

Heating

The choice of the contactor depends on the mechanical endurance (number of operations) and on the electrical heating load i.e. resistive elements, infra-red element, convectors.

Choice of Contactors

The choice of contactor is dependant upon many parameters i.e. operating voltage, size of contacts, number of operations, ambient temperature, type of load supplied etc.

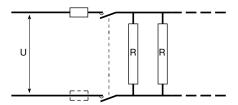
Type of Load

Loads are categorised into various AC ratings, (AC1, AC2, AC3 etc.) and the higher the AC rating the more inductive the load becomes. All Hager contactor ratings are given at AC1, therefore they must be de-rated if used on other types of AC load.

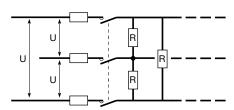
Heat Dissipation Inserts

The ambient temperature around a contactor can affect its life expectancy, therefore, we strongly recommend that heat dissipation inserts (LZ060) are fitted between all contactors and adjacent devices.

Single Phase



Three Phase

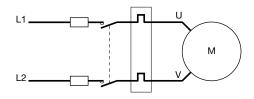


Number of operations

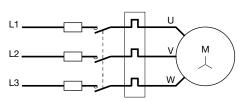
			100,000	150,000	200,000	500,000	1,000,000
		16A	3	2.5	1.9	0.85	0.7
≷	>	25A	4.6	4	3	1.35	1
i K	230	40A	7.3	6.3	4.7	2.2	1.6
σ		63A	11.6	10	7.5	3.5	2.5
loa		16A	8.9	8	5.8	2.8	2
Мах.	>	25A	13.8	12	8.6	4.3	3
Σ	4	40A	22	18.5	14.385	6.3	5
		63A	35	30	22.6	10.2	7.6

Motors

Single Phase 230V (AC3 or AC7b)



Three Phase 400V (AC3 or AC7b)



Choice of Contactor Accor	ding to control diagram
2 Wires	3 Wires

	Single Phase with Capacitor 230V	Three Phase (AC3 or AC7) 400V	2 Wires	3 Wires	
- >	0.88		2 pole 25A		
돌조	2.6		2 pole 40A		
Ë Ë		2.6		3 pole 25A	
Max oad		7.8		3 pole 40A	
		10		3 pole 63A	

Requirements of Use

Influence of Working Temperature

Derating factor between 40°C and 50°C: 0.9

Example: Heating with convector

The maximum load of ESC225 is 4.6kW for 50,000 operations and for

a temperature <40°C.

between 40° C and 50° C, the load is 4.6×0.9 i.e. 4.14kW

Close Fitting

It is necessary to put a heat dissipation insert (reference LZ060) between each contactor.



Description			Modular contact						Auxiliary contact
Standard conform	nity		EN 61095						
Approvals	•		NF - VDE- IMQ - KEMA - RMC / CCC						
••			Relay	Contactor	Relay	Contactor	Contactor	Contactor	Contactor
Number of modul	es		1		2		3		1/2
Thermal current It	:h (40°C)		16A	25A	16A	25A	40A	63A	6A
Rated frequency	(/		50 - 60 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz
Rated insulation v	voltage (Ui)		250V	250V	440V	440V	440V	440V	250V
	thstand voltage (Uimp)		4kV	4kV	4kV	4kV	4kV	4kV	4kV
Protection Degree			2	2	2	2	2	2	2
	currents and power ra	tings in AC	J.		1		1		
AC-1 / AC-7a	Rated operational curr		16A	16A	16A	25A	40A	63A	I_
AU-1 / AU-7a	Rated operational power		3kW	4.6kW	3kW	4.6kW	7.3kW	11.6kW	-
	nated operational power	400V	SKVV	4.0KVV	8.9kW	13.8kW	22kW	35kW	-
AC-3 / AC-7b	Poted energtional curr	1	5.5A	8.5A	5.5A		25A	32A	-
AC-3 / AC-7b	Rated operational curi	1	5.5A 570W	880W	5.5A 570W	8.5A 880W	2.6kW	3.3kW	-
	Rated operational power	400V	57000	00000	1.7kW	2.6kW			-
	Data di anagetiana di asse		-	-	1.7KVV	Z.OKVV	7.8kW	10kW	-
AC-12 Rated operational curre 230V			-	-	-	-	-	-	6A
AC-15 Rated operational currents I 230V		rents le @	-	-	-	-	_	-	2A
Mechanical and	Electrical Endurances								
Mechanical endur	rance	Number of operations	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Electrical endurar	nce @ le AC7a (AC12	Number of operations	60,000	60,000	60,000	60,000	60,000	60,000	60,000
	short-circuit withstand	operations							
Prospected short-	-circuit current	rms	1kA	3kA	1kA	3kA	3kA	3kA	1kA
Associated protect	ction		MCB C16-6kA	MCB C25-6kA	MCB C16-6kA	MCB C25-6kA	MCB C40- 10kA	MCB C63- 10kA	6A 10x38 gG Fuse
Power dissipation	on								
Power dissipation	per current path		1W	1.5W	1W	1.5W	3.2W	5W	0.4W
Magnetic system	n for Eco and standard	contactor							
Pick-up			2.2W	2.2W	2.8W	2.8W	5W	5W	I -
Coil consumption			2.2W	2.2W	2.8W	2.8W	5W	5W	_
Closing delay	<u>'</u>		25ms	25ms	25ms	25ms	25ms	25ms	-
Opering delay			15ms	15ms	15ms	15ms	20ms	20ms	-
Connection			101110	101110	101110	101110	201110	201110	
	I	Diate!	4 40: 2	1 10: 1	1 10: 0	4 40: 1	4 05 - 2	4 05 0	1 0: 1
Main contact cab	ie section	Rigid	110mm ²	110mm ²	110mm ²	110mm ²	425mm ²	425mm ²	16mm ²
NA-t		Flexible	16mm²	16mm²	16mm ²	16mm²	416mm²	416mm²	16mm²
Main contact con	nection screw	Туре	M3.4	M3.4	M3.4	M3.4	M5	M5	M3.4
		Posidrive	PZ2	PZ2	PZ2	PZ2	PZ2	PZ2	PZ2
		Max. tight. torque	1.2Nm	1.2Nm	1.2Nm	1.2Nm	2Nm	2Nm	1.2Nm
Coil connection c	able section	Rigid	110mm ²	110mm ²	110mm ²	110mm ²	110mm ²	110mm ²	-
		Flexible	16mm ²	16mm ²	16mm ²	16mm ²	16mm ²	16mm ²	-
Coil connection s	crew	Туре	M3.5	M3.5	M3.5	M3.5	M4	M4	-
		Posidrive	PZ2	PZ2	PZ2	PZ2	PZ2	PZ2	-
	Max. tight.			1.2Nm	1.2Nm	1.2Nm	1.5Nm	1.5Nm	-
		torque							
Working tempera	ature	torque							
Working tempera	ature	torque	-10°C to +5	60°C					

Contactors & Relays cont.



Lighting systems with electronic ballasts cause inrush current peaks. Therefore we recommend you use the chart below to determinate the maximum amount of lamps that can be connected to a Hager contactor: The chart gives the maximum amount of lamps per contact. In 2014 the performances of the contactors in combination with lights increased. The products identified on the front face with the '+' can accept a higher number of lamps. For these products, see the figures in the column with the '+' in the header.

Compact fluo lamps	Lamp Powe	r 16A				40A	63A
			25A	16A +	25A +	1404	00A
Compact fluo lamp with	5W	11	15	17	27	49	76
external electronic ballast	7W	11	15	17	27	49	76
	9W	9	13	16	26	40	63
	11W	9	13	16	26	40	63
	15W	7	11	14	22	36	57
	18W	7	11	14	22	36	57
	20W	7	11	14	22	36	57
	23W	7	11	14	22	36	57
	26W	7	11	14	22	36	57
Compact fluo lamp with	5W	17	27	34	54	86	135
integrated electronic ballast	7W	17	27	34	54	86	135
	9W	17	27	34	54	86	135
	11W	17	27	34	54	86	135
	15W	17	27	34	54	86	135
	18W	13	20	25	40	63	100
	20W	13	20	25	40	63	100
	23W	13	20	25	40	63	100
	26W	13	20	25	40	63	100
Incandescent lamps		•					
Tungsten & halogen lamps	40W	32	50	36	57	76	120
230V	60W	21	33	28	45	67	105
	75W	17	27	24	38	63	100
	100W	13	20	17	28	41	65
	150W	8	13	11	18	29	45
	200W	6	9	8	14	22	35
	300W	4	7	6	10	15	23
	500W	2	3	3	6	9	14
	1000W	0	0	1	2	4	7
Tungsten & halogen lamps	20W	13	20	25	40	139	218
Tungsten & halogen lamps 12 ou 24V							
50	35W	8	13	16	26	82	129
	50W	6	9	11	18	60	94
	75W	4	6	7	12	52	82
	100W	2	3	3	6	35	55
	150W	1	2	2	4	20	31
LED							
LED 230V with integrated	4W	17	27	34	54	86	135
electronic ballast - non dimmable	4.5W	17	27	34	54	86	135
diffinable	6W	17	27	34	54	86	135
	7W	17	27	34	54	86	135
	8W	17	27	34	54	86	135
	12W	17	27	34	54	86	135
	17W	13	20	25	40	63	101
	18W	13	20	25	40	63	101
	22W	13	20	25	40	63	101
	30W	9	14	17	28	44	70
	34W	9	14	17	28	44	70
	40W	9	14	17	28	44	70
	50W	7	11	14	22	35	55
LED 230V with integrated	4W	38	60	76	120	159	250
electronic ballast - dimmable	5.5W	38	60	76	120	159	250
	6W	38	60	76	120	159	250
	7W	38	60	76	120	159	250
	8W	38	60	76	120	159	250
	12W	38	60	76	120	159	250
	17W	28	44	56	88	118	185
							_
	18W	28	44	56	88	118	185
	22W	28	44	56	88	118	185
	30W	20	31	39	62	82	130
	34W	20	31	39	62	82	130
	40W	20	31	39	62	82	130
	50W	16	24	30	48	65	102
LED 230V headlight with	100W	-	-	3	5	6	9
	150W	-	-	1	3	4	6
	150W 200W	-	-	1		4	6
integrated electronic ballast LED 12V with separated			- - 60		3		
integrated electronic ballast LED 12V with separated	200W	-	-	1	3 2	4	6
integrated electronic ballast LED 12V with separated	200W 1W	- 38	- 60	1 76	3 2 120	4 180	6 220
integrated electronic ballast LED 12V with separated	200W 1W 2.5W	- 38 38	- 60 60	1 76 76	3 2 120 120	4 180 180	6 220 220
integrated electronic ballast LED 12V with separated	200W 1W 2.5W 4W	- 38 38 38	- 60 60 60	1 76 76 76	3 2 120 120 120	4 180 180 180	6 220 220 220
integrated electronic ballast LED 12V with separated	200W 1W 2.5W 4W 5W	- 38 38 38 38	- 60 60 60	1 76 76 76 76	3 2 120 120 120 120	4 180 180 180 180	6 220 220 220 220 220
integrated electronic ballast LED 12V with separated	200W 1W 2.5W 4W 5W 7W	- 38 38 38 38 38	- 60 60 60 60	1 76 76 76 76 76	3 2 120 120 120 120 120	4 180 180 180 180 180	6 220 220 220 220 220 200
Integrated electronic ballast LED 12V with separated transformer - dimmable	200W 1W 2.5W 4W 5W 7W 10W	- 38 38 38 38 38 38	- 60 60 60 60 60	1 76 76 76 76 76 76	3 2 120 120 120 120 120 120	4 180 180 180 180 160 160	6 220 220 220 220 220 200 200
integrated electronic ballast LED 12V with separated transformer - dimmable	200W 1W 2.5W 4W 5W 7W 10W	- 38 38 38 38 38 38	- 60 60 60 60 60	1 76 76 76 76 76 76	3 2 120 120 120 120 120 120	4 180 180 180 180 160 160	6 220 220 220 220 220 200 200
integrated electronic ballast LED 12V with separated transformer - dimmable	200W 1W 2.5W 4W 5W 7W 10W 15W	- 38 38 38 38 38 38 38 28	- 60 60 60 60 60 60 44	1 76 76 76 76 76 76 76 56	3 2 120 120 120 120 120 120 120 120 88	4 180 180 180 180 160 160	6 220 220 220 220 220 200 200 200
ntegrated electronic ballast LED 12V with separated rransformer - dimmable	200W 1W 2.5W 4W 5W 7W 10W 15W	- 38 38 38 38 38 38 28	- 60 60 60 60 60 60 44	1 76 76 76 76 76 76 76 56	3 2 120 120 120 120 120 120 120 120 88	4 180 180 180 180 160 160 160	6 220 220 220 220 200 200 200 200
LED 12V with separated ransformer - dimmable	200W 1W 2.5W 4W 5W 7W 10W 15W 15W 18W 20W	- 38 38 38 38 38 38 38 28 13 13	- 60 60 60 60 60 60 44 20 20	1 76 76 76 76 76 76 76 56	3 2 120 120 120 120 120 120 120 120 88	4	6 220 220 220 220 200 200 200 200 100
LED 12V with separated ransformer - dimmable	200W 1W 2.5W 4W 5W 7W 10W 15W 15W 18W 20W 36W	- 38 38 38 38 38 38 38 28 13 13 12	- 60 60 60 60 60 60 60 44 20 20 19	1 76 76 76 76 76 76 56 19 19 19 17	3 2 120 120 120 120 120 120 120 120 30 30 30 30 28	4	6 220 220 220 220 200 200 100 100 90
LED 12V with separated ransformer - dimmable	200W 1W 2.5W 4W 5W 7W 10W 15W 15W 20W 36W 40W	- 38 38 38 38 38 38 38 28 13 13 12 12	- 60 60 60 60 60 60 60 44 20 20 19 15	1 76 76 76 76 76 76 56 19 19 19 17 16	3 2 120 120 120 120 120 120 120 120 30 30 30 28 26	4	220 220 220 220 200 200 200 200 100 100
LED 12V with separated ransformer - dimmable	200W 1W 2.5W 4W 5W 7W 10W 15W 15W 18W 20W 36W 40W 42W	- 38 38 38 38 38 38 38 28 13 13 12 12 10 9	- 60 60 60 60 60 60 60 44 20 20 19 15 13	1 76 76 76 76 76 76 56 19 19 19 17 16 15	3 2 120 120 120 120 120 120 120 120 30 30 30 28 26 24	180 180 180 180 160 160 160 70 70 70 60 60 55	220 220 220 220 200 200 200 200 100 100
LED 12V with separated ransformer - dimmable	200W 1W 2.5W 4W 5W 7W 10W 15W 18W 20W 36W 40W 42W 58W	- 38 38 38 38 38 38 28 13 12 12 10 9	- 60 60 60 60 60 60 60 44 20 20 19 15 13 12 9	1 76 76 76 76 76 76 56 19 19 19 17 16 15 10	3 2 120 120 120 120 120 120 120 88 30 30 30 30 28 26 24	180 180 180 180 160 160 160 70 70 70 60 60 55 35	220 220 220 220 200 200 200 200 100 100
LED 12V with separated ransformer - dimmable	200W 1W 2.5W 4W 5W 7W 10W 15W 15W 20W 36W 40W 42W 58W 65W	- 38 38 38 38 38 38 38 28 13 12 12 10 9 7	- 60 60 60 60 60 60 44 20 20 19 15 13 12 9	1 76 76 76 76 76 56 19 19 19 17 16 15 10 10	3 2 120 120 120 120 120 120 120 120 88 30 30 30 28 26 24 17	70 70 60 55 35 35	220 220 220 220 220 200 200 200 100 100
LED 12V with separated ransformer - dimmable	200W 1W 2.5W 4W 5W 7W 10W 15W 15W 15W 42W 36W 42W 65W 80W	- 38 38 38 38 38 38 38 28 - 13 12 12 10 9 7 6 5	- 60 60 60 60 60 60 44 20 20 19 15 13 12 9 8	1 76 76 76 76 76 56 56 19 19 17 16 15 10 10 9	3 2 120 120 120 120 120 120 120 120 120 1	4 180 180 180 160 160 160 70 70 70 60 60 60 55 35 35	220 220 220 220 200 200 200 200 100 100
LED 12V with separated ransformer - dimmable	200W 1W 2.5W 4W 5W 7W 10W 15W 18W 20W 36W 40W 42W 58W 65W 80W 115W	- 38 38 38 38 38 38 38 28 13 12 12 10 9 7 6	- 60 60 60 60 60 60 44 20 20 19 15 13 12 9 8 8	1 76 76 76 76 76 76 56 76 19 19 19 17 16 15 10 9 6	3 2 120 120 120 120 120 120 120 120 30 30 30 30 28 26 24 17 17 17	4 180 180 180 160 160 160 70 70 70 60 60 60 55 35 35 30 20	220 220 220 220 200 200 200 200 100 100
LED 12V with separated ransformer - dimmable	200W 1W 2.5W 4W 5W 7W 10W 15W 15W 20W 36W 40W 42W 58W 66W 80W 115W 115W	-38 38 38 38 38 38 38 28 13 12 12 10 9 7 6 5 4 3	- 60 60 60 60 60 60 44 20 20 19 15 13 12 9 8 7 7	1 76 76 76 76 76 76 56 19 19 19 17 16 15 10 10 9 6 6 6	3 2 120 120 120 120 120 120 120 88 30 30 30 28 26 24 17 17 15 10	4	100 100 90 83 56 48 32 26
ED 12V with separated ransformer - dimmable Fluorescent tubes Fo single - uncompensated	200W 1W 2.5W 4W 5W 7W 10W 15W 15W 20W 36W 40W 42W 58W 65W 80W 115W 115W 115W 115W	- 38 38 38 38 38 38 38 28 12 12 10 9 7 6 6 5 4 3 7	- 60 60 60 60 60 60 60 44 20 20 19 15 13 12 9 8 7 5 5	1 76 76 76 76 76 76 76 56 19 19 19 17 16 15 10 10 9 6 6 6 112	3 2 120 120 120 120 120 88 30 30 28 26 24 17 17 15 10 10 20	4	220 220 220 220 200 200 200 200 100 100
LED 12V with separated ransformer - dimmable Fluorescent tubes T5 single - uncompensated	200W 1W 2.5W 4W 5W 7W 10W 15W 15W 20W 36W 40W 42W 58W 66W 80W 115W 115W	-38 38 38 38 38 38 38 38 13 12 12 10 9 7 6 6 5 4 3 7	- 60 60 60 60 60 60 44 20 20 19 15 13 12 9 8 7 7	1 76 76 76 76 76 76 56 19 19 19 17 16 15 10 10 9 6 6 6	3 2 120 120 120 120 120 120 120 88 30 30 30 28 26 24 17 17 15 10	4	100 100 90 83 56 48 32 26
LED 12V with separated transformer - dimmable Fluorescent tubes T5 single - uncompensated	200W 1W 2.5W 4W 5W 7W 10W 15W 15W 20W 36W 40W 42W 58W 65W 80W 115W 115W 115W 115W	-38 38 38 38 38 38 38 28 13 12 12 10 9 7 6 5 4 3 7 7	- 60 60 60 60 60 60 60 44 20 20 19 15 13 12 9 8 7 5 5	1 76 76 76 76 76 76 76 56 19 19 19 17 16 15 10 10 9 6 6 6 112	3 2 120 120 120 120 120 88 30 30 28 26 24 17 17 15 10 10 20	4	6
LED 12V with separated transformer - dimmable Fluorescent tubes T5 single - uncompensated	200W 1W 2.5W 4W 5W 7W 10W 15W 15W 15W 42W 58W 65W 80W 115W 15W 18W 85W	-38 38 38 38 38 38 38 38 13 12 12 10 9 7 6 6 5 4 3 7	- 60 60 60 60 60 60 44 20 20 19 15 13 12 9 8 7 5 5	1 76 76 76 76 76 76 56 19 19 19 17 16 15 10 10 9 6 6 6 12 12 12	3 2 120 120 120 120 120 120 120 120 88 30 30 28 26 24 177 17 15 10	70 70 60 60 55 35 30 20 160 160	100 100 100 100 100 100 100 100 90 90 83 56 48 32 26 57
LED 12V with separated transformer - dimmable Fluorescent tubes T5 single - uncompensated	200W 1W 2.5W 4W 5W 7W 100W 15W 15W 20W 36W 40W 42W 58W 65W 80W 115W 140W 15W 15W 115W 120W 36W 40W 42P 58W 65W 80W 115W 140W 15W 120W	-38 38 38 38 38 38 38 28 13 12 12 10 9 7 6 5 4 3 7 7	- 60 60 60 60 60 60 60 44 20 19 15 13 12 9 8 7 7 5 5	1 76 76 76 76 76 56 56 19 19 17 16 10 10 10 10 10 10 10 10 11 12 12 12 12	3 2 120 120 120 120 120 120 88 30 30 30 28 26 24 17 17 17 15 10 10 20 20 20 20	70 70 60 60 60 36 36 36 36	6
LED 12V with separated transformer - dimmable Fluorescent tubes T5 single - uncompensated	200W 1W 2.5W 4W 5W 7W 10W 15W 15W 20W 36W 40W 42W 58W 65W 80W 115W 140W 15W 140W 15W 36W	-38 38 38 38 38 38 38 38 28 13 12 12 10 9 7 6 5 4 3 7 7	- 60 60 60 60 60 60 20 20 19 15 13 12 9 8 7 7 5 5 11	1 76 76 76 76 76 76 76 76 19 19 19 17 16 15 10 10 10 9 6 6 112 112 112 112	3 2 120 120 120 120 120 120 88 30 30 30 28 26 17 17 17 15 10 20 20 20 20 120 120 120 120 120 120	70 160 170 170 170 170 170 170 170 170 170 17	100 100 100 100 100 100 100 100 100 100
LED 12V with separated transformer - dimmable Fluorescent tubes T5 single - uncompensated	200W 1W 2.5W 4W 5W 7W 100W 15W 15W 20W 36W 40W 42W 58W 65W 80W 115W 140W 140W 15W 18W 20W 36W 440W 42W 42W 42W 42W 42W 42W 42W 42W 42W 42	- 38 38 38 38 38 38 38 38 28 13 12 12 10 9 7 6 5 4 3 7 7 7	- 60 60 60 60 60 60 60 44 20 20 20 19 15 13 12 9 8 7 5 5 11 11 11	1 76 76 76 76 76 76 76 76 19 19 17 16 15 10 10 9 6 6 12 12 12 12 12 12	3 2 2 120 120 120 120 120 88 30 30 30 28 26 24 177 15 10 10 20 20 20 20 20 20 20 20 20 20 20 120 1	70 70 60 60 60 55 35 30 20 16 36 36 36 34 29	100 100 100 90 83 220 200 200 200 200 200 100 90 90 83 56 48 32 26 57 57 57
LED 12V with separated transformer - dimmable Fluorescent tubes T5 single - uncompensated	200W 1W 2.5W 4W 5W 7W 10W 15W 15W 15W 20W 36W 40W 42W 58W 65W 80W 115W 115W 115W 115W 120W 36W 40W 42W 42W 42W 42W 42W 42W 42W 42W 42W 42	-38 38 38 38 38 38 38 38 28 13 12 12 10 9 7 6 6 5 4 3 7 7 7 7 7	- 60 60 60 60 60 60 44 20 20 20 19 15 13 12 9 8 7 5 5 5 11 11 11 11	1 76 76 76 76 76 76 56 19 19 19 17 16 15 10 10 10 10 10 11 12 12 12 12 12 12 12 12 12	3 2 2 120 120 120 120 120 120 88 30 30 30 28 26 24 177 15 10 20 20 20 20 20 20 120 120 120 120 12	70 70 60 60 55 35 30 20 16 36 36 36 34 29	100 100 100 100 100 100 100 90 90 83 56 56 48 32 26 57 57 57 53 45
Integrated electronic ballast LED 12V with separated transformer - dimmable Fluorescent tubes T5 single - uncompensated T5 single - paralell compensation	200W 1W 2.5W 4W 5W 7W 10W 15W 15W 20W 36W 40W 42W 58W 115W 115W 140W 140W 15W 20W 36W 40W 42W 58W	-38 38 38 38 38 38 38 38 38 13 12 12 10 9 7 7 6 6 5 4 3 7 7 7 7	- 60 60 60 60 60 60 60 44 20 19 15 13 12 9 8 8 7 7 5 5 5 11 11 11 11 11	1 76 76 76 76 76 76 56 56 19 19 17 16 15 10 10 10 9 6 6 11 12 11 12 11 12 11 12 11 12 11 12 11 12 11 12 11 12 11 12 11 12 11 11	3 2 120 120 120 120 120 120 88 30 30 30 28 26 24 17 17 15 10 10 20 20 20 20 20 15	70 70 60 60 60 36 36 36 36 34 29 27	100 100 100 100 100 100 100 100 100 100

luorescent tubes							
5 double - uncompensated	2 x 18W	13	20	25	40	50	78
	2 x 20W	12	19	24	38	50	78
	2 x 36W	12	15	19	30	44	69
	2 x 40W	10	13	16	26	40	63
	2 x 42W	9	12	15	24	40	63
		7				27	_
	2 x 58W	_	9	11	18		42
	2 x 65W	6	8	10	16	27	42
	2 x 80W	5	7	8	14	22	35
	2 x 115W	4	5	6	10	16	25
5 double - serie	2 x 18W	7	11	14	22	34	53
compensation			\rightarrow		\rightarrow	_	\rightarrow
ompensation	2 x 20W	7	11	14	22	29	45
	2 x 36W	6	10	12	20	27	42
	2 x 40W	6	10	12	20	27	42
	2 x 42W	6	10	12	20	27	42
	2 x 58W	6	10	12	20	25	39
	2 x 65W	5	7	8	14	23	36
		_				_	
	2 x 80W	5	7	8	14	20	31
	2 x 115W	4	5	6	10	17	25
5 single - electronic ballast	15W	7	11	14	22	36	57
· ·	18W	7	11	14	22	36	57
	20W	7	11	14	22	36	57
					_		_
	36W	7	11	14	22	34	53
	40W	7	11	14	22	29	45
	42W	7	11	14	22	29	45
	58W	6	10	12	20	27	42
	65W	6	10	12	20	27	42
			_				
	80W	6	10	12	20	27	42
	115W	6	10	12	20	25	39
5 double - electronic ballast	2 x 18W	7	11	14	22	34	53
	2 x 20W	7	11	14	22	29	45
	2 x 36W	6	10	12	20	27	42
	2 x 40W	_	_	_	_	_	_
		6	10	12	20	27	42
	2 x 42W	6	10	12	20	27	42
	2 x 58W	6	10	12	20	25	39
	2 x 65W	5	7	8	14	23	36
	2 x 80W	5	7	8	14	20	31
	2 x 115W	4	5	6	10	17	25
	ZXIIOVV	14	lo_	10	110	17	25
Discharge lamps							
ligh-pressure mercury-	50W	9	14	17	28	32	50
apor lamps - without	80W	6	9	11	18	24	37
ompensation	125W	3	5	6	10	18	28
	250W	2	3	3	6	10	15
	400W	1	1	1	2	6	9
	700W	0	0	0	0	4	5
ligh-pressure mercury-	50W	7	11	14	22	26	40
apor lamps - paralell	80W	5	8	10	16	22	34
compensation	125W	3	5	6	10	15	23
	250W	2	3	3	6	9	14
	400W	1	1	1	2	5	8
	700W	0	0	0	0	3	5
	1000W	0	0	0	0	2	3
ow pressure sodium lamps	18W	8	10	8	12	17	23
without compensation	35W	4	6	7	9	14	20
			\rightarrow				_
	55W	3	6	7	9	14	20
	90W	2	4	5	6	9	14
	135W	1	3	3	4	6	8
	180W	1	2	2	4	6	8
ow pressure sodium lamps	18W	5	7	5	8	12	24
paralell compensation			\rightarrow				_
paraion compensation	35W	4	6	4	7	10	23
	55W	3	5	3	5	10	19
	90W	2	3	3	4	8	16
	135W	1	2	1	2	5	7
	180W	1	2	1	2	5	6
High pressure sodium lamps	35W	11	14	15	24	30	50
without compensation		9	12		_	22	_
out compensation	50W	_		10	15		34
	70W	8	9	8	12	18	28
	110W	6	8	6	10	14	22
	150W	4	7	5	8	10	16
		2	4	3	5	6	10
	250W			, ~	_	4	6
		_	1	1		14	
	400W	0	1	1	2	1.0	
	400W 1000W	0	1	1	1	2	3
ligh pressure sodium-	400W	0			_	2 31	50
apour lamps - electronic	400W 1000W	0	1	1	1		
apour lamps - electronic vallast or parallel	400W 1000W 35W	0 0 6	1 9	1 11	1 18	31	50
apour lamps - electronic allast or parallel	400W 1000W 35W 50W 70W	0 0 6 6 4	1 9 9 6	1 11 11 7	1 18 18 12	31 22 16	50 35 25
apour lamps - electronic allast or parallel	400W 1000W 35W 50W 70W 110W	0 0 6 6 4 3	1 9 9 6 5	1 11 11 7 6	1 18 18 12 8	31 22 16 13	50 35 25 21
apour lamps - electronic allast or parallel	400W 1000W 35W 50W 70W 110W	0 0 6 6 4 3 3	1 9 9 6 5	1 11 11 7 6 4	1 18 18 12 8 6	31 22 16 13 8	50 35 25 21 13
apour lamps - electronic allast or parallel	400W 1000W 35W 50W 70W 110W	0 0 6 6 4 3	1 9 9 6 5	1 11 11 7 6	1 18 18 12 8	31 22 16 13	50 35 25 21
apour lamps - electronic allast or parallel	400W 1000W 35W 50W 70W 110W	0 0 6 6 4 3 3	1 9 9 6 5	1 11 11 7 6 4	1 18 18 12 8 6	31 22 16 13 8	50 35 25 21 13
apour lamps - electronic allast or parallel	400W 1000W 35W 50W 70W 110W 150W 250W 400W	0 0 6 6 4 3 3 2	1 9 9 6 5 5 3	1 11 11 7 6 4 3	1 18 18 12 8 6 4	31 22 16 13 8 7 5	50 35 25 21 13 11 8
apour lamps - electronic allast or parallel ompensation	400W 1000W 35W 50W 70W 110W 150W 250W 400W	0 0 6 6 4 3 3 2 1	1 9 9 6 5 5 3 1	1 11 11 7 6 4 3 1	1 18 18 12 8 6 4 2	31 22 16 13 8 7 5	50 35 25 21 13 11 8
apour lamps - electronic allalast or parallel ompensation	400W 1000W 35W 50W 70W 110W 150W 250W 400W 1000W 35W	0 0 6 6 4 3 3 2 1 0	1 9 9 6 5 5 5 3 1 0 0 24	1 11 11 7 6 4 3 1 0	1 18 18 12 8 6 4 2 1 30	31 22 16 13 8 7 5 2 42	50 35 25 21 13 11 8 3 55
apour lamps - electronic allalast or parallel ompensation	400W 1000W 35W 50W 70W 110W 150W 250W 400W 1000W 35W 70W	0 0 6 6 4 3 3 2 1 0 12	1 9 9 6 5 5 5 3 1 0 0 24 15	1 11 11 7 6 4 3 1 0 19	1 18 18 12 8 6 4 2 1 30	31 22 16 13 8 7 5 2 42 26	50 35 25 21 13 11 8 3 55 36
apour lamps - electronic allalast or parallel ompensation	400W 1000W 35W 50W 70W 110W 150W 250W 400W 1000W 35W	0 0 6 6 4 3 3 2 1 0	1 9 9 6 5 5 5 3 1 0 0 24	1 11 11 7 6 4 3 1 0	1 18 18 12 8 6 4 2 1 30	31 22 16 13 8 7 5 2 42	50 35 25 21 13 11 8 3 55
apour lamps - electronic allalast or parallel ompensation	400W 1000W 35W 50W 70W 110W 150W 250W 400W 1000W 35W 70W	0 0 6 6 4 3 3 2 1 0 12 10 6	1 9 9 6 5 5 3 1 1 0 24 15 7	1 11 11 7 6 4 3 1 0 19 12 8	1 18 18 12 8 6 4 2 1 1 30 17 12	31 22 16 13 8 7 5 2 42 26 14	50 35 25 21 13 11 8 3 55 36 20
apour lamps - electronic allalast or parallel ompensation	400W 1000W 35W 50W 70W 110W 150W 250W 400W 1000W 35W 70W 150W 250W	0 0 6 6 4 3 3 2 1 0 12 10 6 3	1 9 9 9 6 5 5 3 1 1 0 24 15 7 5	1 11 11 7 6 4 4 3 1 1 0 19 12 8 5 5	1 18 18 12 8 6 4 2 1 1 30 17 12 8	31 22 16 13 8 7 5 2 42 26 14 9	50 35 25 21 13 11 8 3 55 36 20
apour lamps - electronic allalast or parallel ompensation	400W 1000W 35W 50W 70W 110W 150W 250W 400W 1000W 35W 70W 150W 250W 400W	0 0 6 6 4 3 3 2 1 0 12 10 6	1 9 9 9 6 5 5 5 3 1 1 0 24 15 7 5 2	1 11 11 7 6 4 3 1 0 19 12 8 5	1 18 18 12 8 6 4 2 1 1 30 17 12 8 4 4	31 22 16 13 8 7 5 2 42 26 14 9	50 35 25 21 13 11 8 3 55 36 20 14
ligh pressure sodium- apour lamps - electronic allalast or parallel compensation Metal halide lamps - without compensation	400W 1000W 35W 50W 70W 110W 150W 250W 400W 1000W 35W 70W 150W 250W	0 0 6 6 4 3 3 2 1 0 12 10 6 3	1 9 9 9 6 5 5 3 1 1 0 24 15 7 5	1 11 11 7 6 4 4 3 1 1 0 19 12 8 5 5	1 18 18 12 8 6 4 2 1 1 30 17 12 8	31 22 16 13 8 7 5 2 42 26 14 9	50 35 25 21 13 11 8 3 55 36 20
rapour lamps - electronic alallast or parallel compensation Metal halide lamps - without	400W 1000W 35W 50W 70W 110W 150W 250W 400W 1000W 35W 70W 150W 250W 400W	0 0 6 6 4 3 3 2 1 0 12 10 6	1 9 9 9 6 5 5 5 3 1 1 0 24 15 7 5 2	1 11 11 7 6 4 3 1 0 19 12 8 5	1 18 18 12 8 6 4 2 1 1 30 17 12 8 4 4	31 22 16 13 8 7 5 2 42 26 14 9	50 35 25 21 13 11 8 3 55 36 20 14
apour lamps - electronic allast or parallel ompensation Metal halide lamps - without ompensation Metal halide lamps - without	400W 1000W 35W 50W 70W 110W 150W 250W 400W 1000W 35W 70W 150W 250W 400W 135W 70W 150W 250W 400W	0 0 6 6 4 3 3 2 1 0 12 10 6 3 3 1 0 6	1 9 9 9 6 5 5 5 3 1 0 0 24 15 7 5 5 2 0 0 10	1 11 11 7 6 4 3 1 0 19 12 8 5 5 2	1 18 18 12 8 6 6 4 2 1 1 30 17 12 8 4 0 0 18	31 22 16 13 8 7 5 2 42 26 14 9 6 3	50 35 25 21 13 11 8 3 55 36 20 14 9 5 39
apour lamps - electronic allalast or parallel ompensation Metal halide lamps - without ompensation Metal halide lamps - lectronic ballast or parallel	400W 1000W 35W 50W 70W 110W 150W 250W 400W 1000W 35W 70W 150W 250W 400W 1000W 35W 70W	0 0 6 6 4 3 3 2 1 0 12 10 6 3 3 1 10 6	1 9 9 9 6 5 5 5 3 1 0 0 24 15 7 5 5 2 0 10 8	1 11 11 7 6 4 4 3 1 0 19 12 8 5 5 0 12	1 18 18 12 8 6 6 4 2 2 1 1 30 17 12 8 4 0 18 13	31 22 16 13 8 7 5 2 42 26 14 9 6 3 22 22	50 35 25 21 13 11 8 3 55 36 20 14 9 5 39
apour lamps - electronic alalast or parallel ompensation Metal halide lamps - without ompensation	400W 1000W 35W 50W 70W 110W 150W 250W 400W 1000W 35W 70W 150W 250W 400W 1000W 35W 70W 150W 150W	0 0 6 6 4 3 3 2 1 0 10 6 3 1 1 0 6 5 3 3 1 1 0 6 6 6 7 1 0 6 6 7 1 0 1 0	1 9 9 9 6 5 5 3 1 1 0 0 24 15 7 5 2 2 0 10 8 5 5	1 11 11 7 6 4 3 1 1 0 19 12 8 5 2 0 12 10 6	1 18 18 12 8 6 4 4 2 1 1 30 177 12 8 4 4 0 0 18 13 8	31 22 16 13 8 7 5 2 42 26 14 9 6 3 22 22	50 35 25 21 13 11 8 3 55 36 20 14 9 5 39 39 22
apour lamps - electronic allalast or parallel ompensation Metal halide lamps - without ompensation Metal halide lamps - lectronic ballast or parallel	400W 1000W 35W 50W 70W 110W 150W 250W 400W 1000W 35W 70W 150W 250W 400W 1000W 35W 70W	0 0 6 6 4 3 3 2 1 0 12 10 6 3 3 1 10 6	1 9 9 9 6 5 5 5 3 1 0 0 24 15 7 5 5 2 0 10 8	1 11 11 7 6 4 4 3 1 0 19 12 8 5 5 0 12	1 18 18 12 8 6 6 4 2 2 1 1 30 17 12 8 4 0 18 13	31 22 16 13 8 7 5 2 42 26 14 9 6 3 22 22	50 35 25 21 13 11 8 3 55 36 20 14 9 5 39