

Constant wattage for high intensity discharge (HID) lamps

Index

	page
Introduction	143
Constant wattage control equipment	144
Constant wattage application	145
Constant wattage mercury vapour and metal halide ballast - CWMH and OGCWMH	146
Constant wattage high pressure sodium ballast - CWHS	148

Constant wattage for high intensity discharge (HID) lamps

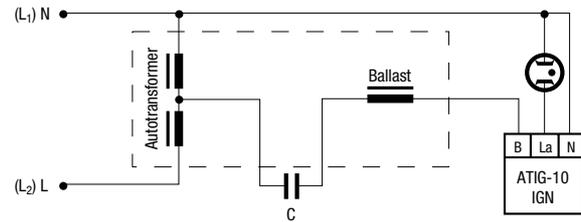
Modern HID lighting has the potential of offering high efficiency, a wide choice of colour characteristics and long service life. However, given variations in mains supply voltage, then with standard reactor-ignitor control equipment, a slight compromise in lamp performance will occur.

Matters to consider with reactor ballast and ignitor control equipment:

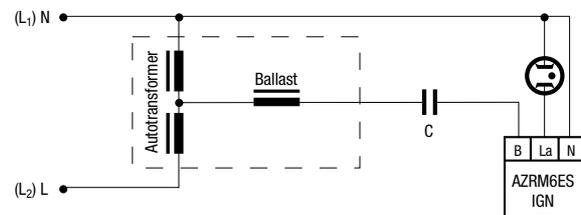
- lumen output and colour temperature variations with changes in supply voltage
- flicker due to asymmetry in lamp cathode emission
- extinction of a HID lamp due to severe supply voltage dip of more than a few cycles followed by the resultant long restrike period
- high starting currents which require large feeder cable sizes together with sequenced switching for large installations
- mains capacitors required for high power factor (HPF) causing low impedance for high frequency mains switching signals
- high capacitor inrush current at switch on
- abnormally high supply voltage may result in overwattage of the lamp and therefore may shorten lamp life

These probabilities are largely addressed when using constant wattage control equipment which provides the following benefits:

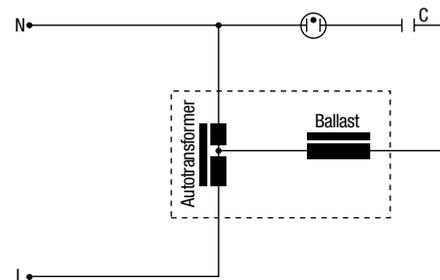
- superior performance and lamp control over +10% variations in supply voltage
- will sustain lamp operation with dips in supply voltage in the order of 40-50%
- greater control of lamp power and colour temperature
- significant reduction in lamp flicker
- high power factor characteristic 0.95 or higher
- low line starting current
- high input impedance to supply switching frequencies



For 1000W HPS lamp



For 250W and 400W HPS lamp



Constant wattage metal halide circuit

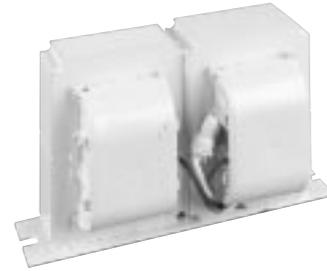
Constant wattage control equipment

The constant wattage autotransformer circuit consists of an autoleak transformer ballast with a matched capacitor in series with the lamp. The capacitor takes part in the regulation of the lamp current and also corrects the power factor. The capacitor also prevents the occurrence of the so called rectifying effect at the end of lamp life. The main benefit of constant wattage control equipment is that the degree of regulation is capable of holding average lamp watts closer to nominal, even with variation in primary voltage. This circuit can be used with as much as 10% input voltage variation yet keeps the lamp wattage within acceptable tolerances.

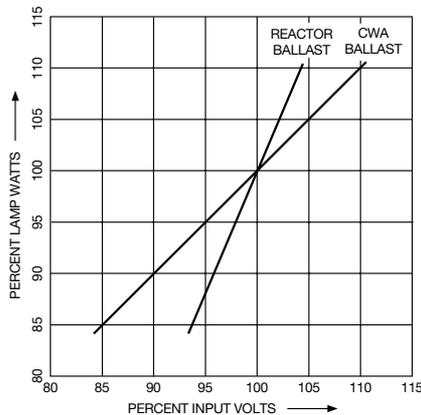
A reactor ballast can only accommodate a maximum 4% input voltage variation to keep the lamp within the same acceptable tolerance. Constant wattage control equipment offers reliable starting and run-up of the lamp through a higher than supply RMS value. It also has favourable operating characteristics for the lamps. The system does, however, also have its disadvantages in that the power (watt) losses in the circuit are high and the control equipment itself is large and heavy.

Premium constant wattage ballast

Tridonicatco has a special 400W Metal Halide version (OGCWMH400) known as a "Premium Constant Wattage Ballast". This ballast offers all of the advantages of the standard constant wattage ballast, but with a substantially lower watts loss making it a more energy efficient (premium) ballast with lower temperature rise. Additionally, the lower manufacturing cost results in a more economical product, competitively priced.



OGCWMH 400-02 ballast



400W MH lamp operation with 3 types of control circuits 240V 50Hz

Line voltage (V)	Premium CWA ballast OGCWMH400-01		Standard CWA ballast CWMH400-19		Reactor ballast OGB400-100	
	Line power (W)	Lamp power (W)	Line power (W)	Lamp power (W)	Line power (W)	Lamp power (W)
200	367	341	385	342	284	267
210	385	356	403	357	324	304
220	404	371	422	372	360	337
230	422	385	441	387	395	369
240	440	400	459	400	429	400
250	457	414	475	412	463	430
260	473	426	490	422	498	459

Constant wattage application

Constant wattage control equipment is being increasingly specified in areas that require consistent/nominal lamp performance. Examples are lighting for sports, heavy industrial lighting and mining sites, particularly in installations where there is a likelihood of supply voltage disturbances.

Design quality and life

- high performance (PEI) winding wire.
- vacuum impregnated core and coil.
- winding insulation Class H materials.
- $\Delta t 75^{\circ}\text{K}$ (typical)
- $t_w 150^{\circ}\text{C}$

10 years continuous operation at 150°C winding temperature

40 years continuous operation at 130°C winding temperature

- +3% selected premium grade long life capacitor rated for 100°C case temperature.
- designed and manufactured in accordance with and compliance to relevant Australian and International Standards.

Application note...

1. Check physical size and thermal performance for retrofitting and new designs. Constant wattage gear is physically larger and has higher losses than standard control equipment and therefore generates more heat. Refer to ballast data.

2. As for all magnetic control equipment constant wattage is frequency dependent. Typically 10% change in supply frequency will give approx 25% change in lumen output for constant wattage.

Typical performance specification

- the constant wattage auto transformer circuit will accommodate supply voltage variations of +10% (eg. for metal halide lamps this provides that for every 1% change in mains voltage there shall be approximately 1% change in lamp wattage).
- the constant wattage ballast has matched $\pm 3\%$ series capacitor that provide tight lamp stability and high power factor correction (PFC) of 0.95 or better.
- ballasts are vacuum impregnated with an unsaturated polyester resin with not less than thermal "Class H" (180°C in accordance with IEC 85: 60085).

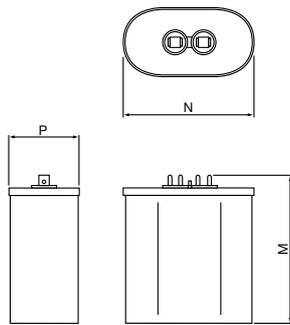
Made in accordance to international standards:

CWMH175:	ANSI C78.1377	IEC 60922	IEC 60923
CWMH250:	ANSI C78.1378	IEC 60922	IEC 60923
OGCWMH400:	ANSI C78.1375	IEC 60922	IEC 60923
CWMH400:	ANSI C78.1375	IEC 60922	IEC 60923
CWMH1000:	ANSI C78.1376	IEC 60922	IEC 60923
CWHS250:	ANSI C78.1351	IEC 60922	IEC 60923
CWHS400:	ANSI C78.1350	IEC 60922	IEC 60923
CWHS1000:	ANSI C78.1352	IEC 60922	IEC 60923

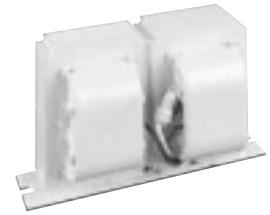
Constant wattage mercury vapour and metal halide ballast - CWMH & OGCWMH

- vacuum impregnated
- very low audible noise
- long service life
- flying leads or 32A double screw terminal
- resistance to moisture and corrosion
- 100% final testing
- continuity
- winding short circuit
- insulation
- impedance

figure 1



OGCWMH400-01 ballast



OGCWMH400-02 ballast

figure 2

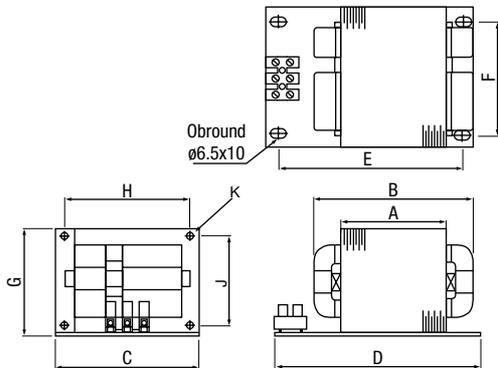


figure 3

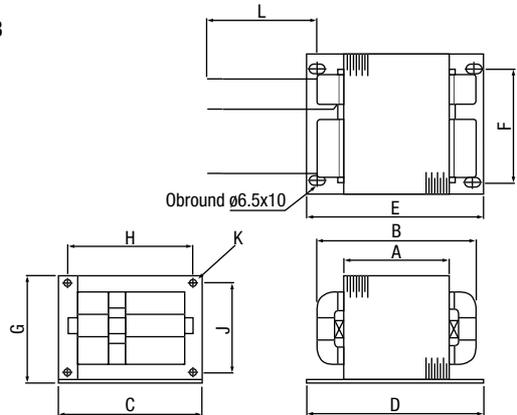


figure 4

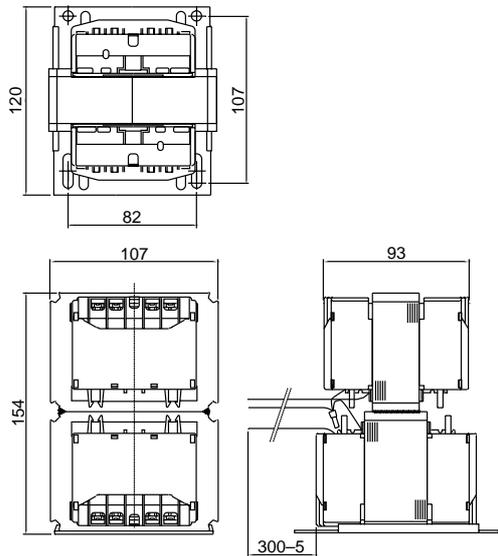
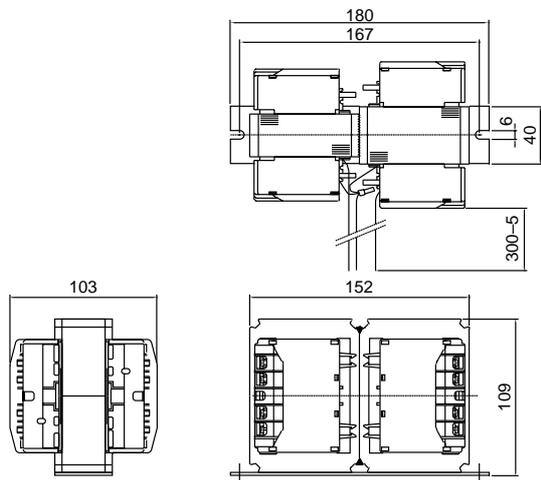


figure 5



Constant wattage mercury vapour and metal halide ballast - CWMH & OGCWMH

Lamp			Ballast		Electrical						Thermal	Physical	Capacitor Electrical	
wattage	voltage	current	type	article number	power cons.	line start current	line current	lamp start current	lamp current	line power factor	ΔT winding	figure 146	capacitor	voltage
W	V	A			W	A	A	A	A		K		μf	VAC
240V 50Hz														
150	100	1.8	CWMH150-01	89120224	32	0.6	0.8	1.95	1.8	0.92	70	2	20	440
175	130	1.5	CWMH175-06	89120247	33	0.6	0.9	1.72	1.5	0.96	75	2	12	440
175	130	1.5	CWMH175-07		33	0.6	0.9	1.72	1.5	0.96	75	2	12	440
250	130	2.1	CWMH250-06	89120256	44	0.9	1.3	1.40	2.1	0.95	70	2	16	525
250	130	2.1	CWMH250-07		44	0.9	1.3	1.40	2.1	0.95	70	3	16	525
400	135	3.25	OGCWMH400-01	89120901	40	1.2	1.9	3.63	3.25	0.95	65	4	40	440
400	135	3.25	OGCWMH400-02	89120902	40	1.2	1.9	3.63	3.25	0.95	65	5	40	440
400	135	3.25	CWMH400-19	89120272	58	0.8	2.0	3.73	3.25	0.95	75	2	24	480
400	135	3.25	CWMH400-20		58	0.8	2.0	3.73	3.25	0.95	75	3	24	480
400	135	3.25	CWMH400-22		60	0.5	1.16	3.73	3.25	0.95	75	2	24	480
1000	265	4.2	CWMH1000-10	89120193	79	2.1	4.7	5.82	4.2	0.96	75	2	28	525
1000	265	4.2	CWMH1000-20	89122513	79	2.1	4.7	5.82	4.2	0.96	75	3	28	525
1500	265	6.3	CWMH1500-2-FL	89120228	136	4.5	7.1	8.8	6.3	0.96	80	2	2x22	660
1500	265	6.3	CWMH1500-2	89120227	136	4.5	7.1	8.8	6.3	0.96	80	3	2x22	660
415V 50Hz														
400	135	3.25	CWMH400-23		60	0.5	1.16	3.73	3.25	0.95	75	3	24	480
1000	265	4.2	CWMH1000-19	89120197	81	1.7	2.7	5.82	4.2	0.96	75	2	28	525
1000	265	4.2	CWMH1000-22		81	1.7	2.7	5.82	4.2	0.96	75	3	28	525
1500	265	6.3	CWMH1500-4-FL	89120230	136	2.5	4.1	8.8	6.3	0.96	80	2	2x22	660
1500	265	6.3	CWMH1500-4		136	2.5	4.1	8.8	6.3	0.96	80	3	2x22	660

Dimensional data - CWHS

Type	Catalogue number	Ballast dimensions (mm)											Capacitor dimensions (mm)		
		A	B	C	D	E	F	G	H	J	K	L	M	N	P
Mercury vapour	CWMH150-01	61	100	101	110	94	82	77	89.5	64	5	270	127	-	46
	CWMH175-06	61	96	101	110	94	82	77	89.5	64	5	270	90	70	40
	CWMH175-07	61	96	101	140	124	82	77	89.5	64	5	-	90	70	40
	CWMH250-06	75	112	101	125	109	82	77	89.5	64	5	270	90	75	50
	CWMH250-07	75	112	101	140	124	82	77	89.5	64	5	-	90	75	50
	OGCWMH400-01	refer to figure 4													
	OGCWMH400-02	refer to figure 5													
	CWMH400-19	105	139	101	145	129	82	77	89.5	64	5	270	110	75	50
	CWMH400-20	105	139	101	170	154	82	77	89.5	64	5	-	110	75	50
	CWMH400-22	105	139	101	145	129	82	77	89.5	64	5	270	110	75	50
	CWMH400-23	105	139	101	170	154	82	77	89.5	64	5	-	110	75	50
	CWMH1000-10	110	160	124	170	150	105	110	111	99	7x5.5	270	110	95	50
	CWMH1000-20	110	160	124	190	170	105	110	111	99	7x5.5	-	110	95	50
CWMH1000-19	110	160	124	170	150	105	110	111	99	7x5.5	270	110	95	50	
CWMH1000-22	110	160	124	190	170	105	110	111	99	7x5.5	-	110	95	50	
Metal halide	OGCWMH400-01	refer to figure 4													
	OGCWMH400-02	refer to figure 5													
	CWMH175-06	61	98	101	110	94	82	77	89.5	64	5	270	90	70	40
	CWMH175-07	61	98	101	140	124	82	77	89.5	64	5	-	90	70	40
	CWMH250-06	75	112	101	125	109	82	77	89.5	64	5	270	90	75	50
	CWMH250-07	75	112	101	140	124	82	77	89.5	64	5	-	90	75	50
	CWMH400-19	105	139	101	145	129	82	77	89.5	64	5	270	110	75	50
	CWMH400-20	105	139	101	170	154	82	77	89.5	64	5	-	110	75	50
	CWMH400-22	105	139	101	145	129	82	77	89.5	64	5	270	110	75	50
	CWMH400-23	105	139	101	170	154	82	77	89.5	64	5	-	110	75	50
	CWMH1000-10	110	160	124	170	150	105	110	111	99	7x5.5	270	110	95	50
	CWMH1000-20	110	160	124	190	170	105	110	111	99	7x5.5	-	110	95	50
	CWMH1000-19	110	160	124	170	150	105	110	111	99	7x5.5	270	110	95	50
	CWMH1000-22	110	160	124	190	170	105	110	111	99	7x5.5	-	110	95	50
	CWMH1500-2-FL	140	168	153	195	165	101	117	136	98	6.35	270	110	95	50
	CWMH1500-2	140	168	153	235	170.5	132	117	136	98	6.35	-	110	95	50
CWMH1500-4-FL	140	168	153	195	165	101	117	136	98	6.35	270	110	95	50	
CWMH1500-4	140	168	153	235	170.5	132	117	136	98	6.35	-	110	95	50	

Constant wattage high pressure sodium ballast - CWHS

- vacuum impregnated
- very low audible noise
- long service life
- flying leads or 32A double screw terminal
- resistance to moisture and corrosion

100% final testing

- continuity
- winding short circuit
- insulation
- impedance



OGCWMH400-02 ballast

figure 1

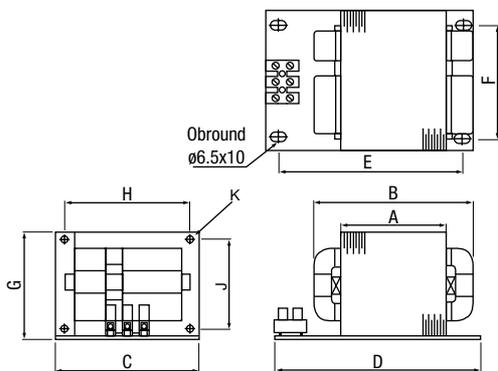


figure 2

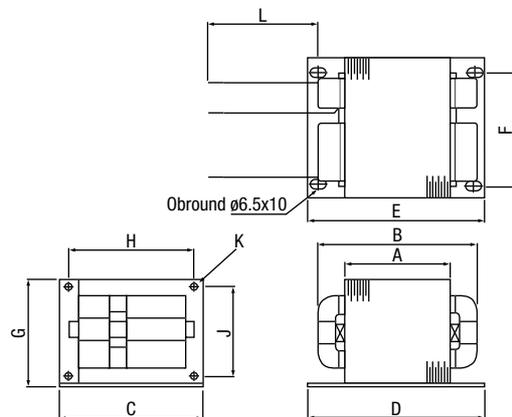
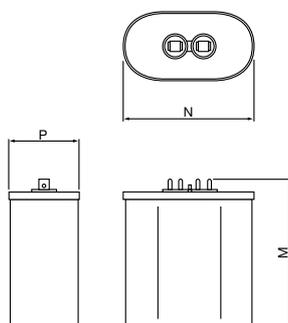


figure 3



Constant wattage high pressure sodium ballast - CWHS

Lamp			Ballast		Electrical						Thermal	Physical	Capacitor	Electrical	Capacitor	Physical
wattage	voltage	current	type	article number	power cons.	line start current	line current	lamp start current	lamp current	line power factor	ΔT winding	figure pg	capacitor	voltage	figure	
W	V	A			W	A	A	A	A		K	148	μf	VAC	pg	
240V 50Hz																
250	100	3.0	CWHS250-2-FL	89120176	48	1.00	1.29	3.75	3.0	0.96	75	1	35	330	3	
250	100	3.0	CWHS250-2		48	1.00	1.29	3.75	3.0	0.96	75	2	35	330	3	
400	100	4.6	CWHS400-2-FL	89120183	70	1.15	2.04	5.60	4.6	0.96	75	1	48	330	3	
400	100	4.6	CWHS400-2	89120177	70	1.15	2.04	5.60	4.6	0.96	75	2	48	330	3	
1000	250	4.7	CWHS1000-2-FL	89120158	92	3.00	4.64	6.80	4.7	0.98	70	1	2x15	660	3	
1000	250	4.7	CWHS1000-2	89120156	92	3.00	4.64	6.80	4.7	0.98	70	2	2x15	660	3	
415V 50Hz																
400	100	4.6	CWHS400-4-FL	89120184	70	0.75	1.18	5.60	4.6	0.96	70	1	48	330	3	
400	100	4.6	CWHS400-4		70	0.75	1.18	5.60	4.6	0.96	70	2	48	330	3	
1000	250	4.7	CWHS1000-4-FL	89120154	95	1.60	2.70	6.80	4.7	0.98	75	1	2x15	660	3	
1000	250	4.7	CWHS1000-4		95	1.60	2.70	6.80	4.7	0.98	75	2	2x15	660	3	

Dimensional data - CWHS

Type	Ballast	Ballast dimensions (mm)											Capacitor dimensions (mm)			
		A	B	C	D	E	F	G	H	J	K	L	M	N	P	
High pressure sodium	CWHS250-2-FL	52	100	125	120	92	76	110	112	97	7x5.5	270	90	75	50	
	CWHS250-2	52	100	125	145	100	105	110	112	97	7x5.5	-	90	75	50	
	CWHS400-2-FL	83	130	125	145	117	76	110	112	97	7x5.5	270	110	75	50	
	CWHS400-2	83	130	125	145	125	104	110	112	97	7x5.5	-	110	75	50	
	CWHS400-4-FL	83	130	125	145	117	76	110	112	97	7x5.5	270	110	75	50	
	CWHS400-4	83	130	125	170	125	104	110	112	97	7x5.5	-	110	75	50	
	CWHS1000-2-FL	124	170	153	195	165	101	117	136	98	6.35	270	110	75	50	
	CWHS1000-2	124	170	153	235	170.5	132	117	136	98	6.35	-	110	75	50	
	CWHS1000-4-FL	124	170	153	195	165	101	117	136	98	6.35	270	110	75	50	
CWHS1000-4	124	170	153	235	170.5	101	117	136	98	6.35	-	110	75	50		

