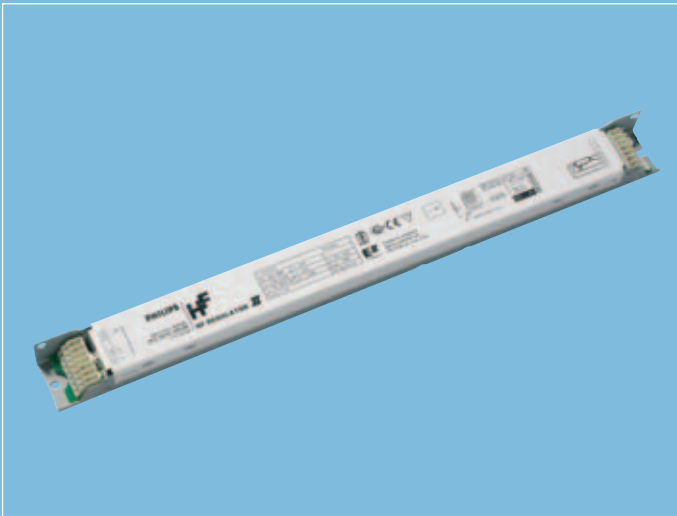


Fluorescent electronic

(Additional to Chapter 3.138 catalogue 2005/2006)

HF-REGULATOR// TL5



HF-REGULATOR// I-10V

1-10V

E II
TECHNOLOGY

Product description

Flat, lightweight high-frequency electronic regulating ballast, using I-10V protocol, for TL5 fluorescent lamps. The HF-REGULATOR// ballasts incorporate the new Philips EII technology.

Features and benefits

- The lamp power can be regulated between 100% to 1%.
- Flat ballast design, 21 mm high.
- Up to 60% reduction in energy consumption can be achieved by using automatic lighting control systems.
- Quick programmed start: 0.5 sec, flicker-free warm start, preheating the lamp electrodes. This enables the lamps to be switched on and off without reducing useful life. Ideal for areas with a high switching frequency.
- Analog control input according to the industry standard I-10V.
- Increased lamp wire flexibility thanks to the Parasitic Capacitance Compensation (longer lamp wiring possible up to 2 meter).
- Smart power: constant light, independent of mains voltage fluctuations.
- Unit is protected against excessive mains voltages, incorrect connections and incorrect lamp use.
- Striation-free operation, no stroboscopic effects.
- Automatic stop circuit is activated within five seconds in case of lamp failure (safety stop). Once the lamp has been replaced, the ballast resets automatically.
- Equipped with connectors suitable for automatic wiring machines.

The Philips HF-REGULATOR// electronic ballasts are equipped with EII-dim technology. This is a dedicated integrated circuit that ensures independent control of each electrode and, in doing so, takes care that:

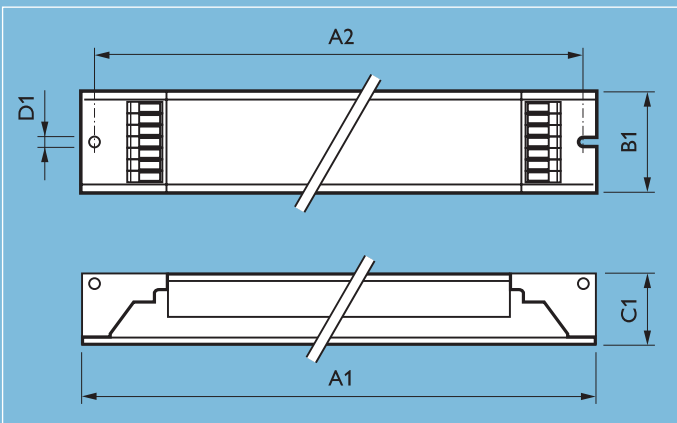
- lamp life is unaffected by dimming position
- lamp burning is stable in every dimming position; and
- energy savings, when dimming are maximised.

Applications

Typical areas of application include:

- I-10V installations with daylight linking and/or movement detection (for energy savings)
- I-10V installations with remote control systems (combining energy savings with comfort)
- Installations with emergency back-up, according to IEC 60598-2-22/VDE 0108.

Dimensions in mm



	A1	A2	B1	C1	D1
1 Lamp	360	350	30	21	4.2
2 Lamp	360	350	30	21	4.2
2 x 80W	425	415	30	21	4.2
3/4 Lamp	360	350	39	21	4.2

Dimensions in mm

Examples


- Office buildings: insurance companies, banks, government ministries
 - Cellular or open plan offices
 - Conference rooms, lecture theatres, corridors
- Schools
- Hospitals
- Department stores, shops, supermarkets
- Hotels, restaurants and bars
- Cinemas, museums.

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 Limit B
- Harmonics: IEC 61000-3-2
- Immunity: IEC 61547
- Safety: IEC 61347-2-3
- Performance: IEC 60929
- Vibration & bump tests: IEC 60068-2-6-FC
IEC 60068-2-29-Eb
- Quality standard: ISO 9001
- Environmental standard: ISO 14001
- Approval marks: ENEC
EMV-VDE
- Temp. declared thermally protected: IEC 61347-1 
- CE marking

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

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

Notes:

- For continuous DC application, an external fuse should be used in the luminaire.
- Continuous low DC voltages (<198 V) can influence the lifetime of the ballast.
- For the HF-R 280 TL5/PL-L EII lamp power will be limited to 50% of the nominal lamp power when operating on DC.

Earth leakage current < 0.5 mA per ballast

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

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

Automatic restart after lamp replacement or voltage dip Yes

Mains current at 230V

Ballast	Lamp type	Qty of lamps	Input current A
HF-R 114-35 TL5 EII	TL5 HE 14W	1	0.09
HF-R 214-35 TL5 EII	TL5 HE 14W	2	0.15
HF-R 314 TL5 EII	TL5 HE 14W	3	-
HF-R 414 TL5 EII	TL5 HE 14W	4	-
HF-R 114-35 TL5 EII	TL5 HE 21W	1	0.12
HF-R 214-35 TL5 EII	TL5 HE 21W	2	0.23
HF-R 114-35 TL5 EII	TL5 HE 28W	1	0.14
HF-R 214-35 TL5 EII	TL5 HE 28W	2	0.27
HF-R 114-35 TL5 EII	TL5 HE 35W	1	0.17
HF-R 214-35 TL5 EII	TL5 HE 35W	2	0.34
HF-R 124 TL5 EII	TL5 HO 24W	1	-
HF-R 224 TL5 EII	TL5 HO 24W	2	-
HF-R 324 TL5 EII	TL5 HO 24W	3	-
HF-R 424 TL5 EII	TL5 HO 24W	4	-
HF-R 139 TL5 EII	TL5 HO 39W	1	-
HF-R 239 TL5 EII	TL5 HO 39W	2	-
HF-R 149 TL5 EII	TL5 HO 49W	1	0.24
HF-R 249 TL5 EII	TL5 HO 49W	2	0.45
HF-R 154 TL5 EII	TL5 HO 54W	1	0.27
HF-R 254 TL5 EII	TL5 HO 54W	2	0.53
HF-R 180 TL5/PL-L EII	TL5 HO 80W	1	0.38
HF-R 280 TL5/PL-L EII	TL5 HO 80W	2	0.75

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Inrush current

Ballast	Qty of lamps	Max. quantity of ballasts per Miniature Circuit Breaker	Inrush current I/2 value time at typical mains impedance
Type B16 A			
HF-R 114-35 TL5 EII	1x14	12	27A/300 µS
HF-R 214-35 TL5 EII	2x14	12	45A/400 µS
HF-R 314 TL5 EII	3x14	-	-
HF-R 414 TL5 EII	4x14	-	-
HF-R 114-35 TL5 EII	1x21	28	27A/300 µS
HF-R 214-35 TL5 EII	2x21	12	45A/400 µS
HF-R 114-35 TL5 EII	1x28	28	27A/300 µS
HF-R 214-35 TL5 EII	2x28	12	45A/400 µS
HF-R 114-35 TL5 EII	1x35	28	27A/300 µS
HF-R 214-35 TL5 EII	2x35	12	45A/400 µS
HF-R 124 TL5 EII	1x24	-	-
HF-R 224 TL5 EII	2x24	-	-
HF-R 324 TL5 EII	3x24	-	-
HF-R 424 TL5 EII	4x24	-	-
HF-R 139 TL5 EII	1x39	-	-
HF-R 239 TL5 EII	2x39	-	-
HF-R 149 TL5 EII	1x49	28	19A/220 µS
HF-R 249 TL5 EII	2x49	12	32A/300 µS
HF-R 154 TL5 EII	1x54	28	24A/250 µS
HF-R 254 TL5 EII	2x54	12	45A/400 µS
HF-R 180 TL5/PL-L EII	1x80	12	45A/400 µS
HF-R 280 TL5/PL-L EII	2x80	9	35A/350 µS

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

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

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 the above mentioned test is carried out and before the installation is put into operation.

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

Ignition time Typical 0.5 sec. quick warm start.

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

Lamps	Qty of Lamps	Ballast	System Power* W	Lamp Power* W	Ballast Loss* W	Efficacy at 35 °C** lm/W	Lumen* lm	CELMA Nom.* EEI
TL5 HE 14W	1	HF-R 114-35 TL5 EII	18	14	4	96	1200	AI
TL5 HE 14W	2	HF-R 214-35 TL5 EII	34	2x14	6	96	2400	AI
TL5 HE 14W	3	HF-R 314 TL5 EII	-	-	-	96	3600	AI
TL5 HE 14W	4	HF-R 414 TL5 EII	-	-	-	96	4800	AI
TL5 HE 21W	1	HF-R 114-35 TL5 EII	25	22	3	100	1900	AI
TL5 HE 21W	2	HF-R 214-35 TL5 EII	49	2x22	5	100	3800	AI
TL5 HE 28W	1	HF-R 114-35 TL5 EII	32	28	4	104	2600	AI
TL5 HE 28W	2	HF-R 214-35 TL5 EII	61	2x28	5	104	5200	AI
TL5 HE 35W	1	HF-R 114-35 TL5 EII	38	35	3	104	3300	AI
TL5 HE 35W	2	HF-R 214-35 TL5 EII	76	2x35	6	104	6600	AI
TL5 HO 24W	1	HF-R 124 TL5 EII	-	-	-	-	2000	AI
TL5 HO 24W	2	HF-R 224 TL5 EII	-	-	-	-	4000	AI
TL5 HO 24W	3	HF-R 324 TL5 EII	-	-	-	-	6000	AI
TL5 HO 24W	4	HF-R 424 TL5 EII	-	-	-	-	8000	AI
TL5 HO 39W	1	HF-R 139 TL5 EII	-	-	-	-	3500	AI
TL5 HO 39W	2	HF-R 239 TL5 EII	-	-	-	-	7000	AI
TL5 HO 49W	1	HF-R 149 TL5 EII	54	49	5	99	4300	AI
TL5 HO 49W	2	HF-R 249 TL5 EII	106	2x49	8	99	8600	AI
TL5 HO 54W	1	HF-R 154 TL5 EII	62	55	7	93	4450	AI
TL5 HO 54W	2	HF-R 254 TL5 EII	119	2x55	9	93	8900	AI
TL5 HO 80W	1	HF-R 180 TL5/PL-L EII	87	80	7	88	6150	AI
TL5 HO 80W	2	HF-R 280 TL5/PL-L EII	174	2x81	12	88	12300	AI

* Typical values for /830 measured at 100% power and 25 °C lamp ambient temperature

** Typical values at 35 °C (light top for MASTER TL5 Super 80 lamps)

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Lamp	Qty of Lamps	Ballast	Power Factor	Max cable Cap ¹⁾ Lp-Lp/Lp-Lgnd PF	Tc max °C	Operating Frequency kHz
TL5 HE 14W	1	HF-R 114-35 TL5 EII	0,95	100/75	75	42..110
TL5 HE 14W	2	HF-R 214-35 TL5 EII	0,95	100/75	75	42..110
TL5 HE 14W	3	HF-R 314 TL5 EII	-	-	-	42..110
TL5 HE 14W	4	HF-R 414 TL5 EII	-	-	-	42..110
TL5 HE 21W	1	HF-R 114-35 TL5 EII	0,96	100/75	75	42..110
TL5 HE 21W	2	HF-R 214-35 TL5 EII	0,96	100/75	75	42..110
TL5 HE 28W	1	HF-R 114-35 TL5 EII	0,98	100/75	75	42..110
TL5 HE 28W	2	HF-R 214-35 TL5 EII	0,98	100/75	75	42..110
TL5 HE 35W	1	HF-R 114-35 TL5 EII	0,99	100/75	75	42..110
TL5 HE 35W	2	HF-R 214-35 TL5 EII	0,99	100/50	75	42..110
TL5 HO 24W	1	HF-R 124 TL5 EII	-	-	-	-
TL5 HO 24W	2	HF-R 224 TL5 EII	-	-	-	-
TL5 HO 24W	3	HF-R 324 TL5 EII	-	-	-	-
TL5 HO 24W	4	HF-R 424 TL5 EII	-	-	-	-
TL5 HO 39W	1	HF-R 139 TL5 EII	-	-	-	-
TL5 HO 39W	2	HF-R 239 TL5 EII	-	-	-	-
TL5 HO 49W	1	HF-R 149 TL5 EII	0,98	100/150	75	42..110
TL5 HO 49W	2	HF-R 249 TL5 EII	0,99	50/75	75	42..110
TL5 HO 54W	1	HF-R 154 TL5 EII	0,98	100/150	75	42..110
TL5 HO 54W	2	HF-R 254 TL5 EII	0,99	50/75	75	42..110
TL5 HO 80W	1	HF-R 180 TL5/PL-L EII	0,99	100/150	75	42..110
TL5 HO 80W	2	HF-R 280 TL5/PL-L EII	0,99	100/150	75	42..110

1) Lp-Lp = between lamp wires Typical wire capacitance 50 pF/m (spacing between wires 0.5 mm)
Lp-Lgnd = between lamp wires and ground Typical wire capacitance 72 pF/m (spacing between wires 0.5 mm)

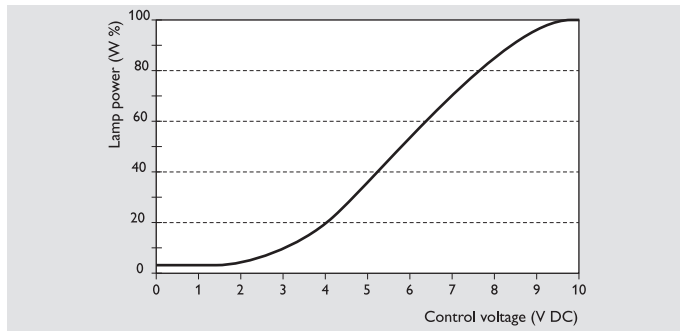
Control input

Regulating level (lamp power) 1 to 100%

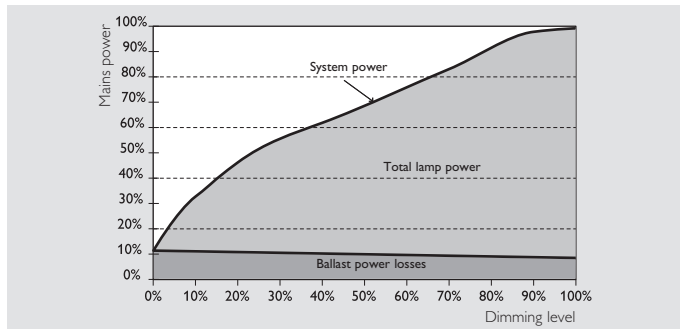
The control input complies with IEC 60929 (Annex E) and is compatible with Philips lighting control equipment

Control input insulation, basic insulation ≥ 1500 V

Protected against accidental mains voltage connection Yes



Relationship between lamp power and control voltage



Input power vs dimlevel HF-REGULATOR// (1-10V)

Technical data for design and mounting in fixtures

Temperatures

Temperature range to ignite lamp
 With ignition aid 0 °C to +50 °C
 at a 70..100% dim input -20 °C to +50 °C

Storage temperature range -25 °C to +80 °C

Stable lamp operation assured > 15 °C*

Striation possible < 10 °C

* > 20 °C for HF-R 280 TL5/PL-L EII

Maximum Tcase 75 °C

The 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 REGULATOR// ballast for TL5 applications 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.

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

EMI precautions have to be taken

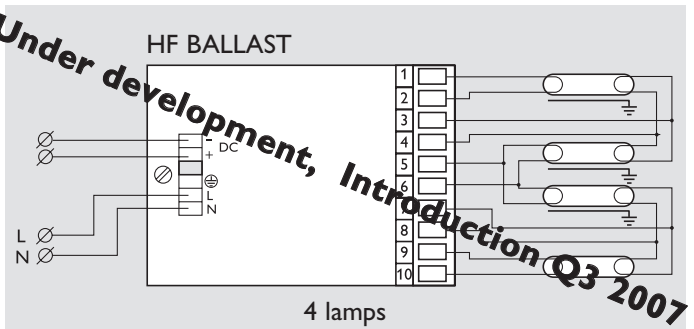
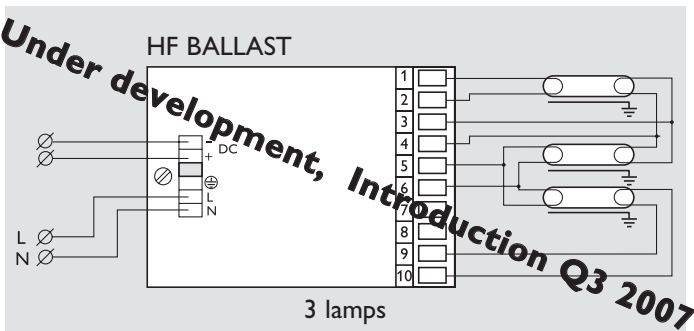
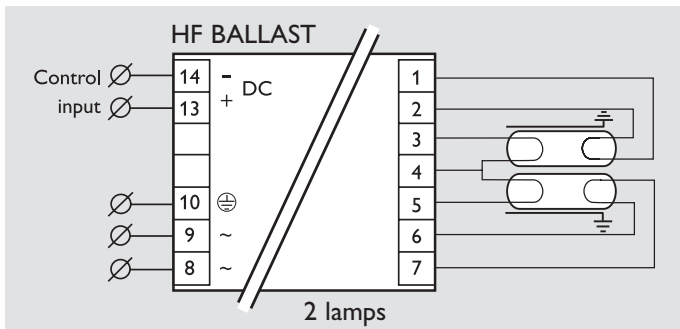
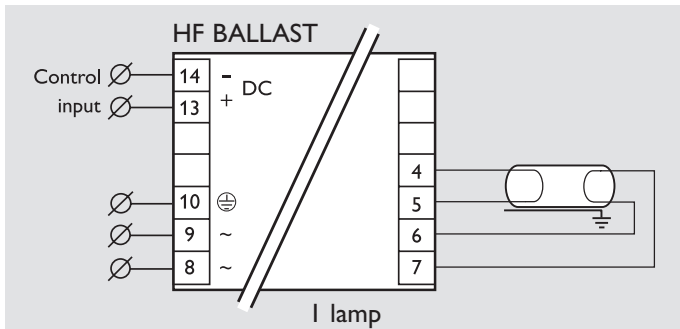
Outdoor Ballast IP=23
 In outdoor the luminaire has to be sufficiently IP rated
 Permitted humidity is tested according to IEC 61347-1 par 11
 Note that no moisture or condensation may enter the ballast

Ignition aid For optimum ignition the TL5 lamps should be mounted at a maximum distance of 6 mm from a metal plate
 The metal plate should be electrically connected to the ballast housing

Earthing Earthing of the HF ballast in a luminaire is necessary for EMC (electromagnetic compatibility)

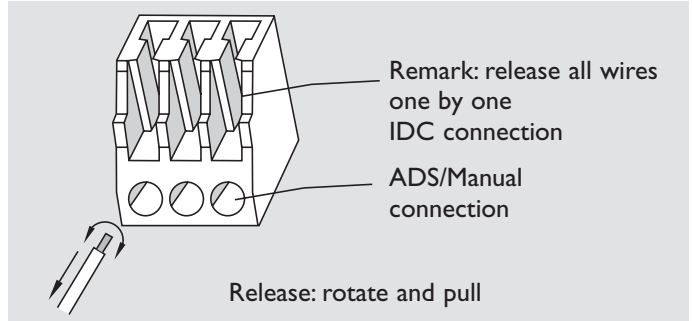
Hum and noise level Inaudible

Wiring diagrams



Connector type

Connection wiring is greatly simplified through use of WAGO 251 universal connector. Suitable for both automatic wiring (ALF and ADS) and manual wiring.



Wire cross-section

IDC connection	0.5 mm - 1.0 mm ²
ADS manual connection	0.5 mm - 0.75 mm ^{2*}
Strip length	8.0 - 9.0 mm

*Stranded wire

Wiring tips

Earth connection to be made via housing or mains connector. Wiring inside fixture should be straight and as short as possible. Lamp wires should not run parallel to mains or control wires to avoid EMC problems. For optimal performance, note that:

- For one lamp ballasts wires 4 and 5 as short as possible, equal in length and a minimum of 50 mm from mains or dim wires. Keep lamp wires 6 and 7 equal in length.
- For two lamp ballasts wires 3, 4 and 5 as short as possible, equal in length and a minimum of 50 mm from mains or dim wires. Keep lamp wires 6 and 7 and 1 and 2 equal in length.

Notes

1. Data based on a mains supply with an impedance of 400 mΩ (equal to 15 m cable of 2.5 mm² 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 based on the assumption that 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 multipole MCB's it is recommended to reduce the number of ballasts by 20%.
6. For optimum performance care has to be taken for symmetrical wiring. Minimal 6 mm distance from lamp to earth plane.
7. In case of DC operation the HF-R 280 TL5/PL-L EII will have maximum 40% light output.

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HF-REGULATOR// TL5

Ordering and packaging data

Ballast	I Piece		Bulk packaging					EOC
	EAN code	Weight	Qty	Dimensions	Volume	Weight	EAN code	
		kg	pcs	lxwxh cm	m ³	Gross kg		
HF-R 114-35 TL5 EII	8711500 911803	0,26	12	40.8x20.8x7.6	0,0065	3,4	8711500 911810	911803 30
HF-R 214-35 TL5 EII	8711500 911780	0,29	12	40.8x20.8x7.6	0,0065	3,8	8711500 911797	911780 30
HF-R 149 TL5 EII	8711500 909985	0,26	12	40.8x20.8x7.6	0,0065	3,4	8711500 909992	909985 30
HF-R 249 TL5 EII	8711500 910035	0,31	12	40.8x20.8x7.6	0,0065	4,0	8711500 910042	910035 30
HF-R 154 TL5 EII	8711500 910059	0,27	12	40.8x20.8x7.6	0,0065	3,5	8711500 910073	910059 30
HF-R 254 TL5 EII	8711500 910080	0,33	12	40.8x20.8x7.6	0,0065	4,2	8711500 910103	910080 30
HF-R 180 TL5/PL-L EII	8711500 910110	0,29	12	40.8x20.8x7.6	0,0065	3,7	8711500 910127	910110 30
HF-R 280 TL5/PL-L EII	8711500 910653	0,42	12	47.6x20.6x7.6	0,0075	5,3	8711500 910660	910653 30

Ordering and packaging data

Ballast	I Piece		Bulk packaging					EOC
	EAN code	Weight	Qty	Dimensions	Volume	Weight	EAN code	
		kg	pcs	lxwxh cm	m ³	Gross kg		
HF-R 314 TL5 EII								
HF-R 414 TL5 EII								
HF-R 124 TL5 EII								
HF-R 224 TL5 EII								
HF-R 324 TL5 EII								
HF-R 424 TL5 EII								
HF-R 139 TL5 EII								
HF-R 239 TL5 EII								

Under development, Introduction Q3 2007



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