC & CE approval, complying to all relevant international Safety and Performance standards
- Robust design for 50.000 hour lifetime at Tc_{max} and over 60.000 on/off switches on one lamp
- Programmed, flicker-free, preheated start (< 1.0 s) enabling the lamp to be switched on/off without reducing lamp lifetime (e.g. for use in combination with lighting control components)
- High power factor 0.99 with THD <10%
- Automatic restart after voltage dip or lamp exchange
- Suitable for DC emergency operation, 186V to 275V (at -10°C), in line with IEC/EN 60598-2-22
- High frequency operation; eliminating eye strain as caused by electromagnetic ballasts
- EMC compliant to EN 55015 2006 + A1 2007
- Unit is protected against excessive mains voltage and incorrect connections
- Active power factor correction for constant light levels independent of mains voltage fluctuations
- Universal connector designed for horizontal manual and push-in robot wiring and vertical ALF-robot wiring

Applications

Ideal for applications with high energy efficiency is desired:

- Used with movement detection control systems like the Philips OccuPlus
- In office buildings, hospitals, supermarkets, department stores, schools
- In class I outdoor applications e.g. industrial premises and car parks
- In emergency lighting applications

PHILIPS

sense and simplicity

Quality

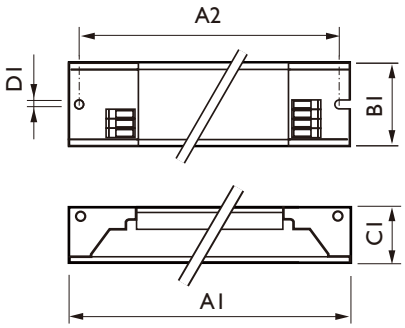
We ensure optimum quality regarding:

- Product safety: Ballast is protected against excessive mains voltage, incorrect connections and a safety stop is automatically activated in case of lamp failure.
- System supplier: As a manufacturer of both lamps and electronic ballast, Philips ensures that optimum lamp/ballast performance is maintained from the earliest development stage.
- International standards: Our ballast complies with all relevant international rules and regulations related to safety, performance, energy efficiency, immunity, hazardous substances and EMC.

Details can be found in the compliance and approval section.

Compliances and approvals

• RFI 9kHz-30 MHz	EN 55015
• RFI 30 Mhz-300 Mhz	EN 55015: 2006+A1:2007
• RFI when operated on DC	EN 55015: 2006+A1:2007
• RFI > 30 MHz	EN 55022 B
• Harmonics	EN 61000-3-2
• Immunity	EN 61547
• Safety	EN 61347-2-3
• Safety when operated on DC	EN 61347-2-3 Annex J
• Performance	EN 60929
• Vibration & bump tests	IEC 68-2-6 Fc
	IEC 68-2-29 Eb
• Quality standard	ISO 9000-2000
• Environmental standard	ISO 14001
• CELMA Energy classification	EEI = A2 BAT
• Approval marks	ENEC, VDE-EMV, C-tick, TISI
• CE marking	
• Temperature declared thermally protected	IEC 61347-1 110



Dimensions in mm (nom)

Type	A1	A2	B1	C1	D1
HF-P III 1 Lamp	360.0	350.0	30.0	22.0	4.2
HF-P III 2 Lamps	360.0	350.0	30.0	22.0	4.2

Electrical data

Ballast	Number or Lamps (x)	Energy Efficiency Index CELMA	Line Frequency (Hz)	Line Voltage (V)
HF-P 1 14-35 TL5 III 220-240V	1	A2 BAT	50/60	220-240
HF-P 2 14-35 TL5 III 220-240V	2	A2 BAT	50/60	220-240
HF-P 1 24/39 TL5 III 220-240V	1	t.b.d*	50/60	220-240
HF-P 2 24/39 TL5 III 220-240V	2	t.b.d*	50/60	220-240
HF-P 149 TL5 III 220-240V	1	A2 BAT	50/60	220-240
HF-P 249 TL5 III 220-240V	2	A2 BAT	50/60	220-240
HF-P 154/155 TL5/PL-L III 220-240V	1	A2 BAT	50/60	220-240
HF-P 254/255 TL5/PL-L III 220-240V	2	A2 BAT	50/60	220-240
HF-P 180 TL5/PL-L III 220-240V	1	t.b.d*	50/60	220-240
HF-P 280 TL5/PL-L III 220-240V	2	t.b.d*	50/60	220-240

*t.b.d = to be defined, under development

Technical data: (all typical values at Vmains = 230V)

Lamps	Qty of Lamps	Ballast	System Power (W)	Lamp Power (W)	Ballast Losses (W)	Nominal Lamp** (Lm)
TL5 HE ECO 13W	1	HF-P 1 14-35 TL5 III 220-240V	14.4	1x12.5	1.9	1200
TL5 HE ECO 13W	2	HF-P 2 14-35 TL5 III 220-240V	27.7	2x12.5	2.7	1200
TL5 HE 14W	1	HF-P 1 14-35 TL5 III 220-240V	16.0	1x14.0	2.0	1200
TL5 HE 14W	2	HF-P 2 14-35 TL5 III 220-240V	30.8	2x14.0	2.8	1200
TL5 HE EC0 19W	1	HF-P 1 14-35 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HE EC0 19W	2	HF-P 2 14-35 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HE 21W	1	HF-P 1 14-35 TL5 III 220-240V	23.2	1x21.0	2.2	1900
TL5 HE 21W	2	HF-P 2 14-35 TL5 III 220-240V	45.2	2x21.0	3.2	1900
TL5 HE ECO 25W	1	HF-P 1 14-35 TL5 III 220-240V	27.7	1x25.4	2.3	2600
TL5 HE ECO 25W	2	HF-P 2 14-35 TL5 III 220-240V	54.4	2x25.4	3.6	2600
TL5 HE 28W	1	HF-P 1 14-35 TL5 III 220-240V	30.5	1x28.0	2.5	2600
TL5 HE 28W	2	HF-P 2 14-35 TL5 III 220-240V	60.5	2x28.0	4.5	2600
TL5 HE ECO 32W	1	HF-P 1 14-35 TL5 III 220-240V	34.9	1x32.3	2.6	3300
TL5 HE ECO 32W	2	HF-P 2 14-35 TL5 III 220-240V	69.3	2x32.3	4.7	3300
TL5 HE 35W	1	HF-P 1 14-35 TL5 III 220-240V	38.0	1x35.0	3.0	3300
TL5 HE 35W	2	HF-P 2 14-35 TL5 III 220-240V	75.6	2x35.0	5.6	3300
TL5 HE ECO 20W	1	HF-P 1 24/39 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HE ECO 20W	2	HF-P 2 24/39 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HO 24W	1	HF-P 1 24/39 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HO 24W	2	HF-P 2 24/39 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HO ECO 34W	1	HF-P 1 24/39 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HO ECO 34W	2	HF-P 2 24/39 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HO 39W	1	HF-P 1 24/39 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HO 39W	2	HF-P 2 24/39 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HO ECO 45W	1	HF-P 149 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HO ECO 45W	2	HF-P 249 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HO 49W	1	HF-P 149 TL5 III 220-240V	54.5	1x51.0	3.5	4300
TL5 HO 49W	2	HF-P 249 TL5 III 220-240V	110.0	2x52.0	6.0	4300
TL5 HO ECO 50W	1	HF-P 154/155 TL5/PL-L III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HO ECO 50W	2	HF-P 254/255 TL5/PL-L III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HO 54W	1	HF-P 154/155 TL5/PL-L III 220-240V	60.5	1x56.0	4.5	4450
TL5 HO 54W	2	HF-P 254/255 TL5/PL-L III 220-240V	118.0	2x56.0	6.0	4450
TL5 HO ECO 73W	1	HF-P 180 TL5/PL-L III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HO ECO 73W	2	HF-P 280 TL5/PL-L III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HO 80W	1	HF-P 180 TL5/PL-L III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
TL5 HO 80W	2	HF-P 280 TL5/PL-L III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
PL-L 55W	1	HF-P 154/155 TL5/PL-L III 220-240V	57.5	1x53.0	4.5	4800
PL-L 55W	2	HF-P 254/255 TL5/PL-L III 220-240V	107.0	2x50.5	6.0	4800
PL-L 80W	1	HF-P 180 TL5/PL-L III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*
PL-L 80W	2	HF-P 280 TL5/PL-L III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*

*t.b.d = to be defined, under development

**Lumen measured at 25˚C for 840 lamp color (maximum TL5 lumen output at 35˚C)

Mains current

Lamps	Qty of Lamps	Ballast	Input current During operation (A)
TL5 HE ECO 13W	1	HF-P 1 14-35 TL5 III 220-240V	0.065
TL5 HE ECO 13W	2	HF-P 2 14-35 TL5 III 220-240V	0.125
TL5 HE 14W	1	HF-P 1 14-35 TL5 III 220-240V	0.070
TL5 HE 14W	2	HF-P 2 14-35 TL5 III 220-240V	0.135
TL5 HE EC0 19W	1	HF-P 1 14-35 TL5 III 220-240V	t.b.d*
TL5 HE EC0 19W	2	HF-P 2 14-35 TL5 III 220-240V	t.b.d*
TL5 HE 21W	1	HF-P 1 14-35 TL5 III 220-240V	0.100
TL5 HE 21W	2	HF-P 2 14-35 TL5 III 220-240V	0.200
TL5 HE ECO 25W	1	HF-P 1 14-35 TL5 III 220-240V	0.125
TL5 HE ECO 25W	2	HF-P 2 14-35 TL5 III 220-240V	0.240
TL5 HE 28W	1	HF-P 1 14-35 TL5 III 220-240V	0.135
TL5 HE 28W	2	HF-P 2 14-35 TL5 III 220-240V	0.265
TL5 HE ECO 32W	1	HF-P 1 14-35 TL5 III 220-240V	0.155
TL5 HE ECO 32W	2	HF-P 2 14-35 TL5 III 220-240V	0.305
TL5 HE 35W	1	HF-P 1 14-35 TL5 III 220-240V	0.170
TL5 HE 35W	2	HF-P 2 14-35 TL5 III 220-240V	0.330
TL5 HE ECO 20W	1	HF-P 1 24/39 TL5 III 220-240V	t.b.d*
TL5 HE ECO 20W	2	HF-P 2 24/39 TL5 III 220-240V	t.b.d*
TL5 HO 24W	1	HF-P 1 24/39 TL5 III 220-240V	t.b.d*
TL5 HO 24W	2	HF-P 2 24/39 TL5 III 220-240V	t.b.d*
TL5 HO ECO 34W	1	HF-P 1 24/39 TL5 III 220-240V	t.b.d*
TL5 HO ECO 34W	2	HF-P 2 24/39 TL5 III 220-240V	t.b.d*
TL5 HO 39W	1	HF-P 1 24/39 TL5 III 220-240V	t.b.d*
TL5 HO 39W	2	HF-P 2 24/39 TL5 III 220-240V	t.b.d*
TL5 HO ECO 45W	1	HF-P 149 TL5 III 220-240V	t.b.d*
TL5 HO ECO 45W	2	HF-P 249 TL5 III 220-240V	t.b.d*
TL5 HO 49W	1	HF-P 149 TL5 III 220-240V	0.245
TL5 HO 49W	2	HF-P 249 TL5 III 220-240V	0.495
TL5 HO ECO 50W	1	HF-P 154/155 TL5/PL-L III 220-240V	t.b.d*
TL5 HO ECO 50W	2	HF-P 254/255 TL5/PL-L III 220-240V	t.b.d*
TL5 HO 54W	1	HF-P 154/155 TL5/PL-L III 220-240V	0.270
TL5 HO 54W	2	HF-P 254/255 TL5/PL-L III 220-240V	0.520
TL5 HO ECO 73W	1	HF-P 180 TL5/PL-L III 220-240V	t.b.d*
TL5 HO ECO 73W	2	HF-P 280 TL5/PL-L III 220-240V	t.b.d*
TL5 HO 80W	1	HF-P 180 TL5/PL-L III 220-240V	t.b.d*
TL5 HO 80W	2	HF-P 280 TL5/PL-L III 220-240V	t.b.d*
PL-L 55W	1	HF-P 154/155 TL5/PL-L III 220-240V	0.250
PL-L 55W	2	HF-P 254/255 TL5/PL-L III 220-240V	0.470
PL-L 80W	1	HF-P 180 TL5/PL-L III 220-240V	t.b.d*
PL-L 80W	2	HF-P 280 TL5/PL-L III 220-240V	t.b.d*

*t.b.d = to be defined, under development

Inrush current

Ballast	Maximum Ballast Number on MCB B16A	Inrush current Peak (A)	Inrush current Width (ms)
HF-P 1 14-35 TL5 III 220-240V	28	24	250
HF-P 2 14-35 TL5 III 220-240V	28	24	250
HF-P 1 24/39 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*
HF-P 2 24/39 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*
HF-P 149 TL5 III 220-240V	28	24	250
HF-P 249 TL5 III 220-240V	12	31	350
HF-P 154/155 TL5/PL-L III 220-240V	28	24	250
HF-P 254/255 TL5/PL-L III 220-240V	12	31	350
HF-P 180 TL5/PL-L III 220-240V	t.b.d*	t.b.d*	t.b.d*
HF-P 280 TL5/PL-L III 220-240V	t.b.d*	t.b.d*	t.b.d*

*t.b.d = to be defined, under development

Conversion table for max. quantities of ballasts on other types of Miniature Circuit Breaker

MCB type	Rating	Relative number of ballasts
B	16 A	100% (see table above)
B	10 A	63%
C	16 A	170%
C	10 A	104%
L, I	16 A	108%
L, I	10 A	65%
G, U, II	16 A	212%
G, U, II	10 A	127%
K, III	16 A	254%
K, III	10 A	154%

Technical data for installation

Mains operation

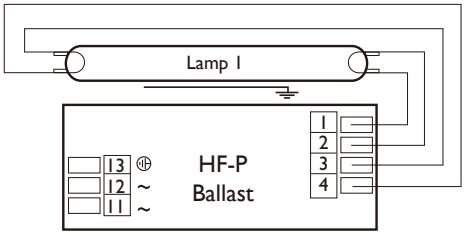
Rated mains voltage	220-240 V
With tolerances for performance +6%, -8%	202-254 V
With tolerances for safety +/- 10%	198-264 V
Mains frequency	50/60 Hz
Operation frequency (typical)	> 42 kHz (45 kHz)
Power factor	0.99
Earth leakage current	< 0.5 mA per ballast
Ignition time	1.0 sec
Constant light operation	In case of mains voltage fluctuations within 202-254 V, the luminous flux changes by a maximum of ± 2%
Overvoltage protection	48 hrs at 320 V AC, 2 hrs at 350 V AC
Dual fixture operation	Master-slave operation, not advised
Cable capacity	
For 1/2 Lamps	Max. 200 pF between lamp wires Max. 200 pF between lamp wires and Earth EMI precautions have to be taken
Automatic restart after lamp replacement or voltage dip	Yes; tested with a dip down to 30% with a duration of 10 mains cycles
Insulation resistance test	500 V DC from both mains inputs to Earth (not between Line and Neutral)

DC/Emergency operation

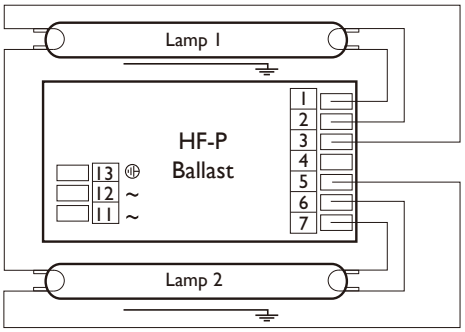
DC voltage operation (during emergency back-up)

Required battery voltage for guaranteed ignition	198 - 254 V
Required battery voltage for burning lamps	176 - 254 V
Nominal light output is obtained at the DC voltage of	220 - 240 V

TL5 1 Lamp



TL5 2 Lamps



Notes:

1. For a continuous DC application, an external fuse should be used in the luminaire.
2. Continuous low DC voltages (<198 V) can influence the lifetime of the ballast.

Mechanical installation notes

Technical data for design and mounting HF ballasts in fixtures

Temperatures

Temperature range to ignite lamp with ignition aid	-25°C to +50°C
Max. T_{case}	75°C

Lifetime of a ballast depends on the temperature of the ballast. This means there is a relation between the Tc point on the ballast and its lifetime. The HF-Performer intelligent ballast has a specified lifetime of 50.000 hrs, with a maximum of 10% failures guaranteed, at a measured Tcase of 75°C. For more information regarding this subject consult the Philips Application guide to fluorescent lamp control gear.

Hum and noise level	inaudible

Permitted humidity is tested according to EN61347-1 par. 11.
Note that no moisture or condensation may enter the ballast.

The ballasts is thermally protected at 110 deg C acc to EN61347-1 annex C.

Connector types:

Connection wiring is greatly simplified through use of WAGO universal connector suitable for both automatic wiring (ALF and ADS) and manual wiring. Earth connection can be made via the earth terminal on the mains side.

Wire lenghts:

For optimal performance (Ignition and EMI), it is advised that following wires need to be kept short (<15 cm)

- For one lamp circuits keep wires to terminals 1 and 2 short.
- For two lamp circuits keep wires to terminals 1, 2, 6 and 7 short.

Wire cross-section:

Lower connector	
On the mains side	0.5...1.0 mm^2
On the lamp side	0.5...1.0 mm^2
Upper connector	
On the mains side	0.5 mm^2 solid wire
	0.75 mm^2 stranded wire
On the lamp side	0.5 mm^2 solid wire
	0.75 mm^2 stranded wire
Strip length	8-9 mm

Notes:

1. Data is based on a mains supply with an impedance of 400 mΩ (equal to 15 m cable of 2.5 mm2 and other 20 m to the middle of the power distribution), under worst case conditions. With an impedance of 800 mΩ the number of ballasts can be increased by 10%.
2. Ensure that the neutral is reconnected again after above mentioned test is carried out and before the installation is put into operation.
3. Lamp wiring; the use of 500V rated components and wiring are required with HF-Performer Intelligent.
4. In some cases the maximum number of ballasts is not determined by the MCB but by the maximum electrical load of the installation.
5. Note that the maximum number of ballasts is given when these are all switched on at the same moment, i.e. by a wall switch.
6. Measurements were carried out on single-pole MCB's. For multi-pole MCB's it is advisable to reduce the number of ballasts by 20%.
7. It is advised to connect the mechanical luminaire parts such as mirror and / or louvre to earth potential, this to ensure best ignition and EMC performance.
8. Measurements will be verified in real installations; therefore data are subject to change.

Ordering and packing data

Ballast	Weight	Qty bulk packing	Dimensions bulk packing	GPC	EOC
	kg	pcs	cm		
HF-P 1 14-35 TL5 III 220-240V	0.245	12	42.0 x 16.0 x 8.0	913713031066	90504500
HF-P 2 14-35 TL5 III 220-240V	0.245	12	42.0 x 16.0 x 8.0	913713031166	90503800
HF-P 1 24/39 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*	t.b.d*
HF-P 2 24/39 TL5 III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*	t.b.d*
HF-P 149 TL5 III 220-240V	0.260	12	42.0 x 16.0 x 8.0	913713028066	86319200
HF-P 249 TL5 III 220-240V	0.280	12	42.0 x 16.0 x 8.0	913713028166	86347500
HF-P 154/155 TL5/PL-L III 220-240V	0.260	12	42.0 x 16.0 x 8.0	913713028266	86348200
HF-P 254/255 TL5/PL-L III 220-240V	0.280	12	42.0 x 16.0 x 8.0	913713028366	86351200
HF-P 180 TL5/PL-L III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*	t.b.d*
HF-P 280 TL5/PL-L III 220-240V	t.b.d*	t.b.d*	t.b.d*	t.b.d*	t.b.d*

*t.b.d = to be defined, under development

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