Stand Alone Controls

ToBeTouched

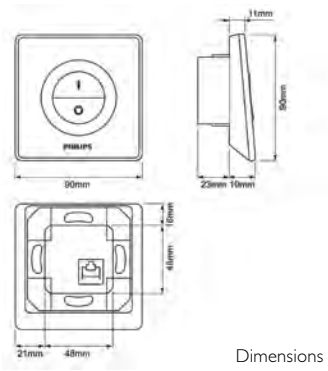
Simplicity Itself.

People working in busy office, school, shop, hospitality and health care environments don't have time to waste working out how to operate the lighting. Building upon the iconic design and user-friendliness of the colour ring used in LivingColours, the ToBeTouched range of intuitive user interfaces brings the same style and ease of interaction to professional lighting applications.

The dynamic "Light Wheel", can change its appearance to visualise different light parameters including brightness, colour, saturation and colour temperature. The user can select which parameter to edit and the "Light Wheel" changes according to the selection. The "what you see is what you get" visualisation of the "Light Wheel" makes it intuitive and easy for the user to predict the result of his or her choice. The soft touch control and the dynamic light ring enriches the experience and adds an element of wonder.

ToBeTouched currently comprises four models. These range from a simple on/off switch, plus a version with dimming, through to a cool/warm white controller and a full-colour model.

Assisting the user with light, sound and colour feedback, these easy-to-install interfaces make operating a lighting system easy – and fun!

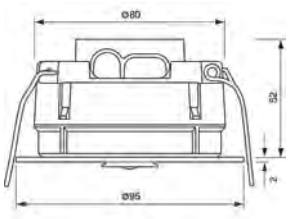


Dimensions in mm (Nominal)

TOBETOUCHED		
Commercial Code	Description	Min Order Quantity
UID8520DIMDALI	UID8520 TOBETOUCHED DIM DALI	1
UID8523LIGHTBOOST	UID8523/00 CDM LIGHT BOOST CONTROLLER	1
UID8530CTDMX	UID8530 TOBETOUCHED COLOUR TEMPERATURE DMX	1
UID8540RGBDMX	UID8540 TOBETOUCHED COLOUR DMX	1
UIA8550TBTPSU	UIA8550 TOBETOUCHED POWER SUPPLY UNIT	1

OccuSwitch DALI

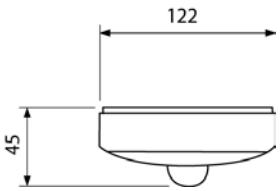
The OccuSwitch DALI is a combined sensor and controller. It will dim and switch the lights in a room or area on occupancy and available daylight, with options for local override, parallel operation. A detachable wiring connector enables easy installation and mounting in the ceiling. Separate Wieland cables are available for an even easier, fast and trouble-free installation.



OCCUSWITCH DALI		
Commercial Code	Description	Min Order Quantity
LRM2070DALI	LRM2070/10 BASIC	1
LRM2080DALI	LRM2080/10 ADVANCED	1

Occuswitch - LRM1000 Movement Detector

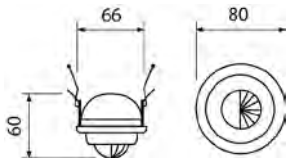
LRM1000 is a ceiling mountable 360 degree motion detector, with built in photo cell sensor and adjustable switch off delay (10sec - 5min), and is capable of switching 2000VA



OCCUSWITCH – LRM1000		
Commercial Code	Description	Min Order Quantity
LRM1000	LRM1000/00 OS Mov Det	1

Occuswitch - LRM1010 Movement Detector Small

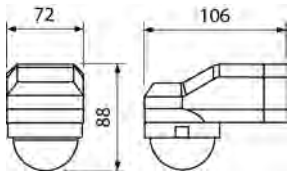
LRM1010 is a recessed surface mounted 360D motion detector, with a built in photo cell sensor and adjustable switch off delay (10sec - 5min). It is capable of switching 1000VA, and has an adjustable directional lense.



OCCUSWITCH – LRM1010		
Commercial Code	Description	Min Order Quantity
LRM1010	LRM1010/00 OS Mov Det Small	1

Occuswitch - LRM1040 Movement Detector 180D Wall/Corner

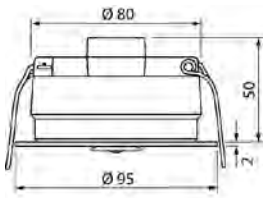
LRM1040 is a wall or corner mounted 180D movement detector, with built in photo cell sensor and adjustable switch off delay (5sec - 12min). It is capable of switching 2000VA, and has selectable Auto/Off mode.



OCCUSWITCH – LRM1040		
Commercial Code	Description	Min Order Quantity
LRM1040	LRM1040/00 OS Mov Det Ip44 180Dgr	1

Occuswitch - LRM1070 Movement Detector

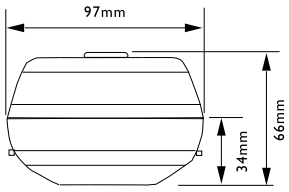
LRM1070 is a movement detector with a built in lighting switch. The unit is designed for the automatic switching of light in indoor applications, with a light sensor range between 10 and 1000 lux. It comes with 360D movement detection, with built in photo cell sensor and adjustable switch of delay (1min - 30min). It is capable of switching 1380 VA, and can run parrallel operation. The product also comes with an optional surface mount box accessory.



OCCUSWITCH - LRM1070		
Commercial Code	Description	Min Order Quantity
LRM1070	LRM1070/00 Sensr Mov Det St	1
LRH1070	LRH1070/00 Sensr Surface Box (to suit Occuswitch LRM1070/00)	1

Highbay Sensor: High Bay 360° Occupancy Sensor

Philips LRM 2510 high bay occupancy sensor with Passive Infrared (PIR) technology operates on line voltage and switch loads directly without the need for power packs. They install to a junction box or fixture and have a detection pattern that covers the typical area of three fixtures.



HIGHBAY SENSOR: HIGH BAY 360° OCCUPANCY SENSOR		
Commercial Code	Description	Min Order Quantity
LRM2510	LRM 2510/00 PIR HIGH BAY HV SENSR	15

Electronic Control Gear

HF Regulator Intelligent Touch & DALI for TL5, TL5 Eco, TLD and PLL

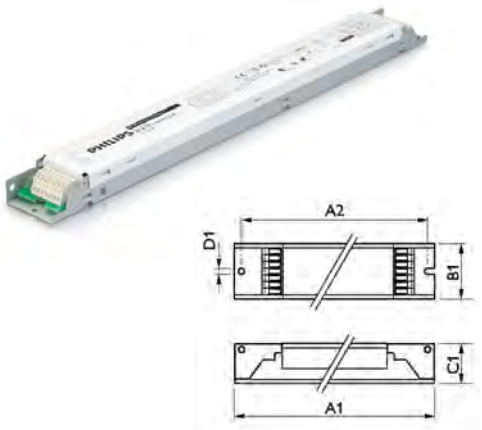
Intelligent high-frequency electronic dimming ballast, using DALI (Digital Addressable Lighting Interface according to IEC62386) or Touch and Dim push-button protocol for fluorescent lamps. Pre-empts upcoming legislation meeting A1 BAT (Best Available Technology) requirements. With a special command you can retrieve the mains power consumption of the system, and with another command you can ask which lamp wattages are connected.

Benefits:

- Extremely low stand-by losses, controlled cut-off for dim levels above 80%, hybrid control dimming (current control at 100% and power control at 1%), combined with MASTER TL5 Eco for extra energy savings
- HF operation improves light quality, lamp lifetime
- Combined with controls, additional energy savings can be achieved
- Compliant with European and Asian norms and suitable for emergency lighting systems

Features:

- The HF-R Intelligent recognises which lamp (T5 HE, HO, ECO or TL-D) is connected and is operated accordingly
- Programmed start: flicker-free ignition < 1.0 second and striation free operation, no stroboscopic effects. Preheating the lamp electrodes enables the lamps to be switched on and off without reducing life
- Smart power ensures constant light, independent of mains fluctuations and dimming from 1 to 100%
- Stop circuit is activated within 5 seconds in the event of lamp failure (safety stop), and ballast resets automatically after lamp replacement



Product ID	A1 (Norm)	A2 (Norm)	B1 (Norm)	C1 (Norm)	D1 (Norm)
HF-Ri TD 1 35/49/80 TL5 E+	360.0	350.0	30.0	22.0	4.1
HF-Ri TD 1 28/35/49/54 TL5 E+	360.0	350.0	30.0	22.0	4.1
HF-Ri TD 2 28/35/49/54 TL5 E+	360.0	350.0	30.0	22.0	4.1
HF-Ri TD 1 14/21/24/39 TL5 E+	360.0	350.0	30.0	22.0	4.1
HF-Ri TD 2 14/21/24/39 TL5 E+	360.0	350.0	30.0	22.0	4.1
HF-Ri TD 3 14/24 TL5 E+ 195-240V 50/60Hz	360.0	350.0	39.0	22.0	4.2
HF-Ri TD 4 14/24 TL5 E+ 195-240V 50/60Hz	360.0	350.0	39.0	22.0	4.2

Dimensions in mm

HF Regulator Intelligent Touch & DALI for TL5, TL5 Eco, TLD and PLL

continued

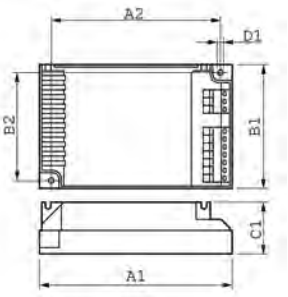
HF-RI TD

Shortcode	Description	Wattage (W)	Voltage	Min Order Quantity	Carton Qty
HFRi114/21/24/39	HF-Ri TD 1 14/21/24/39 TL5 TLD PLL	14/21/24/39	220-240V	1	12
HFRi214/21/24/39	HF-Ri TD 2 14/21/24/39 TL5 TLD PLL	14/21/24/39	220-240V	1	12
HFRi128/35/49/54	HF-Ri TD 1 28/35/49/54 TL5 TLD PLL	28/35/49/54	220-240V	1	12
HFRi228/35/49/54	HF-Ri TD 2 28/35/49/54 TL5 TLD PLL	28/35/49/54	220-240V	1	12
HFRi135/49/80	HF-Ri TD 1 35/49/80 TL5 TLD PLL	35/49/80	220-240V	1	12
HF-Ri TD 314/24	HF-Ri TD 314/24 TL5	14/24	220-240V	12	12
HF-Ri TD 414/24	HF-Ri TD 414/24 TL5	14/24	220-240V	12	12

	T5 HE/T5 ECO HE				T5 HO/T5 ECO HO					TLD			PLL				
Shortcode	14/13	21/19	28/25	35/32	24/20	39/34	54/50	49/45	80/73	18	36	58	24	36	40	55	80
HF-Ri TD 1 14/21/24/39 TL5 E+	•	•			•	•					•		•	•	•		
HF-Ri TD 2 14/21/24/39 TL5 E+	•	•			•	•					•		•	•	•		
HF-Ri TD 1 28/35/49/54 TL5 E+			•	•			•	•				•				•	
HF-Ri TD 2 28/35/49/54 TL5 E+			•	•			•	•				•				•	
HF-Ri TD 1 35/49/80 TL5 E+				•				•	•								•

HF Regulator Touch & DALI for PL-R Eco

HF-Regulator II Touch DALI for PL-T, PL-C and PL-R lamps – Dimming: a next step in energy saving. Low stand-by losses, together with controlled dimming. HF operation improves light quality, lamp lifetime. Combined with controls, additional energy savings can be achieved.



Product ID	Length A1	Fixing Hole Distance Length A2	Width B1	Height C1	Fixing Hole Diameter D1
HF-R TD 114-17 PL-R EII 123	111	79	33	4.5	?

Dimensions in mm

HF-R TD PL-R ECO

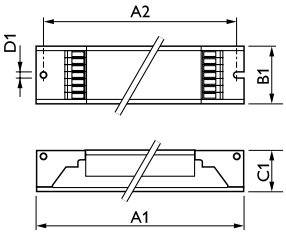
Shortcode	Description	Wattage (W)	Voltage	Min Order Quantity	Carton Qty
HFRTD114-17PLR	HF-R TD 1 14-17 PL-R EII 220-240V	14/17	220-240V	12	12
HFRTD214-17PLR	HF-R TD 2 14-17 PL-R EII 220-240V	14/17	220-240V	12	12

HF Performer III (Fixed Output) for TL5, TL5 Eco and TLD

One of the most energy efficient fixed output (A2 BAT), slim, high frequency electronic ballast for fluorescent lamps. HF-operation reduces eye strain as caused by electromagnetic ballasts. Automatic restart (after voltage dip or lamp exchange) ensures easy operation and hassle free re-lamping.

Key features:

- Programmed, flicker-free, preheated start (< 1.0s)
- 100,000 hour lifetime at Ta 50°C and over 100,000 on/off switches on one lamp
- Automatic restart (after voltage dip or lamp exchange) ensures easy operation and hassle free re-lamping



Product ID	Length A1	Fixing Hole Distance Length A2	Width B1	Height C1	Fixing Hole Diameter D1
TL5 1 and 2x lamp	360	350	30	22	4.2
TL-D 1 and 2x lamp	280	265	30	28	4.2

Dimensions in mm

TL5

Shortcode	Description	Wattage (W)	Voltage	Min Order Quantity	Carton Qty
HFP114-35TL5III	HF-P 1 14-35 TL5 HE III 220-240V 50/60Hz	14/21/28/35	220-240V	1	12
HFP214-35TL5III	HF-P 2 14-35 TL5 HE III 220-240V 50/60Hz	14/21/28/35	220-240V	1	12
HFP149TL5HOIII IDC	HF-P 149 TL5 HO III 220-240V 50/60Hz IDC	49	220-240V	1	12
HFP249TL5HOIII IDC	HF-P 249 TL5 HO III 220-240V 50/60Hz IDC	49	220-240V	1	12
HFP154/155TL5HO/PLLIII IDC	HF-P 154/155 TL5 HO/PLL III 220-240V IDC	54/55	220-240V	1	12
HFP254/255TL5HO/PLLIII IDC	HF-P 254/255 TL5 HO/PLL III 220-240V IDC	54/55	220-240V	1	12

TL-D

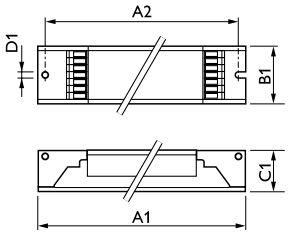
Shortcode	Description	Wattage (W)	Voltage	Min Order Quantity	Carton Qty
HFP118TLD	HF-P 118 TL-D III 220-240V 50/60Hz IDC	18	220-240V	1	12
HFP136TLD	HF-P 136 TL-D III 220-240V 50/60Hz IDC	36	220-240V	1	12
HFP158TLD	HF-P 158 TL-D III 220-240V 50/60Hz IDC	58	220-240V	1	12
HFP218TLD	HF-P 218 TL-D III 220-240V 50/60Hz IDC	18	220-240V	1	12
HFP236TLD	HF-P 236 TL-D III 220-240V 50/60Hz IDC	36	220-240V	1	12
HFP258TLD	HF-P 258 TL-D III 220-240V 50/60Hz IDC	58	220-240V	1	12

HF Selectalume II (Fixed Output) for TL5 and TLD

Affordable, reliable, high frequency electronic ballast for TL5 and TLD fluorescent lamps, ideal alternative for electromagnetic (EM) ballasts.

Key features:

- Energy efficient CELMA A2, savings of 25% energy compared to electromagnetic "C-type" ballasts
- Robust design for 70,000 hour lifetime at Ta=50°C with >50,000 on/off switches on one lamp
- Warm, flicker-free start
- High power factor 0.98 with THD <10%
- Automatic restart after voltage dip or lamp exchange



Product ID	Length A1	Fixing Hole Distance Length A2	Width B1	Height C1	Fixing Hole Diameter D1
TL5 1 and 2x lamp	280	265	30	21.5	4.2
TL-D 1 and 2x lamp	280	265	30	28	4.2

Dimensions in mm

TL5

Shortcode	Description	Wattage (W)	Voltage	Min Order Quantity	Carton Qty
HFS114-35TL5II	HF-S 114-21 TL5 II 220-240V	14/21	220-240V	1	12
HFS214TL5II	HF-S 214 TL5 II 220-240V	14	220-240V	1	12
HFS128-35TL5II	HF-S 128-35 TL5 II 220-240V	28/35	220-240V	1	12
HFS221-28TL5II	HF-S 221-28 TL5 II 220-240V	21/28	220-240V	1	12

TLD

Shortcode	Description	Wattage (W)	Voltage	Min Order Quantity	Carton Qty
HFS118TLDII	HF-S 118 TL-D II 220-240V	18	220-240V	1	12
HFS218TLDII	HF-S 218 TL-D II 220-240V	18	220-240V	1	12
HFS136TLDII	HF-S 136 TL-D II 220-240V	36	220-240V	1	12
HFS236TLDII	HF-S 236 TL-D II 220-240V	36	220-240V	1	12

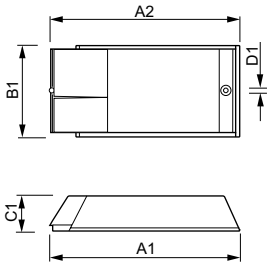
HID-Primavision (Fixed output) Mini

Indoor one-piece electronic ballasts for optimum performance of 20W to 150W CDM discharge lamps. The benefits of electronic gear versus conventional gear are the elimination of lamp flicker, and increase in lamp life of up to 30%, and a reduction of colour shift and simple installation.

"I"- type Independent version, with strain relief, for stand-alone operation.

"S" - type Standard version, for in-fixture operation.

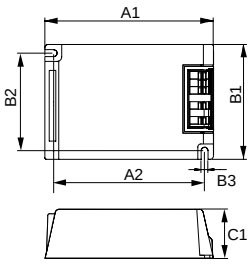
"I" TYPE



Product ID	Length A1	Fixing Hole Distance Length A2	Width B1	Height C1	Fixing Hole Diameter D1
HIDPVm I	190.0	154.0	43.3	30.0	-
HIDPVC 35/70 I	188.0	170.0	62.7	34.5	4.8
HIDPVC 100/150 I	223.9	206.0	82.7	34.2	4.8

Dimensions in mm

"S" TYPE



Product ID	Length A1	Fixing Hole Distance Length A2	Width B1	Fixing Hole Distance Width B1	Height C1	Fixing Hole Diameter D1
HIDPVm S	97.3	88.3	43.3	-	30.5	4.2
HIDPVC 35/70 S	109.6	98.5	74.4	63.7	32.2	4.9
HIDPVC 100/150 S	135.0	-	75.0	-	32.0	4.8

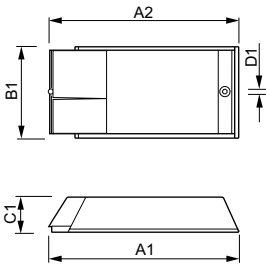
Dimensions in mm

HID PRIMAVISION FOR CDM LAMPS

Shortcode	Description	Wattage (W)	Voltage	Min Order Quantity	Carton Qty
HIDPVmPGJ520w/S	HID-PV m PGJ5 20 /S CDM HPF 220-240V	20	220-240V	1	12
HIDPVmPGJ520W/I	HID-PV m PGJ5 20 /I CDM LPF 220-240V	20	220-240V	1	12
HIDPVmPGJ520WFP	HID-PVm PGJ5 20/FP CDM LPF 220-240V	20	220-240V	1	12
HIDPVm020SCDM	HID-PV m 20 /S CDM HPF 220-240V 50/60Hz	20	220-240V	1	12
HIDPVm020ICDM	HID-PV m 20 /I CDM HPF 220-240V 50/60Hz	20	220-240V	1	12
HIDPVm020FPCDM	HID-PV m 1x020/FP CDM HPF 220-240V	20	220-240V	1	12
HIDPVm035SCDM	HID-PVm 1x035/S CDM HPF 220-240V	35	220-240V	1	12
HIDPVm035ICDM	HID-PVm 1x035/I CDM HPF 220-240V	35	220-240V	1	12
HIDPVm035FPCDM	HID-PVm 1x035/FP CDM HPF 220-240V	35	220-240V	1	12

HID-Primavision (Fixed output) continued

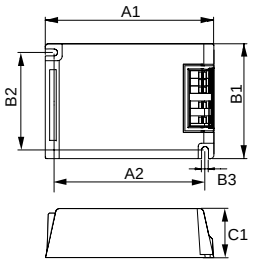
"I & FP" TYPES



Product ID	Length A1	Fixing Hole Distance Length A2	Width B1	Height C1	Fixing Hole Diameter D1
HIDPVm I	190.0	154.0	43.3	30.0	-
HIDPVC 35/70 I	188.0	170.0	62.7	34.5	4.8
HIDPVC 100/150 I	223.9	206.0	82.7	34.2	4.8

Dimensions in mm

"S" TYPE



Product ID	Length A1	Fixing Hole Distance Length A2	Width B1	Fixing Hole Distance Width B1	Height C1	Fixing Hole Diameter D1
HIDPVm S	97.3	88.3	43.3	-	30.5	4.2
HIDPVC 35/70 S	109.6	98.5	74.4	63.7	32.2	4.9
HIDPVC 100/150 S	135.0	-	75.0	-	32.0	4.8

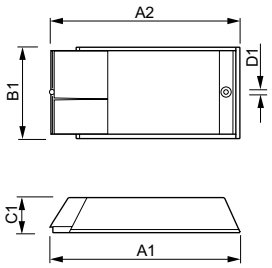
Dimensions in mm

HID PRIMAVISION FOR CDM LAMPS

Shortcode	Description	Wattage (W)	Voltage	Min Order Quantity	Carton Qty
HIDPVC50/SCDM	HID-PV C 50 /S CDM 220-240V 50/60Hz	50	220-240V	1	12
HIDPVC50/ICDM	HID-PV C 50 /I CDM 220-240V 50/60Hz	50	220-240V	1	12
HIDPVC50/FPCDM	HID-PV C 50 /FP CDM 220-240V 50/60Hz	50	220-240V	1	12
HIDPVC100/S CDM	HID-PV C 100/S CDM - flex and plug	100	220-240V	1	12
HIDPVC100/I CDM	HID-PV C 100/I CDM - flex and plug	100	220-240V	1	12
HIDPVC100/FP CDM	HID-PV C 100/FP CDM - flex and plug	100	220-240V	1	12
HIDPVC150/S CDM	HID-PV C 150/S CDM - inbuilt application	150	220-240V	1	12
HIDPVC150/ICDM	HID-PV C 150/I CDM - independent/hard wired	150	220-240V	1	12
HIDPVC150/FPCDM	HID-PV C 150/FP CDM - flex and plug	150	220-240V	1	12
HIDPVSTRAIN	HID-STRAIN RELIEF	NA	NA	10	10

HID-PrimaVision Economy (Fixed output)

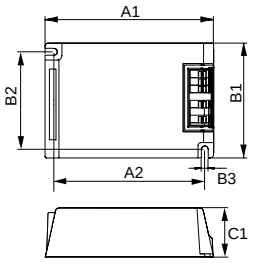
"I" TYPE



Product ID	Length A1	Fixing Hole Distance Length A2	Width B1	Height C1	Fixing Hole Diameter D1
HIDPVm I	190.0	154.0	43.3	30.0	-
HIDPVC 35/70 I	188.0	170.0	62.7	34.5	4.8
HIDPVC 100/150 I	223.9	206.0	82.7	34.2	4.8

Dimensions in mm

"S" TYPE



Product ID	Length A1	Fixing Hole Distance Length A2	Width B1	Fixing Hole Distance Width B1	Height C1	Fixing Hole Diameter D1
HIDPVm S	97.3	88.3	43.3	-	30.5	4.2
IDPVC 35/70 S	109.6	98.5	74.4	63.7	32.2	4.9
HIDPVC 100/150 S	135.0	-	75.0	-	32.0	4.8

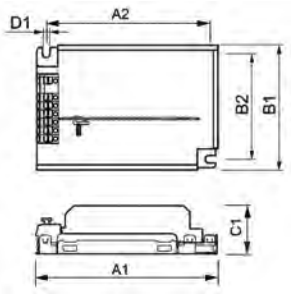
Dimensions in mm

HID PRIMAVISION FOR CDM LAMPS

Shortcode	Description	Wattage (W)	Voltage	Min Order Quantity	Carton Qty
HIDPVE35/S CDM	HID-PV E 35/S CDM - inbuilt application	35	220-240V	12	12
HIDPVE35/I CDM	HID-PV E 35/I CDM - Independent/hard wired	35	220-240V	12	12
HIDPVE35/FP CDM	HID-PV E 35/FP CDM - Flex & Plug	35	220-240V	12	12
HIDPVE70/S CDM	HID-PV E 70/S CDM - inbuilt application	70	220-240V	12	12
HIDPVE70/I CDM	HID-PV E 70/I CDM - Independent/hard wired	70	220-240V	12	12
HIDPVE70/FP CDM	HID-PV E 70/FP CDM - Flex & Plug	70	220-240V	12	12

HID AspiraVision

AspiraVision DALI Compact (70W) for CDM Elite Light Boost – The electronic gear with brains. Dim and boost Elite Light Boost lamps for energy saving and attraction lighting. SOFTSTART allows installation with fewer circuit breakers. Loop Through allows faster, cost-efficient installation.



Product ID	A1	A2	B1	B2	C1	D1
HID-AV C DALI 70 /S CDM 220-240V 50/60Hz	110.0	98.5	75.0	-	32.3	4.5

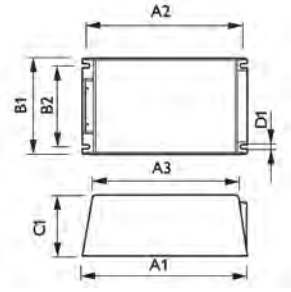
Dimensions in mm

HID ASPIRAVISION

Shortcode	Description	Wattage (W)	Voltage	Min Order Quantity	Carton Qty
HIDAVC70/S CDM	HID-AV C 70/S CDM - inbuilt application	70	220-240V	12	12
HIDAVC70/I CDM	HID-AV C 70/I CDM - independent/hard wired	70	220-240V	1	12
HIDAVC70/FP CDM	HID-AV C 70/FP CDM - flex and plug	70	220-240V	1	12

HID PrimaVision Medium Wattage Elite Ballasts

HID-PrimaVision (Xtreme) for CDM Elite MW – Xtreme drivers for the highest reliability. Most efficient white-light system in the industry in its power range. Designed to minimise maintenance costs in outdoor lighting thanks to the 80,000-hour lifetime and integrated lightning protection. Same energy consumption and smooth driving of the lamp regardless of fluctuations in the mains voltage.



Product ID	A1	A2	B1	B2	C1	D1
HID-PV Xt 210 /S CDM 220-240V 50/60Hz	170.0	156.0	101.0	81.5	59.0	5.0
HID-PV 315 /S CDM 220-240V 50/60Hz	215.0	204.5	128.5	111.5	60.0	4.2

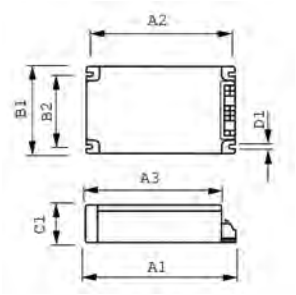
Dimensions in mm

HID PV MW ELITE BALLASTS

Shortcode	Description	Wattage (W)	Voltage	Min Order Quantity	Carton Qty
HIDPVXT210/SCDM	HID-PV Xt 210 /S CDM 220-240V 50/60Hz	210	220-240V	12	12
HIDPV315/SCDM	HID-PV 315 /S CDM 220-240V 50/60Hz	315	220-240V	12	12

HID PrimaVision for Mini White SON

PrimaVision SDW-TG (50W & 100W) for SDW-TG – High quality and robust performance. Optimal lamp performance thanks to minimal lamp power tolerance. Reduces colour differences between lamps and initial lumen spread. Performance is independent of mains voltage.



Product ID	A1	A2	B1	B2	C1	D1
HID-PV 50 /S SDW-TG 220-240V 50/60Hz	150.0	134.0	90.0	70.0	38.0	4.5
HID-PV 100 /S SDW-TG 220-240V 50/60Hz	150.0	134.0	90.0	70.0	38.0	4.5

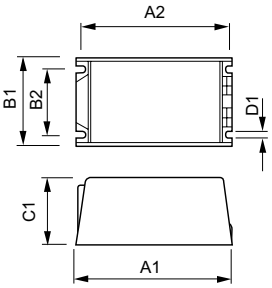
Dimensions in mm

HID PRIMAVISION FOR MINI WHITE SON

Shortcode	Description	Wattage (W)	Voltage	Min Order Quantity	Carton Qty
HIDPVC50SDWTG	HID-PV 50/S SDW-TG	50	220-240V	1	12
HIDPVC100SDWTG	HID-PV 100/S SDW-TG	100	220-240V	1	12
HID-STRAIN RELIEF	HID STRAIN RELIEF	N/A	N/A	10	10

HID PrimaVision Xtreme for CPO

Compact, robust, outdoor, one-piece, electronic ballasts for CosmoPolis White (CPO-TW) lamps. Offering an energy-saving street and road light solution with extremely long life, and suitable for withstanding outdoor environments (storms, lightning strikes, etc.).



Product ID	A1	A2	B1	B2	C1	D1
HIDPV0	150	135.9	65	46.8	65	5

Dimensions in mm

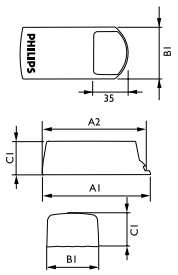
HID DYNAVISION DALI XTREME FOR CPO

Shortcode	Description	Wattage (W)	Voltage	Min Order Quantity	Carton Qty
HIDPVXt45/SCPO	HID-PV Xt 45/S CPO-TW	45	220-240V	12	12
HIDPVXt60/SCPO	HID-PV Xt 60/S CPO-TW	60	220-240V	12	12
HIDPVXt90/SCPO	HID-PV Xt 90/S CPO-TW	90	220-240V	12	12
HIDPVXt140/SCPO	HID-PV Xt 140/S CPO-TW	140	220-240V	12	12

ET-S Halogen Transformer

A high frequency electronic transformer for operation with 12 volt halogen lamps. The ET-Standard transformer is uniquely compact and lightweight. It is also dimmable with approved leading and trailing edge dimmers. A range of benefits include short-circuit protection in the event of lamp failure, temperature protection, constant output voltage, and operates at a whisper (30dB).

Wire cross section on mains and lamp sides of terminals is 0.5 to 2.5mm^2. Distance between lamp and transformer; minimum 20cm, maximum 2m. Distance from other transformers must be more than 25cm.



Product ID	A1	A2	B1	C1
ET-S	105	110	52	33.5

Dimensions in mm

ET-S HALOGEN TRANSFORMER

Shortcode	Description	Wattage (W)	Voltage	Min Order Quantity	Carton Qty
ETS60VA220240V	ET-S 60 220-240V 20-60VA	20-150	220-240V	1	50

Technical Data

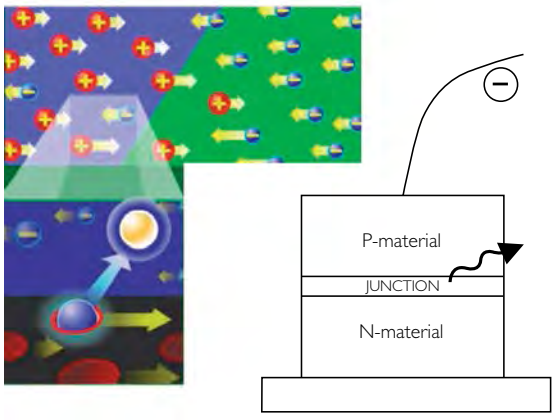
The principles of LED technology

The basis for light generation inside a Light Emitting Diode (LED), a solid-state semiconductor, is the conversion of electrical energy directly into light.

On its most basic level this can be seen as an electron that moves from one material into another while losing an amount of energy. Due to the law of conservation of energy, this loss of energy needs to be converted and, inside a LED, this energy is converted into radiation energy composed of light in the visible part of the spectrum, and a bit of infrared radiation dissipated as heat.

The LED is comprised of two semiconductor regions, a positive electrically charged or p-region and a negative electrically charged or n-region, see Diagram 1. In the p-region there is a shortage of electrons and in the n-region a surplus of electrons. When voltage is applied across these two regions, current begins to flow and electrons move across the p-n junction, from the n-region into the p-region. The process of an electron moving through the p-n junction releases energy. The dispersion of this energy produces photons with visible wavelengths. The higher the energy released, the shorter the wavelength becomes. Low-energy photons will emit in the infrared part of the spectrum, and as the energy increases, the colour of the light will change from deep red, via yellow, green, cyan and blue to the ultra-violet part of the spectrum – in fact it follows the colours of the rainbow.

Diagram 1. LED composition with the electrically charged p- and n-regions and the p-n junction emitting light.



Graph. Colour triangle for a RGB system; all colours within the triangle can be reproduced.

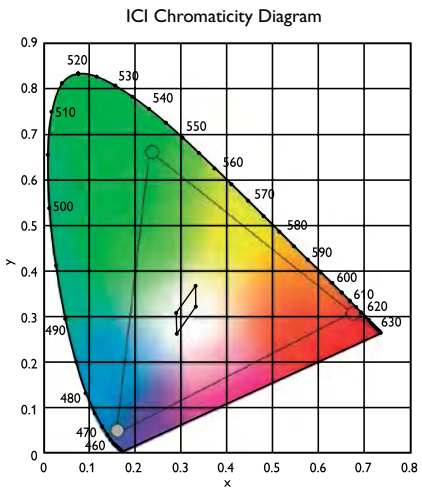
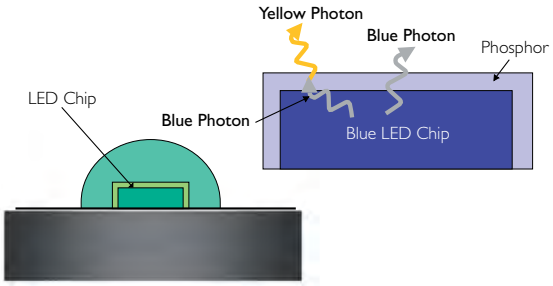


Diagram 2. White LED, the principle of white light generation.



White light and RGB (red, green and blue)

A white LED consists of a blue LED chip and a yellow phosphor coating, see Diagram 2. The blue photons generated in the semiconductor chip can either pass the phosphor layer unaffected, or be converted into yellow photons. These two colours – blue and yellow – combine to produce white light.

It is also possible to generate white light with the aid of a red, green and blue LED. Such LED array systems are called RGB systems. Normally the RGB systems are used to make different colour effects. With a RGB system all colours of light within the colour triangle can be produced.

Characteristics and benefits

On this page you will find an overview of the characteristics and benefits of LEDs. In the various indoor and outdoor applications different advantages will be important. Architectural applications will use the vivid colours and dynamic colour control, whereas the traffic signal market is focused on maximising energy savings and reducing maintenance costs to practically zero.

In general:

- More energy-efficient than incandescent and halogen lamps
- Much longer life, up to 50,000 hours at 70 percent of lumen maintenance
- Reduced maintenance cost
- No unwanted IR or UV radiation in the beam of light, less risk of fading of colour pigments and textile
- Highly efficient low-cost plastic optics can be used

Architecture/design:

- Design flexibility, hidden compact light sources
- Vivid saturated colours without the use of additional filters
- Directed light for increased system efficacy
- Robust, vibration-proof, solid-state lighting
- Less light pollution due to precise optical control

Unique LED advantages:

- Dynamic colour control, white point adjustable
- Fully dimmable without colour variation
- Instant switch-on at full colour and full lighting level
- No transmission loss due to colour filters
- Install and forget for a long time

Environment:

- No hazardous metals e.g. mercury in the light source
- Safety and low temperature:
- Low voltage DC operation
- Highly efficient in cold environment
- Cold start capability down to -40°C
- Sealed for life waterproof luminaires

Value chain

The definition of levels of integration describes the road from LED chip to luminaire, with increasing complexity and value.
Philips undertakes business activities at all levels of the value chain.

Level 0. LED chip

Semiconductor chips are the basis for every LED and these are grown in complex wafer production equipment. The wavelength of the LED is defined according to the manufacturing process, the parameters and the tolerance.

The principles of LED technology

Level 1. LED component

Packaging is the next step. Here the thermal and optical properties are determined and the chip is connected to its package by means of bond wires for external connections.

Level 2. LED array

A miniature printed circuit board is used to connect one or more LEDs, possibly together with driver electronics, and acts as a thermal interface between LEDs and heat sink.

Level 3. LED module

A LED module combines heat sink, optics and separate driver in one module, ready to be installed in a luminaire.
A mono-colour traffic light source is an example of level 3. Three of these modules will be combined in a level-4 traffic signal head.

Level 4. LED luminaire

A LED luminaire can be connected directly to the outside, mechanically and electrically. It houses, supplies power to and protects the LED array(s) from the environment while maintaining optimal operating conditions.

Philips LEDline is an example of a level-4 product.

				
Level 0	**Level 1**	**Level 2**	**Level 3**	**Level 4**
LED-Chip	LED or lamp	LED's on PCB	LED module with optics and driver	Luminaire

Table. Survey of levels of integration and LED products.

LED lighting system

A LED lighting system comprises several components like a power supply, controller, control interface and luminaire/LED arrays/optics. In many cases one or more components are combined in one product for ease of installation. In other cases there might be a need for more flexibility in terms of system configuration and control. e.g. a power supply or control interface may be shared by a group of luminaires. Every single component is selected to fit the application demands.

Lighting controls

The revolution of LED technology for lighting creates new possibilities in the application of lighting. In many applications the dynamic character of LED enables a lighting solution to create a unique experience. By using RGB colours or variation in colour temperature, all sorts of effects are made possible and can be specified for a particular lighting design or application, both indoor and outdoor. To enable these dynamic lighting solutions there is a need for lighting control systems that create the right experience for the customer. Philips provides a range of smart scene-setting lighting controllers that offers a reliable solution for any project, from simple colour selection at the push of a button or the turn of a wheel to fully automated, pre-programmed light control and/or multimedia integration.

Colour characteristics of lamps

Lamps do not all emit light of the same colour. There is, for example, a striking difference between the pronounced amber light from standard sodium lamps and the white light from most other lamps. Even then, one white light is not the same as another. To select the right light source for the colour characteristics required, two separate parameters have to be considered, i.e. the colour temperature of the emitted light and its colour rendering.

Colour temperature

Given that the colour of the light has an important influence on the colour impression of the area, the colour temperature of the light source plays an essential role. To enable an objective comparison of the colour impressions from various sources, subjective terms such as the popular words 'cool' and 'warm' are inadequate. A precise scale is required and given by the term 'correlated colour temperature'; the colour gradation of the light is compared with the light emitted by an intensely heated iron bar of which the temperature is known. In this way, the light colour can be specified by a value in kelvin (K). A low colour temperature represents warm, yellow, orange or red light and a high colour temperature cool, blue or violet light.

Four categories, as a practical guideline, are:

2000 – 3000 K warm/cosy
The colour from incandescent lamps, (compact) fluorescent lamps in the colours 827 and 927 and the SDW-T White SON lamp. Generally used for intimate and cosy environments where the emphasis is on a peaceful relaxing ambience.

3000 – 4000 K warm/neutral
The colour from halogen lamps, colour 830 and 930 (compact) fluorescent lamps and MASTERColour 830 lamps. Used in places where people are active, requiring a welcoming comfortable ambience.

4000 – 5000 K neutral/cool
The light colour from 840 and 940 fluorescent lamps as well as MASTERColour 942 and MHN metal halide lamps. Usually applied in commercial areas and offices where a look of cool efficiency is desired.

5000 K and above daylight and cool daylight
The light colour that best matches natural daylight, such as fluorescent colours 850, 865, 950 and 965.

Colour rendering

The perception of surface colours, the colour rendering of the light, depends on the colour content of the incident light. The light emitted by a light source is composed of a mixture of colours, all in different intensities. A change in the colour mixture and intensity yields a different colour rendering.

Daylight incandescent lamps have fully natural colour rendering properties. The same is true for halogen lamps. The reason for this is the continuous spectrum of the sources, which is typical for filament lamps.

Most gas discharge sources, however, have an interrupted or line spectrum. This has an influence on the quality of their colour rendering properties, which vary from very poor, with SOX low-pressure sodium gas discharge lamps, to excellent, with the colour 90 De Luxe series fluorescent and MASTERColour 942 lamps.

When selecting a particular lamp type, a clear understanding of the colour rendering properties is essential.
A fair indication is given by the colour rendering index (CRI), which is a standardised scale with 100 as the maximum value. Colours are best shown under a light source with the highest colour rendering index. Incidentally, it is only worthwhile to compare CRI values of lamps of similar colour temperature.

In practice, three colour rendering categories are normally found

CRI between Ra 90 and 100.

- Excellent colour rendering properties.
- Applications are mainly those where correct colour appraisal is a critical task.

CRI between Ra 80 and 90.

- Good colour rendering properties.
- Applications in areas where critical colour appraisal is not the primary consideration but where good rendition of colours is essential.

CRI below Ra 80.

- Moderate to poor colour rendering properties.
- Applications in areas where the quality of colour rendering is of minor importance.

The choice in favour of a particular colour rendering class does, of course, depend on the demands that an application makes on a lamp.

For example, a CRI of Ra 60 is inadequate for shop lighting, but is qualified as good for functional road lighting.

Light colour	Colour temp. in kelvin	Type of lamp or lamp colour
Cool Daylight	17000 8000 6500	452 451 865, 965
Daylight	6000	
Cool White	5000 4500 4200	850, 950 HPI (-T) Plus 942, HPL-N, MHN
Neutral White	4000 3500 3400	840, 940 HPL Comfort
'Crisp' Warm White	3000 2900 2800 2700	Halogen 12V, 830, 930 Halogen Plusline Halogen PAR Incandescent, 827, 927
'Cosy' Warm White	2500 2150	SDW-T SON Comfort
Very Warm White	2000	SON PIA Plus

Indoor applications	CRI	Type of lamp or lamp colour
Excellent	100 92 90	Incandescent, halogen 12V, 230V 927, 930, 940, 950, 965 CDM 942
Good	83 82 80	SDW-T 451, 452, 827, 830, 840, 850, 865 CDM 830, SDW-T, MHN, QL
Moderate	75 70 69 65 60	54 25 HPI (-T) Plus SON Comfort 33
Insufficient	55 50	35, HPL Comfort 29
Poor	45 40 25	HPL-N SON Plus SON

Areas of application

Correct light impressions and correct rendering of colours assists us in recognising our surroundings.
The colour climate of an artificially-lit space is determined by light colour temperature and colour rendering.

Room furnishings of wood and fabrics in warm colours require warm lighting in the colours 827 or 927.
For pleasing light the colours 830 and 930 are most suitable for many applications. The more business-like the interiors are, the cooler the light can be. Furniture using chromium, glass and marble, or in black and white, is emphasised by the neutral light colours 840 and 940.
Colours 865 and 965 are best used in environments where there is a high daylight content.

For (compact) fluorescent lamps it is most economical to choose the colours 830 and 840 as they produce the highest light output.
Colours 927, 930, 940 and 950, on the other hand, give the best colour rendering.

Proper use of fluorescent lamps

Philips light colours	Special			Neutral white		Cool daylight		
	79	830	930	840	940	950	865	965
Sales areas								
Groceries								
Meat								
Textiles, leather								
Furniture, carpets								
Sports, games, stationery								
Photo, clocks and jewellery								
Cosmetics, hairdressing								
Flowers								
Bookshops								
Industry								
Workshops								
Electro mechanical assembly								
Textile manufacture								
Printing, graphical tasks								
Colour testing								
Paintshops								
Stores								
Plant nurseries								
Offices, schools								
Office areas								
Conference rooms								
Teaching areas								
Lobbies, corridors								
Others								
Dwellings								
Restaurants								
Museums								
Sport, multipurpose areas								
Hospital bedrooms								
Treatment rooms								

Optimal solution Also suitable

Protection against ingress of solid objects, dust & moisture

The Ingress Protection system (IP) EN 60529, 1991 defines various degrees of protection against the ingress of foreign bodies, dust and moisture. The term 'foreign bodies' includes things like fingers and tools coming into contact with the electrical live parts of the product.

Both safety aspects (contact with live parts) and harmful effects on the function of the luminaire are defined. The exact testing method for luminaires for each IP classification is described in the standard EN 60598.
Some testing methods from EN 60529 were found to be inappropriate for luminaires and it must be noted that the specific conditions in an application may differ from the conditions during testing.

The designation to indicate the degree of protection consists of the characteristic letters IP followed by 2 digits indicating conformity with the conditions stated in the two tables. All Philips luminaires fulfil the minimum classification: IP20 (protected against finger contact with live parts), however a selection of luminaires, especially those for industrial and outdoor (road) applications, meet a higher IP classification. It is important to realise that the specification and safety of luminaires are only secured if the necessary maintenance is carried out according to the instructions of the manufacturer within the time schedules indicated.

Protection against ingress of dust, solid objects and moisture

First number: Degree of protection against contact with external elements			**Second number:** Degree of protection against ingress of moisture		
First number	Description	Explanation	Second number	Description	Explanation
0	Non-protected	Not protected	0	Non-protected	Not protected against moisture
1	Hand-protected	Protected against solid objects exceeding 50mm in diameter	1	Drip-proof against vertical water drops	Water drips falling vertically shall have no harmful effect
2	Finger-protected	Protected against finger contact with live parts; and against solid objects exceeding 12mm in diameter	2	Drip-proof when tilted at angles of up to 15°	Water drips shall have no harmful effect
3	Tool-protected	Protected against contact with live parts by tools, wire or similar objects over 2.5mm thick; and protection against penetration of solid objects exceeding 2.5mm in diameter	3	Rain/spray-proof	Water falling at an angle of up to 60° shall have no harmful effect
4	Wire-protected	Protected against contact with live parts by tools, wire or similar objects over 1mm thick; protection against penetration of solid objects exceeding 1mm in diameter	4	Splash-proof	Splashing water from any direction shall have no harmful effect
5	Dust accumulation-protected	Complete protection against contact with live parts and against harmful accumulation of dust; some dust may penetrate but not to the extent that operation is impaired	5	Jet-proof	Water projected by a nozzle from any direction shall have no harmful effect. (Nozzle diameter 6.3mm, pressure 30kPa)
6	Dust penetration-protected	Complete protection against contact with live parts and against penetration of dust	6	Jet-proof	Water projected by a nozzle from any direction shall have no harmful effect. (Nozzle diameter 12.5mm, pressure 100kPa)
			7	Watertight	Watertight; temporary immersion in water under specified conditions of pressure and time possible without ingress of water in harmful quantities
			8	Pressure watertight	Pressure watertight; continuous submersion in water under specified conditions of pressure and time without ingress of water in harmful quantities

Optics to suit all requirements

The optic in a luminaire is made up of the reflector and louvres, diffuser or refractor system that controls the light direction and beam pattern of the luminaire. It is an essential control device. It is therefore not surprising that Philips offers a wide variety of optics, each designed to perform a specific function.

Which optic is best for the practical situation in question?

The function of the area to be illuminated and the task to be performed usually determine the type of luminaire and optic you need, while the ceiling system often determines the dimensions and the way the luminaire is to be mounted. The luminaire-optic combination must fulfil the lighting requirements defined for each specific area and task. In addition, other requirements, such as image, efficiency and aesthetics, will influence the decision. Light distribution, direct and reflected glare control and efficiency are parameters that influence the performance of the lighting installation. These elements are described in the European standard EN 12464-1 (Light and lighting - Lighting of workplaces).

The following optic guide is comprised of optics for fluorescent luminaires with TL5 and TL-D lamps, grouped in the different optic dimensions (Micro, Mini, Midi and Maxi), for downlights with compact fluorescent lamps and for projectors with compact HID lamps.

The overview offers an indication of the optic description and performance. As the optical performance may vary with lamp type and number of lamps, please consult the photometric database via www.lightingsoftware.philips.com in conjunction with calculation programmes like DIALUX and RELUX.

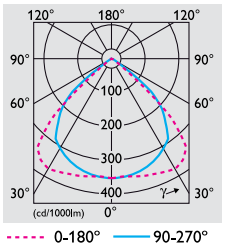
Micro optics – New generation optics for TL5

Micro optics are the latest state-of-the-art in optical design and available for TL5 lamps only. The very slim-line optics, with an opening of only 55mm, are integrated in high-end luminaires. The aluminium optics with their curved underside enhance the aesthetic appearance and have an improved efficiency.

Micro optics are applied in innovative luminaire families like Arano, Celino and Savio, in slim-line and square luminaires.

C8/D8
Performer micro optic made of high-quality standard aluminium, reflection ≥ 83%, available in high gloss (C) and semi-high gloss (D). Delta-shaped light distribution and all-round glare control.

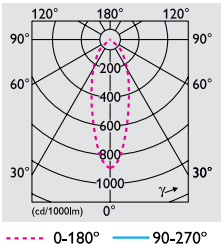
LOR	up to 82%
UGR_R	≤ 19
L	< 1000cd/m²



36

Medium beam rotationally symmetric optic for downlighting and accent lighting. Made of anodised aluminium with 99% reflection.
Intensity varies greatly with lamp type and power. For accent and general lighting in areas where high-quality light sources are required.

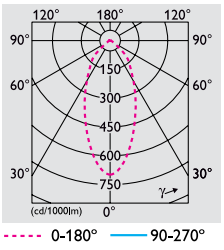
LOR	up to 60%
I_{max}	approx. 1 kcd/klm



60

Wide-beam rotationally symmetric optic for down lighting. Made of anodised aluminium with 99% reflection. Intensity varies greatly with lamp type and power. For general lighting in retail areas, museums, hotels and lobby areas, in offices and public buildings.

LOR	up to 60%
I_{max}	approx. .75 kcd/klm



Explanation of type numbers – *example only*

Luminaires

The method used for type numbers is explained in the following. This explanation covers the major part of the type numbers.

For the precise choice of luminaire for a particular lighting assignment it is advisable to contact a representative of Philips Lighting.

TBS 769 | 1xTL5-28W/840 | HFP | M6

Family name

1st letter
Lamp category
Indicates the lamp type or non-luminaire product types

- B Luminaires for LEDs
- C Combinations of lamps
- F Compact fluorescent
- G Attachments (optical)
- H Gas discharge luminaires
- K Special lamps (e.g. QL lamps)
- L Low voltage (halogen)
- M Compact discharge
- P Projection lamps
- Q Mains voltage incandescent (incl. halogen)
- R Power tracks (incl. accessories)
- T Linear fluorescent luminaires
- V Terminations for fibre optics
- Z Accessories

2nd letter
Mounting position
Indicates the mounting or version

- B Recessed
- C Surface
- D Desktop
- F Floor
- G Special
- K Electrical components
- M Electrical unit (batten)
- P Suspended/pendant
- R Power track mounted
- T Trunking
- W Wall
- Z Multi-use/functional accessory

3rd letter
Design/application
Indicates the type of usage

- G Decorative
- H Special
- K High and low bay
- L Components
- N Air-handling
- S Stand-alone
- V Fibre optics
- W Waterproof
- X Systems/structures
- Z Increased safety

The next three digits in the designation indicate the family of luminaires.

Key-words Lamp (example):	Description
1xTL5-28W/840	1xTL5 fluorescent lamp 28 Watt lampcolour 840
2xTL-D36W	2xTL-D fluorescent lamp 36 Watt
1xA60-MAX100W	1xincandescent lamp with conventional pear shape E27 lampsocket for maximum 100 Watt
1xHAL-PR50W-GU5.3	1xhalogen dichroic reflector lamp 50 Watt 12 volts with lampbase GU5.3
1xHAL-C50W/12V-GY6.35-SI	1xhalogen capsule lamp 50 Watt 12 volts in silver with lampbase GY6.35
1xSDW-T50W	1xWhite SON lamp (SDW-T) 50 Watt
1xCDM-T70W	1xMASTER Colour lamp T-version (CDM-T) 70 Watt
1xCDM-TD100W	1xMASTER Colour lamp TD-version (CDM-TD) 100 Watt
1xPL-S/2P9W	1xcompact fluorescent PL-S lamp / 2pins / 9 Watt
2xPL-C/4P18W/830	2xcompact fluorescent PL-C lamp / 4 pins / 18 Watt lampcolour 830

Key-words Gear (example):	Description
HFP	performer version of HF electronic gear for fluorescent lamps
HFR	regulated version of HF electronic gear for fluorescent lamps
EI	electronic included
IC	electromagnetic gear, parallel compensated

Key-words Optics* (example):	Description
M6	OLC matt aluminium optic with 3D lamellae
M2	matt aluminium optic with flat profiled cross lamellae

Naming of HID control gear

BMH 70 L 300 ITS - *example only*

SN	SON
SD	SON dim
SL	White SON
SX	SOX
MH	Metal Halide
HL	High Pressure Mercury
HA	HPA

Lamp power(s)

Inductive circuit

Number of electrical terminals

TS	thermoswitch
I	Ignitor tap
0	220V 50Hz
1	220V 60Hz
2	230V 50Hz
4	240V 50Hz
7	230/240V 50Hz
8	220/240V 50Hz
10	220…250V 50/60Hz
12	230/240/250V 50Hz

0	standard screw contacts
2	insert contacts

Lamp Characteristics

Efficacy of fluorescent lamp systems – typical examples:

Lamp type		Conventional gear	Electronic gear HFR, HFP, EBS or EBE
TL-D 18 W 4-lamp system	Lamp Ballast Total Lamp flux System efficacy Energy saving potential	4 x 18 W 14 W 86 W 4 x 1350 lumen 63 lumen/Watt	4 x 16 W 10 W 74 W 4 x 1400 lumen 76 lumen/Watt 16%
TL-D 36 W 1-lamp system	Lamp Ballast Total Lamp flux System efficacy Energy saving potential	36 W 8 W 44 W 3350 lumen 76 lumen/Watt	32 W 4 W 36 W 3200 lumen 89 lumen/Watt 22%
TL-D 58 W 1-lamp system	Lamp Ballast Total Lamp flux System efficacy Energy saving potential	58 W 11 W 69 W 5200 lumen 75 lumen/Watt	50 W 5 W 55 W 5000 lumen 89 lumen/Watt 26%
TL5 HE 14 W 4-lamp system	Lamp Ballast Total Lamp flux System efficacy	Not available	4 x 14 W 6 W 62 W 4 x 1350 lumen 87 lumen/Watt
TL5 HE 28 W 1-lamp system	Lamp Ballast Total Lamp flux System efficacy	Not available	28 W 4 W 32 W 2900 lumen 91 lumen/Watt
TL5 HO 49 W 1-lamp system	Lamp Ballast Total Lamp flux System efficacy	Not available	49 W 5 W 54 W 4900 lumen 91 lumen/Watt

Colour temperature and colour rendering

Correct light colours and correct reproduction of colours assists us in recognising our surroundings. The colour climate of an artificially-lit space is determined by the light colour and the colour rendering. Room furnishings of wood and fabrics in warm or pastel colours require warm lighting in the colour /827 or /927.

The more business-like the interior is, the cooler the light can be. Furniture using chromium, glass and marble, or in black and white, is emphasised by the cool light colours /840 and /940.

Colour Rendering (Ra)

Colour rendering is the ability of a light source to reproduce colour. The light source is put over an 8-colour slide test, and the light source's ability to reproduce colour is tested. From this, it is rated on the CRI (Colour Rendering Index). E.g. The '8' in 840 indicates a colour rendering between 80-90.

Moderate: 60 < Ra < 80 | Good: 80 ≤ Ra < 90 | Excellent: Ra ≥ 90

Colour Temperature (K)

Colour temperature refers to the colour appearance of a light source. It is measured in degrees Kelvin(K). E.g. The '40' in 840 indicates a colour temperature of 4000K.

Warm — Cool

2700 Incandescent Light | 3000 Warm White | 4000 Cool White | 5000 Daylight | 6500 Cool Daylight

Glossary of Terminology

Average illuminance
Illuminance averaged over a specified surface.
Unit: lux (lx) = lm/m²
Symbol: E_{av}

Ballast
Electrical device used with discharge lamps for stabilising the current in the discharge.

Beam spread
Angle in the plane through the beam axis over which the luminous intensity drops to a stated percentage (e.g. 50%) of its peak intensity.

Brightness
Attribute of visual sensation according to which an area appears to emit more or less light. Brightness according to the definition is also an attribute of colour.

Candela
The standard unit of light intensity, abbreviated to "cd", which is one lumen per steradian.

CDM
See MASTERColour CDM.

Colour appearance
General expression for the colour impression received when looking at a light source.

Colour change
The facility to change the colour temperature of a lighting installation makes it possible to create a more comfortable working environment or to introduce dynamic lighting effects.

Colour rendering
Ability of a light source to render colours naturally, without distorting the hues seen under a full spectrum radiator (like daylight or incandescent lamps). The colour rendering index (CRI) ranges from 0 to 100.

Colour rendering index CRI
See Colour rendering.
Symbol: R_a

Colour temperature
Temperature in kelvin of a full spectrum radiator closest to the colour appearance of a light source at the same brightness.
Unit: kelvin, K
Symbol: Tc

Contrast C (between two parts of a visual field)
The relevant luminance difference between two parts in accordance with the formula:

$$C = \frac{L1 - L2}{L2}$$

Where the size of the two parts differs greatly and where:
L1 = luminance of the smallest part (object)
L2 = luminance of the largest part (background).

DALI
Digital Addressable Lighting Interface, a standardised communication interface to regulate lighting levels and to switch electronic HFD ballasts on and off.

Daylight linking
Using natural light saves energy and is beneficial to individual users. Daylight linking is a technique that regulates the light output of luminaires in accordance with daylight conditions, thus maintaining a constant level of indoor lighting and ensuring comfort at all times.

Diffuser
Optical element used to mix light rays to improve uniformity or reduce glare. An opal cover is an example of a diffuser.

Direct lighting
Lighting by means of luminaires with a light distribution such that 90 – 100% of the emitted luminous flux reaches the working plane directly, assuming that this plane is unbounded.

Disability glare
Glare that impairs vision.

Discharge lamp
Lamp in which the light is produced, directly or indirectly, by an electric discharge through a gas, a metal vapour or a mixture of several gases and vapours.

Discomfort glare
Glare that causes discomfort without necessarily impairing vision.

Dust-proof luminaire
Luminaire constructed so that dust of a specified nature and fineness cannot enter when it is used in a dust-laden atmosphere.

Emergency lighting
Lighting provided for use when the supply to the normal lighting fails.

Escape lighting
That part of emergency lighting provided to ensure that an escape route can be effectively identified and used in the case of failure of the normal lighting system.

Flashed area
The light of a luminaire in a given direction. The area of the orthogonal projection of the luminous surface on a plane perpendicular to the specified direction.

Fresnel lens or reflector
A Fresnel lens or reflector is an optical element of reduced height. By means of discrete steps, the basic shape is flattened yet the optical characteristics are retained.

Glare
Condition of vision in which there is discomfort or a reduction in the ability to see significant objects, or both, due to an unsuitable distribution or range of luminance or to extreme contrast in space or time.

Halogen lamp
Incandescent lamp in which the inclusion of halogens in the gas filling and a high-temperature quartz envelope promote the tungsten halogen cycle, permitting a higher filament temperature. The result is a higher colour temperature and a significantly extended life.

Halogen HV
"High voltage" 230 - 240V halogen lamp, which does not require a ballast or a transformer.

Halogen LV
"Low voltage" 6 V, 12 V or 24 V halogen lamp. An electronic or electromagnetic transformer is required to operate low-voltage halogen lamps and is often integrated into the luminaire.

HFR-DALI
Electronic regulating DALI ballast for various fluorescent lamps. With this new-style electronic ballast standard push-buttons can be used to dim the light output down to 3%. The lamp can also be switched on or off using the push-button control.

Ballast functions according to the DALI protocol.

HFP PERFORMER
Electronic ballast for various fluorescent lamp types with warm-start principle. See also 'Specification data luminaires'.

HFR 1-10V
Electronic regulating ballast for various fluorescent lamp types by which light dimming is possible. The main ranges of HFR ballasts allow step-less dimming down to 3%. See also 'Specification data luminaires'.

Horizontal illuminance (E_{hor})
Illuminance incident on the horizontal surface.
Unit: lux (lx) = lm/m²
Symbol: E_{hor}

HPI Plus lamp
Metal-halide high-intensity discharge lamp combining high luminous efficacy with white light of moderate colour rendering. Main indoor applications are big industrial halls and lighting of discount stores, hyper/supermarkets and DIY shops. HPI Plus lamps are usually applied in high-bay luminaires and floodlights.

Illuminance
The luminous flux density at the surface being lit. The illuminance in the full summer sun is approx. 100,000 lux. Recommended illuminances for work places range from 200 lux for rough work to 2000 lux for detailed or critical work.
Unit: lux (lx) = lm/m²
Symbol: E

Incandescent lamp
Lamp in which light is produced by means of an element heated to incandescence by the passage of an electric current.

Indirect lighting
Lighting by means of luminaires with a light distribution such that not more than 10 per cent of the emitted luminous flux reaches the working plane directly, assuming that this plane is unbounded.

Induction lighting refractor
Optical element used to concentrate light rays to focus or improve the direction of light. A prismatic cover is an example of a refractor.

Infrared remote control
In offices and meeting rooms where the lighting requirement changes frequently, wireless infrared control offers the flexibility to set the lighting and change it at any time.

Isocandela curve (diagram)
Curve traced on an imaginary sphere with the source at its centre and joining all adjacent points corresponding to those directions in which the luminous intensity is the same, or a plane projection of this curve.

Isolux curve (diagram)
Locus of points on a surface where the illuminance has the same value.

Jet-proof luminaire
Constructed to withstand a direct jet of water from any direction.

LED
Light Emitting Diode used as a light source. Solid-state semiconductor device that converts electrical energy directly into light of a specific colour or white light.

Light output ratio (LOR)
Ratio of the total light emitted by a luminaire to the total light output of the lamp(s) it contains measured at standard operating conditions.

Low-pressure sodium lamp
Sodium vapour lamp in which the partial pressure of the vapour during operation does not exceed 5 Pa – for example: a SOX lamp.

Lumen depreciation
The decline in the light output of a light source during its lifetime.

Luminaire
Appliance that distributes, filters or transforms the light given by a light source (LED or lamp), and which contains all the necessary elements for fixing and protecting the light source(s) and facilitates their power supply and operating conditions.

Luminance
The light intensity per square metre of apparent area of the light source, luminaire or illuminated surface. Where surfaces are lit, the luminance depends upon both lighting level and reflection characteristics of the luminous surface.
Unit: cd/m²
Symbol: L

Luminous efficacy
The quantity of light that a light source emits per unit of electrical energy consumed. Notice that the luminous efficacy can be specified for a light source or for a lighting system (lamp and ballast).
The luminous efficacy of a system is lower than that of the light source.
Unit: lm/W

Luminous flux
The total light output emitted by a light source. Also the total light falling on a surface. The light output of a light source is measured in lumen.
Unit: lumen
Symbol: ø

Luminous intensity
The luminous flux in a given direction, e.g. from a floodlight or projector.
Unit: candela (cd) = one lumen per steradian
Symbol: I

Luminous intensity distribution diagram (table)
Luminous intensity shown in the form of a polar diagram, cartesian diagram or table, in terms of candelas per 1,000 lumens of lamp flux.

The diagram (table) for non-symmetrical light distributions gives the light distribution of a luminaire in at least two planes:
1. In a vertical plane through the longitudinal axis of the luminaire,
2. In a plane at right angles to that axis.

Note: The luminous intensity diagram (table) can be used:
a. To provide a rough idea of the light distribution of the luminaire.
b. For the calculation of illuminance values at a point.
c. For the calculation of the luminance distribution of the luminaire.

Lux
The standard unit of illuminance of a surface being lit. One lux equals one lumen per square metre.

Maintained emergency lighting
Emergency lighting where the lamps are operated from the normal supply during standard conditions. In an emergency situation the emergency lamp (usually one lamp in luminaires of two or more lamps) remains in operation.

Maintained illuminance (luminance)
Value below which the average illuminance on the specified surface is not allowed to fall. The maintained illuminance is specified at the end of the maintenance cycle, taking into consideration the maintenance factor.
It is one of the main specification elements for the lighting designer. In the various standards the maintained illuminance is specified for various activities.
Unit: lux
Symbol: E_m, L_m

Maintenance factor
Correction factor used in lighting design to compensate for the rate of lumen depreciation, caused by lamp ageing (lumen depreciation and lamp failure) and dirt accumulation (luminaire and environment).
It determines the maintenance cycle needed to ensure that illuminance does not fall below the maintained value.

MASTERColour CDM lamp
Series of metal-halide discharge lamps with excellent colour rendering and a warm or neutral colour impression. MASTERColour lamps, also available as reflector lamps, are applied in projectors and downlights for shop and office applications.

Mercury lamp
This High-intensity discharge lamp is used in industry and large public spaces. Higher quality light characteristics are obtained by applying metal-halide lamps.

Metal-halide lamp
Single or double-ended discharge lamp for use in industry, public spaces and shops. Metal-halide lamps combine a natural white colour with a pleasant light and a high luminous intensity.

Movement detection
Sensing of occupancy by movement detection ensures lights are activated only when needed and enables the lighting in a specific area to be controlled.

Non-maintained emergency lighting
Emergency lighting where the emergency lighting lamps come into operation only when the power supply to normal lighting fails.

Obtrusive light
Spill light which because of quantitative, directional and spectral attributes in a given context, gives rise to annoyance, discomfort, distraction or a reduction in the ability to see essential information.

OLC
Omnidirectional Lighting Control, a Philips patented series of optics for TL5 and TL-D lamps offering optimal lighting efficiency in combination with excellent glare and luminance control all around the luminaire.

Optic
A device that changes the direction of a beam of light, usually by reflection, diffusion or refraction by a lens. The optic may include louvres for reduction of glare.

PL lamp
Single-ended compact fluorescent lamp in which the discharge tube is folded into two, four or six limbs. PL lamps are characterised by unusually high light output for their length. They are applied in compact luminaires for professional and domestic use. Also available with integrated ballast.

Power factor
Ratio of the circuit power in watts over the product of the root-mean-square values of voltage and current. For sinusoidal waveforms, it is equal to the cosine of the angle of phase difference between voltage and current. For electronic ballasts the power factor is 0.95 so that no additional phase compensation is required.

Refractor
Optical element used to concentrate light rays to focus or improve the direction of light. A prismatic cover is an example of a refractor.

RGB
Red, green and blue, used to specify the colours of a light source.

SDW-T
White SON or SDW-T lamps offer a high luminous efficacy in combination with warm-white light. The colour rendering is excellent. SDW-T lamps are applied in shops and public spaces where the atmosphere should be warm and cosy.

Sky glow
The brightening of the night sky that results from the reflection of radiation (visible and non-visible), scattered from the constituents of the atmosphere (gas molecules, aerosols and particulate matter) in the direction of observation. It comprises two separate components as follows:

a. Natural sky glow: That part of the sky glow which is attributable to radiation from celestial sources and luminescent processes in the earth's upper atmosphere.

b. Man-made sky glow: That part of the sky glow which is attributable to man-made sources of radiation (e.g. outdoor electric lighting), including radiation that is emitted directly upwards and radiation that is reflected from the surface of the earth.

Sodium lamp, SON lamp
High-pressure discharge lamp with a yellowish colour appearance and an extremely high efficiency. SON and SON Comfort lamps, with improved colour characteristics, are mainly applied in high-bay industrial applications.

Solid-state lighting eg. LED
Description of a lighting device that does not contain moving parts or parts that can break, rupture, shatter, leak or contaminate the environment (such as a lamp).

Spill light (stray light)
Light emitted by a lighting installation which falls outside the boundaries of the site for which the lighting installation is designed.

Starter
Device for starting a discharge lamp, in particular a fluorescent lamp, that preheats the electrodes and/or causes a voltage surge in combination with the series ballast.

Switching and dimming control
As more and more light sources can be dimmed economically, lighting controls need to provide both switching and light regulating capabilities.

TL5
Linear double-ended fluorescent lamp with a diameter of 16mm. In combination with OLC optics and high-frequency ballasts the TL5 system offers a superb performance, both in terms of lighting technology and energy consumption.

TL-D
Linear double-ended fluorescent lamp with a diameter of 26mm. Available in a range of colours and colour rendering characteristics.

Threshold increment (TI)
The measure of disability glare expressed as the percentage increase in the contrast required between an object and its background for it to be seen equally well with a source of glare present.

Note: Higher values of TI correspond to greater disability glare.

Uniformity ratio
Ratio of the minimum over the average illuminance for a specified area (E_{min}/E_{ave}).
When defined as such, the uniformity ratio is also the ratio of the minimum over the maximum illuminance for a specified surface area (E_{min}/E_{max}).

Utilisation factor
Utilisation factor (UF) of a lighting installation represents the percentage of the luminous flux of the lamp(s) that reaches the defined working plane. UF can be seen as the efficiency of the lighting installation. UF is used to calculate the number of luminaires required.

Vertical illuminance
Illuminance incident on the vertical surface.
Unit: lux (lx) = lm/m²
Symbol: E_{vert}

Visual guidance
The sum of the measures taken to give the user of a space an unambiguous and immediately recognisable picture of the course of the path ahead. Visual guidance is important in shops and other public buildings. The lighting designer takes the demands for visual guidance into consideration.

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