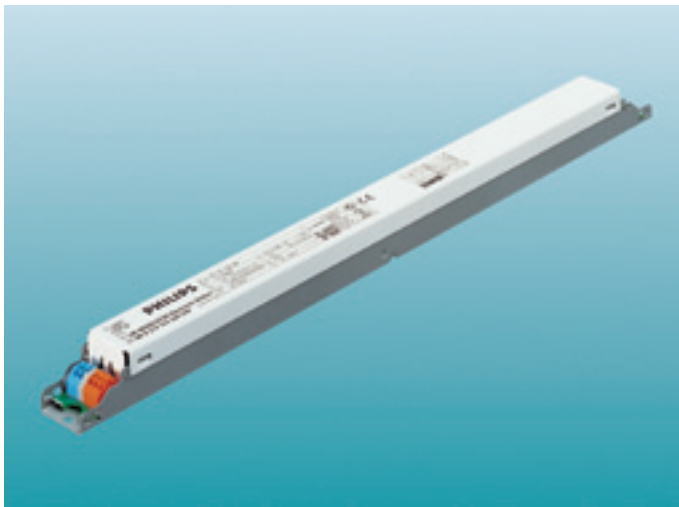


# HF-REGULATOR electronic regulating ballasts for TL5 lamps



## Definition

Slim, lightweight high-frequency electronic regulating ballast for TL5 fluorescent lamps.

## Description

- The lamp power can be regulated down to 3%
- Striation-free operation
- 1 - 10 V control input (European standard)
- Programmed start: flicker-free warm start, ideal for areas with a high switching frequency
- Up to 60% reduction in energy consumption can be achieved by using automatic lighting control systems.

All Philips HF-REGULATOR electronic ballasts are equipped with  $\alpha$ -control. This is a dedicated integrated circuit that ensures independent control of each electrode and, in doing so, takes care that:

- lamp life is unaffected by dimming position;
- lamp burning is stabler in every dimming position; and
- energy savings, when dimming, are maximised.

## Applications

- Typical areas of application include:
- 1 - 10 V installations with daylight linking and/or movement detection (energy saving)
  - 1 - 10 V installations with remote control systems (comfort)
  - Installations with emergency back-up, according to VDE 0108

## Examples:

- Office buildings: insurance companies, banks, government ministries
- Corridors
- Department stores, shops, supermarkets
- Hotels
- Hospitals
- Cinemas.

## Philips quality

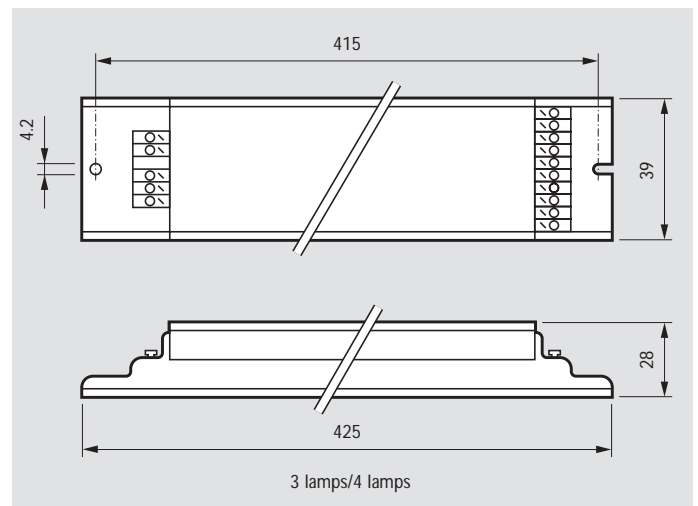
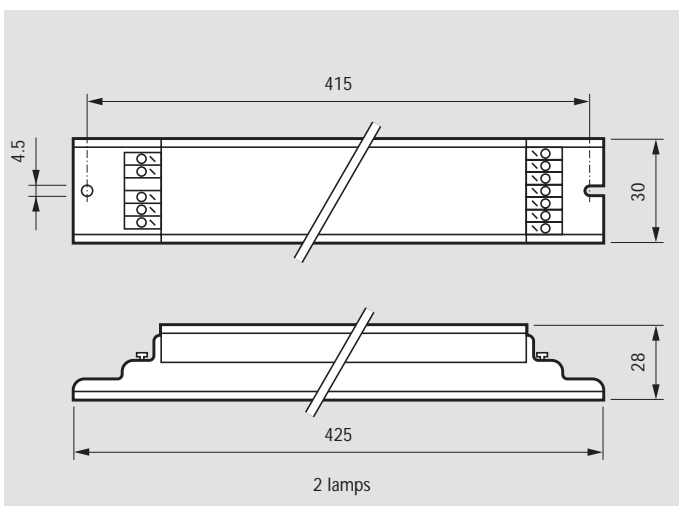
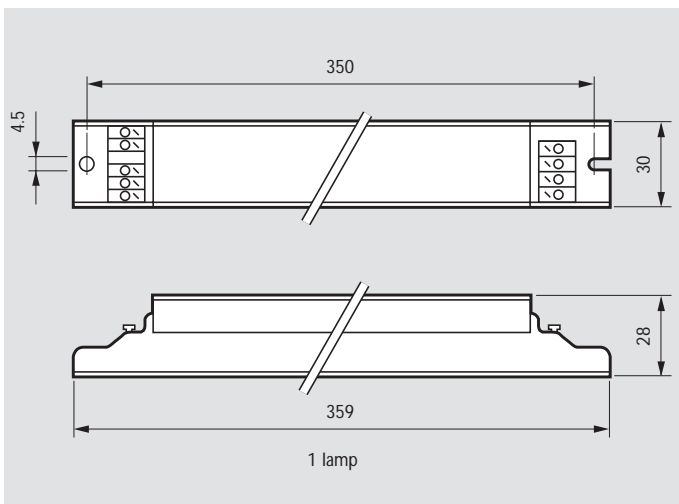
This implies optimum quality with respect to:

- System supplier  
As manufacturer of lamps, electronic control gear and lighting control equipment, Philips ensures that, from the earliest development stage, optimum performance is maintained
- International standards  
Philips HF electronic regulating ballasts comply with all relevant international rules and regulations.

## Compliances and approvals

- RFI < 30 MHz: EN 55015
- RFI > 30 MHz: EN 55022 A
- Harmonics: EN 61000-3-2
- Immunity: EN 61547
- Safety: EN 60928
- Performance: EN 60929-1E
- Vibration & bump tests: IEC 68-2-6 FC  
IEC 68-2-29Eb
- Quality standard: ISO 9001
- Environmental standard: ISO 14001
- Approval marks: ENEC  
VDE-EMV
- CE marking.

Dimensions in mm



# HF-REGULATOR electronic regulating ballasts for TL5 lamps

## Technical data for installation

### Mains operation

Rated mains voltage	220 - 240 V**
with tolerances for safety: +/- 10%	198 - 264 V**
tolerances for performance: +6% -8%	202 - 254 V
Mains frequency	50/60 Hz
Operating frequency	> 42 kHz
Power factor	0.90*; 0.95 at 100% power

Smart power: with AC mains voltage fluctuations, luminous flux varies by  $\pm 2\%$  max.

### DC voltage operation (during emergency back-up)

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

### Notes:

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

### Control input

Control voltage	1 - 10 V DC
Protected against accidental mains voltage connection	yes

### Regulating level (lamp power)

The control input complies with EN 60929, (Amendment 1, Annex E) and is compatible with Philips lighting control equipment.	3 to 100%
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### Ignition time

< 2 s

### Earth leakage current

Maximum number of ballasts which can be connected to one Residual Current Detector of 30 mA

< 0.5 mA per ballast

30

### Overvoltage protection

48 hrs at 320 V AC  
2 hrs at 350 V AC

### Lamp wiring for HF-R...TL5

500 V rated components and wiring are required with HF-REGULATOR TL5

### Dual fixture; master slave operation

not advisable

### Advised maximum cable capacity for optimum performance and EMI suppression

max. 15 pF: between two sets of lamp wires (each set of lamp wires is connected to one electrode of the lamp max.  
75 pF: between one set of lamp wires (connected to one electrode of the lamp) and earth

### Automatic restart after lamp replacement or voltage dip

yes (for 1- and 2-lamp ballasts);  
for 3- and 4-lamp ballasts, the mains power needs to be reset.

\* Value for 1 x 14 W and 1 x 21 W types

\*\* Value for 1 x 80 W

## Insulation resistance test

500 V DC from Line/Neutral to Earth (not between Line and Neutral)

Note: Ensure that the neutral is reconnected again after abovementioned test is carried out and before the installation is put into operation.

## Mains current at 230 V

Ballast	Input current A
HF-R 114 TL5	0.09
HF-R 214 TL5	0.15
HF-R 314 TL5	0.23
HF-R 414 TL5	0.29
HF-R 121 TL5	0.12
HF-R 221 TL5	0.20
HF-R 124 TL5	0.12
HF-R 224 TL5	0.24
HF-R 128 TL5	0.16
HF-R 228 TL5	0.28
HF-R 135 TL5	0.19
HF-R 235 TL5	0.34
HF-R 139 TL5	0.19
HF-R 239 TL5	0.38
HF-R 149 TL5	0.25
HF-R 249 TL5	0.48
HF-R 154 TL5	0.27
HF-R 254 TL5	0.51
HF-R 180 TL-5	0.38

## Inrush current

Ballast	Max. quantity of ballasts per Miniature Circuit Breaker		Inrush current 1/2 value time at typical mains impedance
	type B 16 A	C 16 A	
HF-R 114 TL5	28	48	19A / 220 $\mu$ s
HF-R 214 TL5	28	48	25A / 200 $\mu$ s
HF-R 314 TL5	28	48	25A / 200 $\mu$ s
HF-R 414 TL5	28	48	25A / 200 $\mu$ s
HF-R 121 TL5	28	48	19A / 220 $\mu$ s
HF-R 221 TL5	28	48	25A / 200 $\mu$ s
HF-R 124 TL5	28	48	19A / 220 $\mu$ s
HF-R 224 TL5	28	48	25A / 200 $\mu$ s
HF-R 128 TL5	28	48	19A / 220 $\mu$ s
HF-R 228 TL5	28	48	25A / 200 $\mu$ s
HF-R 135 TL5	28	48	19A / 220 $\mu$ s
HF-R 235 TL5	12	20	32A / 300 $\mu$ s
HF-R 139 TL5	28	48	19A / 220 $\mu$ s
HF-R 239 TL5	12	20	32A / 300 $\mu$ s
HF-R 149 TL5	28	48	19A / 220 $\mu$ s
HF-R 249 TL5	12	20	32A / 300 $\mu$ s
HF-R 154 TL5	28	48	19A / 220 $\mu$ s
HF-R 254 TL5	12	20	32A / 300 $\mu$ s
HF-R 180 TL5	12	20	32A / 300 $\mu$ s

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

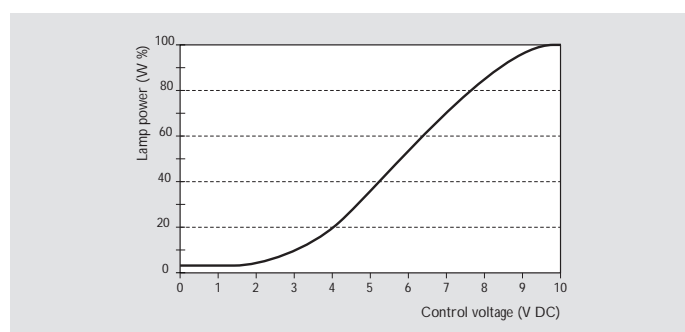
MCB type	Relative quantity of ballasts
B	16 A
B	10 A
C	16 A
C	10 A
L, I	16 A
L, I	10 A
G, U, II	16 A
G, U, II	10 A
K, III	16 A
K, III	10 A
100% (see table above)	
63%	
170%	
104%	
108%	
65%	
212%	
127%	
254%	
154%	

# HF-REGULATOR electronic regulating ballasts for TL5 lamps

## Technical data in relation to energy saving

Lamp	Qty. of lamps	Ballast	System Power* W	Efficacy* lm/W	Lamp Power* W	Efficacy* lm/W	Lumen* lm	CELMA class. EEI
TL5 HE 14W	1	HF-R 114 TL5	18	75	14	96	1350	A1
TL5 HE 14W	2	HF-R 214 TL5	32	84	14	96	1350	A1
TL5 HE 14W	3	HF-R 3/414 TL5	50	81	14	96	1350	A1
TL5 HE 14W	4	HF-R 3/414 TL5	66	81	14	96	1350	A1
TL5 HE 21W	1	HF-R 121 TL5	25	84	21	100	2100	A1
TL5 HE 21W	2	HF-R 221 TL5	48	88	21	100	2100	A1
TL5 HE 28W	1	HF-R 128 TL5	33	85	28	104	2900	A1
TL5 HE 28W	2	HF-R 228 TL5	63	92	28	104	2900	A1
TL5 HE 35W	1	HF-R 135 TL5	40	87	35	104	3650	A1
TL5 HE 35W	2	HF-R 235 TL5	80	91	35	104	3650	A1
TL5 HO 24W	1	HF-R 124 TL5	28	71	23	87	2000	A1
TL5 HO 24W	2	HF-R 224 TL5	53	75	23	87	2000	A1
TL5 HO 39W	1	HF-R 139 TL5	43	81	38	92	3500	A1
TL5 HO 39W	2	HF-R 239 TL5	88	80	38	92	3500	A1
TL5 HO 49W	1	HF-R 149 TL5	55	91	49	102	5000	A1
TL5 HO 49W	2	HF-R 249 TL5	111	90	49	102	5000	A1
TL5 HO 54W	1	HF-R 154 TL5	60	83	54	93	5000	A1
TL5 HO 54W	2	HF-R 254 TL5	119	84	54	93	5000	A1
TL5 HO 80W	1	HF-R 180 TL5	88	80	80	88	7000	A1

\* At 100%.



Relationship between lamp power and control voltage

## Technical data for design and mounting HF ballasts in fixtures

### Temperatures

Temperature range to ignite lamp with ignition aid	+10 ° to +50 °C
Stable lamp operation assured	> 15 °C
Striation possible	< 15 °C

Max. tcase = 75°C\*\*

### Note:

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. For more information regarding this subject consult the Philips Application guide to fluorescent lamp control gear.

Class II luminaires this application is not advisable; only with extensive tests on luminaires can the correct operation be verified

Hum and noise level inaudible

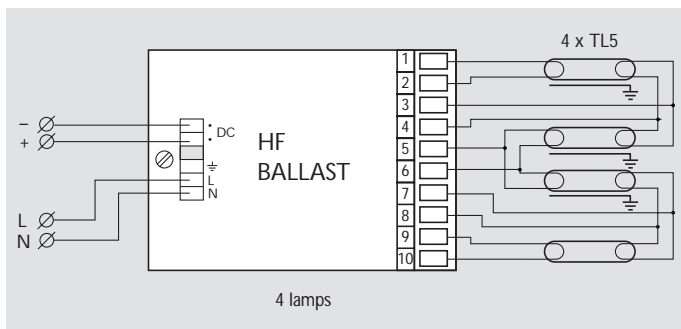
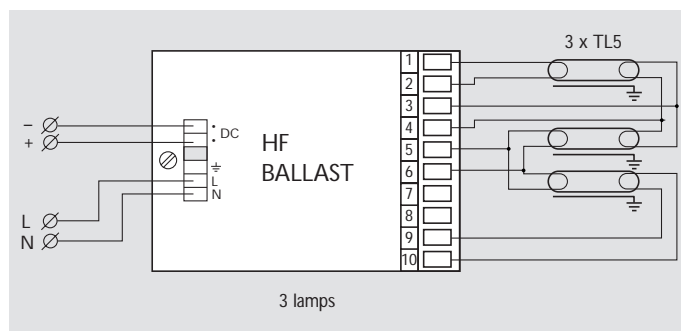
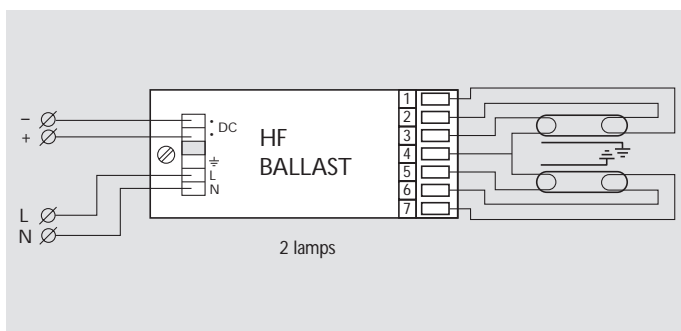
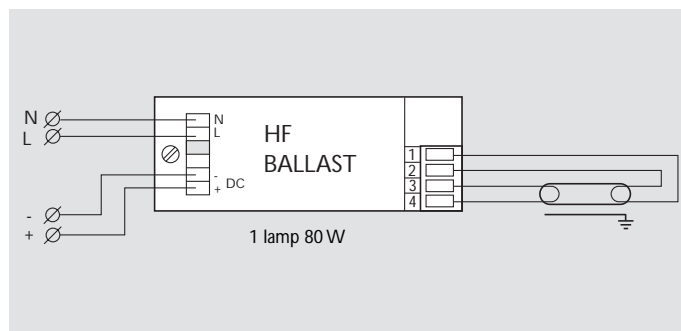
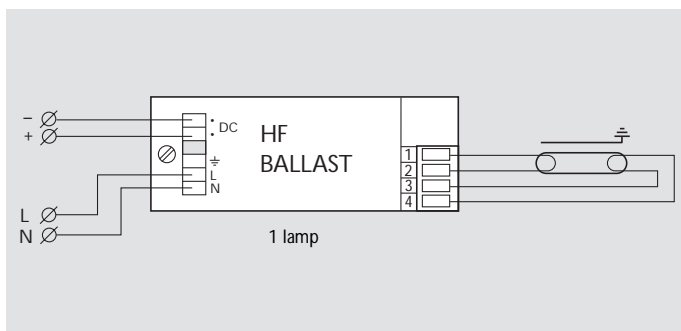
Permitted humidity is tested according to IEC 928 par. 12.  
Note that no moisture or condensation may enter the ballast.

The ballasts that are thermally protected use a protective method of another type providing equivalent thermal protection.

### Notes:

1. Data is based on a mains supply with an impedance of 400 mΩ (equal to 15 m cable of 2.5 mm<sup>2</sup> and another 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. Measurements will be verified in real installations; therefore data are subject to change.
3. In some cases the maximum number of ballasts is not determined by the MCB but by the maximum electrical load of the lighting installation.
4. 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.
5. 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%.
6. First digital regulating steps are fixed at 3% light output (dimming specification).

# HF-REGULATOR electronic regulating ballasts for TL5 lamps



Connection wiring is greatly simplified through use of insert contacts; earth connection can be made via housing or terminal block.

Wire cross-section:

On the mains side (mains/control voltage): 0.5 - 1.5 mm<sup>2</sup>

On the lamp side: 0.5 - 1.5 mm<sup>2</sup>

Strip length: 7.5 - 8.5 mm

Note:

For optimum performance, note that wires from connection 1 and 2 for single-lamp versions, and from connections 3, 4 and 5 for twin-lamp versions, and from connections 5 and 6 for triple/quad-lamp versions should be kept short and equal in length.

Wiring diagrams

## Ordering and packing data

Ballast	1 Piece EAN code	Weight	Bulk packing Qty.	Dimensions l x w x h cm	Volume m <sup>3</sup>	Weight gross kg	EAN code	EOC
HF-R 114 TL5	8711500 060044	0.3	12	39.6 x 19.8 x 7.0	0.005	3.8	8711500 060051	060044
HF-R 214 TL5	8711500 742308	0.4	12	48.0 x 19.8 x 7.0	0.007	5.0	8711500 742315	742308
HF-R 3/414 TL5	8711500 747433	0.5	10	48.0 x 22.0 x 8.5	0.009	5.7	8711500 747440	747433
HF-R 121 TL5	8711500 060068	0.3	12	39.6 x 19.8 x 7.0	0.005	3.8	8711500 060075	060068
HF-R 221 TL5	8711500 744722	0.4	12	48.0 x 19.8 x 7.0	0.007	5.0	8711500 744739	744722
HF-R 124 TL5	8711500 060082	0.3	12	39.6 x 19.8 x 7.0	0.005	3.8	8711500 060099	060082
HF-R 224 TL5	8711500 744852	0.4	12	48.0 x 19.8 x 7.0	0.007	5.0	8711500 744869	744852
HF-R 128 TL5	8711500 741790	0.3	12	39.6 x 19.8 x 7.0	0.005	3.8	8711500 741806	741790
HF-R 228 TL5	8711500 742285	0.4	12	48.0 x 19.8 x 7.0	0.007	5.0	8711500 742292	742285
HF-R 135 TL5	8711500 741813	0.3	12	39.6 x 19.8 x 7.0	0.005	3.8	8711500 741820	741813
HF-R 235 TL5	8711500 744814	0.4	12	48.0 x 19.8 x 7.0	0.007	5.0	8711500 744821	744814
HF-R 139 TL5	8711500 060105	0.3	12	39.6 x 19.8 x 7.0	0.005	3.8	8711500 060112	060105
HF-R 239 TL5	8711500 744890	0.4	12	48.0 x 19.8 x 7.0	0.007	5.0	8711500 744906	744890
HF-R 149 TL5	8711500 741837	0.3	12	39.6 x 19.8 x 7.0	0.005	3.8	8711500 741844	741837
HF-R 249 TL5	8711500 742261	0.4	12	48.0 x 19.8 x 7.0	0.007	5.0	8711500 742278	742261
HF-R 154 TL5	8711500 060549	0.3	12	39.6 x 19.8 x 7.0	0.005	3.8	8711500 060556	060549
HF-R 254 TL5	8711500 746726	0.4	12	48.0 x 19.8 x 7.0	0.007	5.0	8711500 746733	746726
HF-R 180 TL5	8711500 538840	0.3	20	39.6 x 17.0 x 13.0	0.010	6.4	8711500 538857	538840