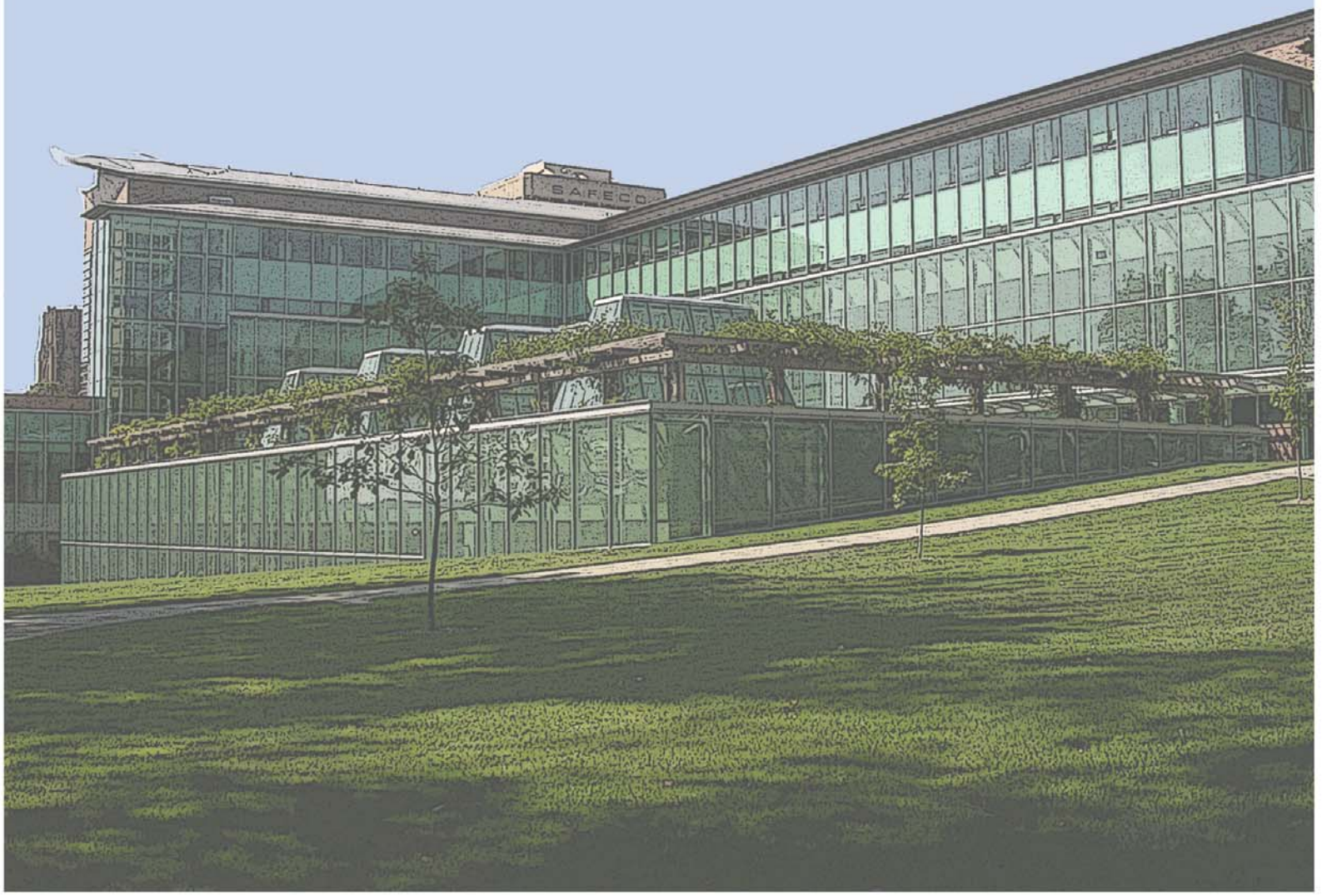
Appendices



Appendix A

Luminaire Designation	Description	Mounting	Lamp		Ballast	CRI	CCT	Volt.	Watts
			#	Type					
H1	Tech Lighting Halogen adjustable accent lights, Clamps to Wall MonoRail	Surface	1	35W MR16	N/A	-	3000	12/277	35
H2	Leucos Incandescent Cylindrical Table Lamp	Table	1	100W A19	N/A	-	-	120	100
F1	Lightolier Compact Fluorescent downlight w/ vertical lamp, 6" aperture	Recessed	1	CFTR32W	Electronic	82	3500	277	34
F1A	Lightolier Compact Fluorescent downlight w/ vertical lamp, 6" aperture	Recessed	1	CFTR32W	Electronic Dimming	82	3500	277	38
F2	Erco 48" Recessed wallwasher	Recessed	1	F28T5	Electronic	82	3500	277	30
F3	Focal Point Fluorescent Directional Cove Light	Surface	1	F28T5	Electronic	85	3500	277	30
F3A	Focal Point Fluorescent Directional Cove Light	Surface	1	F28T5	Electronic Dimming	85	3500	277	30
F4	Se'lux Compact Fluorescent Wall Arm Mounted Sconce	Surface	1	CFQ26W	Electronic	82	3500	277	27
F5	WE-EF Rectangular Compact Fluorescent Step Light	Recessed	1	CFQ18W	Integral Electronic	82	3500	277	20
F6	WE-EF Circular Compact Fluorescent Step Light	Recessed	1	CFQ18W	Integral Electronic	82	3500	277	20
F7A	Focal Point Fluorescent Narrow Slot Downlight with Opaque Satin Lense	Recessed	1	F28T5	Electronic Dimming	85	3500	277	30
F8A	Lightolier Compact Fluorescent Wallwasher w/ vertical lamp,4" aperture	Recessed	1	CFQ18W	Electronic Dimming	82	3500	277	22
F9	Lightolier Compact Fluorescent wallwasher w/ vertical lamp, nominal 6" apperature	Recessed	1	CFTR32W	Electronic	82	3500	277	34
F10	Delray Lighting 8" Clyinder Vertical Lamp Up/Downlight	Surface (Column)	2	CFQ18W	Electronic	82	3500	277	36
F11	Lightolier Compact Fluorescent Downlight w/ vertical lamp, nominal 8 3/4" aperture	Recessed	1	CFM42W	Electronic	82	3500	277	46
F12	Elliptipar Style 301 Assymetrical Linear Fluorescent Strip	Surface	1	F32T8	Electronic	85	3500	277	34
F13	Winona Lighting Decorative Cylindrical Pendant	Suspended	2	FT39W	Magnetic	85	3500	277	84
F14	Elliptipar 30/30 Fluorescent Stack Light	Suspended	1	F28T5	Electronic	85	3500	277	30
M1	Bega Metal Halide Low Profile Path Light	Semi-Recessed	1	39W T4	Magnetic	82	3000	277	53
L1	ioLighting 36" Symmetrical Linear LED Accent, 5 degree beam spread w/ grazing	Surface	1	F28T5	Integrated Driver	-	5000	277	32

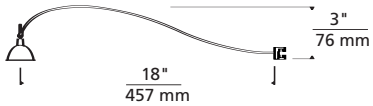
Luminaire Cutsheets

Wall Georgi

FreeJack	MonoRail	Two-Circuit MonoRail	Wall MonoRail	Kable Lite	TwinRail	T~trak™
N/A	N/A	N/A	✓	N/A	N/A	N/A

ARCHITECTURAL HEAD

Shown approximately 20% actual size.



DESCRIPTION
Clamps to Wall MonoRail. 18" long 3" high gentle curve. Pivots at head to direct the beam.

SYSTEM
Available for Wall MonoRail only.

FINISH
Antique bronze, chrome, gold, satin nickel.

LAMP
Low-voltage Halogen MR16 lamp up to 75 watts (not included).

ACCESSORIES & OPTICAL CONTROLS
Wild Thing, Sun Louver, Flight Paper, MR16 Snout, Round Glass Shield, Cone Glass Shield, Lil Egypt, Lil Wok, Barndoors, Snap Barndoors, Backlight Shield, Louver Lens Holder, Snap Louver Lens Holder, Eggcrate Louver, Glass Lens (sold separately).

WEIGHT
0.22 lb./0.10 kg. ±

ORDERING INFORMATION

700WMGRG

FINISH
- **Z** ANTIQUE BRONZE
- **C** CHROME
- **G** GOLD
- **S** SATIN NICKEL

TECH LIGHTING®
7400 Linder Avenue T 847.410.4400
Skokie, Illinois 60077 F 847.410.4500
www.techlighting.com

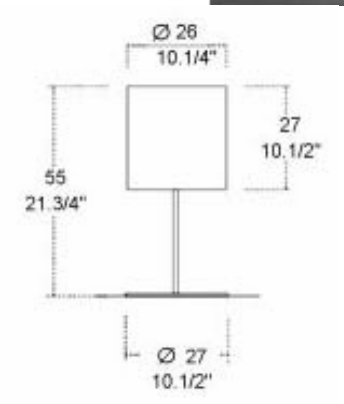
700WMGRG S

FIXTURE TYPE: H1

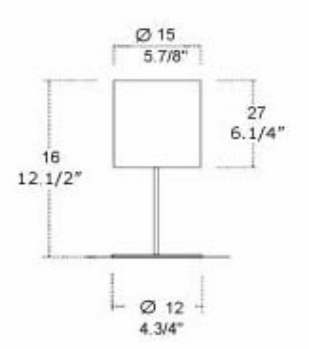
JOB NAME: William H. Gates Hall

CELINE T-T15

LEUCOS INDUSTRIAL DESIGN TEAM



Celine T



Celine T15

DESCRIPTION: A simple drum-shaped, satin white diffuser unites the Celine design offering. Two sizes are available with incandescent light sources to provide diffused illumination.

CONSTRUCTION: Flat round bases and cleaned-lined stems in brushed nickel support the blown glass diffuser. On/Off switches are located on a black cord on all models. Dimmers are optional.

LIGHT SOURCE: T: 1 x 100 watt, incandescent, A-19, medium base (provided)
T15: 1 x 60 watt, incandescent, G-16 1/2, candelabra (provided)

FINISH: Stem and base details are in brushed nickel

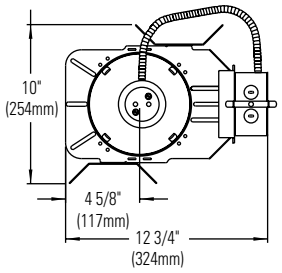
GLASS COLOR: Satin White

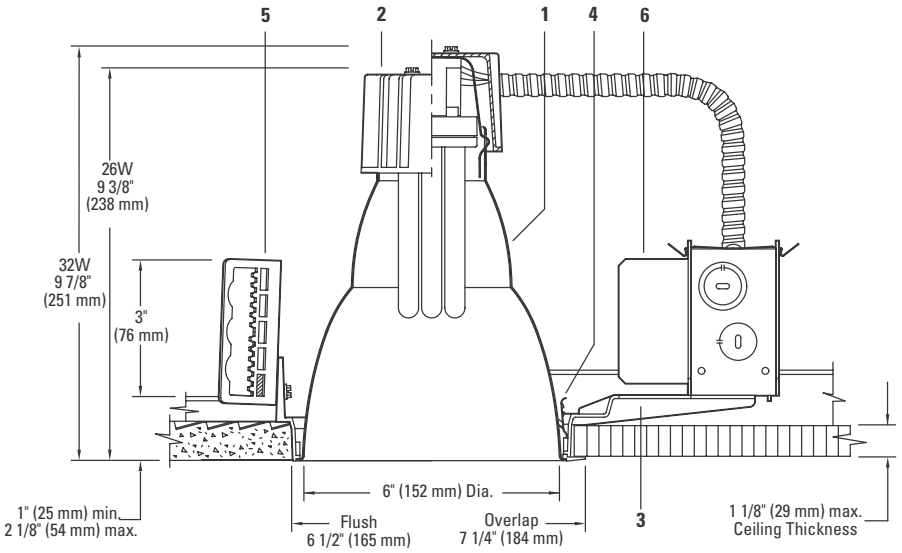
NET WEIGHT: T: 11 lbs.
T 15: 7 lbs.

Leucos USA, Inc.
11 Mayfield Avenue
Edison, NJ 08837
Tel: 732-225-0010
Fax: 732-225-0250
www.leucos.com

Calculite® Compact Fluorescent Open Downlighting **8021**

6" Aperture Triple Tube Vertical Lamp





Ceiling Cutout: 6 9/16" (167 mm) Dia.

Reflector Trim	
8021 CCLW	Comfort Clear™, White Flange
8021 CCLP	Comfort Clear™, Polished Flange
8021 CCL	Comfort Clear™, Molded Trim Ring
8021 ☐	Add suffix. See options for other finishes.

Frame-In Kit			Lamp
S6132BU	Electronic	120V - 277V	**26 or 32W Triple Tube**
S6132BCU3	Universal Dimming	120V - 277V	4-Pin (Amalgam)
S6132BJUM7	Advance Mark7	120V - 277V	

Remodeler Frame-In Kit			Lamp
6132BURM	Electronic	120V - 277V	**26 or 32W Triple Tube** 4-Pin (Amalgam)

Features

1. **Reflector:** 16 ga. Alzak® aluminum, 50° visual cutoff to lamp and lamp image, medium distribution. Comfort Clear™ low iridescence finish. Self-flanged or flangeless with molded white trim ring (field paintable).
2. **Socket Cup:** Effectively dissipates heat and positions lamp holder. Snaps onto reflector neck to assure consistently correct optical alignment without tools.
3. **Mounting Frame:** Galvanized steel for dry or plaster ceilings. Accepts other 6" Triple Tube reflectors (see S6132BU Spec Sheet).
4. **Retaining Springs:** Precision-tooled steel friction springs secure reflector to mounting frame for quick, tool-less installation.
5. **Mounting Brackets:** 16 ga. steel. Adjust from inside of fixture. Use 3/4" or 1 1/2" lathing channel, 1/2" EMT, or optional mounting bars.
6. **Ballast/J-Box:** Electronic 120V-277V. UL listed for through branch circuit wiring with max of (8) No. 12 AWG, 90°c supply conductors. Outboard mounted to reduce heat transfer and maintain lamp efficacy and life. Service from below without tools.

Electrical

Note: For ballast electrical data and latest lamp/ballast compatibility refer to **"Ballast"** specification sheet for complete electrical data.
S6132BU, S6132BCU: UL listed for through branch circuit wiring with max of (8) No. 12 AWG, 90° C supply conductors.
6132BURM: UL listed for No. 12 AWG, 90° C supply conductors.

Options and Accessories

Comfort Clear™ Finishes[1]		Other Finishes	
Diffuse	**CCD**	White	**WH**
Champagne Bronze	**CCZ**		
Pewter	**CPW**		

[1]Specify desired flange. **W** White, **P** Polished, Blank - Molded Ring

Other Dimming:

S6132BJ1MX Advance MarkX, 120V
S6132BJ2MX Advance MarkX, 227V
S6132BJ1LD3 Lutron Hi-lume®, 120V
S6132BJ2LD3 Lutron Hi-lume®, 227V

Options and Accessories (continued)

Emergency Ltg. Kit	**FA EM3E***
	FA EM4*
Fuse (Slow Blow)	Add suffix **F**
Existing/Thk. Ceiling	**FA EC6***
Emergency	Add suffix **EM***
Chicago Plenum	Use 6132BULC

*See Spec. Sheets: FAEM, FAEC

Mounting Bars & Accessories; see Specification Sheet MBA.
Sloped Ceiling Adapters; see Specification Sheet SCA.

IC Frame available; see **C6CFL32** Specification Sheet.

Labels

UL Listed for damp locations.

Alzak® is a registered trademark of ALCOA.
US Patent Pending.

Job Information **Type:** F1 & F1A

Job Name: William H. Gates Hall

Cat. No.: 8021CCLP

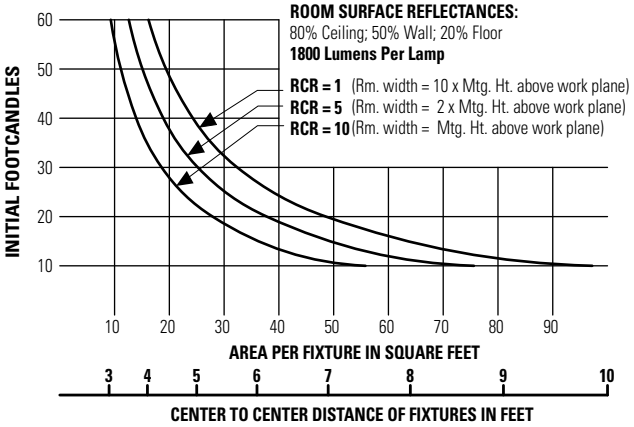
Lamp(s): 1 CFT32W

Notes:

Lightolier a Genlyte company www.lightolier.com
631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710

LIGHTOLIER®

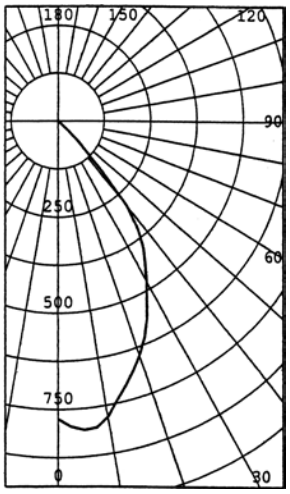
26W
Quick Calculator



This quick calculator chart determines the number and spacing of 1 lt.- 26W TTT units with Comfort Clear™ reflector, for any level of illumination.

Spacing Ratio = 1.0

REPORT NO: LSI 14025
LIGHTOLIER RECESSED FLUORESCENT LUMINAIRE,
WITH COMFORT CLEAR™ REFLECTOR
ONE 26 WATT CPFL GE LAMP,
CAT# F26TBX/SPX35-835.
LUMEN RATING = 1800 LMS.



EFFICIENCY=48.1%
DATE: 4-23-99
CIE TYPE DIRECT
LUMINOUS DIAMETER: 6.000
THIS REPORT BASED ON LM-1 AND
OTHER PERTINENT IES PROCEDURES.

ZONAL SUMMARY

ANGLE	CP	LUMENS
0	775	
5	806	77
10	780	
15	708	199
20	646	
25	566	258
30	478	
35	402	245
40	285	
45	78	81
50	13	
55	4	4
60	2	
65	1	2
70	1	
75	1	1
80	0	
85	0	0

ZONAL LUMENS AND PERCENTAGES

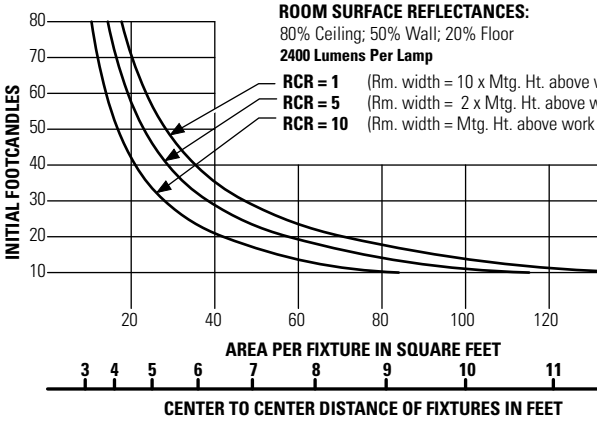
ZONE	LUMENS	%LAMP	%LUMINAIRE
0-30	533	29.66	61.66
0-40	778	43.25	89.92
0-60	863	47.98	99.75
0-90	865	48.10	100.00
40-90	87	4.85	10.08
60-90	2	.12	.25
90-180	0	.00	.00
0-180	865	48.10	100.00

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE = .20

ROOM CAVITY RATIO	80			70			50			30			10			
	WALL OF REFLECTANCE															
	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
1	.54	.53	.52	.53	.52	.51	.51	.50	.49	.49	.48	.48	.47	.47	.46	.46
2	.50	.49	.47	.50	.48	.47	.48	.47	.46	.47	.46	.45	.45	.45	.44	.43
3	.47	.45	.44	.47	.45	.43	.46	.44	.43	.44	.43	.42	.43	.42	.41	.41
4	.45	.42	.40	.44	.42	.40	.43	.41	.40	.42	.41	.39	.41	.40	.39	.38
5	.42	.39	.37	.42	.39	.37	.41	.39	.37	.40	.38	.37	.39	.38	.36	.36
6	.40	.37	.35	.39	.37	.35	.39	.36	.35	.38	.36	.34	.37	.36	.34	.34
7	.37	.34	.33	.37	.34	.32	.36	.34	.32	.36	.34	.32	.35	.33	.32	.31
8	.35	.32	.30	.34	.32	.30	.34	.32	.30	.34	.31	.30	.33	.31	.30	.29
9	.33	.30	.28	.32	.30	.28	.32	.30	.28	.32	.29	.28	.31	.29	.28	.27
10	.31	.28	.26	.30	.28	.26	.30	.28	.26	.30	.27	.26	.29	.27	.26	.25

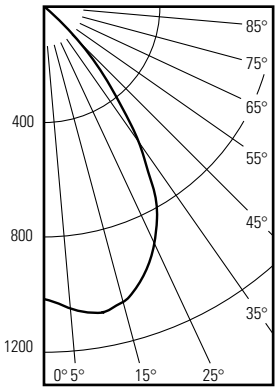
32W
Quick Calculator



This quick calculator chart determines the number and spacing of 1 lt.- 32W TTT uni with Comfort Clear™ reflector, for any level of illumination

Spacing Ratio = 1.1

REPORT PREPARED FOR: LIGHTOLIER 04-27-1999
REPORT NO: LRL 499-9G
LAMPS: 1 PLT-32 LUMENS: 2400
DESCRIP.: 6" DIA X 10" HT RECESSED DOWNLIGHT
WITH COMFORT CLEAR™ REFLECTOR. VERTICAL
LAMP.



EFFICIENCY=52.7%
DATE: 4-27-99
CIE TYPE DIRECT
LUMINOUS DIAMETER: 6.000
THIS REPORT BASED ON LM-1 AND
OTHER PERTINENT IES PROCEDURES.

ZONAL SUMMARY

ZONE	AVG* ZONAL DEG.	C.P. LUMENS
180	0	
175	0	0
165	0	0
155	0	0
145	0	0
135	0	0
125	0	0
115	0	0
105	0	0
95	0	0
90	0	0
85	1	1
75	1	1
65	3	3
55	9	8
45	99	77
35	563	354
25	904	418
15	1063	301
5	1066	102
0	1035	

ZONAL LUMENS AND PERCENTAGES

ZONE	LUMENS	% LAMP	%LUMINAIRE
0–30	821	34.2	64.9
0–40	1175	49.0	92.9
0–60	1260	52.5	99.6
0–90	1265	52.7	100.0
40–90	90	3.8	7.1
60–90	5	0.2	0.4
90–120	0	0.0	0.0
90–150	0	0.0	0.0
90–180	0	0.0	0.0
0–180	1265	52.7	100.0

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE = .20

ROOM CAVITY RATIO	80			70			50			30			10			
	WALL OF REFLECTANCE															
	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
1	.59	.58	.57	.58	.57	.56	.56	.55	.54	.54	.53	.53	.52	.52	.51	.50
2	.56	.54	.53	.55	.54	.52	.54	.52	.51	.52	.51	.50	.51	.50	.49	.48
3	.53	.51	.50	.53	.51	.49	.51	.50	.49	.50	.49	.48	.49	.48	.47	.46
4	.51	.48	.47	.50	.48	.46	.49	.47	.46	.48	.46	.45	.47	.46	.45	.44
5	.48	.46	.44	.48	.45	.44	.47	.45	.43	.46	.44	.43	.45	.44	.43	.42
6	.46	.43	.42	.46	.43	.41	.45	.43	.41	.44	.42	.41	.44	.42	.41	.40
7	.44	.41	.39	.43	.41	.39	.43	.41	.39	.42	.40	.39	.42	.40	.39	.38
8	.41	.39	.37	.41	.39	.37	.41	.38	.37	.40	.38	.37	.40	.38	.36	.36
9	.39	.36	.35	.39	.36	.35	.38	.36	.35	.38	.36	.34	.38	.36	.34	.34
10	.35	.32	.31	.35	.32	.31	.35	.32	.30	.34	.32	.30	.34	.32	.30	.30

Job Information **Type:** F1 & F1A

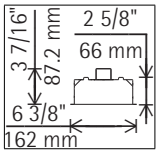
Lightolier a Genlyte company www.lightolier.com
631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710

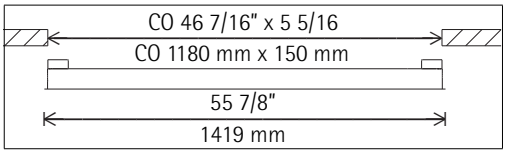
LIGHTOLIER®

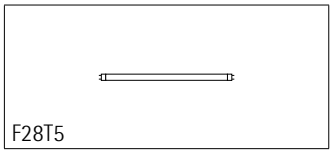
ERCO

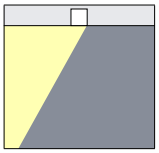
TFL Wallwasher

for fluorescent lamps









65040.023 Reflector silver
F28T5 28W Min. Bipin 2900lm
ECG

Product description
Housing: sheet metal, white (RAL9002) powder-coated. Screw-fastened end plates. Arrangement as continuous band of light possible. Mounting brackets with screw fixing: metal.
2 cable entries, through-wiring possible. 3-pole terminal block.
Electronic control gear 120V/277V, 60Hz, class P inside cast housing.
Wallwasher reflector: aluminum, satin matt anodized. Hinged cover for lamp replacement.
Type Non IC luminaire.
Insulation materials must be kept away from the luminaire by a minimum of 3". Suitable for damp location.
Max. ceiling thickness 3/4".
Weight 17.64lbs / 8.00kg

ERCO Lighting, Inc.
160 Raritan Center Parkway
Suite 10
Edison, NJ 08837
USA
Tel.: +1 732 225 8856
Fax: +1 732 225 8857
info.us@erco.com

Technical Region: 120V/277V, 60Hz
Edition: 11.15.2006
Please download latest version from
www.erco.com/65040.023

ERCO

TFL Wallwasher

Planning Data

Illuminance (fc)
Specifications:
Number of luminaires n > 5
Light loss factor 0.80
Without indirect component
Without peripheral area
Wall height (ft) 10
F28T5 28W Min. Bipin 2900lm

Offset from wall (ft)	3		3		4		4	
Luminaire spacing (ft)	5		6		5		6	
Distance from ceiling (ft)	below the luminaire	between the luminaires	below the luminaire	between the luminaires	below the luminaire	between the luminaires	below the luminaire	between the luminaires
0.000	0	0	0	0	0	0	0	0
1.000	36	25	34	19	16	13	14	10
2.000	53	41	49	32	35	30	31	24
3.000	40	34	36	27	35	30	30	25
4.000	30	26	26	22	28	25	25	21
5.000	22	20	19	17	23	20	20	17
6.000	17	15	14	13	19	16	16	14
7.000	13	11	11	10	15	13	13	11
8.000	10	8	8	7	12	10	10	9
9.000	8	7	7	6	10	8	8	7
10.000	6	5	5	5	8	7	7	6

FOCAL POINT®

covelight™ 68

FEATURES

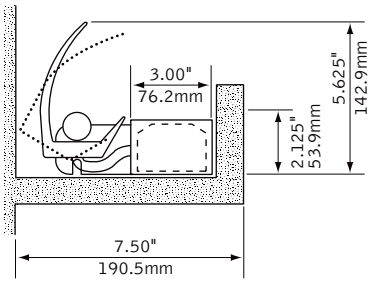
Intended for concealed cove installations where directional light requirements may change.

Multiple lamp configurations provide maximum flexibility.

Continuous row installations may be configured with combinations of 3' and 4' standard length units.

Adjustable asymmetric optical system adds flexibility and performance to any design.

DIMENSIONAL DATA



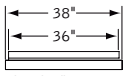
lamping options


BIAX LAMPS

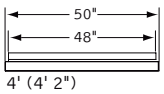

T8 LAMPS


T5/T5HO LAMPS

fixture information



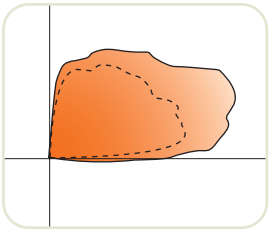
3' (3' 2")



4' (4' 2")

Overall luminaire length will exceed nominal length.

PERFORMANCE



1–Lamp T8
82% Efficiency
1242 cd @ 115°

See **Photometric** section for additional performance data.

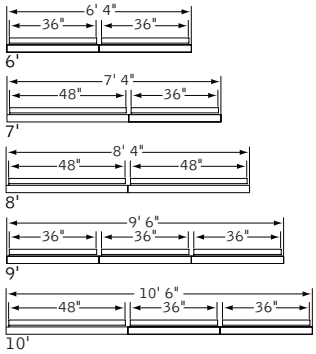
august 2005

fixture type:

project name:

DETAILS

run information



Fixtures are always independent and never joined.
Overall luminaire length will exceed nominal length.
Consult factory for additional row length information.

SPECIFICATIONS

construction

20 Ga. steel reflector housing and remote ballast housing.
16 Ga. steel end plates attached to housing.
Luminaires available in 3' and 4' nominal lengths only.

3' unit weight:	12 lbs
4' unit weight:	16 lbs

optic

Die-formed .02" specular aluminum reflector.

electrical

Electronic ballasts are thermally protected and have a Class "P" rating.
Optional DALI and other dimming ballasts available.
Consult factory for dimming specifications and availability.
UL and cUL listed.

emergency

Emergency battery packs provide 90 minutes of one lamp illumination.
Initial lumen output for lamp types are as follows:

Biax Lamps:	Up to 650 lumens
T8 Lamps:	Up to 475 lumens
T5 Lamp:	Up to 550 lumens
T5HO Lamp:	Up to 825 lumens

Battery pack requires unswitched hot from same branch circuit as AC ballast.

finish

Polyester powder coat applied over a 5-stage pre-treatment.
Standard luminaire housing finished in High Reflectance White.

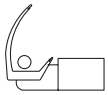
ORDERING

luminaire series		FCV
Covelight	FCV	
profile		68
6" x 8"	68	
lamping		1T5
40 Watt Biax	BX40	
50 Watt Biax	BX50	
55 Watt Biax	BX55	
One Lamp T8	1T8	
One Lamp T5	1T5	
One Lamp T5HO	1T5HO	
circuit		1C
Single Circuit	1C	
voltage		277
120 Volt	120	
277 Volt	277	
347 Volt (Consult factory for availability)	347	
ballast		S
Electronic Instant Start <20% THD (T8 Only)	E	
Electronic Program Start <10% THD	S	
Electronic Dimming Ballast (Consult factory for dimming availability)	D	
mounting		CV
Cove	CV	
factory options		
Emergency Battery Pack	EM	
HLR/GLR Fuse	FU	
Include 3000K Lamp	L830	
Include 3500K Lamp	L835	
Include 4100K Lamp	L841	
finish		HW
High Reflectance White	HW	
luminaire length		4'
3'	3'	
4'	4'	
(Overall luminaire length will exceed nominal length.)		

PERIMETER

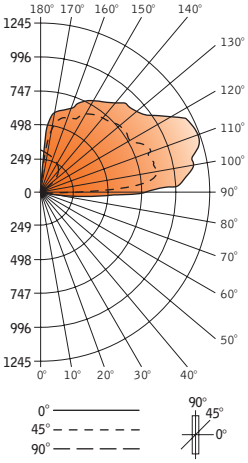
adjustable

covelight™ 68



Filename: FCV681T8.IES
Catalog #: FCV-68-1T8-1C-120-E-HW-4'
Efficiency: 82%
Test #: 8815.0

CANDLEPOWER DISTRIBUTION



Vertical Angle	Horizontal Angle 0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	0	0	0	0	0	
5°	0	0	0	0	0	0
15°	0	0	0	0	0	0
25°	0	0	0	0	0	0
35°	0	0	0	0	0	0
45°	0	0	0	0	0	0
55°	17	8	0	0	0	2
65°	72	47	12	0	0	12
75°	243	208	103	1	0	55
85°	530	462	276	91	0	151
90°	903	813	557	201	0	
95°	1126	1030	728	307	8	365
105°	1215	1115	817	342	51	385
115°	1242	1122	741	413	89	381
125°	983	895	706	443	118	300
135°	907	847	688	455	142	255
145°	798	755	630	464	171	198
155°	691	658	590	390	183	130
165°	594	522	469	341	195	72
175°	295	283	254	219	195	20
180°	198	198	198	198	198	

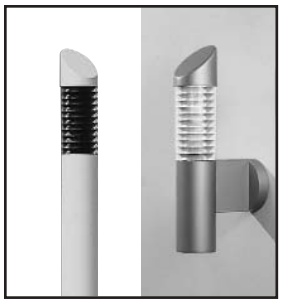
LUMEN SUMMARY

	Zone	Lumens	% Lamp	% Fixt
	90°-120°	1131	39.7	48.7
	90°-130°	1431	50.2	61.6
	90°-150°	1884	66.1	81.0
	90°-180°	2105	73.9	90.6
Total Luminaire	0°-180°	2324	82	100.0

Go to www.focalpointlights.com for additional photometric data.

MTR* 90

se'lux®



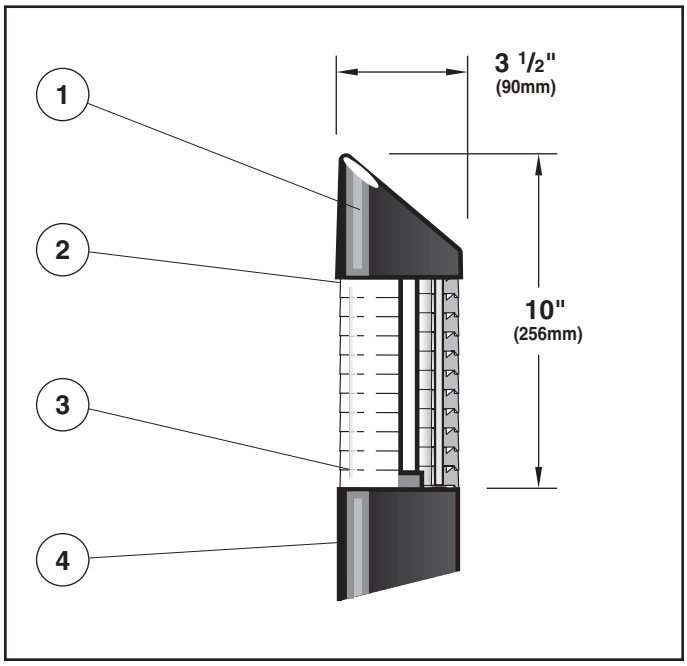
Project: William H. Gates Hall

Type: F4 **Qty:** 22

W90	–	2	–	Q26	–	BK	–	277	–	
Series		**Height**		**Lamp Type / Wattage**		**Finish**		**Voltage**		**Option**

Series	Height	Lamp Type / Wattage	Finish	Voltage	Options
B90 MTR*90 Bollard **W90** MTR*90 Wall	**2** 2' (.6m) **3** 3' (.9m) **4** 4' (1.2m) or specify custom height Wall Mounting see page 2	**T 13** 13w Twin tube fluorescent **Q 18** 18w Quad fluorescent **Q 26** 26w Quad fluorescent	**WH** White **BK** Black **BZ** Bronze **SV** Silver **SP** Specify RAL#	**120** **277** **347**	**HS** House Side Shield (180) Consult factory for details

* US Patent No. 4,669,034



UL LISTED c UL LISTED

Union Made Affiliated with **IBEW** *Local 363*

1. Fixture Cover - Die-cast aluminum cover, with round angled form. Thick-walled aluminum cover is painted white on the interior for maximum luminaire efficiency. Removes by loosening two, vandal-resistant, stainless steel set screws for easy access to lamp chamber.

2. Gasketing - Continuous gaskets provide weather-proofing, dust, and insect control at shielding base, fixture cover and between MTR rings.

3. Shielding - Injection-molded acrylic multi-prisms for total reflection (MTR). MTR rings are patterned after the light bending characteristics of a prism. Rings are secured to die-cast aluminum fitter. Additional small reflector is available for asymmetrical light distribution. Consult factory for information.

4. Column - Extruded, thick-walled aluminum, minimum wall thickness 0.110" (3mm). Column houses cold weather ballast.

5. Column Fitter - (Not shown) Die-cast aluminum fitter holds ballast assembly and lamp socket. Fastened to column with three, vandal-resistant, stainless steel, countersunk screws. Column fitter removal allows access to ballast assembly.

6. Ballast - (Not shown) Electronic, high power factor, class P , type A sound rating. Specify 120v, 277v, or 347v. Consult factory for more detailed ballast information. Lamp provided by others.

7. Lamp - (Not shown) For use with compact fluorescent lamps. T13W single end 2 pin base GX23; and Q18w and Q26w single end 4 pin base G24q. Lamp by others.

8. Fixture Mount - (shown on p.2) Column is mounted to hot-dipped, galvanized steel, direct burial tube, anchored 12" deep for increased rigidity and strength.

Exterior Luminaire Finish - SELUX utilizes a high quality Polyester Powder Coating. All SELUX luminaires and poles undergo a five stage intensive pretreatment process where product is thoroughly cleaned, phosphated and sealed. SELUX powder coated products provide excellent salt and humidity resistance as well as ultra violet resistance for color retention. All products are tested in accordance with test specifications for coatings from ASTM and PCI.

Standard exterior colors are White (WH), Black (BK), Bronze (BZ), and Silver (SV). RAL colors (SP) are available, please specify RAL#.#.

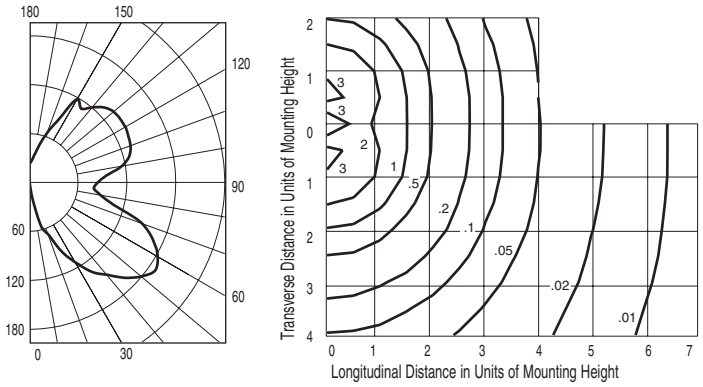
SELUX Corp. © 2002
PO Box 1060, 5 Lumen Lane
Highland, NY 12528
TEL: (845) 691-7723
FAX: (845) 691-6749
E-mail: seluxus@selux.com
Web Site: www.selux.com/usa
MTR90-0403-01 (ss-V3.1)

MTR 90

MTR Refractor

Catalog # B90-3-Q26
ITL Report # 40307

- Innovative multi-prisms for total reflection incorporates light-bending characteristics of a prism. US patent no. 4,669,034.
- Directs light precisely with minimum intensity at critical viewing angles.
- Blends efficiency with visual comfort.
- Maximum candela of 193 at 55° from vertical.



Lamp Prorate Table

Fluorescent

Wattage	Factor	Initial Lumens
13	0.50	900
18	0.69	1250
26	1.00	1800

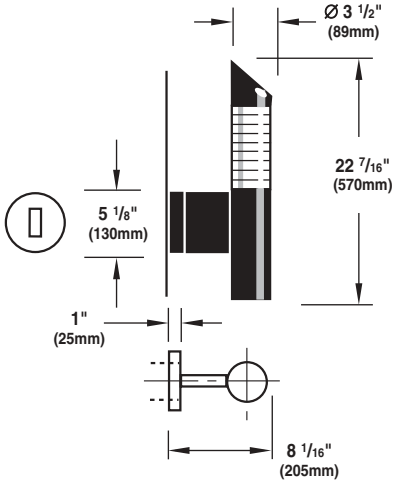
Conversion Chart

Values based on 3' (.9m) mounting height

Mounting Height	Multiply
2.0' (.6m)	2.25
2.5' (.8m)	1.44
3.0' (.9m)	1.00
3.5' (1.1m)	0.73
4.0' (1.2m)	0.56

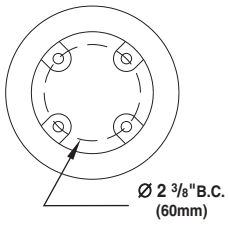
Wall Mount Information

Die cast aluminum wall mount arm with die-cast aluminum canopy. Secured to wall with 1/4" (6mm) threaded fasteners supplied by others.

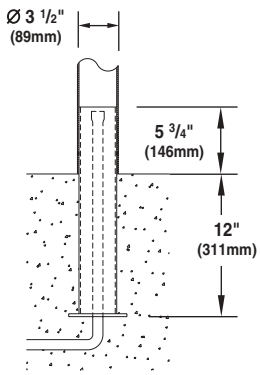


Wall Arm Mounting Detail

(Conduit and mounting hardware by others.)

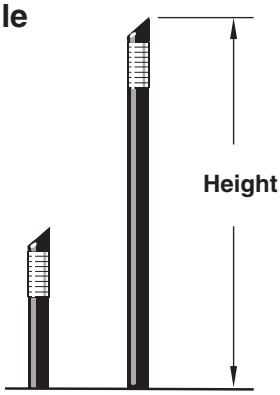


Anchorage Information



Concrete footing to be designed and installed by others.

Profile



In a continuing effort to offer the best product possible, we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product. Specification sheets found at www.selux.com/usa are the most recent versions and supercede all other printed or electronic versions.

ARCHITECTURAL LIGHTING
WALL LUMINAIRES/ RECESSED – STG259

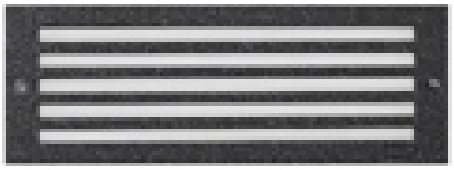
Product Specification

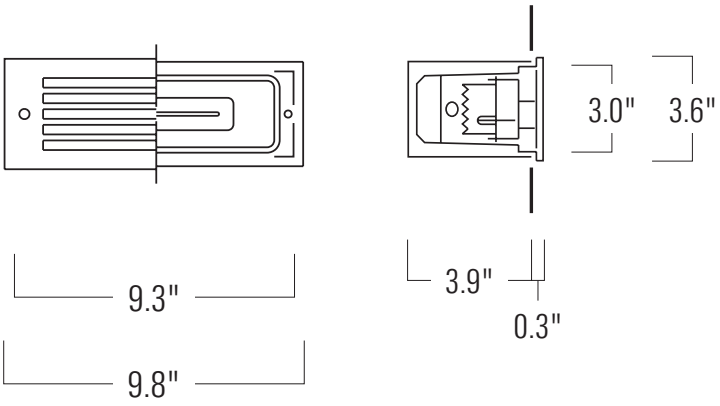
615-1231

Compact fluorescent source.
Painted aluminium lens frame.
Shielded light source with five horizontal slots.

Project: William H. Gates Hall

Date:





Fixture Type:	F5
WE-EF Cat. # :	615-1231
Voltage:	277
Finish:	RAL 9004
Options:	

Product ID. No.	Lamp/ base	Lumen
615-1231	CFQ18W / G24q-2	1200

Recessed wall luminaire with compact fluorescent lamp. Shielded light source with five horizontal slots.

Materials: Luminaire body and frame constructed of die-cast marine grade aluminum alloy.
Opal UV-stabilized polycarbonate diffuser (inside textured).
Durable high-temperature silicone weatherproof gasket.
PCS coated stainless steel hardware.

Electrical: Integral electronic CF ballast for 120 or 277 volt – ***Specify Voltage.***
Compact fluorescent lamp holder: G24q-2 base, 4 pin, CFQ18 watt lamp required (lamp by others).
Provided with ½ " conduit entry at both ends of luminaire body to facilitate thru-wiring. Maximum of four No. 12 AWG conductors (plus ground).

Mounting: Suitable for old, or new work utilizing a unique mounting system featuring two stainless steel claws for a fast and secure installation. Suitable for mounting within 3 feet of ground, and for all types of construction, including concrete pour installations. Refer to optional rough-in housing for concrete pour installations.
Weight: 2.5 lbs.
Rough-in dimensions: 9.5 " W x 3.25 " H x 4.2 " D.

Finish: Standard finish: Black RAL 9004, polyester powder coat with fine texture.
Optional finishes: White RAL 9016, polyester powder coat with fine texture.
Grey Metallic RAL 9007, polyester powder coat with fine texture.
Consult factory for special RAL color options. Specify finish.

Listing: **UL , c UL** listed for Wet locations.
ADA Compliant.
International Standards: IP55 dustproof/ jetproof.

Options: **697-8001:** Fusing (120V/ 277V). Specify.
Refer to mounting accessories for optional blockout for concrete pour installations.

Date: 10/15/04

WE-EF LIGHTING USA, LLC
www.we-ef.com
Bldg. 203 Overlook Drive, Sewickley, PA 15143 [P]: (412) 749-1600 [F]: (412) 749-1670

ARCHITECTURAL LIGHTING
WALL LUMINAIRES/ RECESSED – TRO259

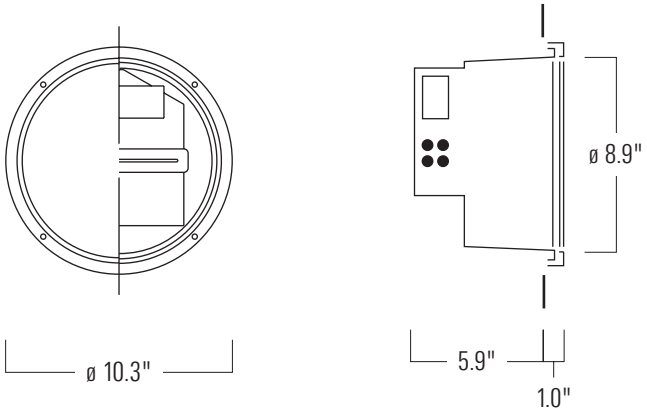
Product Specification

618-4630

Compact fluorescent source.
Painted aluminium lens frame.
Opal lens.

Project: William H. Gates Hall

Date:



Fixture Type:	F5
WE-EF Cat. # :	615-1231
Voltage:	277
Finish:	RAL 9004
Options:	

Product ID. No.	Lamp/ base	Lumen
618-4630	CFQ18W / G24q-2	1200

Recessed wall luminaire with compact fluorescent lamp.

Materials: Luminaire body and frame constructed of die-cast marine grade aluminum alloy.
Opal UV-stabilized polycarbonate diffuser (inside textured).
Durable high-temperature silicone weatherproof gasket.
PCS coated stainless steel hardware.

Electrical: Two ½" conduit entries at bottom of luminaire body to facilitate thru-wiring capability. Maximum of four No. 12 AWG conductors. (plus ground). Suitable for 90 deg. C.
Integral electronic CF ballast for 120 or 277 volt – ***Specify Voltage.***
Compact fluorescent lamp holder: G24q-2 base, 4 pin, CFQ18 watt lamp required (lamp by others).

Mounting: Suitable for mounting within 3 feet of ground and for all types of construction, including concrete pour installations. Installation of housing using galvanized mounting straps included. Refer to optional rough-in housing for concrete pour installations. Weight: 9.0 lbs.
Rough-in dimensions: 9.25 " diameter x 6.16 " D.

Finish: Standard finish: Black RAL 9004, polyester powder coat with fine texture.
Optional finishes: White RAL 9016, polyester powder coat with fine texture.
Grey Metallic RAL 9007, polyester powder coat with fine texture.
Consult factory for special RAL color options. Specify finish.

Listing: **UL , c UL** listed for Wet locations.
ADA Compliant.
International Standards: IP55 dustproof/ jetproof.

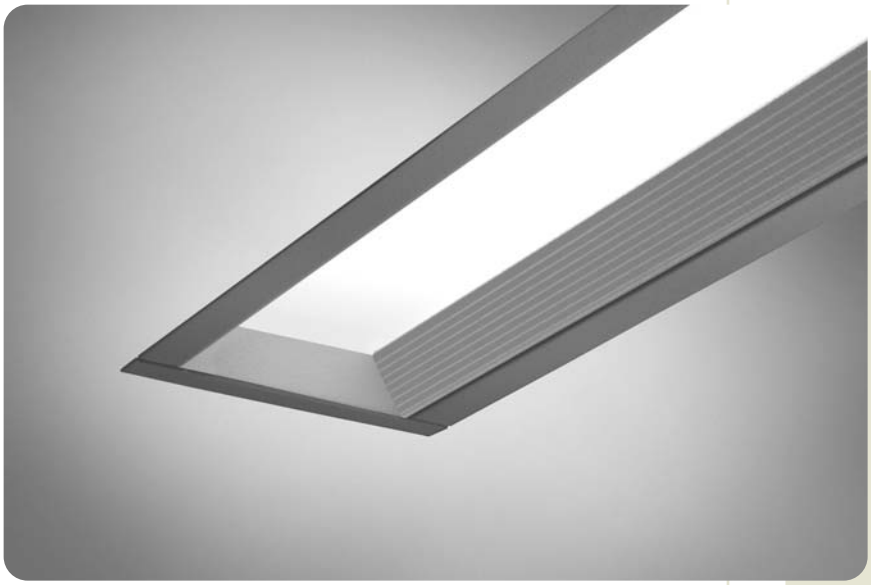
Options:
697-8001: Fusing (120V/ 277V). Specify.
618-9325: BTR25. Rough-in housing to serve as block-out for concrete pour installations. Specify.

Date: 10/15/04

WE-EF LIGHTING USA, LLC
www.we-ef.com
Bldg. 203 Overlook Drive, Sewickley, PA 15143 [P]: (412) 749-1600 [F]: (412) 749-1670

FOCAL POINT®

avenue® b



FEATURES

Narrow 3" slot T5 fluorescent with opaque satin lens.

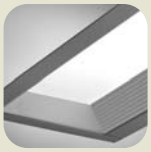
Shielding options include corrugated, solid regressed trim, concave louver as well as flush lens.

Universal mounting allows compatibility for multiple grid types.

Drywall installation is available, which allows for both individual or continuous row mount capability.

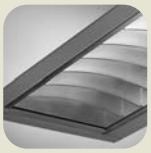
Avenue® B is a great solution for general illumination in a narrow aperture.

shielding options

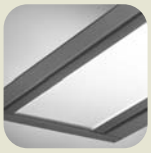


corrugated regress trim

solid regress trim



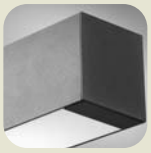
concave louver



flush lens

companion luminaire

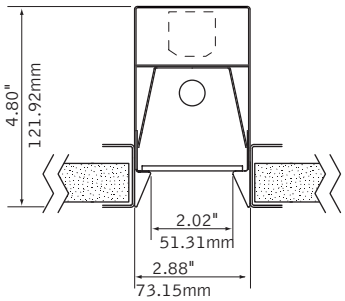
mr16



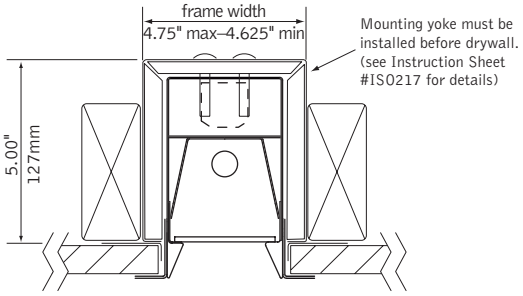
linear

DIMENSIONAL DATA

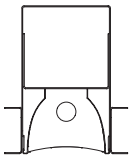
Grid Mount (Regress Trim Shown)



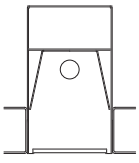
Drywall Flange (Regress Trim Shown)



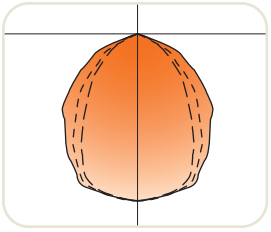
Louver



Flush Lens



PERFORMANCE



1–Lamp T5
62% Efficiency
1466 cd @ 0°

See **Photometric** section for additional performance data.

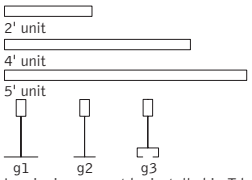
august 2006

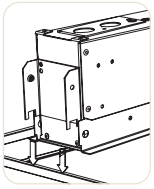
fixture type:

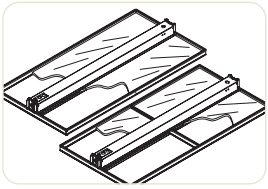
project name:

DETAILS

grid

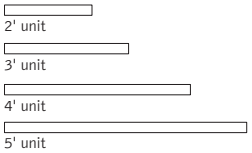






Luminaires cannot be installed in T-bar ceiling systems over 1.5".

drywall



Drywall flange version provided with mounting yoke.

SPECIFICATIONS

construction

One-piece 20 Ga. steel housing

Corrugated and solid regress trim constructed of 6063-T5 extruded aluminum finished in Matte Satin White.

Grid luminaires include 20 Ga. steel, .5" wide universal flange rail finished in Matte Satin White.

Drywall flange option is provided with 20 Ga. steel, .5" wide flange kit and 20 Ga. galvanized steel mounting yoke.

Surface mount 20 Ga. housing is also available.

2' unit weight:	5 lbs.
3' unit weight:	6 lbs.
4' unit weight:	7 lbs.
5' unit weight:	8 lbs.

optic

22 Ga. steel reflectors finished in High Reflectance White powder coat.

Acrylic lens diffuser .118" thick, frosted clear.

Concave parabolic louver: 1"H x 1" frequency fabricated of low iridescent, semi-specular premium grade aluminum.

Louver can be specified with matte white finish.

electrical

Luminaires are individually wired for specified circuits.

Thru-wiring not available.

Electronic ballasts are thermally protected and have a Class "P" rating.

Optional DALI and other dimming ballasts available.

Consult factory for dimming specifications and availability.

UL and cUL listed.

emergency

Emergency battery packs provide 90 minutes of illumination.

Initial lumen output for lamp types are as follows:

T5 Lamp:	Up to 550 lumens
T5HO Lamps:	Up to 825 lumens

Battery pack requires unswitched hot from same branch circuit as AC ballast.

finish

Polyester powder coat applied over a 5-stage pre–treatment.

Standard luminaire housing finished in Matte Satin White.

ORDERING

luminaire series		FAVB
Avenue B	FAVB	
shielding		1T5
Corrugated Regressed Trim with Lens	CR	
Solid Regressed Trim with Lens	SR	
Flush Lens	FL	
Concave Parabolic Louver	PL	
White Concave Parabolic Louver	PW	
lamping		277
One Lamp T5	1T5	
One Lamp T5HO	1T5HO	
circuits		1C
Single Circuit	1C	
voltage		S
120 Volt	120	
277 Volt	277	
347 Volt (Consult factory for availability)	347	
ballast		
Electronic Program Start <10% THD	S	
Electronic Dimming Ballast (Consult factory for dimming availability)	D	
mounting		
15/16" Grid	G1	
9/16" Grid	G2	
9/16" Slot Tee	G3	
Drywall Flange Cut out dimensions: 2': 3.5" x 23.6" 3': 3.5" x 35.6" 4': 3.5" x 47.6" 5': 3.5" x 59.6"	F	
factory options		
Chicago Plenum	CP	
Emergency Circuit	EC	4'
Emergency Battery Pack (3' & 4' Luminaires Only)	EM	
Seismic Brackets	EQ	
HLR/GLR Fuse	FU	
Include 3000K Lamp	L830	
Include 3500K Lamp	L835	
Include 4100K Lamp	L841	
finish		WH
Matte White Housing	WH	
luminaire length		
2' Nominal Housing	2'	
3' Nominal Housing	3'	
4' Nominal Housing	4'	
5' Nominal Housing (Dimming not available with 5' lamps) (For continuous row mount in drywall ceiling, specify luminaire run length, ie 24')	5'	

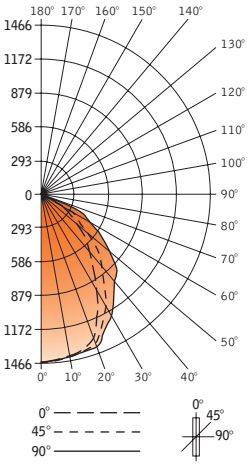
Focal Point L.L.C. 4201 South Pulaski Rd, Chicago, Illinois 60632 | T: 773.247.9494 | F: 773.247.8484 | info@focalpointlights.com | www.focalpointlights.com

regress with lens

avenue® b

Filename: FAVBSR1T5HO.IES
Catalog #: FAVB-SR-1T5HO-1C-120-S-G1-WH-4'
Efficiency: 62%
Test #: 12914.0

CANDLEPOWER DISTRIBUTION



Vertical Angle	Horizontal Angle 0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	1466	1466	1466	1466	1466	
5°	1457	1457	1456	1456	1456	139
15°	1432	1428	1417	1399	1393	401
25°	1311	1299	1254	1187	1150	575
35°	1102	1073	958	837	793	599
45°	934	866	701	586	553	565
55°	649	578	426	357	335	416
65°	404	328	232	187	174	257
75°	184	133	77	60	58	103
85°	39	21	19	18	17	24
90°	0	0	0	0	0	
95°	0	0	0	0	0	0
105°	0	0	0	0	0	0
115°	0	0	0	0	0	0
125°	0	0	0	0	0	0
135°	0	0	0	0	0	0
145°	0	0	0	0	0	0
155°	0	0	0	0	0	0
165°	0	0	0	0	0	0
175°	0	0	0	0	0	0
180°	0	0	0	0	0	

Spacing 1.2
Criterion: 1.1

LUMEN SUMMARY

	Zone	Lumens	% Lamp	% Fixt
	0°-30°	1115	22.3	36.2
	0°-40°	1714	34.3	55.7
	0°-60°	2695	53.9	87.5
	0°-90°	3078	61.6	100.0
Total Luminaire	0°-180°	3078	62	100.0

LUMINANCE DATA (CD/M²)

Vertical Angle	0°	45°	90°
45°	16467	12359	9750
55°	14106	9259	7281
65°	11918	6844	5133
75°	8863	3709	2794
85°	5579	2718	2432

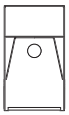
CO–EFFICIENTS OF UTILIZATION

Floor		80				70			50	30	10	00
Ceiling									20			
Wall	70	50	30	10	70	50	10	50	10	50	10	00
RCR 0	73	73	73	73	72	72	72	68	68	65	65	63	63	62
1	68	66	64	62	67	65	61	62	59	60	57	58	56	54
2	63	59	56	53	62	58	52	56	51	54	50	52	49	48
3	59	53	49	46	57	52	45	51	45	49	44	48	43	42
4	54	48	43	40	59	47	40	46	39	45	39	43	38	37
5	50	43	38	35	49	42	34	41	34	40	34	39	33	32
6	46	39	34	31	45	39	30	37	30	36	30	36	30	29
7	43	35	31	27	42	35	27	34	27	33	27	32	26	25
8	40	32	27	24	39	32	24	31	24	30	23	29	23	22
9	37	29	24	21	36	29	21	28	21	27	21	27	20	19
10	34	26	22	19	33	26	19	25	18	25	18	24	18	17

Numbers indicate percentage values of reflectivity.

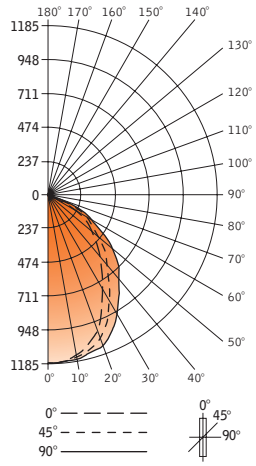
flush lens

avenue® b



Filename: FAVBFL1T5.IES
Catalog #: FAVB-FL-1T5HO-1C-120-S-G1-WH-4'
Efficiency: 51%
Test #: 12915.0

CANDLEPOWER DISTRIBUTION



Vertical Angle	Horizontal Angle 0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	1187	1187	1187	1187	1187	
5°	1182	1182	1178	1176	1176	113
15°	1158	1150	1126	1102	1091	319
25°	1053	1030	696	914	891	450
35°	870	835	749	684	660	476
45°	706	660	571	516	498	455
55°	478	444	383	349	338	355
65°	291	269	234	218	213	242
75°	133	124	111	106	105	122
85°	28	29	28	28	28	31
90°	0	0	0	0	0	
95°	0	0	0	0	0	0
105°	0	0	0	0	0	0
115°	0	0	0	0	0	0
125°	0	0	0	0	0	0
135°	0	0	0	0	0	0
145°	0	0	0	0	0	0
155°	0	0	0	0	0	0
165°	0	0	0	0	0	0
175°	0	0	0	0	0	0
180°	0	0	0	0	0	

Spacing 1.2
Criterion: 1.0

LUMEN SUMMARY

	Zone	Lumens	% Lamp	% Fixt
	0°-30°	881	17.6	34.4
	0°-40°	1357	27.1	53.0
	0°-60°	2168	43.4	84.6
	0°-90°	2561	51.2	100.0
Total Luminaire	0°-180°	2561	51	100.0

LUMINANCE DATA (CD/M²)

Vertical Angle	0°	45°	90°
45°	12448	10067	8780
55°	10390	8325	7347
65°	8584	6903	6283
75°	6406	5347	5058
85°	4005	4005	4005

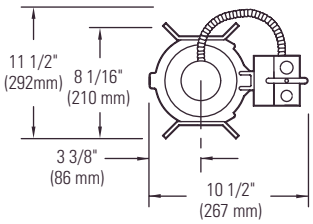
CO–EFFICIENTS OF UTILIZATION

Floor		80				70			50	30	10	00
Ceiling									20			
Wall	70	50	30	10	70	50	10	50	10	50	10	00
RCR 0	61	61	61	61	60	60	60	57	57	54	54	52	52	51
1	57	55	53	51	55	53	50	51	49	49	47	48	46	45
2	52	49	46	43	51	48	43	46	42	44	41	43	40	39
3	48	44	40	37	47	43	37	41	36	40	36	39	35	34
4	45	39	35	32	44	39	32	37	32	36	31	35	31	30
5	41	35	31	28	40	35	28	33	27	33	27	32	27	26
6	38	32	28	25	37	31	24	30	24	30	24	29	24	23
7	35	29	25	22	34	28	22	28	21	27	21	26	21	20
8	33	26	22	19	32	26	19	25	19	24	19	24	19	18
9	30	23	19	17	29	23	17	23	16	22	16	21	16	15
10	28	21	17	15	27	21	15	21	15	20	15	20	15	14

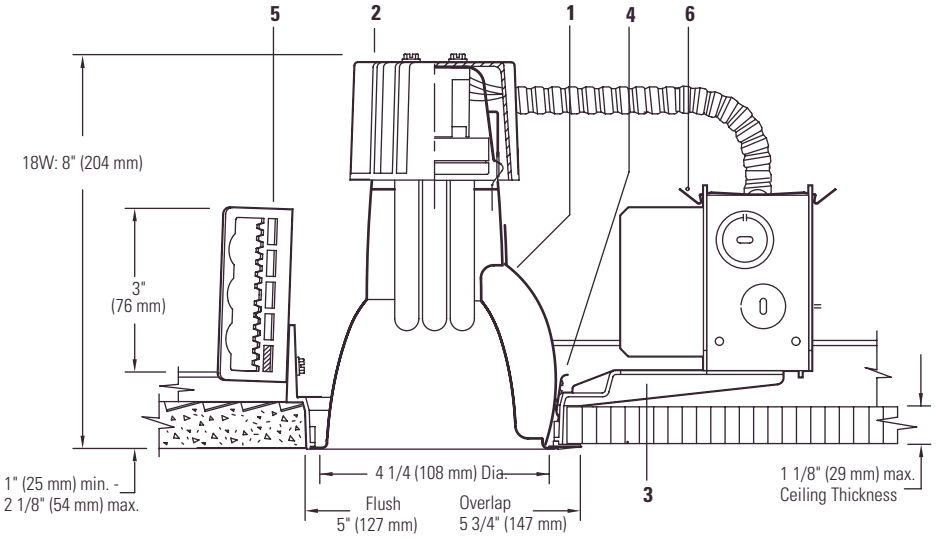
Numbers indicate percentage values of reflectivity.

Calculite® Compact Fluorescent Open Wall Washer **8011WW**

4" Aperture Triple Tube Vertical Lamp



Top View



Ceiling Cutout: 5 1/16" (129 mm) Dia.

Reflector Trim		Frame-In Kit			Lamp
8011WW CCLW	Comfort Clear™, White Flange	**4118VU**	Electronic	120V - 277V	**18W Triple Tube**
8011WW CCLP	Comfort Clear™, Polished Flange				4-Pin (Amalgam)
8011WW CCL	Comfort Clear™, Molded Trim Ring				
8011WW ☐	Add suffix. See options for other finishes.				

Features

1. **Downlight/Wall Washer Reflector:** 16 ga. Alzak® aluminum. 50° lamp cutoff and lamp image. Provides vertical surface wall wash and downlighting. Comfort Clear™ low iridescence finish. Self-flanged or flangeless with molded white trim ring (field paintable).
2. **Socket Cup:** Die-cast aluminum cup effectively dissipates heat and positions lamp holder. Snaps onto reflector neck to assure consistently correct optical alignment without tools.
3. **Mounting Frame:** Die-cast aluminum for dry or plaster ceilings. Accepts other 4" triple tube reflectors.
4. **Retaining Springs:** Precision-tooled steel friction springs secure reflector to mounting frame for quick, tool-less installation.
5. **Mounting Brackets:** 16 ga. steel. Adjust from inside of fixture. Use 3/4" or 1 1/2" lathing channel, 1/2" EMT, or optional mounting bars.
6. **Ballast/J-Box:** Outboard mounted to reduce heat transfer and maintain lamp efficacy and life. Service from below without tools. Provides vertical surface wall wash and downlighting.

Electrical

Note: For ballast electrical data and latest lamp/ballast compatibility refer to **"Ballast"** specification sheet for complete electrical data.

UL Listed for through branch circuit wiring with max of (8) No. 12 AWG, 90°C supply conductors.

Options and Accessories

Comfort Clear™ Finishes[1]		**Other Finishes**	
Diffuse	**CCD**	White	**WH**
Champagne Bronze	**CCZ**		
Pewter	**CPW**		

[1]Specify desired flange
W White, **P** Polished
Blank - Molded Ring

Options and Accessories (continued)

Emergency	Add suffix **EM***
Chicago Plenum	Add suffix **LC**
Emergency Ltg. Kit	**FA EM3E***
	FA EM4E*
Fuse (Slow Blow)	Add suffix **F**

*See Spec. Sheets: FAEM

Mounting Bars & Accessories; see Specification Sheet MBA.
Sloped Ceiling Adapters; see Specification Sheet SCA.

IC Frame available; see **C4CFL18** Specification Sheet.

Labels

UL Listed for damp locations, I.B.E.W.

Alzak® is a registered trademark of ALCOA.
US Patent Pending.

Job Information **Type:** F8A

Job Name: William H. Gates Hall

Cat. No.: 8011WW CCLP

Lamp(s): 18W Triple Tube

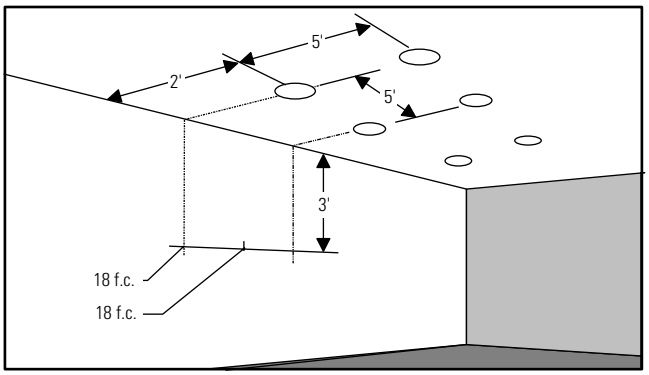
Notes:

Lightolier a Genlyte Thomas Company www.lightolier.com
631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710

LIGHTOLIER®

Lighting Data

Footcandles On Wall: Multiple 18W Triple Tube Units



Example: With multiple clear reflector units located 2' from wall and spaced 2' on center (matching downlights 5' on center), the illumination on the wall 3' down from ceiling will be 14 f.c. beneath units and 18 f.c. between units.

Footcandle values are averaged and rounded off and are based on a minimum of five units.

2' From Wall-2' On Center

Distance From Ceiling in Feet	2		
1	14	12	14
2	17	16	17
3	18	18	18
4	16	16	16
5	12	12	12
6	10	10	10
7	7	7	7
8	6	6	6
9	4	4	4

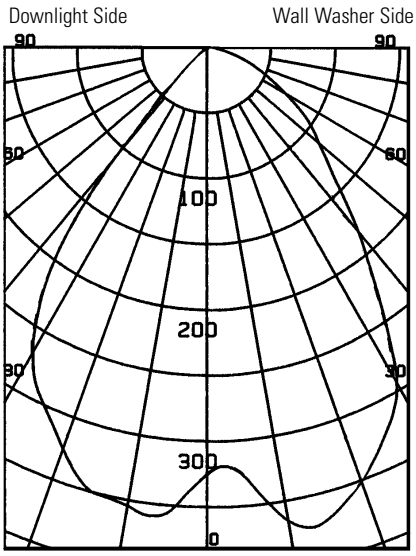
2' From Wall-3' On Center

Distance From Ceiling in Feet	3		
1	11	6	11
2	14	9	14
3	12	12	12
4	10	11	10
5	8	8	8
6	7	7	7
7	5	5	5
8	4	4	4
9	3	3	3

2' From Wall-4' On Center

Distance From Ceiling in Feet	4		
1	11	3	11
2	13	5	13
3	11	7	11
4	8	8	8
5	6	6	6
6	5	5	5
7	4	4	4
8	3	3	3
9	3	3	3

Candlepower Distribution Downlight Spacing Ratio 1.3



Coefficients of Utilization

ROOM CAVITY RATIO	% EFFECTIVE CEILING CAVITY REFLECTANCE 80			70			50			30			10			0
	WALL REFLECTANCE 50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
1	.46	.45	.44	.45	.44	.43	.43	.43	.42	.42	.41	.41	.40	.40	.39	.39
2	.43	.41	.39	.42	.40	.39	.41	.39	.38	.39	.38	.37	.38	.37	.37	.36
3	.40	.37	.36	.39	.37	.36	.38	.36	.35	.37	.36	.34	.36	.35	.34	.33
4	.37	.35	.33	.36	.34	.33	.36	.34	.32	.35	.33	.32	.34	.33	.31	.31
5	.34	.32	.30	.34	.32	.30	.33	.31	.30	.32	.31	.29	.32	.30	.29	.28
6	.32	.30	.28	.32	.29	.28	.31	.29	.27	.31	.29	.27	.30	.28	.27	.26
7	.30	.27	.26	.30	.27	.25	.29	.27	.25	.28	.26	.25	.28	.26	.25	.24
8	.28	.25	.23	.27	.25	.23	.27	.25	.23	.27	.25	.23	.26	.24	.23	.22
9	.26	.23	.22	.26	.23	.22	.25	.23	.21	.25	.23	.21	.24	.23	.21	.21
10	.24	.22	.20	.24	.22	.20	.24	.21	.20	.23	.21	.20	.23	.21	.20	.19

20% FLOOR CAVITY REFLECTANCE

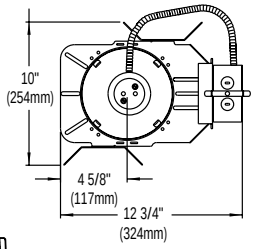
Job Information **Type:** F8A

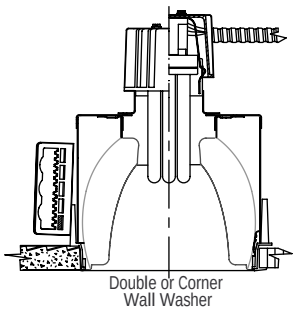
Lightolier a Genlyte Thomas Company www.lightolier.com
631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710

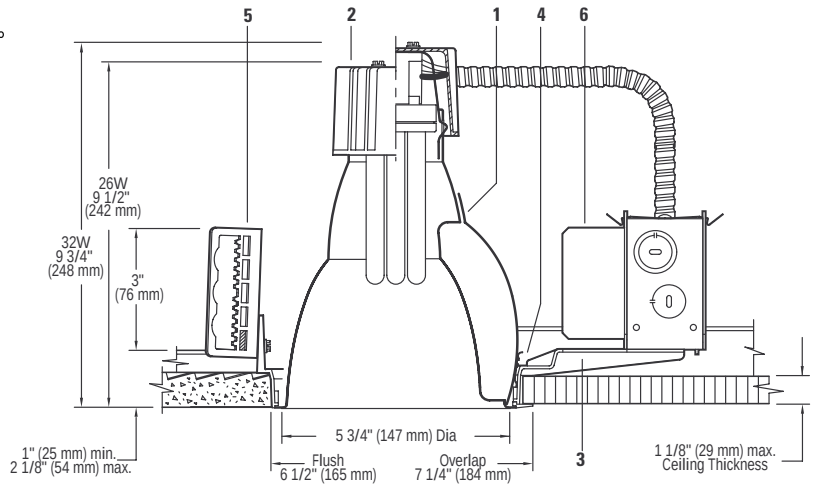
LIGHTOLIER®

Calculite® Compact Fluorescent Open Wall Washer **8021WW**

6" Aperture Triple Tube Vertical Lamp







Ceiling Cutout: 6 9/16" (167mm) Dia.

Reflector Trim

Single Wall Washer	Double Wall Washer	Corner Wall Washer
8021WW CCLW Comfort Clear™, White Flange	**8021DW CCLW**	**8021CW CCLW**
8021WW CCLP Comfort Clear™, Polished Flange	**8021DW CCLP**	**8021CW CCLP**
8021WW CCL Comfort Clear™, Molded Trim Ring	**8021DW CCL**	**8021CW CCL**

8021WW ☐
Add suffix. See options for other finishes.

Frame-In Kit

S6132BU	Electronic, 120V - 277V
S6132BCU	Universal Dimming, 120V - 277V
S6132BUM7	Advance Mark7, 120V - 277V

Lamp

26 or 32W Triple Tube
4-Pin (Amalgam)

Features

1. **Downlight/Wall Washer Reflector:** 16 ga. Alzak® aluminum. 50° lamp cutoff and lamp image. Provides vertical surface wall wash and downlighting. Comfort Clear™ low iridescence finish. Self-flanged or flangeless with molded white trim ring (field paintable).
2. **Socket Cup:** Effectively dissipates heat and positions lamp holder. Snaps onto reflector neck to assure consistently correct optical alignment without tools.
3. **Mounting Frame:** Galvanized steel for dry or plaster ceilings. Accepts other 6" Triple Tube reflectors (see S6132BU Spec Sheet).
4. **Retaining Springs:** Precision-tooled steel friction springs secure reflector to mounting frame for quick, tool-less installation.
5. **Mounting Brackets:** 16 ga. steel. Adjust from inside of fixture. Use 3/4" or 1 1/2" lathing channel, 1/2" EMT, or optional mounting bars.
6. **Ballast/J-Box:** Electronic 120V-277V. UL listed for through branch circuit wiring with max of (8) No. 12AWG, 90°c supply conductors. Outboard mounted to reduce heat transfer and maintain lamp efficacy and life. Service from below without tools. Provides vertical surface wall wash and downlighting.

Electrical

Note: For ballast electrical data and latest lamp/ballast compatibility refer to **"Ballast"** specification sheet for complete electrical data.

Options and Accessories

Comfort Clear™ Finishes[1]		**Other Finishes**	
Diffuse	**CCD**	White	**WH**
Champagne Bronze	**CCZ**		
Pewter	**CPW**		

[1]Specify desired flange. **W** White, **P** Polished, Blank - Molded Ring

Other Dimming:

S6132BJ1MX Advance MarkX, 120V
S6132BJ2MX Advance MarkX, 227V
S6132BJ1LD3 Lutron Hi-lume®, 120V
S6132BJ2LD3 Lutron Hi-lume®, 227V

Options and Accessories (continued)

Emergency	Add suffix **EM***
Chicago Plenum	Use 6132BULC
Fuse (Slow Blow)	Add Suffix **F**
Emergency Ltg. Kit	**FA EM3E***
	FA EM4E*

*See Spec. Sheet: FAEM

Mounting Bars & Accessories; see Specification Sheet MBA.
Sloped Ceiling Adapters; see Specification Sheet SCA.

IC Frame available; see **C6CFL32** specification sheet.

Labels

UL Listed for damp locations.

Alzak® is a registered trademark of ALCOA.
US Patent Pending.

Job Information Type: F9

Job Name: William H. Gates Hall

Cat. No.: 8021WW CCLP

Lamp(s): CFTR32W

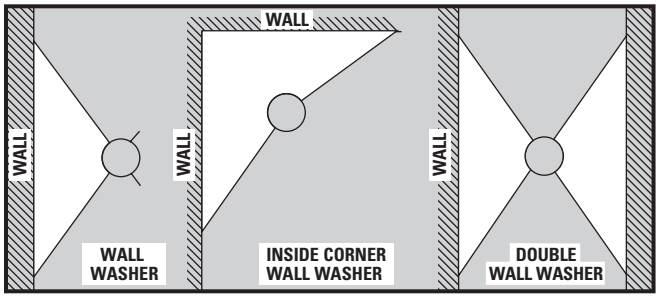
Notes:

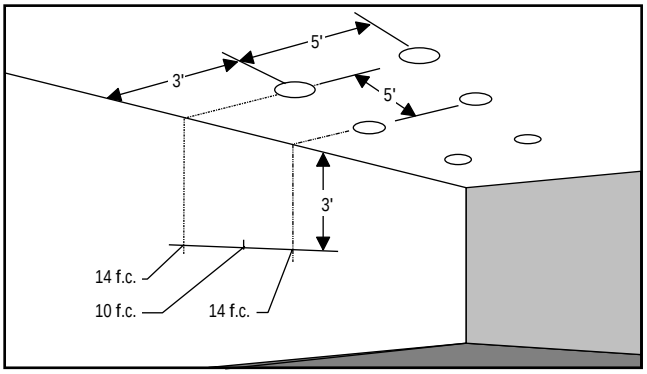
Lightolier a Genlyte Thomas Company www.lightolier.com
631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710

LIGHTOLIER®

Lighting Data

Footcandles On Wall: Multiple 32W Triple Tube Units





2' From Wall-2' On Center

Distance From Ceiling in Feet	2		
1	35	34	35
2	44	44	44
3	47	41	47
4	38	35	38
5	29	27	29
6	22	22	22
7	17	17	17
8	13	13	13
9	11	11	11

2' From Wall-3' On Center

Distance From Ceiling in Feet	3		
1	28	18	28
2	32	27	32
3	30	30	30
4	26	24	26
5	19	20	19
6	15	15	15
7	12	12	12
8	10	10	10
9	8	8	8

2' From Wall-4' On Center

Distance From Ceiling in Feet	4		
1	26	18	26
2	29	16	29
3	25	22	25
4	20	19	20
5	15	15	15
6	11	12	11
7	9	10	9
8	7	8	7
9	6	7	6

Example: With multiple clear reflector units located 3' from wall and spaced 5' on center (matching downlights 5' on center), the illumination on the wall 3' down from ceiling will be 14 f.c. beneath units and 10 f.c. between units.
Footcandle values are averaged and rounded off and are based on a minimum of five units.
Conversion Factor 26WTTT: (Clear), f.c. x 0.8.

3' From Wall-3' On Center

Distance From Ceiling in Feet	3		
1	11	11	11
2	18	18	18
3	20	20	20
4	22	19	21
5	20	18	20
6	17	16	17
7	15	13	14
8	12	11	12
9	11	10	10

3' From Wall-4' On Center

Distance From Ceiling in Feet	4		
1	9	8	9
2	14	13	14
3	16	15	16
4	16	16	16
5	15	14	15
6	13	12	13
7	11	11	11
8	10	9	10
9	8	8	8

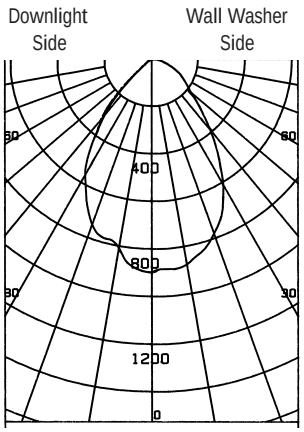
3' From Wall-5' On Center

Distance From Ceiling in Feet	5		
1	9	5	9
2	13	9	13
3	14	10	14
4	13	13	13
5	12	12	12
6	11	10	11
7	9	9	9
8	8	8	8
9	7	7	7

3' From Wall-6' On Center

Distance From Ceiling in Feet	6		
1	9	3	9
2	13	6	13
3	13	7	13
4	13	9	13
5	11	10	11
6	9	9	9
7	8	7	8
8	7	7	7
9	5	6	5

Candlepower Distribution Downlight Spacing Ratio 1.1



Coefficients of Utilization

% Effective Ceiling Cavity Reflectance

	80			70			50			30			10			0
	Wall Reflectance															
Room Cavity Ratio	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
1	.58	.56	.55	.57	.55	.54	.54	.53	.53	.52	.52	.51	.51	.50	.49	.49
2	.53	.51	.49	.53	.50	.49	.51	.49	.48	.49	.48	.47	.48	.47	.46	.45
3	.49	.47	.45	.49	.46	.44	.47	.45	.44	.46	.44	.43	.45	.43	.42	.41
4	.46	.43	.41	.46	.43	.40	.44	.42	.40	.43	.41	.40	.42	.41	.39	.38
5	.43	.40	.37	.42	.39	.37	.41	.39	.37	.40	.38	.36	.40	.38	.36	.35
6	.40	.37	.34	.40	.36	.34	.39	.36	.34	.38	.36	.34	.37	.35	.33.	.33
7	.37	.34	.31	.37	.34	.31	.36	.33	.31	.35	.33	.31	.35	.32	.31	.30
8	.34	.31	.29	.34	.31	.29	.34	.31	.29	.33	.30	.28	.32	.30	.28	.28
9	.32	.29	.26	.32	.29	.26	.31	.28	.26	.31	.28	.26	.30	.28	.26	.25
10	.30	.27	.24	.30	.27	.24	.29	.26	.24	.29	.26	.24	.28	.26	.24	.23

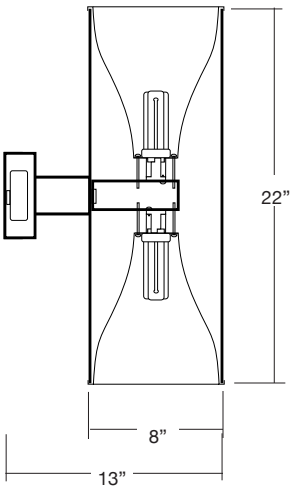
20% Floor Cavity Reflectance

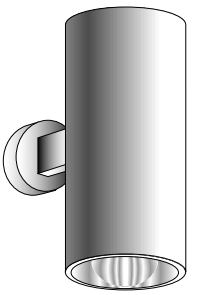
Job Information	Type:	F9

Lightolier a Genlyte Thomas Company www.lightolier.com
631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710

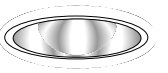
LIGHTOLIER®

8" CYLINDER VERTICAL LAMP UP/DOWNLIGHT



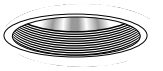


Wall mount
Cylinder



Clear Alzak®

Gold Alzak®



Black Baffle

Splay with
Fresnel Lens

DELRAY LIGHTING INCORPORATED

CUV8200

SPECIFICATION INFORMATION

CYLINDER HOUSING
Wall mounted cylinder is constructed of seamless extruded aluminum with a powder coat finish. Fixture mounts to standard juction box.

REFLECTOR
Reflector is available in thirty degree cutoff **.30**. Finishes are Clear **A** or Gold **G** Alzak for anodized, specular, durable and anti-iridescent reflectors.

TRIM OPTIONS
B black baffle
G gold Alzak
SP splay fesnel lens

BALLAST
Electronic enclosed F-can, class P, HPF is supplied standard in 120V or 277V. Ballasts use 4 pin lamps and provide rapid start, .99 power factor with THD<10%.

ELECTRICAL
Ballast mounted in canopy for easy access. U.L. listed for use in damp locations. For wet locations fixture is provided with convex lens; specify **WL** .

ACCESSORIES
B black baffle
R retro-fit for existing cylinder (consult factory)
WL for wet location

FINISHES
BM brushed metal
BZ bronze
K black
W white

ORDERING INFORMATION

LAMP
2-18 18 watt quad tube
2-26 26 watt quad tube
2-32 32 watt triple tube
2-42 42 watt triple tube

120V ELECT.
CUV8218.1E 18watt quad tube
CUV8226.1E 26watt quad tube
CUV8232.1E 32watt triple tube
CUV8242.1E 42watt triple tube

277V ELECT.
CUV8218.2E 18watt quad tube
CUV8226.2E 26watt quad tube
CUV8232.2E 32watt triple tube
CUV8242.2E 42watt triple tube

SUBMITTAL INFORMATION

TYPE: F10

PROJECT: Gates Hall

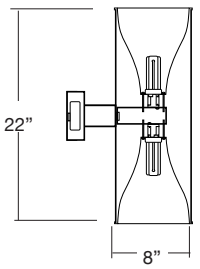
NOTES:

DESCRIPTION: CUV8218.2E

BURBANK,
CALIFORNIA,
91505
WWW.
DELRAY
LIGHTING.
COM

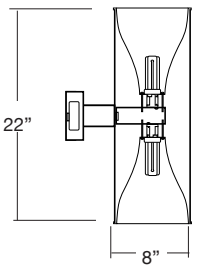
CLEAR ALZAK 30°

CUV8218



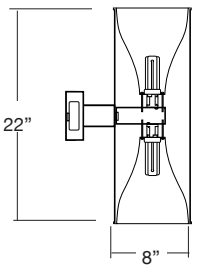
CLEAR ALZAK 30°

CUV8226



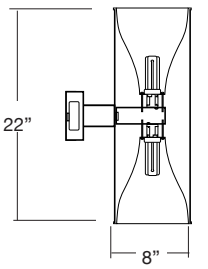
CLEAR ALZAK 30°

CUV8232



CLEAR ALZAK 30°

CUV8242



CONE OF LIGHT

MTG. HT.	FC/0•	DIA.
4’	65	3.7
6’	29	5.5
8’	17	7.3
10’	11	9.2
12’	8	11.0

50% FC at edge

MTG. HT.	FC/0•	DIA.
4’	81	3.7
6’	39	5.5
8’	19	7.3
10’	12	9.2
12’	9	11.0

50% FC at edge

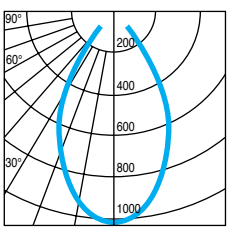
MTG. HT.	FC/0•	DIA.
4’	95	4.2
6’	42	6.4
8’	24	8.5
10’	15	10.7
12’	11	12.8

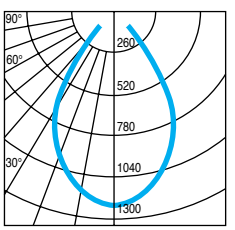
50% FC at edge

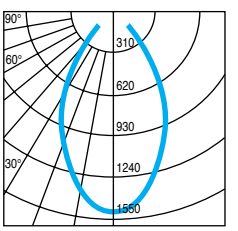
MTG. HT.	FC/0•	DIA.
4’	123	4.3
6’	54	6.6
8’	31	8.8
10’	19	10.9
12’	14	12.9

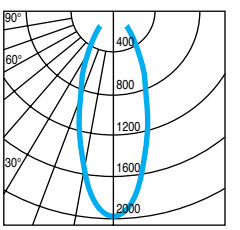
50% FC at edge

CP DISTRIBUTION









COEFFICIENTS OF UTILIZATION

% CEILING 80	(20% FLOOR)		
% WALL 70	50	30	
0	75	75	75
1	72	71	70
2	70	67	65
3	67	64	61
4	64	60	58
5	62	57	54
6	59	55	52
7	57	52	49
8	54	49	46
9	52	47	43
10	50	44	41

% CEILING 80	(20% FLOOR)		
% WALL 70	50	30	
0	71	71	71
1	69	67	66
2	66	63	61
3	63	60	57
4	61	57	54
5	58	53	50
6	55	51	48
7	53	48	45
8	50	45	42
9	48	43	39
10	46	40	37

% CEILING 80	(20% FLOOR)		
% WALL 70	50	30	
0	84	84	84
1	80	78	77
2	77	74	71
3	73	69	66
4	70	65	62
5	67	61	57
6	63	58	54
7	60	54	50
8	57	50	46
9	54	47	43
10	51	44	40

% CEILING 80	(20% FLOOR)		
% WALL 70	50	30	
0	79	79	79
1	76	74	73
2	73	70	67
3	69	66	63
4	66	62	58
5	63	58	55
6	60	55	51
7	57	51	48
8	54	48	44
9	51	45	41
10	49	42	39

NOTES

CUV8218
1-18 watt quad tube
G24q-2 electronic socket
Total lumens-1250
Spacing criteria-.9
Gold Alzak x.90

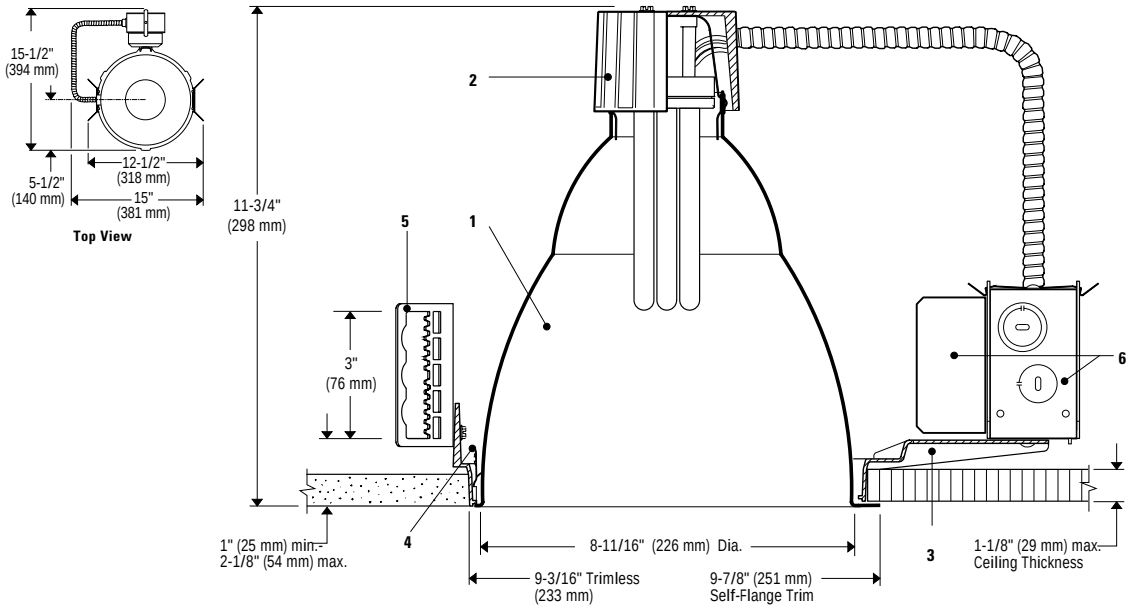
CUV8226
1-26 watt quad tube
G24q-3 electronic socket
Total lumens-1800
Spacing criteria-.9
Gold Alzak x.90

CUV8232
1-32 watt triple tube
G24q-3 electronic socket
Total lumens-2400
Spacing criteria-.9
Gold Alzak x.90

CUV8242
1-42 watt triple tube
G24q-4 electronic socket
Total lumens-3200
Spacing criteria-.9
Gold Alzak x.90

Calculite® Compact Fluorescent Open Downlight **8023**

8 3/4" Aperture Triple Tube Vertical Lamp



Ceiling Cutout: 9 1/4" (235 mm) Dia.

Reflector Trim		Frame-In Kit			Lamp
8023 CCLW	Comfort Clear™, White Flange	**Note:** Add **S** for Steel frame: ex. **S8142VU -** Steel Frame Without **S**- Die Cast: ex. **8142VU -** Die Cast			
8023 CCLP	Comfort Clear™, Polished Flange	**S8142VU**	Electronic	120V - 277V	**42W Triple Tube**
8023 CCL	Comfort Clear™, Molded Trim Ring	**S8142VCU3**	PowerSpec® Dimming	120V - 277V	4-Pin (Amalgam)
8023 ☐	Add suffix. See options for other finishes.	**Remodeler Frame-In Kit**			**Lamp**
		8142VURM	Electronic	120V - 277V	Same as 8142VU

Features

1. **Reflector:** 16 ga. Alzak® aluminum, 50° visual cutoff to lamp and lamp image, medium distribution. Comfort Clear™ low iridescence finish. Self-flanged or flangeless with molded white trim ring (field paintable).
2. **Socket Cup:** Die-cast aluminum cup effectively dissipates heat and positions lamp holder. Snaps onto reflector neck to assure consistently correct optical alignment without tools.
3. **Mounting Frame:** Die-cast aluminum for dry or plaster ceilings.
4. **Retaining Springs:** Precision-tooled steel friction springs secure reflector to mounting frame for quick, tool-less installation.
5. **Mounting Brackets:** 16 ga. steel. Adjust from inside of fixture. Use 3/4" or 1 1/2" lathing channel, 1/2" EMT, or optional mounting bars.
6. **Ballast/J-Box:** Outboard mounted to reduce heat transfer and maintain lamp efficacy and life. Service from below without tools.

Electrical

Note: For ballast electrical data and latest lamp/ballast compatibility refer to **"Ballast"** specification sheet for complete electrical data.
8142VU, 8142VCU: UL listed for through branch circuit wiring with max of (8) No. 12 AWG, 90° C supply conductors.
8142VURM: UL listed for No. 12 AWG, 90° C supply conductors.

Options and Accessories

Comfort Clear™ Finishes[1]

Diffuse	**CCD**
Champagne Bronze	**CCZ**
White	**WH**

[1]Specify desired flange
W White, **P** Polished
Blank - Molded Ring

Options and Accessories (continued)

Emergency	Add suffix **EM***
Chicago Plenum	Add suffix **LC**
Emergency Ltg. Kit	**FA EM3E***
	FA EM4E*
Fuse (Slow Blow)	Add suffix **F**

*See Spec. Sheets: FAEM

Mounting Bars & Accessories; see Specification Sheet MBA. Sloped Ceiling Adapters; see Specification Sheet SCA.

Labels

UL listed for damp locations.

Alzak® is a registered trademark of ALCOA.
US Patent Pending

Job Information Type: F11

Job Name: William H. Gates Hall

Cat. No.: 8023 CCLP

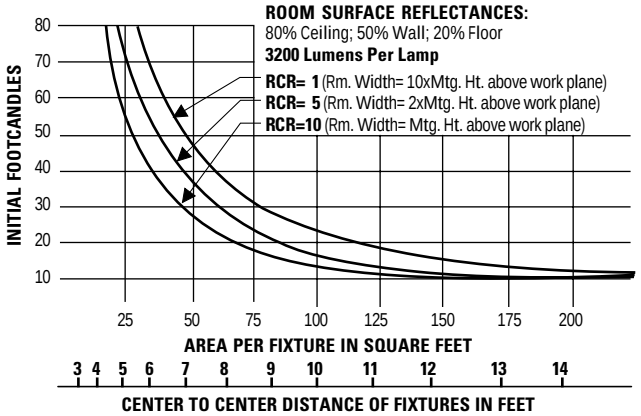
Lamp(s): 42W Triple Tube

Notes:

Lightolier a Genlyte company www.lightolier.com
631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710

LIGHTOLIER®

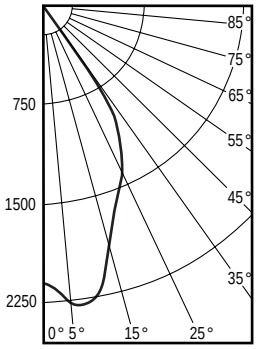
Quick Calculator



This quick calculator chart determines the number and spacing of 1 lt. 42W PL-T units with clear reflector, for any level of illumination.

Spacing Ratio = 0.9

CERTIFIED TEST REPORT NO. 0701FR
COMPUTED BY LSI PROGRAM **TEST LITE**
CALCULITE 8 3/4" DIA. APERTURE RECESSED COMPACT FLUORESCENT OPEN DOWNLIGHT. COMFORT CLEAR™ REFLECTOR 1-42W PLT TRIPLE TUBE LAMP. LUMEN RATING = 3200 LMS.



****EFFICIENCY=63.1%****

DATE: MAR. 31, 99

TESTED ACCORDING TO IES PROCEDURES. TEST DISTANCE EXCEEDS FIVE TIMES THE GREATEST LUMINOUS OPENING OF LUMINAIRE.

CANDLEPOWER SUMMARY

ANGLE	MEAN CP	LUMENS
0	1982	
5	2098	196
10	2051	
15	1817	510
20	1507	
25	1323	610
30	1124	
35	830	511
40	470	
45	211	180
50	36	
55	6	11
60	3	
65	1	1
70	0	
75	0	0
80	0	
85	0	0
90	0	

ZONAL LUMENS AND PERCENTAGES

ZONE	LUMENS	%LAMP	%LUMINAIRE
0-30	1316	41.14	65.17
0-40	1827	57.11	90.47
0-60	2018	63.08	99.93
0-90	2019	63.12	100.00
40-90	192	6.02	9.53
60-90	1	.04	.07
90-180	0	.00	.00
0-180	2019	63.12	100.00

Coefficients Of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE = .20

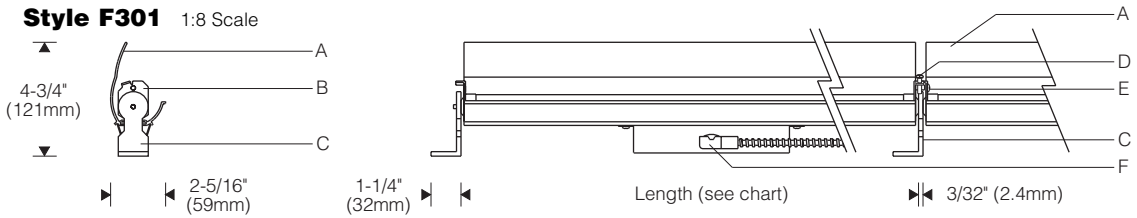
	80			70			50			30			10			
	WALL REFLECTANCE															
ROOM CAVITY RATIO	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
1	.71	.69	.68	.69	.68	.67	.67	.66	.65	.64	.64	.63	.62	.62	.61	.60
2	.67	.64	.62	.65	.63	.62	.63	.62	.60	.62	.63	.59	.60	.59	.58	.57
3	.63	.60	.58	.62	.59	.57	.60	.58	.56	.59	.57	.56	.57	.56	.55	.54
4	.59	.56	.54	.59	.56	.54	.57	.55	.53	.56	.54	.52	.55	.53	.52	.51
5	.56	.53	.50	.55	.52	.50	.54	.52	.50	.53	.51	.49	.52	.50	.49	.48
6	.46	.43	.42	.52	.49	.47	.51	.49	.47	.51	.48	.46	.50	.48	.46	.45
7	.44	.41	.39	.49	.46	.44	.49	.46	.44	.48	.45	.43	.47	.45	.43	.42
8	.41	.39	.37	.46	.43	.41	.46	.43	.41	.45	.43	.41	.45	.42	.40	.40
9	.39	.36	.35	.44	.41	.38	.43	.40	.38	.43	.40	.38	.42	.40	.38	.37
10	.35	.32	.31	.41	.38	.36	.41	.38	.36	.40	.37	.35	.40	.37	.35	.35

Job Information | Type: F11

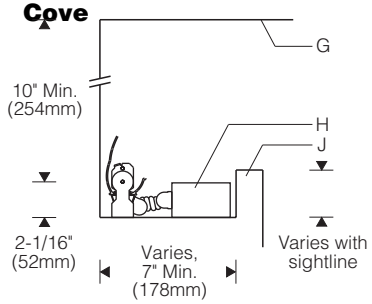
Lightolier a Genlyte company www.lightolier.com
631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710

LIGHTOLIER®

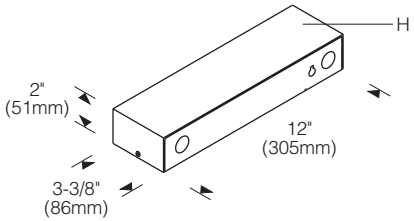
Style F301 1:8 Scale



Cove



Remote Ballast



Lamp Length	*Luminaire Length*
1 x 2'	24-1/2" (622mm)
1 x 3'	36-1/2" (927mm)
1 x 4'	48-1/2" (1231mm)
1 x 5'	60-3/8" (1533mm)
2 x 3'	73" (1854mm)
2 x 4'	97" (2464mm)
2 x 5'	120-3/4" (3067mm)

Note: Finish interior of cove matte white for best results.

Specifications

A Specular extruded aluminum reflector
B Stainless steel lamp-holder/support brackets
C Aluminum L-shaped mounting brackets
D Rotation locking screw
E Joiner/alignment screw
F Flexible metal conduit with 90° connector
G Ceiling
H Remote ballast in aluminum enclosure
J Architectural cove (for design guidance, see Applications Section)

Finish:
Reflector - extruded high purity aluminum with clear anodized specular finish. Mounting brackets and ballast enclosure - mill finish aluminum. All luminaire hardware - stainless steel.

Mounting:
L-shaped mounting brackets can be base or wall mounted. Two brackets are supplied for each reflector. Reflectors can be mounted individually or joined together to form a continuous row. When mounted in a row, one bracket supports adjacent reflectors for minimum spacing.

Reflector aiming is adjustable and is fixed in position by rotation locking screws at each mounting bracket. When mounted in a continuous row, joiner screws lock reflectors together allowing all in the row to be aimed together.

Standard:
UL listed or CSA certified for damp locations.
(Style 151 smooth painted model with gasketed lens recommended for damp location use; see Outdoor Section.)

Electrical:
Use 90°C wire for supply connections. 5' (1.5m) wire leads exit center of reflector. 90° connector and 4' (1.2m) of flexible metal conduit are provided. Connector can be reversed in field from front of reflector to back.

Remote electronic HPF thermally protected class P ballast. Aluminum ballast enclosure includes four 7/8" diameter entries and a knockout for an accessory fuse. **Maximum wire length between electronic ballast and fixture is 12' for two-lamp reflectors and 15' for one-lamp reflectors.** Magnetic ballast is available for remote distances up to 55'.

Optional electronic dimming ballast dims to 5% of full light output. **Maximum wire length between dimming ballast and fixture is 1' for two-lamp reflectors and 4' for 1-lamp reflectors.** Compatible dimmer switch is required (by others). Consult local sales representative for specifications.

For complete ballast specifications, see Accessories Section.

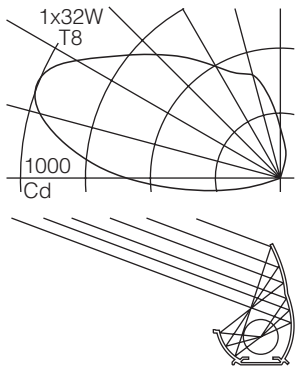
Features

- *Compact and flexible - effective indirect cove lighting for malls, offices, lobbies, conference rooms and corridors*
- *Adjustable - all reflectors in a row join and aim together; rotation locking screws secure position*
- *Create rows of any length - modules from 2' to 10'*
- *Durable - all parts are aluminum or stainless steel*

C 11.0

Performance

Two parabolic reflector sections drive light across the ceiling from one edge. An elliptical section shields the lamp from normal viewing angles and redirects its light to a parabola. Glare is minimized and asymmetry of the beam is maximized resulting in high beam efficiency and superior surface uniformity.



For complete photometrics, visit www.elliptipar.com

To form a Catalog Number

F	3 0 1	A132	S	0 0	2	00	0
1	2	3	4	5	6	7	8

Project: **William H. Gates Hall**

Type: **F12**

1 Source

F = Linear fluorescent

2 Style

301 = Small concealed, **remote** ballast

3 Lamp

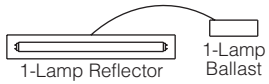
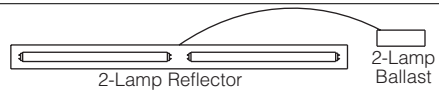
Note: To order by overall row length, enter **ROW CODE** in place of Lamp Code below (see Row Charts on page C-11.2). Row Code specifies a row complete with all necessary reflectors, brackets and remote ballasts

A 1 32 = **Lamp Code** (to specify individual units)

- 1 = **Reflector Configuration**, specify **1**, **2** or **3** (see chart below)
- 32 = **Lamp Wattage** (see chart below)

Example: **A232** = two 32W T8 lamps in nominal 8' reflector; one 2-lamp ballast

Reflector Configuration

1	
2	
3	

Lamp Wattage	*Lamp Length*	*Lamp Number*
T8 Fluorescent		
17	2'	F17T8
25	3'	F25T8
32	4'	F32T8
40	5'	F40T8

For complete lamp and ballast information, see Accessories Section. T8 lamps by others.

4 Mounting

S = L-shaped brackets for wall or base mounting

5 Finish

00 = Bright anodized reflector; mill finish brackets and ballast enclosure

6 Voltage/Ballast

Electronic	*Dimming**
1 = 120V	**T** = 120V
2 = 277V	**V** = 277V
3 = 347V (Canada)	

* Dimming available for 3' F25T8 and 4' F32T8 (lamp codes **A125**, **A225**, **A132** and **A232**). For other T8 lamp lengths, consult sales representative. Dimming not available for Reflector Configuration **3**.

7 Option (see Accessories Section for specifications)

00 = No options
0E = Remote emergency battery pack. Consult factory if dimming is also required.
0Y = Modified to comply with New York City code
XX = For modification not listed, include detailed description. Consult factory prior to specification.

8 Standard

0 = UL, Underwriters Laboratories
J = CSA, Canadian Standards Association

Example

F301 - A225 - S - 00 - 1 - 000

Small concealed fluorescent unit consisting of one nominal 6' reflector for use with two 25W T8 lamps. Remote 120V electronic 2-lamp ballast. L-shaped mounting brackets. UL.

Accessories

Order separately. See Accessories Section for specifications.

AFK000X ☐ = Ballast **fuse** kit
- **0** = UL
- **J** = CSA

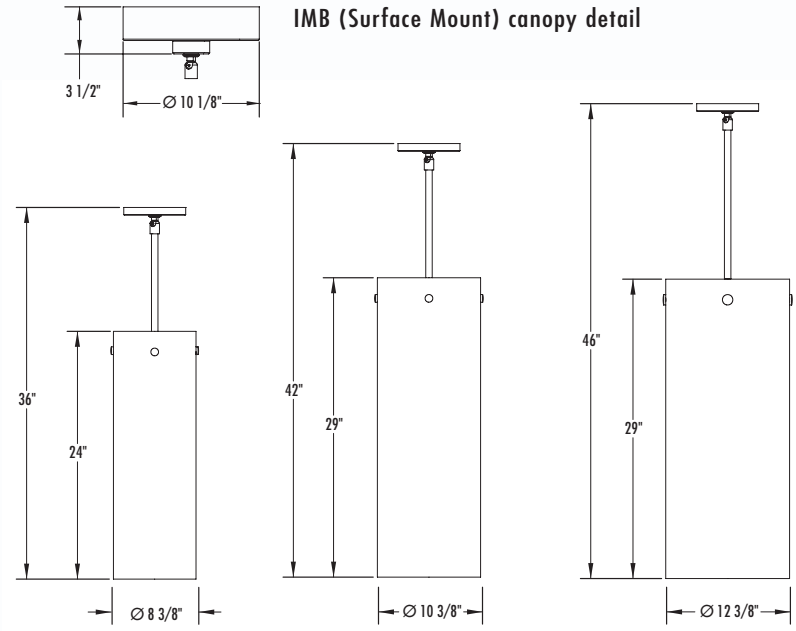
C 11.1

elliptipar
114 Boston Post Road, West Haven, Connecticut 06516, USA
Voice 203.931.4455 • Fax 203.931.4464 • **www.elliptipar.com**

FIXTURE: F13

5400
BADE

IMB (Surface Mount) canopy detail



SUBMITTAL SPECIFICATIONS:

5400 - ____ - ____ - ____ - ____ - ____ - ____ - ____

CATALOG NUMBER	LAMPING	VOLTAGE	LENS OPTION	FINISH	BALLAST	SPECIAL

PRODUCT SPECIFICATIONS:

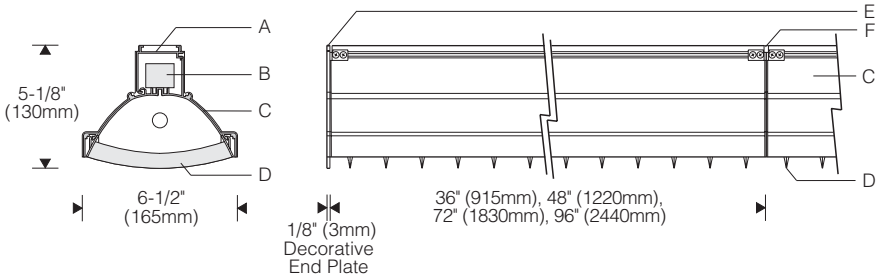
Catalog#:	**5400-8, 5400-10, 5400-12**		
Lamping:	5400-8*	**F -**	(2) FT39W/2G11
		F/H75-	(2) FT39W/2G11 and (1) 75W Par 38 Halogen Downlight
		F/MH70-	(2) FT39W/2G11 and (1) 70W Par 38 Metal Halide Downlight
	5400-10	**F -**	(4) FT40W/2G11
		F/H100-	(4) FT40W/2G11 and (1) 100W Par 38 Halogen Downlight
		F/MH100-	(4) FT40W/2G11 and (1) 100W Par 38 Metal Halide Downlight
	5400-12	**F -**	(4) FT50W/2G11
		F/H250-	(4) FT50W/2G11 and (1) 250W Par 38 Halogen Downlight
		F/MH100-	(4) FT50W/2G11 and (1) 100W Par 38 Metal Halide Downlight
Voltage:		**120V or 277V**	(when using Halogen Downlight 120V only)
Lens Option: FAH is our Hand Painted Acrylic. See page 13 for an example or visit our website for more information.		**OA-**	Extruded Opal Acrylic – Etched (Shown)
		FAH4-	White Vein Hand Painted Faux Alabaster
		FAH5-	Antique (Beige) Hand Painted Faux Alabaster
		FAH6-	Gray Vein Hand Painted Faux Alabaster
		FAH7-	Beige Vein Hand Painted Faux Alabaster
Finishes:	Standard	**PB-**	Polished Brass (Shown)
		PN-	Polished Nickel
		SGW-	Semi Gloss White
	Custom	**CPF-**	Custom Painted Finish (Consult Factory)
		CMF-	Custom Metal Finish (Consult Factory)
Ballast:	Metal Halide	**IMB-**	Integral Electronic (See Surface Mount Canopy Detail)
		RMB-	Remote Mount Magnetic
	Fluorescent**	**DIM-**	Dimming (Lutron ECO 10)
	Fluorescent/Metal Halide**	**DIM/IMB-**	Dimming (Lutron ECO 10) / Integral Electronic (See Surface Mount Canopy Detail)
		DIM/RMB-	Dimming (Lutron ECO 10) / Remote Mount Electronic
Special:		**STD-**	Standard
		MOD-	Modified Standard
Weight:		**F-**	**8-** 10 lbs. **10-** 15 lbs. **12-** 25 lbs.
		F/H-	**8-** 12 lbs. **10-** 18 lbs. **12-** 28 lbs.
		F/MH-	**8-** 20 lbs. **10-** 25 lbs. **12-** 35 lbs.

*** Dimming NOT Available for 5400-8** **** Dimming option for Fluorescent lamps only.**

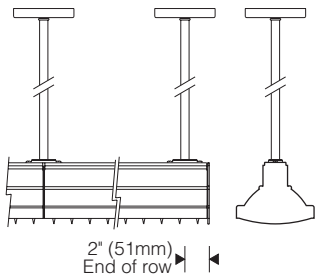
Lutron ECO-10 ballast's offer 100% to 10% dimming. ECO-10 ballast's are fully compatible with Lutrons complete line of 3-wire fluorescent controls.

5250 / CISCO COMPLIMENTARY WALL BRACKET - SEE PAGE 14 FOR BRACKET SPECIFICATIONS

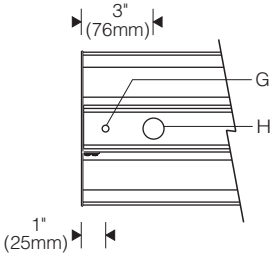
Style 3030 1:8 Scale



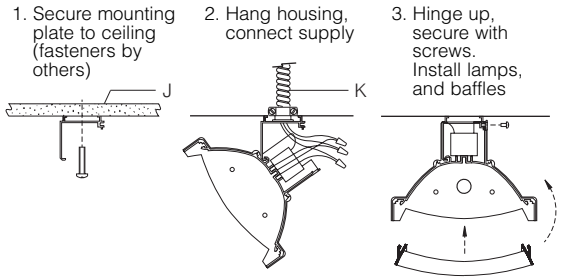
Pendant Stems (X mount)



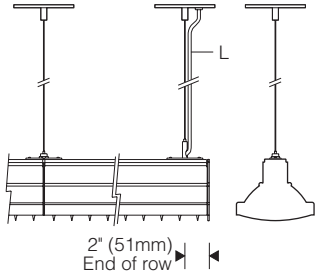
Top View (S mount)



Installation (S mount)



Cables (X mount)



Specifications

- **A** Extruded aluminum mounting plate
- **B** Electronic ballast
- **C** Specular extruded aluminum reflector housing
- **D** Snap-in semi-specular parabolic cross-baffle, blades 1-1/2" o.c., 25° shielding
- **E** Aluminum decorative end plate (3 profiles - order separately)
- **F** Aluminum joiner/ reveal plates
- **G** Mounting holes, 9/32" (7mm) dia. (**S** mount)
- **H** Knockout, (2) 7/8" (22mm) dia. (**S** mount)
- **J** Structure, fasteners (by others)
- **K** Conduit, connector (by others)
- **L** 18/3 cord with cable clips (cable mount)

Finish:
Painted surfaces - 6 stage pretreatment and electrostatically applied thermoset powder coat for stable, long lasting and corrosion resistant finish.

Reflector - extruded high purity aluminum with clear anodized specular finish. All luminaire hardware - stainless steel.

Cross-baffle - injection molded high-impact polycarbonate with metalized semi-specular finish.

Mounting:
S mount - mounting plate fastens flush to ceiling. Unit hinges on plate for hands-free access to wiring.

X mount - stems, cables **ordered separately**

Pendant stem - 11/16" O.D. aluminum, internally threaded. 5" dia. aluminum canopy.

Cable - 1/16" dia. 7x7 aircraft cable, field adjustable length. Crossbar with 1/4-20 stud and 5" dia. canopy.

When mounted in rows, clips are provided to align and space the mounting plates.

For bridge mount (shelf supported), consult factory.

Electrical:
Use 90°C wire for supply connections and through wire.

S mount - 7/8" (22mm) dia. knockouts at ends of mounting plate for conduit feed (by others).

X mount - electrical feed hanger mounts over recessed outlet box (by others) and **must be located at end of row**.

Housing hinges down for access to ballast and wiring. Optional #14 AWG prewired modular through wiring with quick connectors.

Integral electronic HPF thermally protected class P ballast with end-of-life protection.

Optional integral emergency battery operates one lamp. Separate unswitched supply is required.

Standard:
UL listed or CSA certified.

REV. 2/06 **Patents Pending**

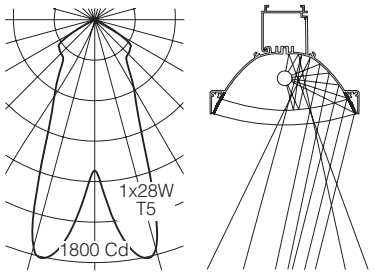
Features

- *Single T5 exceeds IESNA recommended light level - 30fc vertical at 30" AND complies with energy standards*
- *Precise extruded reflector drives light to the bottom shelf - maximizes visibility of books and shelf utilization*
- *Parabolic cross-baffle - 25° lengthwise shielding*
- *Electronic ballast - programmed start for long life*

S 1.0

Performance

Multiple reflector segments drive light to the lowest shelves. Unique cross-baffle redirects a portion of the lamp energy that otherwise goes directly to the floor back into the main beam while providing lengthwise shielding. The result is high beam efficiency and superior surface uniformity in tall, narrow stacks.



For complete photometrics, visit www.elliptipar.com.

elliptipar

To Order

To form a Catalog Number

3	0	3	0	-	T	128	-	X	-	02	-	2	-	00	0
					1	2		3		4		5		6	7

Project: **William H. Gates Hall**

Type: **F14**

1 Style

3030 = Stack light, integral ballast

2 Lamp

T ___ ___ = **T5 Fluorescent Lamp Code**
- **Lamp Wattage** (see chart below)
- **Number of Lamps in Length**, specify **1** or **2**

Example: **T228** = 8' (2.4m) housing with two 28W T5 lamps

Lamp Code	*Length*	*Lamps*
T5 Fluorescent		
T121	36" (915mm)	1 x F21T5
T128	48" (1220mm)	1 x F28T5
T221	72" (1830mm)	2 x F21T5
T228	96" (2440mm)	2 x F28T5

For complete lamp and ballast information, see Accessories Section. Standard T5 lamp color is 3000K / 80+ CRI.

S 1.1

3 Mounting

S = Ceiling (surface) mount
X = For use with pendant stem or cable hangers
Note: Order hangers separately

For bridge mount (shelf supported) consult factory.

4 Finish

02 = Semi-gloss white
99 = Custom RAL or computer matched color to be specified, consult sales representative

5 Voltage/Ballast

Electronic
1 = 120V
2 = 277V
For 347V (Canada), consult factory.

6 Option (See Accessories Section for specifications)

00 = No option
0E = Integral emergency battery pack with indicator lamp and test button. Operates one lamp.
Note: For **X** mount, order one additional electrical feed stem or cable for unswitched feed to battery.
0K = Prewired modular #12 AWG thru wiring w/ connectors
XX = For modification not listed, include detailed description. Consult factory prior to specification.

7 Standard

0 = UL, Underwriters Laboratories
J = CSA, Canadian Standards Association

Example

3030 - T228 - X - 02 - 1 - 0K0

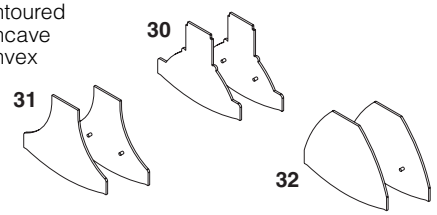
Stack light for use with two 4' F28T5 lamps. 96" long housing (not including decorative end plates). For use with pendant stem or cable hangers (order separately). Semi-gloss white. Integral 120V electronic 2-lamp ballast. UL. Optional modular wiring. Order decorative end plates separately.

If cable mounted (up to 48"), order (1) VER02480 non-electrical plus (1) VES02480 electrical feed hanger. For each additional unit in a row, order (1) additional VER02480 non-electrical hanger. See Hangers.

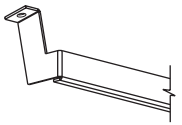
Accessories

Order separately. See Accessories Section for specifications.

ADE ___ ___ **0** = **Decorative end plates**, pair, white, or custom color to match housing. **Note**: required for each row or single unit. Adds 1/4" (6mm) to length.
- **4**
- **30** = Contoured
- **31** = Concave
- **32** = Convex



ARS30 ___ **0** = **Roomside shield,** increases crosswise shielding from 25° to 35° (for end stack) attaches internally alongside lamp. Consult factory for additional information.
- **36** = 36" (T121 lamp)
- **48** = 48" (T128 lamp)
- **72** = 72" (T221 lamp)
- **96** = 96" (T228 lamp)



AFK000X ___ = Ballast **fuse** kit
- **0** = UL
- **J** = CSA

Hangers

Order separately. See Accessories Section for specifications.

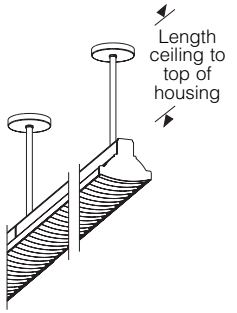
Singles - order one non-electrical and one electrical feed hanger for each unit (**X** mount).

Rows - order one non-electrical hanger for each unit (**X** mount) plus one electrical feed for each row.

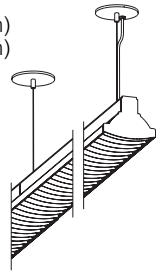
Note: For each single or row with emergency battery (option code **0E**), order one additional electrical feed and subtract one non-electrical hanger.

Electrical feed(s) must be located at an end of row.

VE ___ ___ ___ **0** = **Pendant stem**, 11/16" O.D.
- **Length** in inches, up to 60" (1.5m), 6" minimum
- **02** = White
- **99** = Custom RAL or computer matched color to be specified, consult sales representative
- **F** = Non-electrical
- **G** = Electrical feed, with (3) #14 AWG leads



VE ___ ___ ___ **0** = **Cable support**, field adjustable
- **48** = up to 48" (1.2m)
- **96** = up to 96" (2.4m)
- **02** = White canopy, cord
- **99** = Custom RAL or computer matched color to be specified, consult sales representative
- **R** = Non-electrical
- **S** = Electrical feed, 18/3 cord

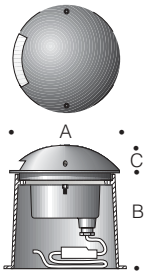


elliptipar
114 Boston Post Road, West Haven, Connecticut 06516, USA
Voice 203.931.4455 • Fax 203.931.4464 • **www.elliptipar.com**

Drive over luminaires for special applications

Outer housing: Constructed of high tensile strength, copper free die cast aluminum alloy.
Inner housing: Constructed of copper free die cast aluminum alloy, die cast aluminum clamping ring/cover/guard, removable for relamping, secured together with four (4) heavy stainless steel bolts which provide a pressure seal to gasket and glass. Two (2) captive socket head stainless steel screws secure inner housing cover to outer housing.
Enclosure: One piece heavy die cast aluminum cover with clear borosilicate focusing lens with cast aluminum guard. Molded, one piece, high temperature silicone rubber gasket.
Electrical: G 8.5 porcelain bi-pin lampholder with stainless steel contacts. Magnetic HPF ballast available 120V or 277V - specify.
Inner housing pre-wired with three (3) feet of 18/3 waterproof cable, cable clamp, and waterproof cable gland entry into housing. A separate waterproof wiring box for power supply must be provided (by contractor).
Finish: Standard finish is an eight step process consisting of two coats of gray high solids, UV stabilized polyurethane, one with light texture over a phosphate base. Custom colors are not available.
U.L. listed, suitable for wet locations and vehicle drive over.
Protection class: IP 67.
Luminaires are designed to withstand loads of up to 8,800 lbs. at speeds up to 12 mph when installed on a proper foundation. Proper drainage must be provided.

Type: M1
BEGA Product #: 8853MH
Project: WILLIAM H. GATES HALL
Voltage: 277
Color:
Options:
Modified:



High strength aluminum alloy, stainless steel, and bronze construction. Optical lens made from clear borosilicate glass. U.L. listed, suitable for wet locations. IP 67.
Finish: Gray.

		Lamp	Lumen	A	B	C
8853MH	Single 60°	1 39W T4 G8.5	3300	8 1/16	6 7/8	2 3/16

BEGA/US 1000 BEGA Way, Carpinteria, CA 93013 [P] 805·684·0533 [F] 805·684·6682

BEST IN SHOW LIGHTFAIR INTERNATIONAL 2004

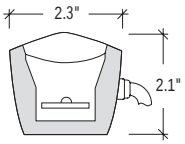
line
series 2.0

PROGRESS Report SELECTION 2004

5°, 30°, 60°

PATENT PENDING

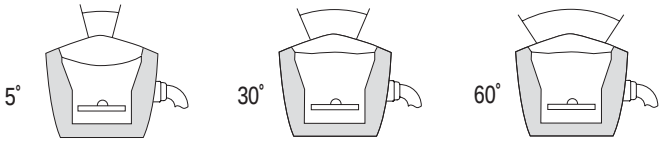
Dimensions



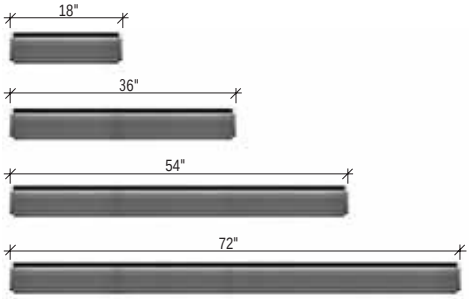
Dimension includes electrical feed and wire bending radius for interior applications.

Dimension includes electrical feed and wire bending radius for exterior applications.

Beam Spread Options



Individual Unit Lengths



Application

io Lighting's line series 2.0 is approximately 2" x 2" in cross section which allows for luminous accents to be delivered from "tight" architectural details. This low voltage linear floodlight luminaire utilizes high brightness LEDs and may be specified for interior or exterior applications. Nominal lengths include: 18", 36", 54", and 72". Precise beam spreads (5°, 30°, 60°) along the perpendicular axis of the fixture are well suited for building grazing or wall washing effects. Individual units may be placed end to end to create continuos rows without obvious shadows between fixtures. Similar to halogen light sources, LEDs are point sources that offer superior definition to three dimensional objects and sparkle to reflective surfaces. Average rated life for series 2.0 is 50,000 hours. Lamp Lumen depreciation at 50,000 hrs is 30%.

Light Output

series 2.0's superior optical assemblies offer fixture efficiencies that range from 85% to almost 100%. Refer to light output tables for foot candle values at various distances. IES format files may be obtained from the factory or downloaded from iolighting.com.

- Warm White (3000° K): 177 lms/ft
- Cool White (5000° K): 296 lms/ft

Construction

Heavy-duty aluminum housing provides recommended heat sink requirements for LEDs. Precision optics are composed of a customized acrylic material offering excellent light transmission and UV stability. High strength adhesive bonds the housing and optical assembly. series 2.0 is UL listed for wet locations.

Mounting Options

series 2.0 may be surface mounted, side surface mounted or surface mounted with field adjustability and lockable aiming.

Electrical

All fixtures are pre-wired and pre-assembled for easy installation. 8'-0", 18 AWG electrical feed is side mounted to enable continuous row mounting. Universal 120v or 277v supply required for remote driver. Driver enclosures for interior or exterior applications may be provided by io. Drivers may be remotely located up to 18'-0" (w/18 AWG), 46'-0"(w/14 AWG) and 71'-0" (w/12 AWG). Dimming is available, consult factory for details.

Individual units *may* be daisy chained and fed from a high capacity driver. Consult factory for more information.

Power Consumption

- standard: 10 w/ft

Finish

Anodized aluminum finish is standard. Custom anodized finishes available upon request.

370 Corporate Woods Pkwy Vernon Hills, IL 60061-3107
T 847.735.7000 F 847.735.7001 E info@iolighting.com W iolighting.com

c UL us

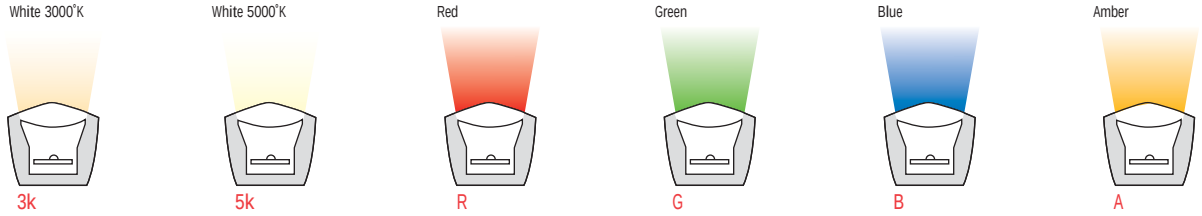
line
series 2.0

5˚, 30˚, 60˚

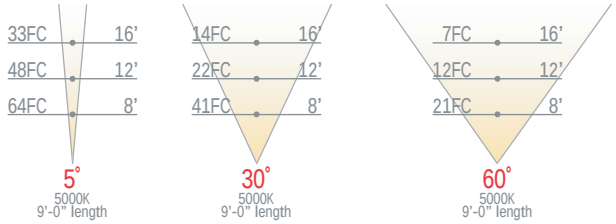
PATENT PENDING

BEST IN SHOW LIGHTFAIR INTERNATIONAL 2004

Color Options



Light Output

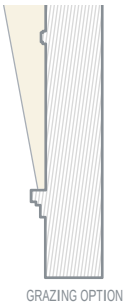


Grazing Option
Edge of optic employs a diffuser to distribute fill light at lower angles. The grazing option may be specified with all three beam spread options.

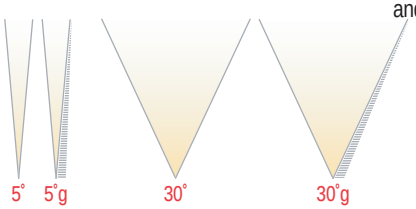
IES format photometrics may be downloaded from www.iolighting.com

Multipliers for Alternate Light Source Colors	.6	.43	.6	.19	.43
	3000k	RED	GREEN	BLUE	AMBER

Distributions



series 2.0 may be specified with 5˚, 30˚, 60˚ beam spreads. For grazing vertical surfaces, each of the three beam spreads is available with a "grazing option".

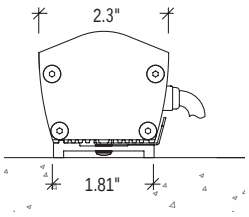


series 2.0's optical assembly is designed to practically eliminate stray light, making it perfect for applications where *light pollution* and/or *light trespass* are important design considerations.

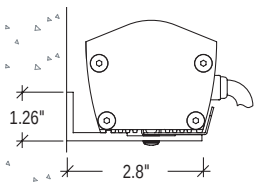
line series 2.0 is UL listed for wet locations. It is not rated for submersible applications. line should not be mounted in conditions where there is any standing water whatsoever.

Mounting Options

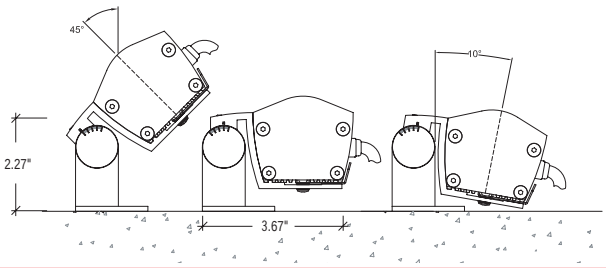
100 surface



101 side surface



102 field adjustable with lockable aiming



Order Code

0	04	I	5K	5G	100	1	36	2	I
io	2.0	Location	Color	Distribution	Mounting	Finish	Length	Voltage Dimming	Driver Enclosure

Location
- I Interior
- E Exterior

Color
- 3k White 3000˚K
- 5k White 5000˚K
- *R Red
- *G Green
- *B Blue
- *A Amber

Note: Driver options and details vary from white light. Consult factory for details.

Distribution
- 5 5˚
- 5g 5˚ w/grazing
- 30 30˚
- 30g 30˚ w/grazing
- 60 60˚
- 60g 60˚ w/grazing

Mounting
- 100 Surface
- 101 Side surface
- 102 Field adjustable

Finish
- 1 Anodized Aluminum
- 2 Custom

Length

UNITS		(actual)
18	18"	(17.71")
36	36"	(34.71")
54	54"	(51.71")
72	72"	(68.71")

CONTINUOS ROW
Specify Length
i.e. 60'-0"

Voltage Dimming

SIDE FEED	STANDARD
1	120v
2	277v
3	120v w/dim
4	277v w/dim
5	other

Driver Enclosure
- I Interior
- E Exterior
- N Not Req'd

Supplied by electrical contractors

370 Corporate Woods Pkwy Vernon Hills, IL 60061-3107
T 847.735.7000 F 847.735.7001 E info@iolighting.com W iolighting.com

Lamp Cutsheets

20864 – Q35MR16/C/CG12

GE ConstantColor® Precise™ MR16

• UV protection

PRINT

GENERAL CHARACTERISTICS

Lamp type	Halogen - MR
Bulb	MR16
Base	2-Pin (GU5.3)
Filament	C-6
Wattage	35
Voltage	12
Voltage (MIN)	35
Rated Life	5000 hrs
Rated Life (Vert)	5000 hrs
Lamp Enclosure Type (LET)	Covered glass

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	7500
Initial Lumens (Hor)	7500
Initial Lumens (Vert)	7500
Center Beam Candlepower (CBCP)	7500
Color Temperature	3000 K
Nominal Initial Lumens per Watt	214

ELECTRICAL CHARACTERISTICS

Burn Position	Universal burning position

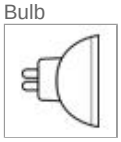
DIMENSIONS

Maximum Overall Length (MOL)	1.8750 in (47.6 mm)
Bulb Diameter (DIA)	2.000 in (50.8 mm)

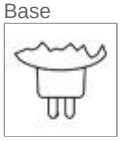
PRODUCT INFORMATION

Product Code	20864
Description	Q35MR16/C/CG12
ANSI Code	FRB
Standard Package	BUNDLE
Standard Package GTIN	00043168208642
Standard Package Quantity	20
Sales Unit	Unit
No Of Items Per Sales Unit	1
No Of Items Per Standard Package	20

Bulb



Base



Filament

View Larger

ADDITIONAL RESOURCES

Catalogs

Testimonials

Brochures

Product Brochures
- Color
- XL Brochure

Application/Segment Brochures
- Contractor Lighting
- Healthcare Lighting
- Office Lighting

Sell Sheets
- GE ConstantColor® Precise™ MR16 Lamps

IES/Photometric Download

MSDS (Material Safety Data Sheets)

Disposal Policies & Recycling Information

FIXTURE: H2

WORLDWIDE PARTNER

GE Lighting

Commercial Products & Solutions

91227 – TU*100A1/F-RS/E27 230-240V GE 1/20 MIH

GE A19

GENERAL CHARACTERISTICS

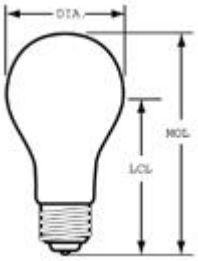
Lamp type	Incandescent - A-line
Bulb	A19
Base	Medium Skirt (E27)
Wattage	100
Rated Life	3000 hrs

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	880
Nominal Initial Lumens per Watt	8

PRODUCT INFORMATION

Product Code	91227
Description	TU*100A1/F-RS/E27 230-240V GE 1/20 MIH
Standard Package Quantity	20
Sales Unit	Unit



Bulb

View Larger

ADDITIONAL RESOURCES

Catalogs

Disposal Policies & Recycling Information

Return To Top

FIXTURE: F1 & F1A

GE Consumer & Industrial Lighting

WORLDWIDE PARTNER

Commercial Products & Solutions

PRINT

97631 – F32TBX/835/A/ECO

GE Ecolux® Biax® T4 - Facilities; Retail Display; Hospitality; Office; Restaurant; Warehouse

High Color Rendering
Energy Savings

GENERAL CHARACTERISTICS

Lamp type	Compact Fluorescent - Plug-In
Bulb	T4
Base	GX24q-3
Wattage	32
Voltage	120/100
Rated Life	12000 hrs
Starting Temperature (MIN)	0 °C (32 °F)
Cathode Resistance	2.700 Ohm
Rated Life (rapid start) @ Time	12000 h @ 3 h 20000 h @ 12 h
Additional Info	Dimmable with appropriate dimming ballast., End of Life Protection (EOL), TCLP compliant
Primary Application	Facilities; Retail Display; Hospitality; Office; Restaurant; Warehouse

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	2200
Mean Lumens	1850
Nominal Initial Lumens per Watt	68
Color Temperature	3500 K
Color Rendering Index (CRI)	82

ELECTRICAL CHARACTERISTICS

Current (max)	5.2500 A
Open Circuit Voltage (after preheating) (MAX)	265 V
Open Circuit Voltage (MIN)	515 V
Lamp Current	0.320 A
Preheat Voltage (MIN)	4 V
Current Crest Factor (MAX)	1.7
Supply Current Frequency	20000 Hz

Bulb

Base

View Larger

ADDITIONAL RESOURCES

Catalogs

Testimonials

Brochures

Product Brochures

- Ecolux
- Ecolux (Environmental)

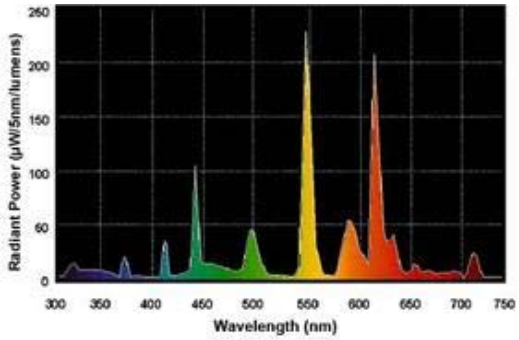
Sell Sheets

- Fast Warming
- Biax® T/E 32W with Amalgam

Disposal Policies & Recycling Information

GRAPHS & CHARTS

Spectral Power Distribution



FIXTURE: F2

GE Consumer & Industrial Lighting

WORLDWIDE PARTNER

Commercial Products & Solutions

PRINT

46705 – F28W/T5/835/ECO

GE Ecolux® Starcoat® T5

• Passes TCLP, which can lower disposal costs.

High Color Rendering

GENERAL CHARACTERISTICS

Lamp type	Linear Fluorescent - Straight Linear
Bulb	T5
Base	Miniature Bi-Pin (G5)
Wattage	28
Voltage	167
Rated Life	30000 hrs
Rated Life (rapid start) @ Time	36000 h @ 12 h 30000 h @ 3 h
Bulb Material	Soda lime
Starting Temperature (MIN)	-20 °C (-4 °F)
Additional Info	TCLP compliant

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	2900
Mean Lumens	2660
Nominal Initial Lumens per Watt	103
Color Temperature	3500 K
Color Rendering Index (CRI)	85
S/P Ratio (Scotopic/Photopic Ratio)	1.5

ELECTRICAL CHARACTERISTICS

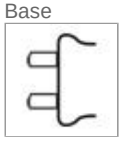
Open Circuit Voltage (rapid start) Min @ Temperature	425 V @ 10 °C
Cathode Resistance Ratio - Rh/Rc (MIN)	4.25
Cathode Resistance Ratio - Rh/Rc (MAX)	6.5
Current Crest Factor (MAX)	1.7

DIMENSIONS

Maximum Overall Length (MOL)	45.8000 in (1163.3 mm)
Nominal Length	45.200 in (1148.0 mm)
Bulb Diameter (DIA)	0.625 in (15.8 mm)
Bulb Diameter (DIA) (MAX)	0.670 in (17.0 mm)
Max Base Face to Base Face (A)	45.240 in (1149.0 mm)
Face to End of Opposing Pin	45.420 in (1153.6 mm)

Bulb

Base



View Larger

ADDITIONAL RESOURCES

Catalogs

Testimonials

Brochures

Application/Segment Brochures

- Contractor Lighting
- Healthcare Lighting

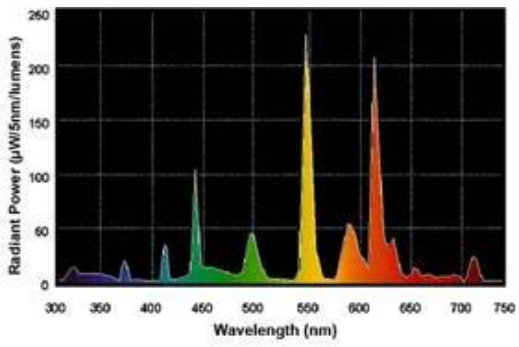
Product Brochures

- Ecolux
- Ecolux (Environmental)

Disposal Policies & Recycling Information

GRAPHS & CHARTS

Spectral Power Distribution



Lamp Mortality

FIXTURE: F3 & F3A

GE Consumer & Industrial Lighting

WORLDWIDE PARTNER

Commercial Products & Solutions

46705 – F28W/T5/835/ECO

GE Ecolux® Starcoat® T5

PRINT

• Passes TCLP, which can lower disposal costs.

High Color Rendering

GENERAL CHARACTERISTICS

Lamp type	Linear Fluorescent - Straight Linear
Bulb	T5
Base	Miniature Bi-Pin (G5)
Wattage	28
Voltage	167
Rated Life	30000 hrs
Rated Life (rapid start) @ Time	36000 h @ 12 h 30000 h @ 3 h
Bulb Material	Soda lime
Starting Temperature (MIN)	-20 °C (-4 °F)
Additional Info	TCLP compliant

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	2900
Mean Lumens	2660
Nominal Initial Lumens per Watt	103
Color Temperature	3500 K
Color Rendering Index (CRI)	85
S/P Ratio (Scotopic/Photopic Ratio)	1.5

ELECTRICAL CHARACTERISTICS

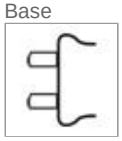
Open Circuit Voltage (rapid start) Min @ Temperature	425 V @ 10 °C
Cathode Resistance Ratio - Rh/Rc (MIN)	4.25
Cathode Resistance Ratio - Rh/Rc (MAX)	6.5
Current Crest Factor (MAX)	1.7

DIMENSIONS

Maximum Overall Length (MOL)	45.8000 in (1163.3 mm)
Nominal Length	45.200 in (1148.0 mm)
Bulb Diameter (DIA)	0.625 in (15.8 mm)
Bulb Diameter (DIA) (MAX)	0.670 in (17.0 mm)
Max Base Face to Base Face (A)	45.240 in (1149.0 mm)
Face to End of Opposing Pin	45.420 in (1153.6 mm)

Bulb

Base



View Larger

ADDITIONAL RESOURCES

Catalogs

Testimonials

Brochures

Application/Segment Brochures

- Contractor Lighting
- Healthcare Lighting

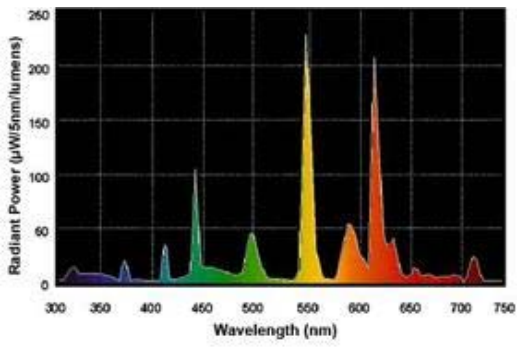
Product Brochures

- Ecolux
- Ecolux (Environmental)

Disposal Policies & Recycling Information

GRAPHS & CHARTS

Spectral Power Distribution



Lamp Mortality

FIXTURE: F4

GE Consumer & Industrial Lighting

WORLDWIDE PARTNER

Commercial Products & Solutions

97616 – F26TBX/835/A/ECO

GE Ecolux® Biax® T4 - Facilities; Retail Display; Hospitality; Office; Restaurant; Warehouse

PRINT

High Color Rendering
Energy Savings

GENERAL CHARACTERISTICS

Lamp type	Compact Fluorescent - Plug-In
Bulb	T4
Base	GX24q-3
Wattage	26
Voltage	120/105
Rated Life	12000 hrs
Starting Temperature (MIN)	0 °C (32 °F)
Cathode Resistance	2.700 Ohm
Rated Life (rapid start) @ Time	12000 h @ 3 h 20000 h @ 12 h
Additional Info	Dimmable with appropriate dimming ballast., End of Life Protection (EOL), TCLP compliant
Primary Application	Facilities; Retail Display; Hospitality; Office; Restaurant; Warehouse

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	1710
Mean Lumens	1440
Nominal Initial Lumens per Watt	65
Color Temperature	3500 K
Color Rendering Index (CRI)	82

ELECTRICAL CHARACTERISTICS

Current (max)	5.2500 A
Open Circuit Voltage (after preheating) (MAX)	265 V
Open Circuit Voltage Across Starter (MIN)	198 V
Lamp Current	0.325 A
Preheat Voltage (MIN)	4 V
Current Crest Factor (MAX)	1.7
Supply Current Frequency	20000 Hz

Bulb

Base

View Larger

ADDITIONAL RESOURCES

Catalogs

Testimonials

Brochures

Product Brochures

- Ecolux
- Ecolux (Environmental)

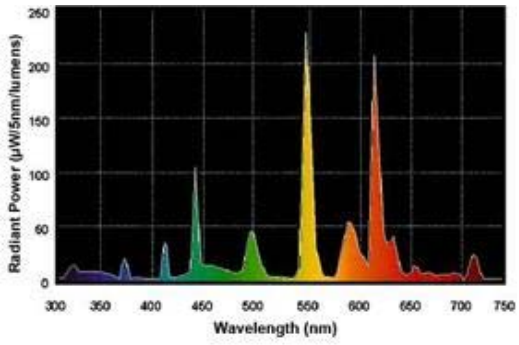
Sell Sheets

- Fast Warming

Disposal Policies & Recycling Information

GRAPHS & CHARTS

Spectral Power Distribution



FIXTURE: F5
F6

WORLDWIDE PARTNER

GE Consumer & Industrial Lighting

Commercial Products & Solutions

97600 – F18DBX/835/ECO4P

GE Ecolux® Biax® T4 - Facilities; Retail Display; Hospitality; Office; Restaurant; Warehouse

PRINT

High Color Rendering
Energy Savings

GENERAL CHARACTERISTICS

Lamp type	Compact Fluorescent - Plug-In
Bulb	T4
Base	G24q-2
Wattage	18
Voltage	100
Rated Life	12000 hrs/20000
Starting Temperature (MIN)	0 °C (32 °F)
Cathode Resistance	6.050 Ohm
Additional Info	Dimmable with appropriate dimming ballast., End of Life Protection (EOL), TCLP compliant
Primary Application	Facilities; Retail Display; Hospitality; Office; Restaurant; Warehouse

PHOTOMETRIC CHARACTERISTICS

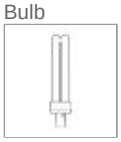
Initial Lumens	1200
Mean Lumens	970
Nominal Initial Lumens per Watt	66
Color Temperature	3500 K
Color Rendering Index (CRI)	82

ELECTRICAL CHARACTERISTICS

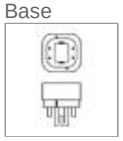
Current (max)	5.2500 A
Open Circuit Voltage (after preheating) (MAX)	220 V
Open Circuit Voltage Across Starter (MIN)	198 V
Lamp Current	0.220 A
Preheat Voltage (MIN)	4 V
Current Crest Factor (MAX)	1.7
Supply Current Frequency	60 Hz

DIMENSIONS

Bulb



Base



View Larger

ADDITIONAL RESOURCES

Catalogs

Testimonials

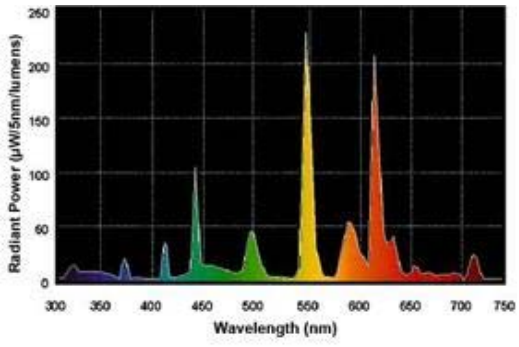
Sell Sheets

- Double Biax® 2-Pin & 4-Pin

Disposal Policies & Recycling Information

GRAPHS & CHARTS

Spectral Power Distribution



FIXTURE: F7A

GE Consumer & Industrial Lighting

WORLDWIDE PARTNER

Commercial Products & Solutions

PRINT

46705 – F28W/T5/835/ECO

GE Ecolux® Starcoat® T5

• Passes TCLP, which can lower disposal costs.

High Color Rendering

GENERAL CHARACTERISTICS

Lamp type	Linear Fluorescent - Straight Linear
Bulb	T5
Base	Miniature Bi-Pin (G5)
Wattage	28
Voltage	167
Rated Life	30000 hrs
Rated Life (rapid start) @ Time	36000 h @ 12 h 30000 h @ 3 h
Bulb Material	Soda lime
Starting Temperature (MIN)	-20 °C (-4 °F)
Additional Info	TCLP compliant

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	2900
Mean Lumens	2660
Nominal Initial Lumens per Watt	103
Color Temperature	3500 K
Color Rendering Index (CRI)	85
S/P Ratio (Scotopic/Photopic Ratio)	1.5

ELECTRICAL CHARACTERISTICS

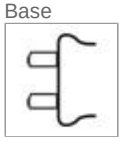
Open Circuit Voltage (rapid start) Min @ Temperature	425 V @ 10 °C
Cathode Resistance Ratio - Rh/Rc (MIN)	4.25
Cathode Resistance Ratio - Rh/Rc (MAX)	6.5
Current Crest Factor (MAX)	1.7

DIMENSIONS

Maximum Overall Length (MOL)	45.8000 in (1163.3 mm)
Nominal Length	45.200 in (1148.0 mm)
Bulb Diameter (DIA)	0.625 in (15.8 mm)
Bulb Diameter (DIA) (MAX)	0.670 in (17.0 mm)
Max Base Face to Base Face (A)	45.240 in (1149.0 mm)
Face to End of Opposing Pin	45.420 in (1153.6 mm)

Bulb

Base



View Larger

ADDITIONAL RESOURCES

Catalogs

Testimonials

Brochures

Application/Segment Brochures

- Contractor Lighting
- Healthcare Lighting

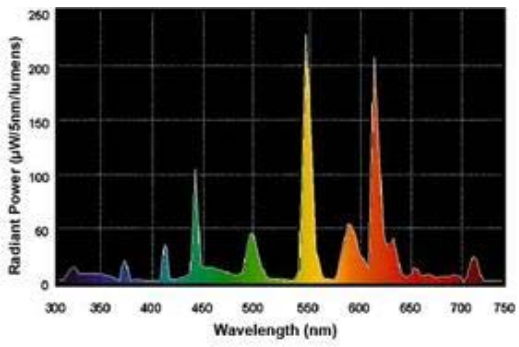
Product Brochures

- Ecolux
- Ecolux (Environmental)

Disposal Policies & Recycling Information

GRAPHS & CHARTS

Spectral Power Distribution



Lamp Mortality

FIXTURE: F8A

GE Consumer & Industrial Lighting

WORLDWIDE PARTNER

Commercial Products & Solutions

97600 – F18DBX/835/ECO4P

GE Ecolux® Biax® T4 - Facilities; Retail Display; Hospitality; Office; Restaurant; Warehouse

PRINT

High Color Rendering
Energy Savings

GENERAL CHARACTERISTICS

Lamp type	Compact Fluorescent - Plug-In
Bulb	T4
Base	G24q-2
Wattage	18
Voltage	100
Rated Life	12000 hrs/20000
Starting Temperature (MIN)	0 °C (32 °F)
Cathode Resistance	6.050 Ohm
Additional Info	Dimmable with appropriate dimming ballast., End of Life Protection (EOL), TCLP compliant
Primary Application	Facilities; Retail Display; Hospitality; Office; Restaurant; Warehouse

PHOTOMETRIC CHARACTERISTICS

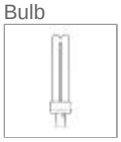
Initial Lumens	1200
Mean Lumens	970
Nominal Initial Lumens per Watt	66
Color Temperature	3500 K
Color Rendering Index (CRI)	82

ELECTRICAL CHARACTERISTICS

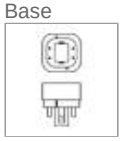
Current (max)	5.2500 A
Open Circuit Voltage (after preheating) (MAX)	220 V
Open Circuit Voltage Across Starter (MIN)	198 V
Lamp Current	0.220 A
Preheat Voltage (MIN)	4 V
Current Crest Factor (MAX)	1.7
Supply Current Frequency	60 Hz

DIMENSIONS

Bulb



Base



View Larger

ADDITIONAL RESOURCES

Catalogs

Testimonials

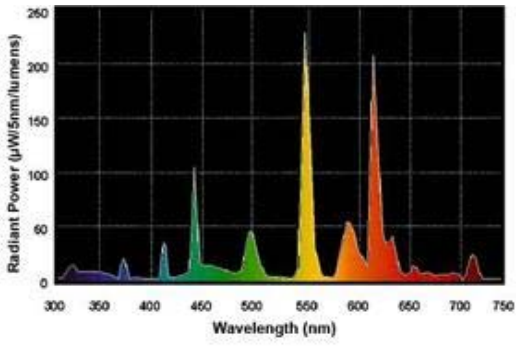
Sell Sheets

- Double Biax® 2-Pin & 4-Pin

Disposal Policies & Recycling Information

GRAPHS & CHARTS

Spectral Power Distribution



FIXTURE: F9

GE Consumer & Industrial Lighting

WORLDWIDE PARTNER

Commercial Products & Solutions

97631 – F32TBX/835/A/ECO

GE Ecolux® Biax® T4 - Facilities; Retail Display; Hospitality; Office; Restaurant; Warehouse

PRINT

High Color Rendering
Energy Savings

Bulb

Base

View Larger

GENERAL CHARACTERISTICS

Lamp type	Compact Fluorescent - Plug-In
Bulb	T4
Base	GX24q-3
Wattage	32
Voltage	120/100
Rated Life	12000 hrs
Starting Temperature (MIN)	0 °C (32 °F)
Cathode Resistance	2.700 Ohm
Rated Life (rapid start) @ Time	12000 h @ 3 h 20000 h @ 12 h
Additional Info	Dimmable with appropriate dimming ballast., End of Life Protection (EOL), TCLP compliant
Primary Application	Facilities; Retail Display; Hospitality; Office; Restaurant; Warehouse

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	2200
Mean Lumens	1850
Nominal Initial Lumens per Watt	68
Color Temperature	3500 K
Color Rendering Index (CRI)	82

ELECTRICAL CHARACTERISTICS

Current (max)	5.2500 A
Open Circuit Voltage (after preheating) (MAX)	265 V
Open Circuit Voltage (MIN)	515 V
Lamp Current	0.320 A
Preheat Voltage (MIN)	4 V
Current Crest Factor (MAX)	1.7
Supply Current Frequency	20000 Hz

ADDITIONAL RESOURCES

Catalogs

Testimonials

Brochures

Product Brochures

- Ecolux
- Ecolux (Environmental)

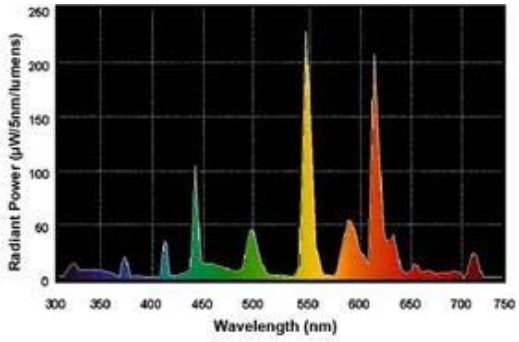
Sell Sheets

- Fast Warming
- Biax® T/E 32W with Amalgam

Disposal Policies & Recycling Information

GRAPHS & CHARTS

Spectral Power Distribution



FIXTURE: F10

GE Consumer & Industrial Lighting

WORLDWIDE PARTNER

Commercial Products & Solutions

97600 – F18DBX/835/ECO4P

GE Ecolux® Biax® T4 - Facilities; Retail Display; Hospitality; Office; Restaurant; Warehouse

PRINT

High Color Rendering
Energy Savings

GENERAL CHARACTERISTICS

Lamp type	Compact Fluorescent - Plug-In
Bulb	T4
Base	G24q-2
Wattage	18
Voltage	100
Rated Life	12000 hrs/20000
Starting Temperature (MIN)	0 °C (32 °F)
Cathode Resistance	6.050 Ohm
Additional Info	Dimmable with appropriate dimming ballast., End of Life Protection (EOL), TCLP compliant
Primary Application	Facilities; Retail Display; Hospitality; Office; Restaurant; Warehouse

PHOTOMETRIC CHARACTERISTICS

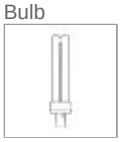
Initial Lumens	1200
Mean Lumens	970
Nominal Initial Lumens per Watt	66
Color Temperature	3500 K
Color Rendering Index (CRI)	82

ELECTRICAL CHARACTERISTICS

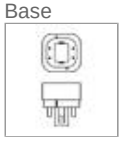
Current (max)	5.2500 A
Open Circuit Voltage (after preheating) (MAX)	220 V
Open Circuit Voltage Across Starter (MIN)	198 V
Lamp Current	0.220 A
Preheat Voltage (MIN)	4 V
Current Crest Factor (MAX)	1.7
Supply Current Frequency	60 Hz

DIMENSIONS

Bulb



Base



View Larger

ADDITIONAL RESOURCES

Catalogs

Testimonials

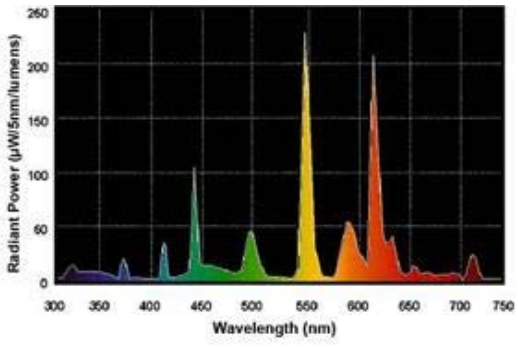
Sell Sheets

- Double Biax® 2-Pin & 4-Pin

Disposal Policies & Recycling Information

GRAPHS & CHARTS

Spectral Power Distribution



FIXTURE: F11

WORLDWIDE PARTNER

GE Lighting

Commercial Products & Solutions

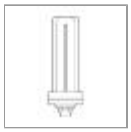
97635 – F42TBX/835/A/ECO

GE Ecolux® Biax® T4 - Facilities; Retail Display; Hospitality; Office; Restaurant; Warehouse

PR

High Color Rendering
Energy Savings

Bulb



Base

View Larger

GENERAL CHARACTERISTICS

Lamp type	Compact Fluorescent - Plug-In
Bulb	T4
Base	GX24-q4
Wattage	42
Voltage	135
Rated Life	12000 hrs
Starting Temperature (MIN)	-18 °C (-0 °F)
Cathode Resistance	2.700 Ohm
Rated Life (rapid start) @ Time	12000 h @ 3 h 20000 h @ 12 h
Additional Info	Dimmable with appropriate dimming ballast., End of Life Protection (EOL), TCLP compliant
Primary Application	Facilities; Retail Display; Hospitality; Office; Restaurant; Warehouse

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	3200
Mean Lumens	2690
Nominal Initial Lumens per Watt	76
Color Temperature	3500 K
Color Rendering Index (CRI)	82

ELECTRICAL CHARACTERISTICS

Current (max)	5.2500 A
Open Circuit Voltage (after preheating) (MAX)	265 V
Open Circuit Voltage (MIN)	515 V
Lamp Current	0.320 A
Preheat Voltage (MIN)	4 V

ADDITIONAL RESOURCES

Catalogs

Testimonials

Brochures

Product Brochures

- Ecolux
- Ecolux (Environmental)

Sell Sheets

- Fast Warming
- Biax® T/E 42W

Disposal Policies & Recycling Information

FIXTURE: F12

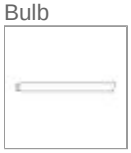
10326 – F32T8XLSPX35HLEC

GE Ecolux® Starcoat® T8

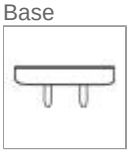
• Passes TCLP, which can lower disposal costs.

High Color Rendering
Energy Savings

Bulb



Base



View Larger

GENERAL CHARACTERISTICS

Lamp type	Linear Fluorescent - Straight Linear
Bulb	T8
Base	Medium Bi-Pin (G13)
Wattage	32
Voltage	137
Rated Life	24000 hrs
Rated Life (instant start) @ Time	29000 h @ 12 h 24000 h @ 3 h
Rated Life (rapid start) @ Time	29000 h @ 12 h
Bulb Material	Soda lime
Starting Temperature (MIN)	10 °C (50 °F)
Additional Info	TCLP compliant

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	3100
Mean Lumens	2915
Nominal Initial Lumens per Watt	96
Color Temperature	3500 K
Color Rendering Index (CRI)	85
S/P Ratio (Scotopic/Photopic Ratio)	1.5

ELECTRICAL CHARACTERISTICS

Open Circuit Voltage (rapid start) Min @ Temperature	315 V @ 10 °C
Cathode Resistance Ratio - Rh/Rc (MIN)	4.25
Cathode Resistance Ratio - Rh/Rc (MAX)	6.5
Current Crest Factor (MAX)	1.7

DIMENSIONS

ADDITIONAL RESOURCES

Catalogs

Testimonials

Brochures

Application/Segment Brochures
- Contractor Lighting
- Healthcare Lighting
- Office Lighting
- Retail Lighting

Product Brochures
- Ecolux
- Ecolux (Environmental)
- Industrial Lighting
- ULTRA Linear Fluorescent

Sell Sheets
- F32T8 High Lumen Linear Fluorescent System

MSDS (Material Safety Data Sheets)

Disposal Policies & Recycling Information

GRAPHS & CHARTS

Spectral Power Distribution

FIXTURE: F13

GE Lighting

WORLDWIDE PARTNER

Commercial Products & Solutions

46745 – F39W/T5/835/ECO

GE Ecolux® Starcoat® T5

PR

• Passes TCLP, which can lower disposal costs.

High Color Rendering

GENERAL CHARACTERISTICS

Lamp type	Linear Fluorescent - Straight Linear
Bulb	T5
Base	Miniature Bi-Pin (G5)
Wattage	39
Voltage	112
Rated Life	30000 hrs
Rated Life (rapid start) @ Time	36000 h @ 12 h 30000 h @ 3 h
Bulb Material	Soda lime
Starting Temperature (MIN)	-20 °C (-4 °F)
Additional Info	TCLP compliant

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	3500
Mean Lumens	3220
Nominal Initial Lumens per Watt	89
Color Temperature	3500 K
Color Rendering Index (CRI)	85
S/P Ratio (Scotopic/Photopic Ratio)	1.5

ELECTRICAL CHARACTERISTICS

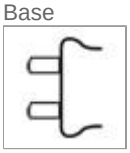
Open Circuit Voltage (rapid start) Min @ Temperature	350 V @ 10 °C
Cathode Resistance Ratio - Rh/Rc (MIN)	4.25
Cathode Resistance Ratio - Rh/Rc (MAX)	6.5
Current Crest Factor (MAX)	1.7

DIMENSIONS

Maximum Overall Length (MOL)	33.9800 in (863.0 mm)
Nominal Length	33.400 in (848.3 mm)

Bulb

Base



View Larger

ADDITIONAL RESOURCES

Catalogs

Testimonials

Brochures

Application/Segment Brochures

- Contractor Lighting
- Healthcare Lighting

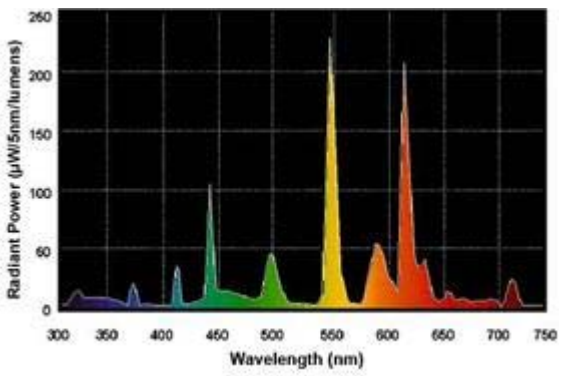
Product Brochures

- Ecolux
- Ecolux (Environmental)

Disposal Policies & Recycling Information

GRAPHS & CHARTS

Spectral Power Distribution



FIXTURE: F14

GE Consumer & Industrial Lighting

WORLDWIDE PARTNER

Commercial Products & Solutions

PRINT

46705 – F28W/T5/835/ECO

GE Ecolux® Starcoat® T5

• Passes TCLP, which can lower disposal costs.

High Color Rendering

GENERAL CHARACTERISTICS

Lamp type	Linear Fluorescent - Straight Linear
Bulb	T5
Base	Miniature Bi-Pin (G5)
Wattage	28
Voltage	167
Rated Life	30000 hrs
Rated Life (rapid start) @ Time	36000 h @ 12 h 30000 h @ 3 h
Bulb Material	Soda lime
Starting Temperature (MIN)	-20 °C (-4 °F)
Additional Info	TCLP compliant

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	2900
Mean Lumens	2660
Nominal Initial Lumens per Watt	103
Color Temperature	3500 K
Color Rendering Index (CRI)	85
S/P Ratio (Scotopic/Photopic Ratio)	1.5

ELECTRICAL CHARACTERISTICS

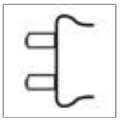
Open Circuit Voltage (rapid start) Min @ Temperature	425 V @ 10 °C
Cathode Resistance Ratio - Rh/Rc (MIN)	4.25
Cathode Resistance Ratio - Rh/Rc (MAX)	6.5
Current Crest Factor (MAX)	1.7

DIMENSIONS

Maximum Overall Length (MOL)	45.8000 in (1163.3 mm)
Nominal Length	45.200 in (1148.0 mm)
Bulb Diameter (DIA)	0.625 in (15.8 mm)
Bulb Diameter (DIA) (MAX)	0.670 in (17.0 mm)
Max Base Face to Base Face (A)	45.240 in (1149.0 mm)
Face to End of Opposing Pin	45.420 in (1153.6 mm)

Bulb

Base



View Larger

ADDITIONAL RESOURCES

Catalogs

Testimonials

Brochures

Application/Segment Brochures

- Contractor Lighting
- Healthcare Lighting

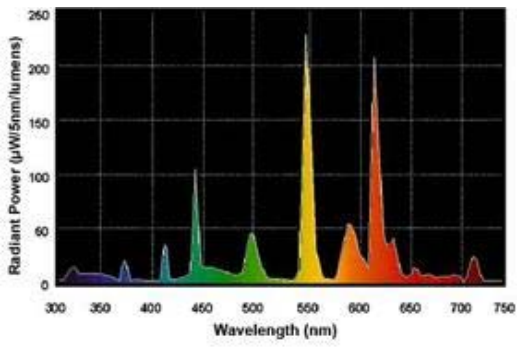
Product Brochures

- Ecolux
- Ecolux (Environmental)

Disposal Policies & Recycling Information

GRAPHS & CHARTS

Spectral Power Distribution



Lamp Mortality

FIXTURE: M1

GE Consumer & Industrial Lighting

WORLDWIDE PARTNER

Commercial Products & Solutions

20153 – CMH39TUVCU830G12

GE ConstantColor® PulseArc® CMH® Ceramic Metal Halide T4.5

PRINT

GENERAL CHARACTERISTICS

Lamp type	High Intensity Discharge - Ceramic Metal Halide
Bulb	T4.5
Base	Bi-Pin (G12)
Wattage	39
Rated Life	10000 hrs
Bulb Material	Quartz
Lamp Enclosure Type (LET)	Enclosed fixtures only
Additional Info	UV control

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	3400
Mean Lumens	2600
Nominal Initial Lumens per Watt	87
Color Temperature	3000 K
Color Rendering Index (CRI)	82

ELECTRICAL CHARACTERISTICS

Burn Position	Universal burning position
Warm Up Time to 90% (MAX)	2 min/3
Hot Restart Time to 90% (MIN)	10 min
Hot Restart Time to 90% (MAX)	15 min

DIMENSIONS

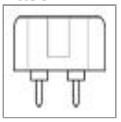
Maximum Overall Length (MOL)	3.5600 in (90.4 mm)
Light Center Length (LCL)	2.180 in (55.3 mm)

PRODUCT INFORMATION

Product Code	20153
Description	CMH39TUVCU830G12
ANSI Code	M130
Standard Package	Case
Standard Package GTIN	10043168201534
Standard Package Quantity	12

Bulb

Base



View Larger

ADDITIONAL RESOURCES

Catalogs

Testimonials

Brochures

Product Brochures

- Ceramic Metal Halide

Application/Segment Brochures

- Contractor Lighting

MSDS (Material Safety Data Sheets)

Disposal Policies & Recycling Information

Ballast Cutsheets

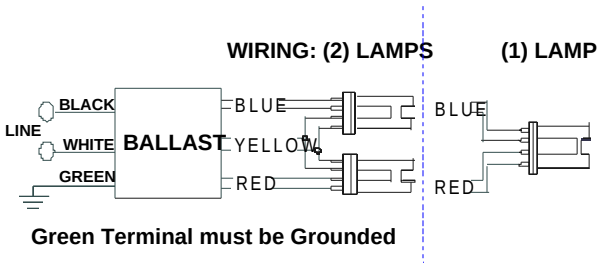
ICF-2S26-H1-LD@277

Brand Name	SMARTMATE
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
CFM26W/GX24Q	1	26	0/-18	0.11	29	1.10	10	0.98	1.5	3.79
CFM26W/GX24q	2	26	0/-18	0.20	54	1.00	10	0.99	1.5	1.85
* CFM32W/GX24q	1	32	0/-18	0.13	36	0.98	10	0.98	1.5	2.72
CFM42W/GX24q	1	42	0/-18	0.17	46	0.98	10	0.98	1.5	2.13
CFQ26W/G24q	1	26	0/-18	0.10	27	1.00	10	0.98	1.5	3.70
CFQ26W/G24q	2	26	0/-18	0.19	51	1.00	10	0.99	1.5	1.96
CFS21W/GR10q	2	21	0/-18	0.18	51	1.12	10	0.99	1.5	2.20
FT24W/2G11	2	24	0/-18	0.18	48	0.93	10	0.99	1.5	1.94

Wiring Diagram



Green Terminal must be Grounded

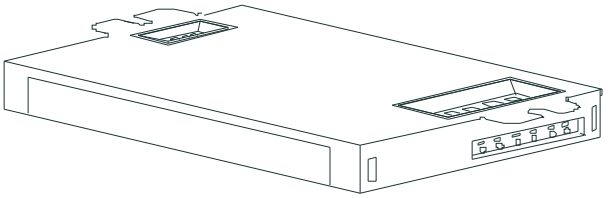
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	0.0	
White	0.0	
Blue	0.0	
Red	0.0	
Yellow	0	
Gray		
Violet		

	in.	cm.
Yellow/Blue		
Blue/White		
Brown		
Orange		
Orange/Black		
Black/White		
Red/White		

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
4.98 "	2.4 "	1.0 "	4.6 "
4 49/50	2 2/5	1	4 3/5
12.6 cm	6.1 cm	2.5 cm	11.7 cm

Revised 09/02/2004

ADVANCE
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 630-307-3071
Corporate Offices: Phone: 800-322-2086

ICF-2S26-H1-LD@277	
Brand Name	SMARTMATE
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be available in a plastic/metal can or all metal can construction to meet all plenum requirements.

1.3 Ballast shall be provided with poke-in wire trap connectors color coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be Programmed Start except for ballasts with -QS suffix, which shall be Rapid Start.

2.2 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.3 Ballast shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency) with no damage to the IntelliVolt ballast. RCF models shall operate from 60 Hz input source of 120V with sustained variations of +/- 10% (voltage and frequency) with no damage to the ballast.

2.4 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.5 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.6 Ballast shall have a minimum ballast factor of 1.00 for primary lamp application.

2.7 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less in accordance with lamp manufacturer recommendations.

2.8 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage with primary lamp.

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of -18C (0F) for primary lamp. Ballasts for PL-H lamps shall have a minimum starting temperature of -30C (-20F) for primary lamp.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions without damage.

Section III - Regulatory Requirements

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall be Underwriters Laboratories (UL) rated for use in air-handling spaces.

3.4 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.5 Ballast shall comply with ANSI C82.11 where applicable.

3.6 Ballast shall comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated) except for RCF models which shall be Consumer (Class B).

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9002 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 75C and three-years for a maximum case temperature of 85C (90C 3year warranty for ICF1H120-M4-XX, ICF2S42-90C-M2-XX and ICF2S70-M4-XX modesls).

4.3 Manufacturer shall have a fifteen-year history of producing electronic ballasts for the North American market.

4.4 Ballast shall be Advance part # _____ or approved equal.

Revised 09/02/2004

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD
ROSEMONT, ILLINOIS 60018
TELEPHONE: (847) 390-5000 FAX: (847) 390-5109

Compact SE Overview

For designs requiring the energy savings and aesthetic appeal of dimmed T4 compact fluorescent or T5 twin-tube lamps, Compact SE dimming ballasts are your solution. The Compact SE product family includes ballasts for nearly every type of dimmable compact fluorescent lamp.

Compact SE, case type A
3.00”w (76mm) x 1.00”h (25mm) x 4.90”l (124mm)

Compact SE, case type B
3.00”w (76mm) x 1.00”h (25mm) x 6.75”l (171mm)

Compact SE, case type F
2.38”w (60mm) x 1.50”h (38mm) x 9.50”l (241mm)

Features

- Continuous, flicker-free dimming from 100% to 5%
- Standard 3-wire line-voltage phase-control technology for consistent fixture-to-fixture dimming performance
- Models for 4-pin T4 compact lamps and T5 twin-tube lamps
- Programmed rapid start design will preheat lamp cathodes before applying full arc voltage
- Lamps turn on to any dimmed level without flashing to full brightness
- Low harmonic distortion throughout the entire dimming range maintains power quality
- Frequency of operation ensures that ballast does not interfere with infrared devices operating between 38 and 42 kHz
- Inrush current limiting circuitry eliminate circuit breaker tripping, switch arcing, and relay failure
- End-of-lamp-life protection circuitry ensures safe operation throughout entire lamp life cycle
- Ultra quiet operation
- Protected from miswires of any input power to control lead, or lamp leads to each other or ground
- 100% compatible with all Lutron 3-wire fluorescent controls
- 100% performance tested at factory
- Designed and assembled in the USA
- 5-year limited warranty with Lutron field service commissioning (3-year standard warranty) from date of purchase
- Ballasts that dim T4 compact fluorescent lamps are intended for factory installation by OEM fixture manufacturer.

Specifications

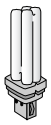
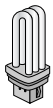
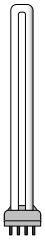
Performance

- Dimming Range: 100% to 5% measured relative light output (RLO)
- Lamp Starting: programmed rapid start
- Minimum Lamp Starting Temperature: 10°C (50°F)
- Ambient Temperature Operating Range: 10°C (50°F) to 60°C (140°F)
- Relative Humidity: maximum 90% non-condensing
- Operating Voltage: 120V or 277V at 60Hz
- Lamp Current Crest Factor: less than 1.7
- Lamp Flicker: none visible
- Light Output: constant ±2% light output for line voltage variations of ±10%
- Lamp Life: average lamp life meets or exceeds rating of lamp manufacturer
- Ballast Factor: greater than .95 for T4 quad or triple tube lamps, and greater than .85 for T5 twin-tube lamps
- Power Factor: greater than .95
- Total Harmonic Distortion (THD): less than 10%
- Maximum Inrush Current: 7 amps per ballast at 120V, 3 amps per ballast at 277V
- Sound Rating: Inaudible in a 27dBa ambient
- Maximum Ballast Case Temperature: 75°C (167°F)

Standards

- UL Listed (evaluated to the requirements of UL935)
- CSA certified (evaluated to the requirements of C22.2 No. 74)
- Class P thermally protected
- Meets ANSI C82.11 High Frequency Ballast Standard
- Meets FCC Part 18 Non-Consumer for EMI/RFI emissions requirements
- T4 compact fluorescent ballasts are MIL Std. 461E compliant (meets the requirements of CE101, RE101 and RE102)
- Meets ANSI C62.41 Category A surge protection standards to 6kV
- Manufacturing facilities employ ESD reduction practices that comply with the requirements of ANSI/ESD S20.20
- Lutron Quality Systems registered to ISO 9001

Compact SE Ballast Models

Lamp Type	Lamp Watts	Lamps per ballast	Case Type	120 VOLTS Ballast Current (amps)	120 VOLTS **Compact SE** Model Number [1]	277 VOLTS Ballast Current (amps)	277 VOLTS **Compact SE** Model Number [1]
T4 4-Pin Quad-Tube  1/2" diameter	18W	1 2	A B	.20 .42	FDB-T418-120-1-S FDB-T418-120-2-S	.08 .17	FDB-T418-277-1-S FDB-T418-277-2-S
	26W	1 2	A B	.26 .50	FDB-T426-120-1-S FDB-T426-120-2-S	.12 .21	FDB-T426-277-1-S FDB-T426-277-2-S
T4 4-Pin Triple-Tube  1/2" diameter	18W	1 2	A B	.20 .42	FDB-T418-120-1-S FDB-T418-120-2-S	.08 .17	FDB-T418-277-1-S FDB-T418-277-2-S
	26W	1 2	A B	.26 .50	FDB-T426-120-1-S FDB-T426-120-2-S	.12 .21	FDB-T426-277-1-S FDB-T426-277-2-S
	32W	1 2	A B	.31 .59	FDB-T432-120-1-S FDB-T432-120-2-S	.13 .24	FDB-T432-277-1-S FDB-T432-277-2-S
	42W	1 2	B B	.36 .67	FDB-T442-120-1-S FDB-T442-120-2-S	.16 .29	FDB-T442-277-1-S FDB-T442-277-2-S
T5 Twin-Tube  5/8" diameter	36/39W (16")	1 2 3	F F F	.33 .58 .85	FDB-1643-120-1 FDB-1643-120-2 FDB-1643-120-3	.14 .25 .35	FDB-1643-277-1 FDB-1643-277-2 FDB-1643-277-3
	40W (22")	1 2 3	F F F	.33 .61 .88	FDB-2227-120-1 FDB-2227-120-2 FDB-2227-120-3	.14 .25 .38	FDB-2227-277-1 FDB-2227-277-2 FDB-2227-277-3
	50W (22")	1 2	F F	.38 .69	FDB-2243-120-1 FDB-2243-120-2	.17 .32	FDB-2243-277-1 FDB-2243-277-2

FCB-T432-277-1-S

[1] Mounting studs standard for T4 ballasts. Delete suffix -S in the model number if mounting studs not needed.

Job Name:	Model Numbers:	
William H. Gates Hall	FCB-T432-277-1-S	
Job Number:		

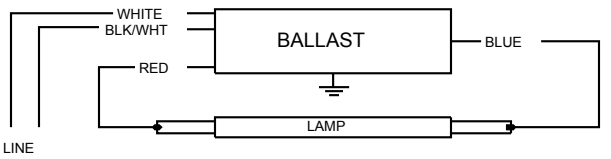
VCN-132-MC

Brand Name	CENTIUM MICRO CAN
Ballast Type	Electronic
Starting Method	Instant Start
Lamp Connection	Series
Input Voltage	277
Input Frequency	60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
F21T5	1	21	50/10	0.10	27	1.10	10	0.98	1.7	4.07
F25T8	1	25	0/-18	0.09	25	0.98	10	0.98	1.7	3.92
* F28T5	1	28	50/10	0.11	30	0.98	10	0.99	1.7	3.27
F32T8	1	32	0/-18	0.11	30	0.98	10	0.98	1.7	3.27
F32T8/ES (30W)	1	30	60/16	0.10	28	0.98	10	0.98	1.7	3.50

Wiring Diagram



Diag. 63

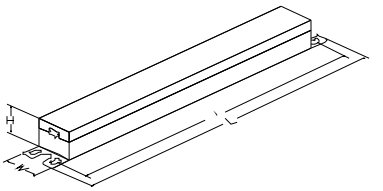
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black		0
White	25L	63.5
Blue	31R	78.7
Red	37L	94
Yellow		0
Gray		0
Violet		0

	in.	cm.
Yellow/Blue		0
Blue/White		0
Brown		0
Orange		0
Orange/Black		0
Black/White	25L	63.5
Red/White		0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
9.50 "	1.08 "	1.05 "	8.91 "
9 1/2	1 2/25	1 1/20	8 91/100
24.1 cm	2.7 cm	2.7 cm	22.6 cm

Revised 07/23/2004

ADVANCE
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 630-307-3071
Corporate Offices: Phone: 800-322-2086

VCN-132-MC	
Brand Name	CENTIUM MICRO CAN
Ballast Type	Electronic
Starting Method	Instant Start
Lamp Connection	Series
Input Voltage	277
Input Frequency	60 HZ
Status	Active

Electrical Specifications

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be provided with integral leads color-coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be Instant Start.

2.2 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.3 Ballast shall operate from 50/60 Hz input source of 120V or 277V with sustained variations of +/- 10% (voltage and frequency) with no damage to the ballast. IntelliVolt models shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency) with no damage to the ballast.

2.4 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.5 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.6 Ballast shall have a minimum ballast factor for primary lamp application as follows: 0.75 for Low Watt, 0.85 for Normal Light Output, and 1.20 for High Light.

2.7 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less in accordance with lamp manufacturer recommendations.

2.8 Ballast input current shall have Total Harmonic Distortion (THD) of less than 20% for Standard models and THD of less than 10% for Centium models when operated at nominal line voltage with primary lamp.

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of -18C (0F) for standard T8 lamps and 16C (60F) for energy-saving T8 lamps.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions without damage.

Section III - Regulatory Requirements

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.4 Ballast shall comply with ANSI C82.11 where applicable.

3.5 Ballast shall comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9002 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C.

4.3 Manufacturer shall have a fifteen-year history of producing electronic ballasts for the North American market.

4.4 Ballast shall be Advance part # _____ or approved equal.

NOTE: The use of Optanium 2.0 (IOP) models is recommended to reduce striations in energy-saving T8 lamps (25W, 28W or 30W). Remote or tandem wiring of energy-saving T8 lamps (25W, 28W or 30W) is only recommended for Optanium 2.0 (IOP) models.

Consult lamp manufacturer for operation of T5 lamps on instant start ballasts.

Revised 07/23/2004

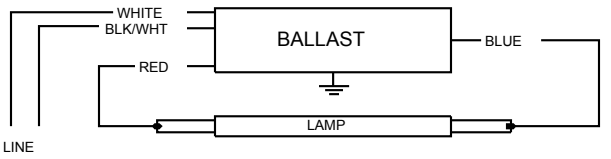
ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD
ROSEMONT, ILLINOIS 60018
TELEPHONE: (847) 390-5000 FAX: (847) 390-5109

VCN-132-MC	
Brand Name	CENTIUM MICRO CAN
Ballast Type	Electronic
Starting Method	Instant Start
Lamp Connection	Series
Input Voltage	277
Input Frequency	60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
F21T5	1	21	50/10	0.10	27	1.10	10	0.98	1.7	4.07
F25T8	1	25	0/-18	0.09	25	0.98	10	0.98	1.7	3.92
* F28T5	1	28	50/10	0.11	30	0.98	10	0.99	1.7	3.27
F32T8	1	32	0/-18	0.11	30	0.98	10	0.98	1.7	3.27
F32T8/ES (30W)	1	30	60/16	0.10	28	0.98	10	0.98	1.7	3.50

Wiring Diagram



Diag. 63

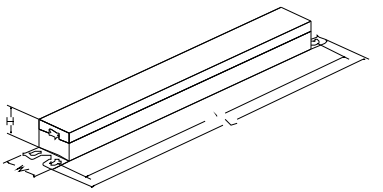
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black		0
White	25L	63.5
Blue	31R	78.7
Red	37L	94
Yellow		0
Gray		0
Violet		0

	in.	cm.
Yellow/Blue		0
Blue/White		0
Brown		0
Orange		0
Orange/Black		0
Black/White	25L	63.5
Red/White		0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
9.50 "	1.08 "	1.05 "	8.91 "
9 1/2	1 2/25	1 1/20	8 91/100
24.1 cm	2.7 cm	2.7 cm	22.6 cm

Revised 07/23/2004

ADVANCE
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 630-307-3071
Corporate Offices: Phone: 800-322-2086

VCN-132-MC	
Brand Name	CENTIUM MICRO CAN
Ballast Type	Electronic
Starting Method	Instant Start
Lamp Connection	Series
Input Voltage	277
Input Frequency	60 HZ
Status	Active

Electrical Specifications

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be provided with integral leads color-coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be Instant Start.

2.2 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.3 Ballast shall operate from 50/60 Hz input source of 120V or 277V with sustained variations of +/- 10% (voltage and frequency) with no damage to the ballast. IntelliVolt models shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency) with no damage to the ballast.

2.4 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.5 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.6 Ballast shall have a minimum ballast factor for primary lamp application as follows: 0.75 for Low Watt, 0.85 for Normal Light Output, and 1.20 for High Light.

2.7 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less in accordance with lamp manufacturer recommendations.

2.8 Ballast input current shall have Total Harmonic Distortion (THD) of less than 20% for Standard models and THD of less than 10% for Centium models when operated at nominal line voltage with primary lamp.

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of -18C (0F) for standard T8 lamps and 16C (60F) for energy-saving T8 lamps.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions without damage.

Section III - Regulatory Requirements

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.4 Ballast shall comply with ANSI C82.11 where applicable.

3.5 Ballast shall comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9002 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C.

4.3 Manufacturer shall have a fifteen-year history of producing electronic ballasts for the North American market.

4.4 Ballast shall be Advance part # _____ or approved equal.

NOTE: The use of Optanium 2.0 (IOP) models is recommended to reduce striations in energy-saving T8 lamps (25W, 28W or 30W). Remote or tandem wiring of energy-saving T8 lamps (25W, 28W or 30W) is only recommended for Optanium 2.0 (IOP) models.

Consult lamp manufacturer for operation of T5 lamps on instant start ballasts.

Revised 07/23/2004

ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD
ROSEMONT, ILLINOIS 60018
TELEPHONE: (847) 390-5000 FAX: (847) 390-5109

Eco-10 Overview

Eco-10 lighting management electronic dimming ballasts are designed to maximize the benefits of a lighting management system. Eco-10 offers 100% to 10% dimming, and is ideal for use in any space where saving energy is the primary goal of the design.

Eco-10, case type C
1.18”w (30mm) x 1.00”h (25mm) x 18.00”l (457mm)

Eco-10, case type D
1.58”w (40mm) x 1.00”h (25mm) x 9.50”l (241mm)

Eco-10, case type F
2.38”w (60mm) x 1.50”h (38mm) x 9.50”l (241mm)

Features

- Continuous, flicker-free dimming from 100% to 10%
- Standard 3-wire line-voltage phase-control technology for consistent fixture-to-fixture dimming performance
- Models available for T5 and T5-HO linear, T8 linear and U-bent, and T5 twin-tube lamps
- Programmed rapid start design preheats lamp cathodes before applying full arc voltage
- Lamps turn on to any dimmed level without flashing to full brightness
- Low harmonic distortion throughout the entire dimming range maintains power quality
- Frequency of operation ensures that ballast does not interfere with infrared devices operating between 38 and 42 kHz
- Inrush current limiting circuitry eliminates circuit breaker tripping, switch arcing, and relay failure
- End-of-lamp-life protection circuitry (for T5 and T5-HO linear models) ensures safe operation throughout entire lamp life cycle
- For linear lamps, ballasts maintain consistent light output for different lamp lengths, ensuring uniformity
- Ultra-quiet operation
- Protected from miswires of any input power to control lead
- 100% compatible with all Lutron 3-wire fluorescent controls
- 100% performance tested at factory
- Designed and assembled in the USA
- 5-year limited warranty with Lutron field service commissioning (3-year standard warranty) from date of purchase

Specifications

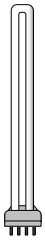
Performance

- Dimming Range: 100% to 10% measured relative light output
- Lamp Starting: programmed rapid start
- Minimum Lamp Starting Temperature: 10°C (50°F)
- Ambient Temperature Operating Range: 10°C (50°F) to 60°C (140°F)
- Relative Humidity: maximum 90% non-condensing
- Operating Voltage: 120V or 277V at 60Hz
- Lamp Current Crest Factor: less than 1.7
- Lamp Flicker: none visible
- Light Output Variation: constant ±2% light output for line voltage variations of ±10%
- Lamp Life: average lamp life meets or exceeds rating of lamp manufacturer
- Ballast Factor: greater than .85 for T8 and T5 twin-tube lamps, equal to 1.0 for T5 lamps
- Power Factor: greater than .95
- Total Harmonic Distortion (THD): less than 20%
- Maximum Inrush Current: 7 amps per ballast at 120V, 3 amps per ballast at 277V
- Sound Rating: Inaudible in a 27dBa ambient
- Maximum Ballast Case Temperature: 75°C (167°F)

Standards

- UL Listed (evaluated to the requirements of UL935)
- CSA certified (evaluated to the requirements of C22.2 No. 74)
- Class P thermally protected
- Meets ANSI C82.11 High Frequency Ballast Standard
- Meets FCC Part 18 Non-Consumer requirements for EMI/RFI emissions
- Meets ANSI C62.41 Category A surge protection standards up to and including 4kV
- Manufacturing facilities employ ESD reduction practices that comply with the requirements of ANSI/ESD S20.20
- Lutron Quality Systems registered to ISO 9001.2000

Eco-10 Ballast Models

Lamp Type				120 VOLTS		277 VOLTS	
	Lamp Watts (length)	Lamps per ballast	Case Type	Ballast Current (amps)	**Eco-10** Model Number	Ballast Current (amps)	**Eco-10** Model Number
T5 linear  5/8" diameter	14W (22")	1 2	C C	.17 .32	E 3 T514 C 120 1 E 3 T514 C 120 2	.08 .14	E 3 T514 C 277 1 E 3 T514 C 277 2
	21W (34")	1 2	C C	.25 .43	E 3 T521 C 120 1 E 3 T521 C 120 2	.11 .19	E 3 T521 C 277 1 E 3 T521 C 277 2
	28W (45.3")	1 2	C C	.30 .55	ECO-T528-120-1 ECO-T528-120-2	.14 .25	ECO-T528-277-1 ECO-T528-277-2
T5-HO linear high output  5/8" diameter	24W (21.5")	1 2	C C	.26 .45	ECO-T524-120-1 ECO-T524-120-2	.13 .20	ECO-T524-277-1 ECO-T524-277-2
	39W (33.4")	1 2	C C	.38 .76	ECO-T5H39-120-1 ECO-T5H39-120-2	.17 .31	ECO-T5H39-277-1 ECO-T5H39-277-2
	54W (45.3")	1 2	C C	.58 1.1	ECO-T554-120-1 ECO-T554-120-2	.25 .45	ECO-T554-277-1 ECO-T554-277-2
T5 Twin-Tube  5/8" diameter	36/39W (16")	1 2 3	F F F	.33 .58 .85	ECO-T539-120-1 ECO-T539-120-2 ECO-T539-120-3	.14 .25 .35	ECO-T539-277-1 ECO-T539-277-2 ECO-T539-277-3
	40W (22")	1 2 3	F F F	.33 .61 .88	ECO-T540-120-1 ECO-T540-120-2 ECO-T540-120-3	.14 .25 .38	ECO-T540-277-1 ECO-T540-277-2 ECO-T540-277-3
	50W (22")	1 2	F F	.38 .69	ECO-T550-120-1 ECO-T550-120-2	.17 .32	ECO-T550-277-1 ECO-T550-277-2

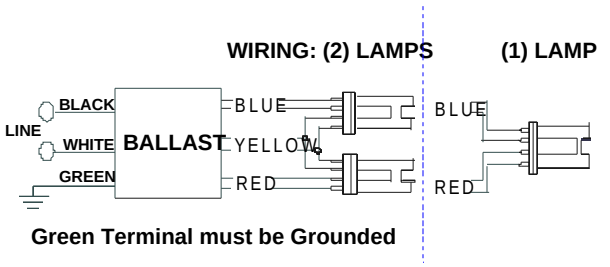
ICF-2S26-H1-LD@277

Brand Name	SMARTMATE
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
CFM26W/GX24Q	1	26	0/-18	0.11	29	1.10	10	0.98	1.5	3.79
CFM26W/GX24q	2	26	0/-18	0.20	54	1.00	10	0.99	1.5	1.85
CFM32W/GX24q	1	32	0/-18	0.13	36	0.98	10	0.98	1.5	2.72
CFM42W/GX24q	1	42	0/-18	0.17	46	0.98	10	0.98	1.5	2.13
* CFQ26W/G24q	1	26	0/-18	0.10	27	1.00	10	0.98	1.5	3.70
CFQ26W/G24q	2	26	0/-18	0.19	51	1.00	10	0.99	1.5	1.96
CFS21W/GR10q	2	21	0/-18	0.18	51	1.12	10	0.99	1.5	2.20
FT24W/2G11	2	24	0/-18	0.18	48	0.93	10	0.99	1.5	1.94

Wiring Diagram



Green Terminal must be Grounded

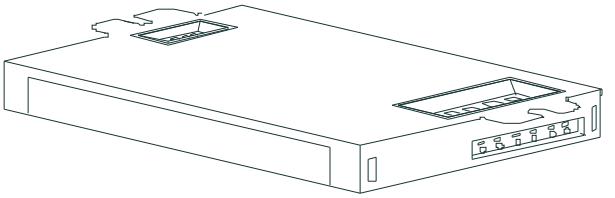
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	0.0	
White	0.0	
Blue	0.0	
Red	0.0	
Yellow	0	
Gray		
Violet		

	in.	cm.
Yellow/Blue		
Blue/White		
Brown		
Orange		
Orange/Black		
Black/White		
Red/White		

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
4.98 "	2.4 "	1.0 "	4.6 "
4 49/50	2 2/5	1	4 3/5
12.6 cm	6.1 cm	2.5 cm	11.7 cm

Revised 09/02/2004

ADVANCE
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 630-307-3071
Corporate Offices: Phone: 800-322-2086

ICF-2S26-H1-LD@277	
Brand Name	SMARTMATE
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be available in a plastic/metal can or all metal can construction to meet all plenum requirements.

1.3 Ballast shall be provided with poke-in wire trap connectors color coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be Programmed Start except for ballasts with -QS suffix, which shall be Rapid Start.

2.2 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.3 Ballast shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency) with no damage to the IntelliVolt ballast. RCF models shall operate from 60 Hz input source of 120V with sustained variations of +/- 10% (voltage and frequency) with no damage to the ballast.

2.4 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.5 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.6 Ballast shall have a minimum ballast factor of 1.00 for primary lamp application.

2.7 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less in accordance with lamp manufacturer recommendations.

2.8 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage with primary lamp.

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of -18C (0F) for primary lamp. Ballasts for PL-H lamps shall have a minimum starting temperature of -30C (-20F) for primary lamp.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions without damage.

Section III - Regulatory Requirements

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall be Underwriters Laboratories (UL) rated for use in air-handling spaces.

3.4 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.5 Ballast shall comply with ANSI C82.11 where applicable.

3.6 Ballast shall comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated) except for RCF models which shall be Consumer (Class B).

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9002 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 75C and three-years for a maximum case temperature of 85C (90C 3year warranty for ICF1H120-M4-XX, ICF2S42-90C-M2-XX and ICF2S70-M4-XX modesls).

4.3 Manufacturer shall have a fifteen-year history of producing electronic ballasts for the North American market.

4.4 Ballast shall be Advance part # _____ or approved equal.

Revised 09/02/2004

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD
ROSEMONT, ILLINOIS 60018
TELEPHONE: (847) 390-5000 FAX: (847) 390-5109

Eco-10 Overview

Eco-10 lighting management electronic dimming ballasts are designed to maximize the benefits of a lighting management system. Eco-10 offers 100% to 10% dimming, and is ideal for use in any space where saving energy is the primary goal of the design.

Eco-10, case type C
1.18"w (30mm) x 1.00"h (25mm) x 18.00"l (457mm)

Eco-10, case type D
1.58"w (40mm) x 1.00"h (25mm) x 9.50"l (241mm)

Eco-10, case type F
2.38"w (60mm) x 1.50"h (38mm) x 9.50"l (241mm)

Features

- Continuous, flicker-free dimming from 100% to 10%
- Standard 3-wire line-voltage phase-control technology for consistent fixture-to-fixture dimming performance
- Models available for T5 and T5-HO linear, T8 linear and U-bent, and T5 twin-tube lamps
- Programmed rapid start design preheats lamp cathodes before applying full arc voltage
- Lamps turn on to any dimmed level without flashing to full brightness
- Low harmonic distortion throughout the entire dimming range maintains power quality
- Frequency of operation ensures that ballast does not interfere with infrared devices operating between 38 and 42 kHz
- Inrush current limiting circuitry eliminates circuit breaker tripping, switch arcing, and relay failure
- End-of-lamp-life protection circuitry (for T5 and T5-HO linear models) ensures safe operation throughout entire lamp life cycle
- For linear lamps, ballasts maintain consistent light output for different lamp lengths, ensuring uniformity
- Ultra-quiet operation
- Protected from miswires of any input power to control lead
- 100% compatible with all Lutron 3-wire fluorescent controls
- 100% performance tested at factory
- Designed and assembled in the USA
- 5-year limited warranty with Lutron field service commissioning (3-year standard warranty) from date of purchase

Specifications

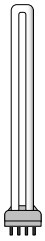
Performance

- Dimming Range: 100% to 10% measured relative light output
- Lamp Starting: programmed rapid start
- Minimum Lamp Starting Temperature: 10°C (50°F)
- Ambient Temperature Operating Range: 10°C (50°F) to 60°C (140°F)
- Relative Humidity: maximum 90% non-condensing
- Operating Voltage: 120V or 277V at 60Hz
- Lamp Current Crest Factor: less than 1.7
- Lamp Flicker: none visible
- Light Output Variation: constant ±2% light output for line voltage variations of ±10%
- Lamp Life: average lamp life meets or exceeds rating of lamp manufacturer
- Ballast Factor: greater than .85 for T8 and T5 twin-tube lamps, equal to 1.0 for T5 lamps
- Power Factor: greater than .95
- Total Harmonic Distortion (THD): less than 20%
- Maximum Inrush Current: 7 amps per ballast at 120V, 3 amps per ballast at 277V
- Sound Rating: Inaudible in a 27dBa ambient
- Maximum Ballast Case Temperature: 75°C (167°F)

Standards

- UL Listed (evaluated to the requirements of UL935)
- CSA certified (evaluated to the requirements of C22.2 No. 74)
- Class P thermally protected
- Meets ANSI C82.11 High Frequency Ballast Standard
- Meets FCC Part 18 Non-Consumer requirements for EMI/RFI emissions
- Meets ANSI C62.41 Category A surge protection standards up to and including 4kV
- Manufacturing facilities employ ESD reduction practices that comply with the requirements of ANSI/ESD S20.20
- Lutron Quality Systems registered to ISO 9001.2000

Eco-10 Ballast Models

Lamp Type				120 VOLTS		277 VOLTS	
	Lamp Watts (length)	Lamps per ballast	Case Type	Ballast Current (amps)	**Eco-10** Model Number	Ballast Current (amps)	**Eco-10** Model Number
T5 linear  5/8" diameter	14W (22")	1 2	C C	.17 .32	E 3 T514 C 120 1 E 3 T514 C 120 2	.08 .14	E 3 T514 C 277 1 E 3 T514 C 277 2
	21W (34")	1 2	C C	.25 .43	E 3 T521 C 120 1 E 3 T521 C 120 2	.11 .19	E 3 T521 C 277 1 E 3 T521 C 277 2
	28W (45.3")	1 2	C C	.30 .55	ECO-T528-120-1 ECO-T528-120-2	.14 .25	ECO-T528-277-1 ECO-T528-277-2
T5-HO linear high output  5/8" diameter	24W (21.5")	1 2	C C	.26 .45	ECO-T524-120-1 ECO-T524-120-2	.13 .20	ECO-T524-277-1 ECO-T524-277-2
	39W (33.4")	1 2	C C	.38 .76	ECO-T5H39-120-1 ECO-T5H39-120-2	.17 .31	ECO-T5H39-277-1 ECO-T5H39-277-2
	54W (45.3")	1 2	C C	.58 1.1	ECO-T554-120-1 ECO-T554-120-2	.25 .45	ECO-T554-277-1 ECO-T554-277-2
T5 Twin-Tube  5/8" diameter	36/39W (16")	1 2 3	F F F	.33 .58 .85	ECO-T539-120-1 ECO-T539-120-2 ECO-T539-120-3	.14 .25 .35	ECO-T539-277-1 ECO-T539-277-2 ECO-T539-277-3
	40W (22")	1 2 3	F F F	.33 .61 .88	ECO-T540-120-1 ECO-T540-120-2 ECO-T540-120-3	.14 .25 .38	ECO-T540-277-1 ECO-T540-277-2 ECO-T540-277-3
	50W (22")	1 2	F F	.38 .69	ECO-T550-120-1 ECO-T550-120-2	.17 .32	ECO-T550-277-1 ECO-T550-277-2

Job Name:	Model Numbers:	
William H. Gates Hall	EC0-T528-277-1	
Job Number:		

Compact SE Overview

For designs requiring the energy savings and aesthetic appeal of dimmed T4 compact fluorescent or T5 twin-tube lamps, Compact SE dimming ballasts are your solution. The Compact SE product family includes ballasts for nearly every type of dimmable compact fluorescent lamp.

Compact SE, case type A
3.00”w (76mm) x 1.00”h (25mm) x 4.90”l (124mm)

Compact SE, case type B
3.00”w (76mm) x 1.00”h (25mm) x 6.75”l (171mm)

Compact SE, case type F
2.38”w (60mm) x 1.50”h (38mm) x 9.50”l (241mm)

Features

- Continuous, flicker-free dimming from 100% to 5%
- Standard 3-wire line-voltage phase-control technology for consistent fixture-to-fixture dimming performance
- Models for 4-pin T4 compact lamps and T5 twin-tube lamps
- Programmed rapid start design will preheat lamp cathodes before applying full arc voltage
- Lamps turn on to any dimmed level without flashing to full brightness
- Low harmonic distortion throughout the entire dimming range maintains power quality
- Frequency of operation ensures that ballast does not interfere with infrared devices operating between 38 and 42 kHz
- Inrush current limiting circuitry eliminate circuit breaker tripping, switch arcing, and relay failure
- End-of-lamp-life protection circuitry ensures safe operation throughout entire lamp life cycle
- Ultra quiet operation
- Protected from miswires of any input power to control lead, or lamp leads to each other or ground
- 100% compatible with all Lutron 3-wire fluorescent controls
- 100% performance tested at factory
- Designed and assembled in the USA
- 5-year limited warranty with Lutron field service commissioning (3-year standard warranty) from date of purchase
- Ballasts that dim T4 compact fluorescent lamps are intended for factory installation by OEM fixture manufacturer.

Specifications

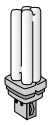
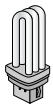
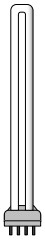
Performance

- Dimming Range: 100% to 5% measured relative light output (RLO)
- Lamp Starting: programmed rapid start
- Minimum Lamp Starting Temperature: 10°C (50°F)
- Ambient Temperature Operating Range: 10°C (50°F) to 60°C (140°F)
- Relative Humidity: maximum 90% non-condensing
- Operating Voltage: 120V or 277V at 60Hz
- Lamp Current Crest Factor: less than 1.7
- Lamp Flicker: none visible
- Light Output: constant ±2% light output for line voltage variations of ±10%
- Lamp Life: average lamp life meets or exceeds rating of lamp manufacturer
- Ballast Factor: greater than .95 for T4 quad or triple tube lamps, and greater than .85 for T5 twin-tube lamps
- Power Factor: greater than .95
- Total Harmonic Distortion (THD): less than 10%
- Maximum Inrush Current: 7 amps per ballast at 120V, 3 amps per ballast at 277V
- Sound Rating: Inaudible in a 27dBa ambient
- Maximum Ballast Case Temperature: 75°C (167°F)

Standards

- UL Listed (evaluated to the requirements of UL935)
- CSA certified (evaluated to the requirements of C22.2 No. 74)
- Class P thermally protected
- Meets ANSI C82.11 High Frequency Ballast Standard
- Meets FCC Part 18 Non-Consumer for EMI/RFI emissions requirements
- T4 compact fluorescent ballasts are MIL Std. 461E compliant (meets the requirements of CE101, RE101 and RE102)
- Meets ANSI C62.41 Category A surge protection standards to 6kV
- Manufacturing facilities employ ESD reduction practices that comply with the requirements of ANSI/ESD S20.20
- Lutron Quality Systems registered to ISO 9001

Compact SE Ballast Models

Lamp Type	Lamp Watts	Lamps per ballast	Case Type	120 VOLTS Ballast Current (amps)	120 VOLTS **Compact SE** Model Number [1]	277 VOLTS Ballast Current (amps)	277 VOLTS **Compact SE** Model Number [1]
T4 4-Pin Quad-Tube  1/2" diameter	18W	1 2	A B	.20 .42	FDB-T418-120-1-S FDB-T418-120-2-S	.08 .17	FDB-T418-277-1-S FDB-T418-277-2-S
	26W	1 2	A B	.26 .50	FDB-T426-120-1-S FDB-T426-120-2-S	.12 .21	FDB-T426-277-1-S FDB-T426-277-2-S
T4 4-Pin Triple-Tube  1/2" diameter	18W	1 2	A B	.20 .42	FDB-T418-120-1-S FDB-T418-120-2-S	.08 .17	FDB-T418-277-1-S FDB-T418-277-2-S
	26W	1 2	A B	.26 .50	FDB-T426-120-1-S FDB-T426-120-2-S	.12 .21	FDB-T426-277-1-S FDB-T426-277-2-S
	32W	1 2	A B	.31 .59	FDB-T432-120-1-S FDB-T432-120-2-S	.13 .24	FDB-T432-277-1-S FDB-T432-277-2-S
	42W	1 2	B B	.36 .67	FDB-T442-120-1-S FDB-T442-120-2-S	.16 .29	FDB-T442-277-1-S FDB-T442-277-2-S
T5 Twin-Tube  5/8" diameter	36/39W (16")	1 2 3	F F F	.33 .58 .85	FDB-1643-120-1 FDB-1643-120-2 FDB-1643-120-3	.14 .25 .35	FDB-1643-277-1 FDB-1643-277-2 FDB-1643-277-3
	40W (22")	1 2 3	F F F	.33 .61 .88	FDB-2227-120-1 FDB-2227-120-2 FDB-2227-120-3	.14 .25 .38	FDB-2227-277-1 FDB-2227-277-2 FDB-2227-277-3
	50W (22")	1 2	F F	.38 .69	FDB-2243-120-1 FDB-2243-120-2	.17 .32	FDB-2243-277-1 FDB-2243-277-2

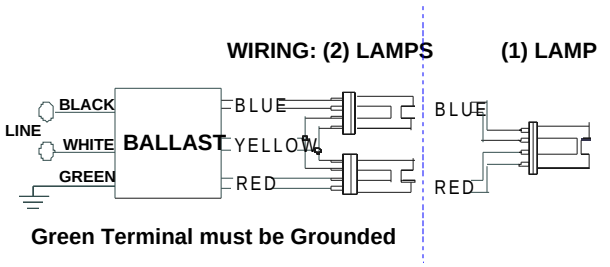
[1] Mounting studs standard for T4 ballasts. Delete suffix -S in the model number if mounting studs not needed.

ICF-2S26-H1-LD@277	
Brand Name	SMARTMATE
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
CFM26W/GX24Q	1	26	0/-18	0.11	29	1.10	10	0.98	1.5	3.79
CFM26W/GX24q	2	26	0/-18	0.20	54	1.00	10	0.99	1.5	1.85
* CFM32W/GX24q	1	32	0/-18	0.13	36	0.98	10	0.98	1.5	2.72
CFM42W/GX24q	1	42	0/-18	0.17	46	0.98	10	0.98	1.5	2.13
CFQ26W/G24q	1	26	0/-18	0.10	27	1.00	10	0.98	1.5	3.70
CFQ26W/G24q	2	26	0/-18	0.19	51	1.00	10	0.99	1.5	1.96
CFS21W/GR10q	2	21	0/-18	0.18	51	1.12	10	0.99	1.5	2.20
FT24W/2G11	2	24	0/-18	0.18	48	0.93	10	0.99	1.5	1.94

Wiring Diagram



Green Terminal must be Grounded

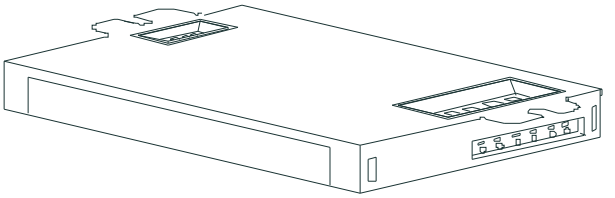
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	0.0	
White	0.0	
Blue	0.0	
Red	0.0	
Yellow	0	
Gray		
Violet		

	in.	cm.
Yellow/Blue		
Blue/White		
Brown		
Orange		
Orange/Black		
Black/White		
Red/White		

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
4.98 "	2.4 "	1.0 "	4.6 "
4 49/50	2 2/5	1	4 3/5
12.6 cm	6.1 cm	2.5 cm	11.7 cm

Revised 09/02/2004

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

ADVANCE
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 630-307-3071
Corporate Offices: Phone: 800-322-2086

ICF-2S26-H1-LD@277	
Brand Name	SMARTMATE
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be available in a plastic/metal can or all metal can construction to meet all plenum requirements.

1.3 Ballast shall be provided with poke-in wire trap connectors color coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be Programmed Start except for ballasts with -QS suffix, which shall be Rapid Start.

2.2 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.3 Ballast shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency) with no damage to the IntelliVolt ballast. RCF models shall operate from 60 Hz input source of 120V with sustained variations of +/- 10% (voltage and frequency) with no damage to the ballast.

2.4 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.5 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.6 Ballast shall have a minimum ballast factor of 1.00 for primary lamp application.

2.7 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less in accordance with lamp manufacturer recommendations.

2.8 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage with primary lamp.

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of -18C (0F) for primary lamp. Ballasts for PL-H lamps shall have a minimum starting temperature of -30C (-20F) for primary lamp.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions without damage.

Section III - Regulatory Requirements

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall be Underwriters Laboratories (UL) rated for use in air-handling spaces.

3.4 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.5 Ballast shall comply with ANSI C82.11 where applicable.

3.6 Ballast shall comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated) except for RCF models which shall be Consumer (Class B).

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9002 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 75C and three-years for a maximum case temperature of 85C (90C 3year warranty for ICF1H120-M4-XX, ICF2S42-90C-M2-XX and ICF2S70-M4-XX modesls).

4.3 Manufacturer shall have a fifteen-year history of producing electronic ballasts for the North American market.

4.4 Ballast shall be Advance part # _____ or approved equal.

Revised 09/02/2004

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

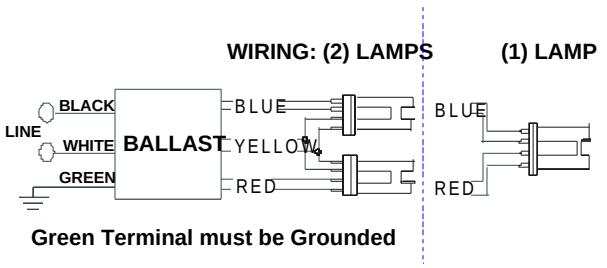
ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD
ROSEMONT, ILLINOIS 60018
TELEPHONE: (847) 390-5000 FAX: (847) 390-5109

ICF-2S18-H1-LD@277	
Brand Name	SMARTMATE
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
CFM18W/GX24Q	1	18	0/-18	0.08	20	1.05	10	0.97	1.5	5.25
CFM18W/GX24q	2	18	0/-18	0.14	39	1.05	10	0.99	1.5	2.69
CFQ18W/G24q	1	18	0/-18	0.07	19	1.00	10	0.97	1.5	5.26
* CFQ18W/G24q	2	18	0/-18	0.13	35	0.95	10	0.99	1.5	2.71
CFS16W/GR10q	2	16	0/-18	0.13	37	1.00	09	0.99	1.5	2.70
CFS21W/GR10Q	1	21	0/-18	0.07	20	0.90	15	0.97	1.5	4.50
CFS21W/GR10Q	2	21	0/-18	0.14	40	0.91	10	0.99	1.5	2.28

Wiring Diagram



Green Terminal must be Grounded

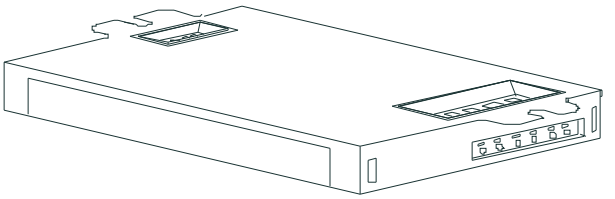
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	0.0	
White	0.0	
Blue	0.0	
Red	0.0	
Yellow	0	
Gray		
Violet		

	in.	cm.
Yellow/Blue		
Blue/White		
Brown		
Orange		
Orange/Black		
Black/White		
Red/White		

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
4.98 "	2.4 "	1.0 "	4.6 "
4 49/50	2 2/5	1	4 3/5
12.6 cm	6.1 cm	2.5 cm	11.7 cm

Revised 08/15/2006

ADVANCE
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 630-307-3071
Corporate Offices: Phone: 800-322-2086

ICF-2S18-H1-LD@277	
Brand Name	SMARTMATE
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be available in a plastic/metal can or all metal can construction to meet all plenum requirements.

1.3 Ballast shall be provided with poke-in wire trap connectors color coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be Programmed Start except for ballasts with -QS suffix, which shall be Rapid Start.

2.2 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.3 Ballast shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency) with no damage to the IntelliVolt ballast. RCF models shall operate from 60 Hz input source of 120V with sustained variations of +/- 10% (voltage and frequency) with no damage to the ballast.

2.4 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.5 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.6 Ballast shall have a minimum ballast factor of 1.00 for primary lamp application.

2.7 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less in accordance with lamp manufacturer recommendations.

2.8 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage with primary lamp.

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of -18C (0F) for primary lamp. Ballasts for PL-H lamps shall have a minimum starting temperature of -30C (-20F) for primary lamp.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions without damage.

Section III - Regulatory Requirements

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall be Underwriters Laboratories (UL) rated for use in air-handling spaces.

3.4 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.5 Ballast shall comply with ANSI C82.11 where applicable.

3.6 Ballast shall comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated) except for RCF models which shall be Consumer (Class B).

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9002 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 75C and three-years for a maximum case temperature of 85C (90C 3year warranty for ICF1H120-M4-XX, ICF2S42-90C-M2-XX and ICF2S70-M4-XX modesls).

4.3 Manufacturer shall have a fifteen-year history of producing electronic ballasts for the North American market.

4.4 Ballast shall be Advance part # _____ or approved equal.

Revised 08/15/2006

ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD
ROSEMONT, ILLINOIS 60018
TELEPHONE: (847) 390-5000 FAX: (847) 390-5109

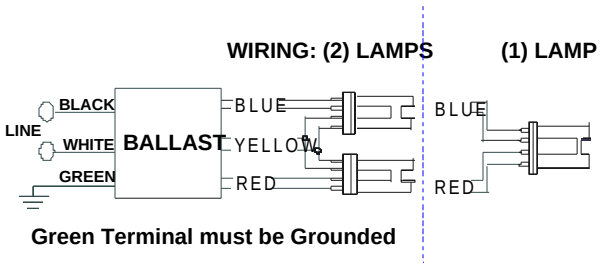
ICF-2S26-H1-LD@277

Brand Name	SMARTMATE
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
CFM26W/GX24Q	1	26	0/-18	0.11	29	1.10	10	0.98	1.5	3.79
CFM26W/GX24q	2	26	0/-18	0.20	54	1.00	10	0.99	1.5	1.85
CFM32W/GX24q	1	32	0/-18	0.13	36	0.98	10	0.98	1.5	2.72
* CFM42W/GX24q	1	42	0/-18	0.17	46	0.98	10	0.98	1.5	2.13
CFQ26W/G24q	1	26	0/-18	0.10	27	1.00	10	0.98	1.5	3.70
CFQ26W/G24q	2	26	0/-18	0.19	51	1.00	10	0.99	1.5	1.96
CFS21W/GR10q	2	21	0/-18	0.18	51	1.12	10	0.99	1.5	2.20
FT24W/2G11	2	24	0/-18	0.18	48	0.93	10	0.99	1.5	1.94

Wiring Diagram



Green Terminal must be Grounded

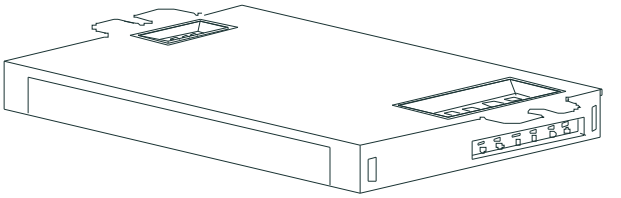
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	0.0	
White	0.0	
Blue	0.0	
Red	0.0	
Yellow	0	
Gray		
Violet		

	in.	cm.
Yellow/Blue		
Blue/White		
Brown		
Orange		
Orange/Black		
Black/White		
Red/White		

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
4.98 "	2.4 "	1.0 "	4.6 "
4 49/50	2 2/5	1	4 3/5
12.6 cm	6.1 cm	2.5 cm	11.7 cm

Revised 09/02/2004

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

ADVANCE
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 630-307-3071
Corporate Offices: Phone: 800-322-2086

ICF-2S26-H1-LD@277	
Brand Name	SMARTMATE
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be available in a plastic/metal can or all metal can construction to meet all plenum requirements.

1.3 Ballast shall be provided with poke-in wire trap connectors color coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be Programmed Start except for ballasts with -QS suffix, which shall be Rapid Start.

2.2 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.3 Ballast shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency) with no damage to the IntelliVolt ballast. RCF models shall operate from 60 Hz input source of 120V with sustained variations of +/- 10% (voltage and frequency) with no damage to the ballast.

2.4 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.5 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.6 Ballast shall have a minimum ballast factor of 1.00 for primary lamp application.

2.7 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less in accordance with lamp manufacturer recommendations.

2.8 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage with primary lamp.

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of -18C (0F) for primary lamp. Ballasts for PL-H lamps shall have a minimum starting temperature of -30C (-20F) for primary lamp.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions without damage.

Section III - Regulatory Requirements

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall be Underwriters Laboratories (UL) rated for use in air-handling spaces.

3.4 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.5 Ballast shall comply with ANSI C82.11 where applicable.

3.6 Ballast shall comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated) except for RCF models which shall be Consumer (Class B).

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9002 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 75C and three-years for a maximum case temperature of 85C (90C 3year warranty for ICF1H120-M4-XX, ICF2S42-90C-M2-XX and ICF2S70-M4-XX modesls).

4.3 Manufacturer shall have a fifteen-year history of producing electronic ballasts for the North American market.

4.4 Ballast shall be Advance part # _____ or approved equal.

Revised 09/02/2004

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

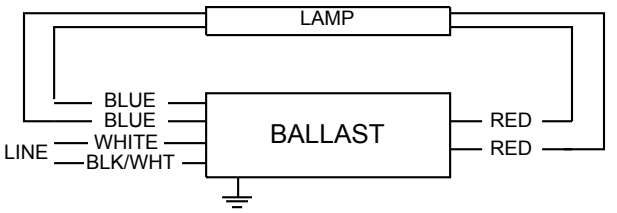
ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD
ROSEMONT, ILLINOIS 60018
TELEPHONE: (847) 390-5000 FAX: (847) 390-5109

VCN-1S32-SC	
Brand Name	CENTIUM
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	277
Input Frequency	60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
F17T8	1	17	32/00	0.08	22	1.00	10	0.97	1.7	4.55
F25T8	1	25	32/00	0.10	28	0.95	10	0.98	1.7	3.39
* F32T8	1	32	32/00	0.13	34	0.90	10	0.98	1.7	2.65

Wiring Diagram



Diag. 20

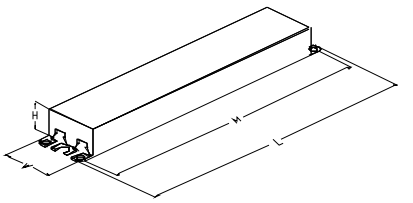
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black		0
White	22L	55.9
Blue	36L	91.4
Red	26R	66
Yellow		0
Gray		0
Violet		0

	in.	cm.
Yellow/Blue		0
Blue/White		0
Brown		0
Orange		0
Orange/Black		0
Black/White	22L	55.9
Red/White		0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
9.50 "	1.7 "	1.18 "	8.90 "
9 1/2	1 7/10	1 9/50	8 9/10
24.1 cm	4.3 cm	3 cm	22.6 cm

Revised 11/13/2001

ADVANCE
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 630-307-3071
Corporate Offices: Phone: 800-322-2086

VCN-1S32-SC	
Brand Name	CENTIUM
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	277
Input Frequency	60 HZ
Status	Active

Electrical Specifications

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be provided with integral leads color-coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be _____ (Instant or Rapid) Start.

2.2 Ballast shall provide Independent Lamp Operation (ILO) for Instant Start ballasts allowing remaining lamp(s) to maintain full light output when one or more lamps fail.

2.3 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power (except T8/HO ballast).

2.4 Ballast shall operate from 60 Hz input source of 120V, 277V or 347V as applicable with sustained variations of +/- 10% (voltage and frequency) with no damage to the ballast. IntelliVolt models shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency) with no damage to the ballast.

2.5 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz ("GCN" models between 20kHz and 30kHz) to avoid interference with infrared devices and eliminate visible flicker.

2.6 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.7 Ballast shall have a minimum ballast factor for primary lamp application as follows: 0.75 for Low Watt, 0.85 for Normal Light Output, and 1.20 for High Light.

2.8 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less in accordance with lamp manufacturer recommendations.

2.9 Ballast input current shall have Total Harmonic Distortion (THD) of less than 20% for Standard models and THD of less than 10% for Centium models when operated at nominal line voltage with primary lamp.

2.10 Ballast shall have a Class A sound rating for all 4-foot lamps and smaller.

2.11 Ballast shall have a minimum starting temperature of _____ [-18C (0F) for standard T8 and Long Twin Tube lamps, 10C (50F) for standard T12 lamps, 0C (32F) for Slimline T8 lamps and "GCN" models, -29C (-20F) for T8/HO lamps,] for primary lamp application. Ballast shall have a minimum starting temperature of 60F (16C) for energy-saving T8 and T12 lamps.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions without damage.

Section III - Regulatory Requirements

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable. Models with -HAZ suffix meet UL 935 Type HL (hazardous location) requirements.

3.3 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.4 Ballast shall comply with ANSI C82.11 where applicable.

3.5 Ballast shall comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9002 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C.

4.3 Manufacturer shall have a fifteen-year history of producing electronic ballasts for the North American market.

4.4 Ballast shall be Advance part # _____ or approved equal.

NOTE: The use of Optanium 2.0 (IOP) models is recommended to reduce striation in energy-saving T8 lamps (25W, 28W or 30W). Remote or tandem wiring of energy-saving T8 lamps (25W, 28W or 30W) is only recommended for Optanium 2.0 (IOP) models.

Revised 11/13/2001

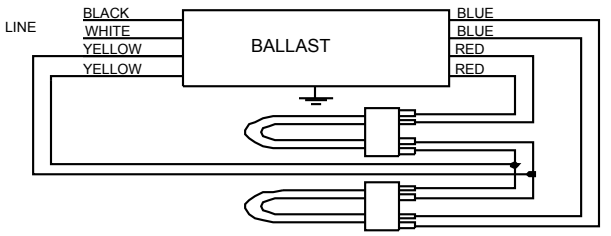
ADVANCE TRANSFORMER CO.
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD
ROSEMONT, ILLINOIS 60018
TELEPHONE: (847) 390-5000 FAX: (847) 390-5109

V-2BS39-TP	
Brand Name	MAGNETIC STD
Ballast Type	Magnetic
Starting Method	Rapid Start
Lamp Connection	Series
Input Voltage	277
Input Frequency	60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (Watts)	Ballast Factor	MAX THD %	Power Factor	Lamp Current Crest Factor	B.E.F.
FT36W/2G11	2	36	50/10	0.32	80	0.91	30	0.90	1.8	1.15
* FT39W/2G11	2	39	50/10	0.33	84	0.91	30	0.91	1.8	1.09

Wiring Diagram



Diag. 41

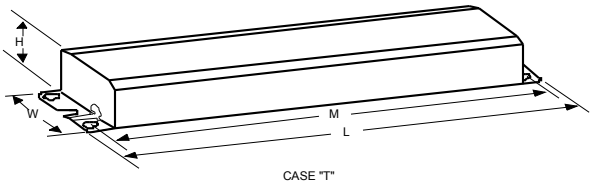
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	12	
White	12	
Blue	24	
Red	24	
Yellow	24	
Gray		
Violet		

	in.	cm.
Yellow/Blue		
Blue/White		
Brown		
Orange		
Orange/Black		
Black/White		
Red/White		

Enclosure



CASE "T"

Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
9.50 "	2.375 "	1.5 "	8.90625 "
9 1/2	2 3/8	1 1/2	8 29/32
24.1 cm	6 cm	3.8 cm	22.6 cm

Revised 07/01/1999

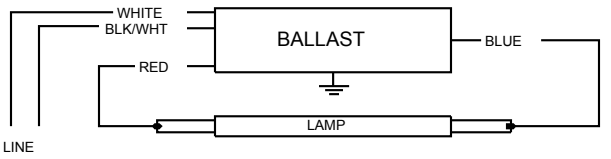
ADVANCE
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 630-307-3071
Corporate Offices: Phone: 800-322-2086

VCN-132-MC	
Brand Name	CENTIUM MICRO CAN
Ballast Type	Electronic
Starting Method	Instant Start
Lamp Connection	Series
Input Voltage	277
Input Frequency	60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
F21T5	1	21	50/10	0.10	27	1.10	10	0.98	1.7	4.07
F25T8	1	25	0/-18	0.09	25	0.98	10	0.98	1.7	3.92
* F28T5	1	28	50/10	0.11	30	0.98	10	0.99	1.7	3.27
F32T8	1	32	0/-18	0.11	30	0.98	10	0.98	1.7	3.27
F32T8/ES (30W)	1	30	60/16	0.10	28	0.98	10	0.98	1.7	3.50

Wiring Diagram



Diag. 63

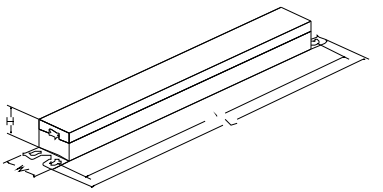
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black		0
White	25L	63.5
Blue	31R	78.7
Red	37L	94
Yellow		0
Gray		0
Violet		0

	in.	cm.
Yellow/Blue		0
Blue/White		0
Brown		0
Orange		0
Orange/Black		0
Black/White	25L	63.5
Red/White		0

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
9.50 "	1.08 "	1.05 "	8.91 "
9 1/2	1 2/25	1 1/20	8 91/100
24.1 cm	2.7 cm	2.7 cm	22.6 cm

Revised 07/23/2004

ADVANCE
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 630-307-3071
Corporate Offices: Phone: 800-322-2086

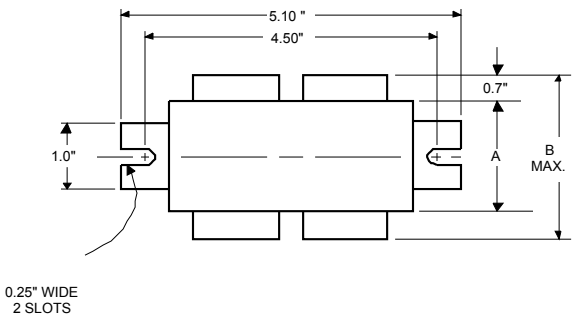
ADVANCE™

Metal Halide Lamp Ballast

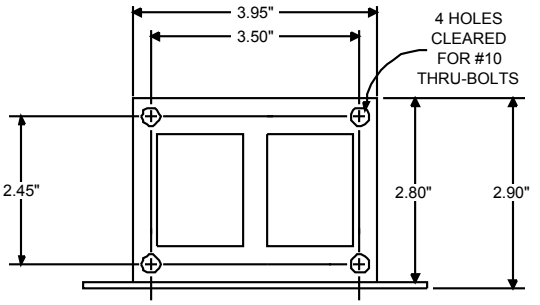
Catalog Number 71A50Y1
For 39W M130
60 Hz HX-HPF
Status: Active

DIMENSIONS AND DATA

3 X 4 CORE - 2 COIL UNIT

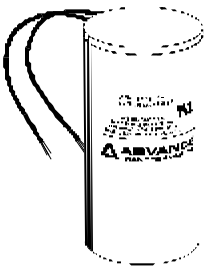


0.25" WIDE
2 SLOTS



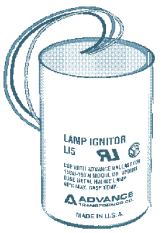
INPUT VOLTS		100	200			
CIRCUIT TYPE	HX-HPF					
POWER FACTOR (min)	90%					
REGULATION						
Line Volts	±5%					
Lamp Watts	±10%					
LINE CURRENT (Amps)						
Operating		0.56	0.28			
Open Circuit		1.30	0.70			
Starting		0.50	0.25			
UL TEMPERATURE RATINGS						
Insulation Class	H(180°C)					
Coil Temperature Code	1029	A	A			
MIN. AMBIENT STARTING TEMP.	-30°F or -35°C					
NOM. OPEN CIRCUIT VOLTAGE	248					
INPUT VOLTAGE AT LAMP DROPOUT		70	140			
INPUT WATTS	53					
RECOMMENDED FUSE (Amps)		3	2			
CORE and COIL						
Dimension (A)	0.85					
Dimension (B)	1.95					
Weight (lbs.)	3					
Lead Lengths	12"					
CAPACITOR REQUIREMENT						
Microfarads	10.0					
Volts (min.)	280					
Fault Current Withstand (amps)						
60 Hz TEST PROCEDURES (Refer to Advance Test Procedure for HID Ballasts - Form 1270)						
High Potential Test (Volts)						
1 minute	1500					
2 seconds	2500					
Open Circuit Voltage Test (Volts)	223-273					
Short-Circuit Current Test (Amps)						
Secondary Current	0.60-0.74					
Input Current		0.38 0.58	0.19 0.29	-	-	-

Capacitor: 7C100M30-R



Capacitance: 10
Dia/Oval Dim: 1.5
Height: 2.9
Temp Rating: 105°C

Ignitor: LI533-H4



Ballast to Lamp Distance (BTL) = 5 feet
Temp Rating: 105°C

Wiring Diagram:

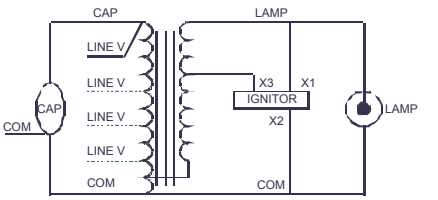


Fig. K3

Typical Ordering Information

(please call Advance for suffix availability)

Order Suffix	Description
500D.	Ballast With Ignitor and Dry Film Capacitor

Data is based upon tests performed by Advance Transformer in a controlled environment and representitive of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice.

ADVANCE
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 630-307-3071
Corporate Offices: Phone: 800-322-2086

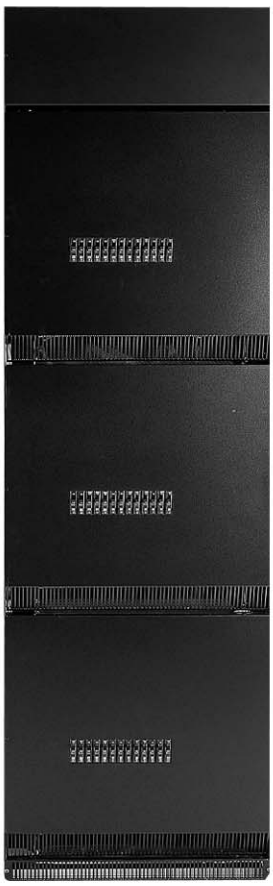
04/15/02

Controls

GP Dimming Panels
120-127 / 277 Volt

GP3/4
Mini
Panels

GP8-24
Standard-Size
Panels



GP36
Large-Size Panels

GP48-144
Large-Size Panels

GP Dimming Panels provide power and dimming for up to 144 load circuits and control any light source, including full-conduction non-dim.

Models available with:

- 120-127 V and 277 V input power.
- 3 to 144 circuits.
- Different feed types and breakers.

GP Dimming Panels work with:

- GRAFIK Eye 4000 Control Units.
- GRAFIK 5000™, GRAFIK 6000®, and GRAFIK 7000® Systems.
- LP Dimming Panels.
- XP Softswitch™ Panels.
- DMX512 dimming systems via the 2LINK™ option.

Specifications - 120-127 / 277 Volt

Standards

- UL Listed
  (Reference: UL File 42071).
- Complies with CSA or NOM (where appropriate).

Power

- Input power: 100-127V and 277V, 50/60Hz, phase-to-neutral.
- Branch Circuit Capacity:
  - 120-127V - up to 2000W/VA
  - 277V - 4500W/VA
- Number of Circuits: 3-144
- Branch Circuit Breakers: UL-rated thermal magnetic.
  AIC ratings (other ratings available):
  - 100-127V – 10,000A
  - 277V – 14,000A
- Lightning strike protection: Meets ANSI/IEEE standard 62.41-1980. Can withstand voltage surges of up to 6000V and current surges of up to 3000A.
- 10-year power failure memory: Automatically restores lighting to scene selected prior to power interruption.

Sources/Load Types

Operates these sources with a smooth continuous Square Law dimming curve or on a full conduction non-dim basis:

- Incandescent (Tungsten)/Halogen
- Magnetic Low Voltage Transformer
- Electronic Low Voltage Transformer[1]
- Lutron Electronic Fluorescent Dimming Ballasts
- Magnetic Fluorescent Lamp Ballasts
- Optional modules allow for control of 0-10V, DSI, and PWM load types.
- Operates HID sources on a full conduction non-dim basis.

Wiring

- Internal: Prewired by Lutron.
- System communications: Low-voltage Class 2 (PELV) wiring connects Dimming Panels to other components.
- Line (mains) voltage: Feed, load, and control circuit wiring only. No other wiring or assembly required.

Filter Chokes

- Load current rise time is measured at a 90 degree conduction angle.
- 10-90% of load current waveform:
  - 350µSec rise time at 50% dimmer capacity.
  - 400µSec rise time at 100% dimmer capacity.
- 0-100% of load current waveform:
  - 525µSec rise time at 50% dimmer capacity.
  - 600µSec rise time at 100% dimmer capacity.
- At no point in the waveform can the rate of current change exceed 300mA per µSec.
- Consult Lutron for higher rise time options.

Dimming Cards

- Panel current ratings are listed for continuous operation - UL-listed specifically for each light source.
- RTISS™ filter circuit technology compensates for incoming line voltage variations: No visible flicker with +/-2% change in RMS voltage/cycle and +/-2% Hz change in frequency/second.
- Arcless-relay air gap-off switches (one per load circuit) ensure open load circuits when off function selected. Eliminate arcing at mechanical contacts when loads are switched.

Physical Design

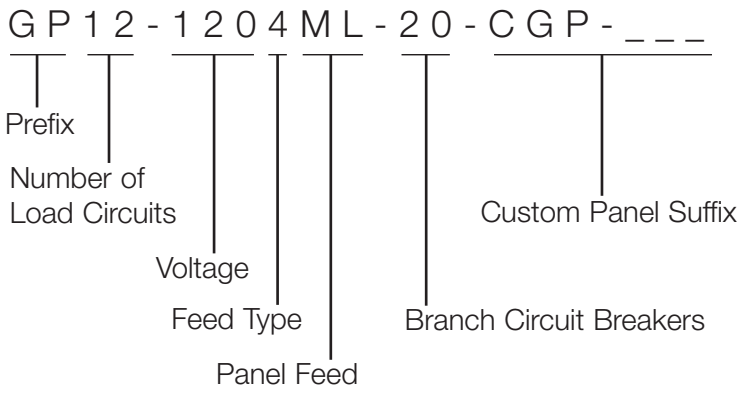
- Enclosure: NEMA-Type 1 (Type 2 available upon request), IP-20 protection; #16 U.S. Gauge Steel. Indoors only.
- Weight: 30-1300 pounds (14-590kg).
- Mounting: Surface mount only. Allow space for ventilating.

Environment/Heat Dissipation

- Patented, ribbed aluminum heat sink base cools Panel by convection. No fans.
- 32-104°F (0-40°C). Relative humidity less than 90% non-condensing.

[1] Reverse-phase control transformers require an ELVI Power Interface. Check phase with transformer manufacturer.

How to Build a GP Model Number



Prefix:
GP for GP Dimming Panel

Number of Load Circuits:
Indicates number of load circuits in the panel

Voltage:
120 for 120-127 V
277 for 277 V

Feed Type:
2 for 1 phase 2 wire
3 for 1 phase 3 wire (split phase)
4 for 3 phase 4 wire

Panel Feed:
ML for Main Lugs only
Mxx for Main Breaker with **xx** = breaker size in Amps

Branch Circuit Breakers:
20 for 20A branch circuit breakers
15 for 15A branch circuit breakers

Custom Panel Suffix:
Indicates panel with special options

GP8-24 Standard-Size Models

Only standard panels listed. Consult Lutron for further options.

277V Power

Number Of Circuits	Feed Type	Panel Feed	Maximum Feed	Panel Branch Ratings: Circuit Breakers[1]	Panel Branch Ratings: Maximum Dimmed Hot Load [2]
GP8	1Ø, 2W	Main Lugs Only	175A	20A	4500W/VA
	3Ø, 4W	Main Lugs Only	175A	20A	4500W/VA
		60A Main Breaker	60A	20A	4500W/VA
GP12	3Ø, 4W	Main Lugs Only	175A	20A	4500W/VA
		80A Main Breaker	80A	20A	4500W/VA
GP16	3Ø, 4W	Main Lugs Only	175A	20A	4500W/VA
		125A Main Breaker	125A	20A	4500W/VA

[1] 20/16A, 15/12A continuous load rating.

[2] Measured current will not exceed continuous load rating due to voltage drop in the dimmer.

Job Name:	Model Numbers:	
William H. Gates Hall		
Job Number:		

Appendix B

Panelboard Worksheets

EXISTING PANELBOARD NW01-N02

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NW01-N		Panel Location:			ELEC. ROOM NW - LEVEL 01			
Nominal Phase to Neutral Voltage------->				277		Phase:			3			
Nominal Phase to Phase Voltage-------->				480		Wires:			4			
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks		
1	A	MECH FTU	4	WEST	6300	va	1.00	6300	6300			
2	A	LIGHTING	1	SW ROOMS	3000	va	0.95	2850	3000			
3	B	--	4	WEST	6400	va	1.00	6400	6400			
4	B	LIGHTING	1	NW ROOMS	1000	va	0.95	950	1000			
5	C	--	4	WEST	6200	va	1.00	6200	6200			
6	C	LIGHTING	1	LOUNGE	2100	va	0.95	1995	2100			
7	A	LIGHTING	1	RM 118	1300	va	0.95	1235	1300			
8	A	LIGHTING	1	CORRIDOR	3600	w	0.95	3600	3789			
9	B	SPARE			0	w		0	0			
10	B	LIGHTING	1	E EXTERIO	2400	va	0.95	2280	2400			
11	C	SPARE			0	w		0	0			
12	C	LIGHTING	1	E EXTERIO	2100	va	0.95	1995	2100			
13	A	MECH FTU	3	WEST	9500	va	1.00	9500	9500			
14	A	ALC-1A	2		500	va	1.00	500	500			
15	B	--	3	WEST	9500	va	1.00	9500	9500			
16	B	SPARE			0	w		0	0			
17	C	--	3	WEST	9500	va	1.00	9500	9500			
18	C	SPARE			0	w		0	0			
19	A	SPARE			0	w		0	0			
20	A	SPARE			0	w		0	0			
21	B	--			0	w		0	0			
22	B	SPARE			0	w		0	0			
23	C	--			0	w		0	0			
24	C	SPARE			0	w		0	0			
25	A	SPARE			0	w		0	0			
26	A	SPARE			0	w		0	0			
27	B	SPARE			0	w		0	0			
28	B	SPARE			0	w		0	0			
29	C	SPARE			0	w		0	0			
30	C	SPARE			0	w		0	0			
31	A	SPARE			0	w		0	0			
32	A	SPARE			0	w		0	0			
33	B	SPARE			0	w		0	0			
34	B	SPARE			0	w		0	0			
35	C	SPARE			0	w		0	0			
36	C	SPARE			0	w		0	0			
37	A	SPARE			0	w		0	0			
38	A	SPARE			0	w		0	0			
39	B	SPARE			0	w		0	0			
40	B	SPARE			0	w		0	0			
41	C	SPARE			0	w		0	0			
42	C	SPARE			0	w		0	0			
PANEL TOTAL								62.8	63.6	Amps=	76.5	

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL	A					24.0	24.4	38%	88.0
PHASE TOTAL	B					19.1	19.3	30%	69.7
PHASE TOTAL	C					19.7	19.9	31%	71.8

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		14.9	15.7	1.25	18.6	19.6	0.95		
2	equipment		0.5	0.5	1.00	0.5	0.5	1.00		
3	Mechanical - highest		28.5	28.5	1.25	35.6	35.6	1.00		
4	Mechanical		18.9	18.9	1.00	18.9	18.9	1.00		
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						73.7	74.6			
Spare Capacity			25%			18.4	18.7			
Total Design Loads						92.1	93.3	0.99	Amps=	112.3

REVISED PANELBOARD NW01-N02

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NW01-N		Panel Location:			ELEC. ROOM NW - LEVEL 01		
Nominal Phase to Neutral Voltage------->				277		Phase:			3		
Nominal Phase to Phase Voltage-------->				480		Wires:			4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
1	A	MECH FTU	4	WEST	6300	va	1.00	6300	6300		
2	A	LIGHTING	1	SW ROOMS	3000	va	0.95	2850	3000		
3	B	--	4	WEST	6400	va	1.00	6400	6400		
4	B	LIGHTING	1	NW ROOMS	1000	va	0.95	950	1000		
5	C	--	4	WEST	6200	va	1.00	6200	6200		
6	C	LIGHTING	1	LOUNGE	2100	va	0.95	1995	2100		
7	A	LIGHTING	1	RM 118	1300	va	0.95	1235	1300		
8	A	LIGHTING	1	CORRIDOR	2070	VA	0.95	1967	2070		
9	B	SPARE			0	w		0	0		
10	B	LIGHTING	1	TERRACE	1920	w	0.95	1920	2021		
11	C	SPARE			0	w		0	0		
12	C	LIGHTING	1	TERRACE	1756	w	0.95	1756	1848		
13	A	MECH FTU	3	WEST	9500	va	1.00	9500	9500		
14	A	ALC-1A	2	ELEC. RM	500	va	1.00	500	500		
15	B	--	3	WEST	9500	va	1.00	9500	9500		
16	B	LIGHTING	1	GALLERIA	340	w	0.95	340	358		
17	C	--	3	WEST	9500	va	1.00	9500	9500		
18	C	LIGHTING	1	GALLERIA	936	w	0.95	936	985		
19	A	SPARE			0	w		0	0		
20	A	SPARE			0	w		0	0		
21	B	--			0	w		0	0		
22	B	SPARE			0	w		0	0		
23	C	--			0	w		0	0		
24	C	SPARE			0	w		0	0		
25	A	SPARE			0	w		0	0		
26	A	SPARE			0	w		0	0		
27	B	SPARE			0	w		0	0		
28	B	SPARE			0	w		0	0		
29	C	SPARE			0	w		0	0		
30	C	SPARE			0	w		0	0		
31	A	SPARE			0	w		0	0		
32	A	SPARE			0	w		0	0		
33	B	SPARE			0	w		0	0		
34	B	SPARE			0	w		0	0		
35	C	SPARE			0	w		0	0		
36	C	SPARE			0	w		0	0		
37	A	SPARE			0	w		0	0		
38	A	SPARE			0	w		0	0		
39	B	SPARE			0	w		0	0		
40	B	SPARE			0	w		0	0		
41	C	SPARE			0	w		0	0		
42	C	SPARE			0	w		0	0		
PANEL TOTAL								61.8	62.6	Amps=	75.3

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL	A					22.4	22.7	36%	81.8
PHASE TOTAL	B					19.1	19.3	31%	69.6
PHASE TOTAL	C					20.4	20.6	33%	74.5

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		13.9	14.7	1.25	17.4	18.4	0.95		
2	equipment		0.5	0.5	1.00	0.5	0.5	1.00		
3	Mechanical - highest		28.5	28.5	1.25	35.6	35.6	1.00		
4	Mechanical		18.9	18.9	1.00	18.9	18.9	1.00		
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						72.5	73.4			
Spare Capacity			25%			18.1	18.3			
Total Design Loads						90.6	91.7	0.99	Amps=	110.4

EXISTING PANELBOARD NWB1-E02

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NWB1-E		Panel Location:			ELEC. RM NW - LEVEL B1		
Nominal Phase to Neutral Voltage------->				277		Phase:			3		
Nominal Phase to Phase Voltage-------->				480		Wires:			4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
1	A	LIGHTING	1	EXIT SIGNS	100	va	0.95	95	100		
2	A	LIGHTING	1	STAIR 1	400	va	0.95	380	400		
3	B	LIGHTING	1	EGRESS	3300	va	0.95	3135	3300		
4	B	LIGHTING	1	STAIR 4	200	va	0.95	190	200		
5	C	LIGHTING	1	MECH/ELEC	400	va	0.95	380	400		
6	C	LIGHTING	1	L107	1500	va	0.95	1425	1500		
7	A	LIGHTING	1	EXIT SIGNS	100	va	0.95	95	100		
8	A	SPARE			0	w		0	0		
9	B	LIGHTING	1	EGRESS L-0	1300	va	0.95	1235	1300		
10	B	SPARE			0	w		0	0		
11	C	LIGHTING	1	MECH/ELEC	400	va	0.95	380	400		
12	C	SPARE			0	w		0	0		
13	A	SPARE			0	w		0	0		
14	A	SPARE			0	w		0	0		
15	B	SPARE			0	w		0	0		
16	B	SPARE			0	w		0	0		
17	C	SPARE			0	w		0	0		
18	C	SPARE			0	w		0	0		
19	A	SPARE			0	w		0	0		
20	A	SPARE			0	w		0	0		
21	B	SPARE			0	w		0	0		
22	B	SPARE			0	w		0	0		
23	C	SPARE			0	w		0	0		
24	C	SPARE			0	w		0	0		
25	A	SPARE			0	w		0	0		
26	A	SPARE			0	w		0	0		
27	B	SPARE			0	w		0	0		
28	B	SPARE			0	w		0	0		
29	C	SPARE			0	w		0	0		
30	C	SPARE			0	w		0	0		
31	A	SPARE			0	w		0	0		
32	A	SPARE			0	w		0	0		
33	B	SPARE			0	w		0	0		
34	B	--			0	w		0	0		
35	C	SPARE			0	w		0	0		
36	C	--			0	w		0	0		
37	A	SPARE			0	w		0	0		
38	A	SPARE			0	w		0	0		
39	B	SPARE			0	w		0	0		
40	B	--			0	w		0	0		
41	C	SPARE			0	w		0	0		
42	C	--			0	w		0	0		
PANEL TOTAL								7.3	7.7	Amps=	9.3

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL		A				0.6	0.6	8%	2.2
PHASE TOTAL		B				4.6	4.8	62%	17.3
PHASE TOTAL		C				2.2	2.3	30%	8.3

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		7.3	7.7	1.25	9.1	9.6	0.95		
2			0.0	0.0	0.00	0.0	0.0			
3			0.0	0.0	0.00	0.0	0.0			
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						9.1	9.6			
Spare Capacity			25%			2.3	2.4			
Total Design Loads						11.4	12.0	0.95	Amps=	14.5

REVISED PANELBOARD NWB1-E02

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->	CB-NWB1-E	Panel Location:	ELEC. RM NW - LEVEL B1
Nominal Phase to Neutral Voltage------->	277	Phase:	3
Nominal Phase to Phase Voltage-------->	480	Wires:	4

Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks
1	A	LIGHTING	1	EXIT SIGNS	100	va	0.95	95	100	
2	A	LIGHTING	1	STAIR 1	400	va	0.95	380	400	
3	B	LIGHTING	1	EGRESS	3300	va	0.95	3135	3300	
4	B	LIGHTING	1	STAIR 4	200	va	0.95	190	200	
5	C	LIGHTING	1	MECH/ELEC	400	va	0.95	380	400	
6	C	LIGHTING	1	LIBRARY	460	w	0.95	460	484	
7	A	LIGHTING	1	EXIT SIGNS	100	va	0.95	95	100	
8	A	SPARE			0	w		0	0	
9	B	LIGHTING	1	EGRESS L-0	1175	va	0.95	1116	1175	
10	B	SPARE			0	w		0	0	
11	C	LIGHTING	1	MECH/ELEC	400	va	0.95	380	400	
12	C	SPARE			0	w		0	0	
13	A	SPARE			0	w		0	0	
14	A	SPARE			0	w		0	0	
15	B	SPARE			0	w		0	0	
16	B	SPARE			0	w		0	0	
17	C	SPARE			0	w		0	0	
18	C	SPARE			0	w		0	0	
19	A	SPARE			0	w		0	0	
20	A	SPARE			0	w		0	0	
21	B	SPARE			0	w		0	0	
22	B	SPARE			0	w		0	0	
23	C	SPARE			0	w		0	0	
24	C	SPARE			0	w		0	0	
25	A	SPARE			0	w		0	0	
26	A	SPARE			0	w		0	0	
27	B	SPARE			0	w		0	0	
28	B	SPARE			0	w		0	0	
29	C	SPARE			0	w		0	0	
30	C	SPARE			0	w		0	0	
31	A	SPARE			0	w		0	0	
32	A	SPARE			0	w		0	0	
33	B	SPARE			0	w		0	0	
34	B	SPARE			0	w		0	0	
35	C	SPARE			0	w		0	0	
36	C	SPARE			0	w		0	0	
37	A	SPARE			0	w		0	0	
38	A	SPARE			0	w		0	0	
39	B	SPARE			0	w		0	0	
40	B	SPARE			0	w		0	0	
41	C	SPARE			0	w		0	0	
42	C	SPARE			0	w		0	0	
PANEL TOTAL								6.2	6.6	Amps= 7.9

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL	A					0.6	0.6	9%	2.2
PHASE TOTAL	B					4.4	4.7	71%	16.9
PHASE TOTAL	C					1.2	1.3	20%	4.6

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		6.2	6.6	1.25	7.8	8.2	0.95		
2			0.0	0.0	0.00	0.0	0.0			
3			0.0	0.0	0.00	0.0	0.0			
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						7.8	8.2			
Spare Capacity			75%			5.8	6.1			
Total Design Loads						13.6	14.3	0.95	Amps=	17.3

EXISTING PANELBOARD NW02-N02

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NW02-N	Panel Location:				ELEC. RM NW LEVEL 02		
Nominal Phase to Neutral Voltage------->				277	Phase:				3		
Nominal Phase to Phase Voltage-------->				480	Wires:				4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
1	A	MECH FTU	2	WEST	3900	va	1.00	3900	3900		
2	A	LIGHTING	1	EST OFFICE	2700	va	0.95	2565	2700		
3	B	--	2	WEST	3200	va	1.00	3200	3200		
4	B	LIGHTING	1	W CORRIDO	1900	va	0.95	1805	1900		
5	C	--	2	WEST	2400	va	1.00	2400	2400		
6	C	LIGHTING	1	SW OFFICES	1500	va	0.95	1425	1500		
7	A	SPARE			0	w		0	0		
8	A	LIGHTING	1	NW ROOMS	900	va	0.95	855	900		
9	B	SPARE			0	w		0	0		
10	B	LIGHTING	1	NTRAL COR	2300	va	0.95	2185	2300		
11	C	SPARE			0	w		0	0		
12	C	LIGHTING	1	LEAR STOR	600	va	0.95	570	600		
13	A	SPARE			0	w		0	0		
14	A	SPARE			0	w		0	0		
15	B	--			0	w		0	0		
16	B	SPARE			0	w		0	0		
17	C	--			0	w		0	0		
18	C	SPARE			0	w		0	0		
19	A	SPARE			0	w		0	0		
20	A	SPARE			0	w		0	0		
21	B	SPARE			0	w		0	0		
22	B	SPARE			0	w		0	0		
23	C	SPARE			0	w		0	0		
24	C	SPARE			0	w		0	0		
25	A	SPARE			0	w		0	0		
26	A	SPARE			0	w		0	0		
27	B	SPARE			0	w		0	0		
28	B	SPARE			0	w		0	0		
29	C	SPARE			0	w		0	0		
30	C	SPARE			0	w		0	0		
31	A	SPARE			0	w		0	0		
32	A	SPARE			0	w		0	0		
33	B	SPARE			0	w		0	0		
34	B	SPARE			0	w		0	0		
35	C	SPARE			0	w		0	0		
36	C	SPARE			0	w		0	0		
37	A	SPARE			0	w		0	0		
38	A	SPARE			0	w		0	0		
39	B	SPARE			0	w		0	0		
40	B	SPARE			0	w		0	0		
41	C	SPARE			0	w		0	0		
42	C	SPARE			0	w		0	0		
PANEL TOTAL								18.9	19.4	Amps=	23.3

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL	A					7.3	7.5	39%	27.1
PHASE TOTAL	B					7.2	7.4	38%	26.7
PHASE TOTAL	C					4.4	4.5	23%	16.2

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		9.4	9.9	1.25	11.8	12.4	0.95		
2	mechanical largest		9.5	9.5	1.25	11.9	11.9	1.00		
3	mechanical		0.0	0.0	1.00	0.0	0.0			
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						23.6	24.3			
Spare Capacity			25%			5.9	6.1			
Total Design Loads						29.5	30.3	0.97	Amps=	36.5

REVISED PANELBOARD NW02-N02

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NW02-N	Panel Location:				ELEC. RM NW LEVEL 02		
Nominal Phase to Neutral Voltage------->				277	Phase:				3		
Nominal Phase to Phase Voltage-------->				480	Wires:				4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
1	A	MECH FTU	2	WEST	3900	va	1.00	3900	3900		
2	A	LIGHTING	1	EST OFFICE	2700	va	0.95	2565	2700		
3	B	--	2	WEST	3200	va	1.00	3200	3200		
4	B	LIGHTING	1	W CORRIDO	1900	va	0.95	1805	1900		
5	C	--	2	WEST	2400	va	1.00	2400	2400		
6	C	LIGHTING	1	SW OFFICES	935	va	0.95	888	935		
7	A	SPARE			0	w		0	0		
8	A	LIGHTING	1	NW ROOMS	900	va	0.95	855	900		
9	B	SPARE			0	w		0	0		
10	B	LIGHTING	1	NTRAL COR	2300	va	0.95	2185	2300		
11	C	SPARE			0	w		0	0		
12	C	LIGHTING	1	LEAR STOR	600	va	0.95	570	600		
13	A	SPARE			0	w		0	0		
14	A	LIGHTING	1	GALLERIA	340	w	0.95	340	358		
15	B	--			0	w		0	0		
16	B	LIGHTING	1	GALLERIA	1640	w	0.95	1640	1726		
17	C	--			0	w		0	0		
18	C	SPARE			0	w		0	0		
19	A	SPARE			0	w		0	0		
20	A	SPARE			0	w		0	0		
21	B	SPARE			0	w		0	0		
22	B	SPARE			0	w		0	0		
23	C	SPARE			0	w		0	0		
24	C	SPARE			0	w		0	0		
25	A	SPARE			0	w		0	0		
26	A	SPARE			0	w		0	0		
27	B	SPARE			0	w		0	0		
28	B	SPARE			0	w		0	0		
29	C	SPARE			0	w		0	0		
30	C	SPARE			0	w		0	0		
31	A	SPARE			0	w		0	0		
32	A	SPARE			0	w		0	0		
33	B	SPARE			0	w		0	0		
34	B	SPARE			0	w		0	0		
35	C	SPARE			0	w		0	0		
36	C	SPARE			0	w		0	0		
37	A	SPARE			0	w		0	0		
38	A	SPARE			0	w		0	0		
39	B	SPARE			0	w		0	0		
40	B	SPARE			0	w		0	0		
41	C	SPARE			0	w		0	0		
42	C	SPARE			0	w		0	0		
PANEL TOTAL								20.3	20.9	Amps=	25.2

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL	A					7.7	7.9	38%	28.4
PHASE TOTAL	B					8.8	9.1	44%	32.9
PHASE TOTAL	C					3.9	3.9	19%	14.2

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		10.8	11.4	1.25	13.6	14.3	0.95		
2	mechanical largest		9.5	9.5	1.25	11.9	11.9	1.00		
3	mechanical		0.0	0.0	1.00	0.0	0.0			
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						25.4	26.1			
Spare Capacity			50%			12.7	13.1			
Total Design Loads						38.2	39.2	0.97	Amps=	47.2

EXISTING PANELBOARD NE02-N04

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NE02-N	Panel Location:			ELEC. RM NE -LEVEL 02			
Nominal Phase to Neutral Voltage------->				277	Phase:			3			
Nominal Phase to Phase Voltage-------->				480	Wires:			4			
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
1	A	MECH FTU	2	EAST	4800	VA	1.00	4800	4800		
2	A	LIGHTING	1	S. FOYER	1400	VA	0.95	1330	1400		
3	B	--	2	EAST	700	VA	1.00	700	700		
4	B	LIGHTING	1	S. FOYER	2400	VA	0.95	2280	2400		
5	C	--	2	EAST	2600	VA	1.00	2600	2600		
6	C	LIGHTING	1	ENTRAL OF	3100	VA	0.95	2945	3100		
7	A	SPARE			0	w		0	0		
8	A	LIGHTING	1	LOCKERS	800	VA	0.95	760	800		
9	B	SPARE			0	w		0	0		
10	B	LIGHTING	1	NE ROOMS	300	VA	0.95	285	300		
11	C	SPARE			0	w		0	0		
12	C	LIGHTING	1	E. FOYER	1300	VA	0.95	1235	1300		
13	A	SPARE			0	w		0	0		
14	A	LIGHTING	1	RM. 217	1900	VA	0.95	1805	1900		
15	B	--			0	w		0	0		
16	B	LIGHTING	1	RM. 213	1300	VA	0.95	1235	1300		
17	C	--			0	w		0	0		
18	C	LIGHTING	1	RM. 212	700	VA	0.95	665	700		
19	A	SPARE			0	w		0	0		
20	A	LIGHTING	1	RM. 222	1700	VA	0.95	1615	1700		
21	B	SPARE			0	w		0	0		
22	B	ALC-2B	3	ELEC. CLOS	500	VA	1.00	500	500		
23	C	SPARE			0	w		0	0		
24	C	SPARE			0	w		0	0		
25	A	SPARE			0	w		0	0		
26	A	SPARE			0	w		0	0		
27	B	SPARE			0	w		0	0		
28	B	SPARE			0	w		0	0		
29	C	SPARE			0	w		0	0		
30	C	SPARE			0	w		0	0		
31	A	SPARE			0	w		0	0		
32	A	SPARE			0	w		0	0		
33	B	SPARE			0	w		0	0		
34	B	SPARE			0	w		0	0		
35	C	SPARE			0	w		0	0		
36	C	SPARE			0	w		0	0		
37	A	SPARE			0	w		0	0		
38	A	SPARE			0	w		0	0		
39	B	SPARE			0	w		0	0		
40	B	SPARE			0	w		0	0		
41	C	SPARE			0	w		0	0		
42	C	SPARE			0	w		0	0		
PANEL TOTAL								22.8	23.5	Amps=	28.3

PHASE LOADING		kW	kVA	%	Amps	
PHASE TOTAL	A	10.3	10.6	45%	38.3	
PHASE TOTAL	B	5.0	5.2	22%	18.8	
PHASE TOTAL	C	7.4	7.7	33%	27.8	

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		14.2	14.9	1.25	17.7	18.6	0.95		
2	mechanical largest		8.1	8.1	1.25	10.1	10.1	1.00		
3	equipment		0.5	0.5	1.00	0.5	0.5	1.00		
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						28.3	29.3			
Spare Capacity			25%			7.1	7.3			
Total Design Loads						35.4	36.6	0.97	Amps=	44.0

REVISED PANELBOARD NE02-N04

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NE02-N	Panel Location:			ELEC. RM NE -LEVEL 02			
Nominal Phase to Neutral Voltage------->				277	Phase:			3			
Nominal Phase to Phase Voltage-------->				480	Wires:			4			
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
1	A	MECH FTU	2	EAST	4800	VA	1.00	4800	4800		
2	A	SPARE				VA	0.95	0	0		
3	B	--	2	EAST	700	VA	1.00	700	700		
4	B	SPARE				VA	0.95	0	0		
5	C	--	2	EAST	2600	VA	1.00	2600	2600		
6	C	LIGHTING	1	ENTRAL OF	3100	VA	0.95	2945	3100		
7	A	SPARE			0	w		0	0		
8	A	LIGHTING	1	LOCKERS	800	VA	0.95	760	800		
9	B	SPARE			0	w		0	0		
10	B	LIGHTING	1	NE ROOMS	300	VA	0.95	285	300		
11	C	SPARE			0	w		0	0		
12	C	LIGHTING	1	E. FOYER	1300	VA	0.95	1235	1300		
13	A	SPARE			0	w		0	0		
14	A	LIGHTING	1	RM. 217	1900	VA	0.95	1805	1900		
15	B	--			0	w		0	0		
16	B	LIGHTING	1	RM. 213	1300	VA	0.95	1235	1300		
17	C	--			0	w		0	0		
18	C	LIGHTING	1	RM. 212	700	VA	0.95	665	700		
19	A	SPARE			0	w		0	0		
20	A	LIGHTING	1	RM. 222	1700	VA	0.95	1615	1700		
21	B	SPARE			0	w		0	0		
22	B	ALC-2B	3	ELEC. CLOS	500	VA	1.00	500	500		
23	C	SPARE			0	w		0	0		
24	C	SPARE			0	w		0	0		
25	A	SPARE			0	w		0	0		
26	A	SPARE			0	w		0	0		
27	B	SPARE			0	w		0	0		
28	B	SPARE			0	w		0	0		
29	C	SPARE			0	w		0	0		
30	C	SPARE			0	w		0	0		
31	A	SPARE			0	w		0	0		
32	A	SPARE			0	w		0	0		
33	B	SPARE			0	w		0	0		
34	B	SPARE			0	w		0	0		
35	C	SPARE			0	w		0	0		
36	C	SPARE			0	w		0	0		
37	A	SPARE			0	w		0	0		
38	A	SPARE			0	w		0	0		
39	B	SPARE			0	w		0	0		
40	B	SPARE			0	w		0	0		
41	C	SPARE			0	w		0	0		
42	C	SPARE			0	w		0	0		
PANEL TOTAL								19.1	19.7	Amps=	23.7

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL	A					9.0	9.2	47%	33.2
PHASE TOTAL	B					2.7	2.8	14%	10.1
PHASE TOTAL	C					7.4	7.7	39%	27.8

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		10.5	11.1	1.25	13.2	13.9	0.95		
2	mechanical largest		8.1	8.1	1.25	10.1	10.1	1.00		
3	equipment		0.5	0.5	1.00	0.5	0.5	1.00		
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						23.8	24.5			
Spare Capacity			25%			6.0	6.1			
Total Design Loads						29.8	30.6	0.97	Amps=	36.9

EXISTING PANELBOARD NW03-E02

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NW03-E	Panel Location:			ELEC. RM NW - LEVEL 03			
Nominal Phase to Neutral Voltage------->				277	Phase:			3			
Nominal Phase to Phase Voltage-------->				480	Wires:			4			
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
1	A	LIGHTING	1	EXIT SIGNS	100	va	0.95	95	100		
2	A	LIGHTING	1	EXIT SIGNS	100	va	0.95	95	100		
3	B	LIGHTING	1	EGRESS	1300	va	0.95	1235	1300		
4	B	LIGHTING	1	EGRESS	1700	va	0.95	1615	1700		
5	C	LIGHTING	1	MECH. EMER	300	va	0.95	285	300		
6	C	LIGHTING	1	MECH. EMER	300	va	0.95	285	300		
7	A				0	w		0	0		
8	A				0	w		0	0		
9	B				0	w		0	0		
10	B				0	w		0	0		
11	C				0	w		0	0		
12	C				0	w		0	0		
13	A				0	w		0	0		
14	A				0	w		0	0		
15	B				0	w		0	0		
16	B				0	w		0	0		
17	C				0	w		0	0		
18	C				0	w		0	0		
19	A				0	w		0	0		
20	A				0	w		0	0		
21	B				0	w		0	0		
22	B				0	w		0	0		
23	C				0	w		0	0		
24	C				0	w		0	0		
25	A				0	w		0	0		
26	A				0	w		0	0		
27	B				0	w		0	0		
28	B				0	w		0	0		
29	C				0	w		0	0		
30	C				0	w		0	0		
31	A				0	w		0	0		
32	A				0	w		0	0		
33	B				0	w		0	0		
34	B				0	w		0	0		
35	C				0	w		0	0		
36	C				0	w		0	0		
37	A				0	w		0	0		
38	A				0	w		0	0		
39	B				0	w		0	0		
40	B				0	w		0	0		
41	C				0	w		0	0		
42	C				0	w		0	0		
PANEL TOTAL								3.6	3.8	Amps=	4.6

PHASE LOADING					kW	kVA	%	Amps
PHASE TOTAL	A				0.2	0.2	5%	0.7
PHASE TOTAL	B				2.9	3.0	79%	10.8
PHASE TOTAL	C				0.6	0.6	16%	2.2

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		3.6	3.8	1.25	4.5	4.8	0.95		
2			0.0	0.0	0.00	0.0	0.0			
3			0.0	0.0	0.00	0.0	0.0			
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						4.5	4.8			
Spare Capacity			25%			1.1	1.2			
Total Design Loads						5.6	5.9	0.95	Amps=	7.1

REVISED PANELBOARD NW03-E02

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NW03-E		Panel Location:			ELEC. RM NW - LEVEL 03		
Nominal Phase to Neutral Voltage------->				277		Phase:			3		
Nominal Phase to Phase Voltage-------->				480		Wires:			4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
1	A	LIGHTING	1	EXIT SIGNS	100	va	0.95	95	100		
2	A	LIGHTING	1	EXIT SIGNS	100	va	0.95	95	100		
3	B	LIGHTING	1	EGRESS	1300	va	0.95	1235	1300		
4	B	LIGHTING	1	EGRESS	1630	va	0.95	1549	1630		
5	C	LIGHTING	1	MECH. EMER	300	va	0.95	285	300		
6	C	LIGHTING	1	MECH. EMER	300	va	0.95	285	300		
7	A				0	w		0	0		
8	A				0	w		0	0		
9	B				0	w		0	0		
10	B				0	w		0	0		
11	C				0	w		0	0		
12	C				0	w		0	0		
13	A				0	w		0	0		
14	A				0	w		0	0		
15	B				0	w		0	0		
16	B				0	w		0	0		
17	C				0	w		0	0		
18	C				0	w		0	0		
19	A				0	w		0	0		
20	A				0	w		0	0		
21	B				0	w		0	0		
22	B				0	w		0	0		
23	C				0	w		0	0		
24	C				0	w		0	0		
25	A				0	w		0	0		
26	A				0	w		0	0		
27	B				0	w		0	0		
28	B				0	w		0	0		
29	C				0	w		0	0		
30	C				0	w		0	0		
31	A				0	w		0	0		
32	A				0	w		0	0		
33	B				0	w		0	0		
34	B				0	w		0	0		
35	C				0	w		0	0		
36	C				0	w		0	0		
37	A				0	w		0	0		
38	A				0	w		0	0		
39	B				0	w		0	0		
40	B				0	w		0	0		
41	C				0	w		0	0		
42	C				0	w		0	0		
PANEL TOTAL								3.5	3.7	Amps=	4.5

PHASE LOADING		kW	kVA	%	Amps	
PHASE TOTAL	A	0.2	0.2	5%	0.7	
PHASE TOTAL	B	2.8	2.9	79%	10.6	
PHASE TOTAL	C	0.6	0.6	16%	2.2	

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		3.5	3.7	1.25	4.4	4.7	0.95		
2			0.0	0.0	0.00	0.0	0.0			
3			0.0	0.0	0.00	0.0	0.0			
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						4.4	4.7			
Spare Capacity			50%			2.2	2.3			
Total Design Loads						6.6	7.0	0.95	Amps=	8.4

EXISTING PANELBOARD NEB1-N04

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NEB1-N	Panel Location:				ELEC. RM NE LEVEL B1		
Nominal Phase to Neutral Voltage------->				277	Phase:				3		
Nominal Phase to Phase Voltage-------->				480	Wires:				4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
1	A	LIGHTING	1	SE OFFICES	3600	va	0.95	3420	3600		
2	A	LIGHTING	1	S & SE WALI	3100	va	0.95	2945	3100		
3	B	LIGHTING	1	ALCOVE	1000	va	0.95	950	1000		
4	B	LIGHTING	1	STACKS	2900	va	0.95	2755	2900		
5	C	LIGHTING	1	LIBR. RDG	2300	va	0.95	2185	2300		
6	C	LIGHTING	1	STACKS	3000	va	0.95	2850	3000		
7	A	LIGHTING	1	LIBR. RDG	1300	va	0.95	1235	1300		
8	A	LIGHTING	1	STACKS	3400	va	0.95	3230	3400		
9	B	LIGHTING	1	LIBR. RDG	1800	va	0.95	1710	1800		
10	B	LIGHTING	1	STACKS	2900	va	0.95	2755	2900		
11	C	LIGHTING	1	LIBR. RDG	1800	va	0.95	1710	1800		
12	C	LIGHTING	1	STACKS	2600	va	0.95	2470	2600		
13	A	LIGHTING	1	LIBR. RDG	1800	va	0.95	1710	1800		
14	A	LIGHTING	1	STACKS	3000	va	0.95	2850	3000		
15	B	LIGHTING	1	LIBR. RDG	1800	va	0.95	1710	1800		
16	B	LIGHTING	1	NE ROOMS	2600	va	0.95	2470	2600		
17	C	LIGHTING	1	LIBR. RDG	1800	va	0.95	1710	1800		
18	C	ALC-L1B	2	ELEC. RM	500	va	1.00	500	500		
19	A	LIGHTING	1	LIBR. RDG	1800	va	0.95	1710	1800		
20	A	SPARE			0	w		0	0		
21	B	LIGHTING	1	LIBR. RDG	2300	va	0.95	2185	2300		
22	B	SPARE			0	w		0	0		
23	C	SPARE			0	w		0	0		
24	C	SPARE			0	w		0	0		
25	A	SPARE			0	w		0	0		
26	A	SPARE			0	w		0	0		
27	B	--			0	w		0	0		
28	B	SPARE			0	w		0	0		
29	C	--			0	w		0	0		
30	C	SPARE			0	w		0	0		
31	A	SPARE			0	w		0	0		
32	A	SPARE			0	w		0	0		
33	B	SPARE			0	w		0	0		
34	B	SPARE			0	w		0	0		
35	C	SPARE			0	w		0	0		
36	C	SPARE			0	w		0	0		
37	A	MECH FTU	3	EAST	6500	va	1.00	6500	6500		
38	A	SPARE			0	w		0	0		
39	B	--	3	EAST	4900	va	1.00	4900	4900		
40	B	SPARE			0	w		0	0		
41	C	--	3	EAST	4200	va	1.00	4200	4200		
42	C	SPARE			0	w		0	0		
PANEL TOTAL								58.7	60.9	Amps=	73.3

PHASE LOADING		kW	kVA	%	Amps	
PHASE TOTAL	A	23.6	24.5	40%	88.4	
PHASE TOTAL	B	19.4	20.2	33%	72.9	
PHASE TOTAL	C	15.6	16.2	27%	58.5	

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		42.6	44.8	1.25	53.2	56.0	0.95		
2	equipment		0.5	0.5	1.00	0.5	0.5	1.00		
3	Mechanical (Largest)		15.6	15.6	1.25	19.5	19.5	1.00		
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						73.2	76.0			
Spare Capacity			25%			18.3	19.0			
Total Design Loads						91.5	95.0	0.96	Amps=	114.3

REVISED PANELBOARD NEB1-N04

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NEB1-N	Panel Location:				ELEC. RM NE LEVEL B1		
Nominal Phase to Neutral Voltage------->				277	Phase:				3		
Nominal Phase to Phase Voltage-------->				480	Wires:				4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
1	A	LIGHTING	1	SE OFFICES	3600	va	0.95	3420	3600		
2	A	LIGHTING	1	LIBRARY	1196	w	0.95	1196	1259		
3	B	LIGHTING	1	ALCOVE	1000	va	0.95	950	1000		
4	B	LIGHTING	1	STACKS	2900	va	0.95	2755	2900		
5	C	LIGHTING	1	LIBRARY	1196	w	0.95	1196	1259		
6	C	LIGHTING	1	STACKS	3000	va	0.95	2850	3000		
7	A	LIGHTING	1	LIBR. RDG	1300	va	0.95	1235	1300		
8	A	LIGHTING	1	STACKS	3400	va	0.95	3230	3400		
9	B	LIGHTING	1	LIBR. RDG	1752	w	0.95	1752	1844		
10	B	LIGHTING	1	STACKS	2900	va	0.95	2755	2900		
11	C	LIGHTING	1	LIBR. RDG	1752	w	0.95	1752	1844		
12	C	LIGHTING	1	STACKS	2600	va	0.95	2470	2600		
13	A	SPARE				va	0.95	0	0		
14	A	LIGHTING	1	STACKS	3000	va	0.95	2850	3000		
15	B	SPARE				va	0.95	0	0		
16	B	LIGHTING	1	NE ROOMS	2600	va	0.95	2470	2600		
17	C	SPARE				va	0.95	0	0		
18	C	ALC-L1B	2	ELEC. RM	500	va	1.00	500	500		
19	A	SPARE				va	0.95	0	0		
20	A	SPARE			0	w		0	0		
21	B	SPARE			0	va	0.95	0	0		
22	B	SPARE			0	w		0	0		
23	C	SPARE			0	w		0	0		
24	C	SPARE			0	w		0	0		
25	A	SPARE			0	w		0	0		
26	A	SPARE			0	w		0	0		
27	B	--			0	w		0	0		
28	B	SPARE			0	w		0	0		
29	C	--			0	w		0	0		
30	C	SPARE			0	w		0	0		
31	A	SPARE			0	w		0	0		
32	A	SPARE			0	w		0	0		
33	B	SPARE			0	w		0	0		
34	B	SPARE			0	w		0	0		
35	C	SPARE			0	w		0	0		
36	C	SPARE			0	w		0	0		
37	A	MECH FTU	3	EAST	6500	va	1.00	6500	6500		
38	A	SPARE			0	w		0	0		
39	B	--	3	EAST	4900	va	1.00	4900	4900		
40	B	SPARE			0	w		0	0		
41	C	--	3	EAST	4200	va	1.00	4200	4200		
42	C	SPARE			0	w		0	0		
PANEL TOTAL								47.0	48.6	Amps=	58.5

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL	A					18.4	19.1	39%	68.8
PHASE TOTAL	B					15.6	16.1	33%	58.3
PHASE TOTAL	C					13.0	13.4	28%	48.4

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		30.9	32.5	1.25	38.6	40.6	0.95		
2	equipment		0.5	0.5	1.00	0.5	0.5	1.00		
3	Mechanical (Largest)		15.6	15.6	1.25	19.5	19.5	1.00		
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						58.6	60.6			
Spare Capacity			25%			14.7	15.2			
Total Design Loads						73.3	75.8	0.97	Amps=	91.2

EXISTING PANELBOARD NWB2-N03(2)

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				3-NWB2-N0		Panel Location:		PUMP ROOM			
Nominal Phase to Neutral Voltage------->				277		Phase:		3			
Nominal Phase to Phase Voltage-------->				480		Wires:		4			
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
43	A	MECH FC-11	1	B2	800	va	1.00	800	800		
44	A	SPARE			0	w		0	0		
45	B	--	1	B2	800	va	1.00	800	800		
46	B	--			0	w		0	0		
47	C	--	1	B2	800	va	1.00	800	800		
48	C	--			0	w		0	0		
49	A	MECH FC-12	2	B2	800	va	1.00	800	800		
50	A	SPARE			0	w		0	0		
51	B	--	2	B2	800	va	1.00	800	800		
52	B	--			0	w		0	0		
53	C	--	2	B2	800	va	1.00	800	800		
54	C	--			0	w		0	0		
55	A	SPARE			0	w		0	0		
56	A	SPACE			0	w		0	0		
57	B	--			0	w		0	0		
58	B	--			0	w		0	0		
59	C	--			0	w		0	0		
60	C	--			0	w		0	0		
61	A	SPARE			0	w		0	0		
62	A	SPACE			0	w		0	0		
63	B	--			0	w		0	0		
64	B	--			0	w		0	0		
65	C	--			0	w		0	0		
66	C	--			0	w		0	0		
67	A	SPACE			0	w		0	0		
68	A	SPACE			0	w		0	0		
69	B	--			0	w		0	0		
70	B	--			0	w		0	0		
71	C	--			0	w		0	0		
72	C	--			0	w		0	0		
73	A	SPACE			0	w		0	0		
74	A	SPACE			0	w		0	0		
75	B	--			0	w		0	0		
76	B	--			0	w		0	0		
77	C	--			0	w		0	0		
78	C	--			0	w		0	0		
79	A	SPACE			0	w		0	0		
80	A	SPACE			0	w		0	0		
81	B	--			0	w		0	0		
82	B	--			0	w		0	0		
83	C	--			0	w		0	0		
84	C	--			0	w		0	0		
								4.8	4.8	Amps=	5.8

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL		A				1.6	1.6	33%	5.8
PHASE TOTAL		B				1.6	1.6	33%	5.8
PHASE TOTAL		C				1.6	1.6	33%	5.8

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	mech largest		2.4	2.4	1.25	3.0	3.0	1.00		
2	mechanical		2.4	2.4	1.00	2.4	2.4	1.00		
3	fluorescent lighting		0.0	0.0	0.00	0.0	0.0			
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						5.4	5.4			
Spare Capacity			25%			1.4	1.4			
Total Design Loads						6.8	6.8	1.00	Amps=	8.1

REVISED PANELBOARD NWB2-N03(2)

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->					3-NWB2-N0		Panel Location:		PUMP ROOM		
Nominal Phase to Neutral Voltage------->					277		Phase:		3		
Nominal Phase to Phase Voltage-------->					480		Wires:		4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
43	A	MECH FC-11	1	B2	800	va	1.00	800	800		
44	A	DIMMER RACK 1	3	LEVEL 01	1430	w	0.95	1430	1505		
45	B	--	1	B2	800	va	1.00	800	800		
46	B	--	3		1430	w	0.95	1430	1505		
47	C	--	1	B2	800	va	1.00	800	800		
48	C	--	3		1430	w	0.95	1430	1505		
49	A	MECH FC-12	2	B2	800	va	1.00	800	800		
50	A	SPARE			0	w		0	0		
51	B	--	2	B2	800	va	1.00	800	800		
52	B	--			0	w		0	0		
53	C	--	2	B2	800	va	1.00	800	800		
54	C	--			0	w		0	0		
55	A	SPARE			0	w		0	0		
56	A	SPACE			0	w		0	0		
57	B	--			0	w		0	0		
58	B	--			0	w		0	0		
59	C	--			0	w		0	0		
60	C	--			0	w		0	0		
61	A	SPARE			0	w		0	0		
62	A	SPACE			0	w		0	0		
63	B	--			0	w		0	0		
64	B	--			0	w		0	0		
65	C	--			0	w		0	0		
66	C	--			0	w		0	0		
67	A	SPACE			0	w		0	0		
68	A	SPACE			0	w		0	0		
69	B	--			0	w		0	0		
70	B	--			0	w		0	0		
71	C	--			0	w		0	0		
72	C	--			0	w		0	0		
73	A	SPACE			0	w		0	0		
74	A	SPACE			0	w		0	0		
75	B	--			0	w		0	0		
76	B	--			0	w		0	0		
77	C	--			0	w		0	0		
78	C	--			0	w		0	0		
79	A	SPACE			0	w		0	0		
80	A	SPACE			0	w		0	0		
81	B	--			0	w		0	0		
82	B	--			0	w		0	0		
83	C	--			0	w		0	0		
84	C	--			0	w		0	0		
								9.1	9.3	Amps=	11.2

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL	A					3.0	3.1	33%	11.2
PHASE TOTAL	B					3.0	3.1	33%	11.2
PHASE TOTAL	C					3.0	3.1	33%	11.2

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	mech largest		2.4	2.4	1.25	3.0	3.0	1.00		
2	mechanical		2.4	2.4	1.00	2.4	2.4	1.00		
3	fluorescent lighting		4.3	4.5	1.25	5.4	5.6	0.95		
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						10.8	11.0			
Spare Capacity			25%			2.7	2.8			
Total Design Loads						13.5	13.8	0.97	Amps=	16.6

EXISTING PANELBOARD NWB2-N08

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NWB2-N	Panel Location:			ELEC. RM - LEVEL B2			
Nominal Phase to Neutral Voltage------->				277	Phase:			3			
Nominal Phase to Phase Voltage-------->				480	Wires:			4			
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
1	A	SPARE			0	w		0	0		
2	A	LIGHTING	1	W STORAG	1800	va	0.95	1710	1800		
3	B	SPARE			0	w		0	0		
4	B	LIGHTING	1	S. STACKS	3500	va	0.95	3325	3500		
5	C	SPARE			0	w		0	0		
6	C	LIGHTING	1	SE. OFFICES	2000	va	0.95	1900	2000		
7	A	SPARE			0	w		0	0		
8	A	LIGHTING	1	STACKS	3400	va	0.95	3230	3400		
9	B	SPARE			0	w		0	0		
10	B	LIGHTING	1	STACKS	3300	va	0.95	3135	3300		
11	C	SPARE			0	w		0	0		
12	C	LIGHTING	1	STACKS	3300	va	0.95	3135	3300		
13	A	SPARE			0	w		0	0		
14	A	LIGHTING	1	STACKS	2900	va	0.95	2755	2900		
15	B	SPARE			0	w		0	0		
16	B	LIGHTING	1	STACKS	2000	va	0.95	1900	2000		
17	C	SPARE			0	w		0	0		
18	C	LIGHTING	1	STACKS	2700	va	0.95	2565	2700		
19	A	SPARE			0	w		0	0		
20	A	LIGHTING	1	CORRIDOR	3600	va	0.95	3420	3600		
21	B	SPARE			0	w		0	0		
22	B	LIGHTING	1	N. ROOMS	3500	va	0.95	3325	3500		
23	C	SPARE			0	w		0	0		
24	C	LIGHTING	1	L201, L202	2000	va	0.95	1900	2000		
25	A	SPARE			0	w		0	0		
26	A	ALC-L2A	2	ELEC. RM	500	va	1.00	500	500		
27	B	SPARE			0	w		0	0		
28	B	ALC-L2B	2	ELEC. RM	500	va	1.00	500	500		
29	C	SPARE			0	w		0	0		
30	C	SPARE			0	w		0	0		
31	A	SPARE			0	w		0	0		
32	A	SPARE			0	w		0	0		
33	B	SPARE			0	w		0	0		
34	B	SPARE			0	w		0	0		
35	C	SPARE			0	w		0	0		
36	C	SPARE			0	w		0	0		
37	A	SPARE			0	w		0	0		
38	A	SPARE			0	w		0	0		
39	B	SPARE			0	w		0	0		
40	B	SPARE			0	w		0	0		
41	C	SPARE			0	w		0	0		
42	C	SPARE			0	w		0	0		
PANEL TOTAL								33.3	35.0	Amps=	42.1

PHASE LOADING		kW	kVA	%	Amps		
PHASE TOTAL	A	11.6	12.2	35%	44.0		
PHASE TOTAL	B	12.2	12.8	37%	46.2		
PHASE TOTAL	C	9.5	10.0	29%	36.1		

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		32.3	34.0	1.25	40.4	42.5	0.95		
2	equipment		1.0	1.0	1.00	1.0	1.0	1.00		
3			0.0	0.0	0.00	0.0	0.0			
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						41.4	43.5			
Spare Capacity			25%			10.3	10.9			
Total Design Loads						51.7	54.4	0.95	Amps=	65.4

REVISED PANELBOARD NWB2-E08

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NWB2-N		Panel Location:			ELEC. RM - LEVEL B2		
Nominal Phase to Neutral Voltage------->				277		Phase:			3		
Nominal Phase to Phase Voltage-------->				480		Wires:			4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
1	A	SPARE			0	w		0	0		
2	A	LIGHTING	1	W STORAG	1800	va	0.95	1710	1800		
3	B	SPARE			0	w		0	0		
4	B	LIGHTING	1	S. STACKS	2160	w	0.95	2160	2274		
5	C	SPARE			0	w		0	0		
6	C	LIGHTING	1	SE. OFFICES	2000	va	0.95	1900	2000		
7	A	SPARE			0	w		0	0		
8	A	LIGHTING	1	STACKS	3400	va	0.95	3230	3400		
9	B	SPARE			0	w		0	0		
10	B	LIGHTING	1	STACKS	3300	va	0.95	3135	3300		
11	C	SPARE			0	w		0	0		
12	C	LIGHTING	1	STACKS	3300	va	0.95	3135	3300		
13	A	SPARE			0	w		0	0		
14	A	LIGHTING	1	STACKS	2900	va	0.95	2755	2900		
15	B	SPARE			0	w		0	0		
16	B	LIGHTING	1	STACKS	2000	va	0.95	1900	2000		
17	C	SPARE			0	w		0	0		
18	C	LIGHTING	1	STACKS	2700	va	0.95	2565	2700		
19	A	SPARE			0	w		0	0		
20	A	LIGHTING	1	CORRIDOR	2000	va	0.95	1900	2000		
21	B	SPARE			0	w		0	0		
22	B	LIGHTING	1	N. ROOMS	3500	va	0.95	3325	3500		
23	C	SPARE			0	w		0	0		
24	C	LIGHTING	1	L201, L202	2000	va	0.95	1900	2000		
25	A	SPARE			0	w		0	0		
26	A	ALC-L2A	2	ELEC. RM	500	va	1.00	500	500		
27	B	SPARE			0	w		0	0		
28	B	ALC-L2B	2	ELEC. RM	500	va	1.00	500	500		
29	C	SPARE			0	w		0	0		
30	C	LIGHTING	1	LIBR. RDG	1380	w	0.95	1380	1453		
31	A	SPARE			0	w		0	0		
32	A	SPARE			0	w		0	0		
33	B	SPARE			0	w		0	0		
34	B	SPARE			0	w		0	0		
35	C	SPARE			0	w		0	0		
36	C	SPARE			0	w		0	0		
37	A	SPARE			0	w		0	0		
38	A	SPARE			0	w		0	0		
39	B	SPARE			0	w		0	0		
40	B	SPARE			0	w		0	0		
41	C	SPARE			0	w		0	0		
42	C	SPARE			0	w		0	0		
PANEL TOTAL								32.0	33.6	Amps=	40.5

PHASE LOADING		kW	kVA	%	Amps	
PHASE TOTAL	A	10.1	10.6	32%	38.3	
PHASE TOTAL	B	11.0	11.6	34%	41.8	
PHASE TOTAL	C	10.9	11.5	34%	41.3	

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		31.0	32.6	1.25	38.7	40.8	0.95		
2	equipment		1.0	1.0	1.00	1.0	1.0	1.00		
3			0.0	0.0	0.00	0.0	0.0			
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						39.7	41.8			
Spare Capacity			50%			19.9	20.9			
Total Design Loads						59.6	62.7	0.95	Amps=	75.4

EXISTING PANELBOARD NWB2-E04

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NWB2-E		Panel Location:			MAIN ELEC. RM - LEVEL B2		
Nominal Phase to Neutral Voltage------->				277		Phase:			3		
Nominal Phase to Phase Voltage-------->				480		Wires:			4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
1	A	LIGHTING	1	EXIT SIGNS	100	va	0.95	95	100		
2	A	LIGHTING	1	STAIR 2	800	va	0.95	760	800		
3	B	LIGHTING	1	EGRESS	1800	va	0.95	1710	1800		
4	B	LIGHTING	1	STAIR 3	600	va	0.95	570	600		
5	C	LIGHTING	1	MECH/ELEC	1400	va	0.95	1330	1400		
6	C	SPARE			0	w		0	0		
7	A	SPARE			0	w		0	0		
8	A	SPARE			0	w		0	0		
9	B	SPARE			0	w		0	0		
10	B	SPARE			0	w		0	0		
11	C	SPARE			0	w		0	0		
12	C	SPARE			0	w		0	0		
13	A	SPARE			0	w		0	0		
14	A	SPARE			0	w		0	0		
15	B	SPARE			0	w		0	0		
16	B	SPARE			0	w		0	0		
17	C	SPARE			0	w		0	0		
18	C	SPARE			0	w		0	0		
19	A	SPARE			0	w		0	0		
20	A	SPARE			0	w		0	0		
21	B	SPARE			0	w		0	0		
22	B	SPARE			0	w		0	0		
23	C	SPARE			0	w		0	0		
24	C	SPARE			0	w		0	0		
25	A	SPARE			0	w		0	0		
26	A	SPARE			0	w		0	0		
27	B	SPARE			0	w		0	0		
28	B	SPARE			0	w		0	0		
29	C	SPARE			0	w		0	0		
30	C	SPARE			0	w		0	0		
31	A	SPARE			0	w		0	0		
32	A	SPARE			0	w		0	0		
33	B	SPARE			0	w		0	0		
34	B	SPARE			0	w		0	0		
35	C	SPARE			0	w		0	0		
36	C	SPARE			0	w		0	0		
37	A	SPARE			0	w		0	0		
38	A	SPARE			0	w		0	0		
39	B	SPARE			0	w		0	0		
40	B	SPARE			0	w		0	0		
41	C	SPARE			0	w		0	0		
42	C	SPARE			0	w		0	0		
PANEL TOTAL								4.5	4.7	Amps=	5.7

PHASE LOADING		kW	kVA	%	Amps	
PHASE TOTAL	A	0.9	0.9	19%	3.2	
PHASE TOTAL	B	2.3	2.4	51%	8.7	
PHASE TOTAL	C	1.3	1.4	30%	5.1	

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		4.5	4.7	1.25	5.6	5.9	0.95		
2			0.0	0.0	0.00	0.0	0.0			
3			0.0	0.0	0.00	0.0	0.0			
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						5.6	5.9			
Spare Capacity			25%			1.4	1.5			
Total Design Loads						7.0	7.3	0.95	Amps=	8.8

REVISED PANELBOARD NWB2-N04

LIGHTING AND APPLIANCE PANELBOARD SIZING WORKSHEET

Panel Tag---------->				CB-NWB2-E		Panel Location:			MAIN ELEC. RM - LEVEL B2		
Nominal Phase to Neutral Voltage------->				277		Phase:			3		
Nominal Phase to Phase Voltage-------->				480		Wires:			4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Remarks	
1	A	LIGHTING	1	EXIT SIGNS	100	va	0.95	95	100		
2	A	LIGHTING	1	STAIR 2	800	va	0.95	760	800		
3	B	LIGHTING	1	EGRESS	1900	va	0.95	1805	1900		
4	B	LIGHTING	1	STAIR 3	600	va	0.95	570	600		
5	C	LIGHTING	1	MECH/ELEC	1400	va	0.95	1330	1400		
6	C	SPARE			0	w		0	0		
7	A	SPARE			0	w		0	0		
8	A	SPARE			0	w		0	0		
9	B	SPARE			0	w		0	0		
10	B	SPARE			0	w		0	0		
11	C	SPARE			0	w		0	0		
12	C	SPARE			0	w		0	0		
13	A	SPARE			0	w		0	0		
14	A	SPARE			0	w		0	0		
15	B	SPARE			0	w		0	0		
16	B	SPARE			0	w		0	0		
17	C	SPARE			0	w		0	0		
18	C	SPARE			0	w		0	0		
19	A	SPARE			0	w		0	0		
20	A	SPARE			0	w		0	0		
21	B	SPARE			0	w		0	0		
22	B	SPARE			0	w		0	0		
23	C	SPARE			0	w		0	0		
24	C	SPARE			0	w		0	0		
25	A	SPARE			0	w		0	0		
26	A	SPARE			0	w		0	0		
27	B	SPARE			0	w		0	0		
28	B	SPARE			0	w		0	0		
29	C	SPARE			0	w		0	0		
30	C	SPARE			0	w		0	0		
31	A	SPARE			0	w		0	0		
32	A	SPARE			0	w		0	0		
33	B	SPARE			0	w		0	0		
34	B	SPARE			0	w		0	0		
35	C	SPARE			0	w		0	0		
36	C	SPARE			0	w		0	0		
37	A	SPARE			0	w		0	0		
38	A	SPARE			0	w		0	0		
39	B	SPARE			0	w		0	0		
40	B	SPARE			0	w		0	0		
41	C	SPARE			0	w		0	0		
42	C	SPARE			0	w		0	0		
PANEL TOTAL								4.6	4.8	Amps=	5.8

PHASE LOADING						kW	kVA	%	Amps
PHASE TOTAL	A					0.9	0.9	19%	3.2
PHASE TOTAL	B					2.4	2.5	52%	9.0
PHASE TOTAL	C					1.3	1.4	29%	5.1

LOAD CATAGORIES			Connected			Demand				
			kW	kVA	DF	kW	kVA	PF		
1	fluorescent lighting		4.6	4.8	1.25	5.7	6.0	0.95		
2			0.0	0.0	0.00	0.0	0.0			
3			0.0	0.0	0.00	0.0	0.0			
4			0.0	0.0	0.00	0.0	0.0			
5			0.0	0.0	0.00	0.0	0.0			
6			0.0	0.0	0.00	0.0	0.0			
7			0.0	0.0	0.00	0.0	0.0			
8			0.0	0.0	0.00	0.0	0.0			
Total Demand Loads						5.7	6.0			
Spare Capacity			50%			2.9	3.0			
Total Design Loads						8.6	9.0	0.95	Amps=	10.8

Conduit Sizing Worksheets

Conduit Sizing Worksheet - 60A Panel

Total Cross Sectional of Wire Area	0.2239	sq. inches
Calculated EMT Conduit Size (minimum size is 3/4")	1	" EMT
Calculated IMC Conduit Size (minimum size is 3/4")	3/4	" IMC
Calculated RMC Conduit Size (minimum size is 3/4")	1	" RMC
Calculated RNC Conduit Size (minimum size is 3/4")	1	" RNC

Ref: 2005 NEC, Tables 4, 5 and 8

									Totals	
Wize Size	TW, THW		THWN, THHN		XHHW		Bare Wire		No.	Area
	No.	Area	No.	Area	No.	Area	No.	Area		
14		0.0139		0.0097		0.0139		0.004	0	0
12		0.0181		0.0133		0.0181		0.006	0	0
10		0.0243	1	0.0211		0.0243		0.011	1	0.0211
8		0.0437		0.0366		0.0437		0.017	0	0
6		0.0726	4	0.0507		0.0590		0.027	4	0.2028
4		0.0973		0.0824		0.0814		0.042	0	0
3		0.1134		0.0973		0.0962		0.053	0	0
2		0.1333		0.1158		0.1146		0.067	0	0
1		0.1901		0.1562		0.1534		0.087	0	0
1/0		0.2223		0.1855		0.1825		0.109	0	0
2/0		0.2624		0.2223		0.2190		0.137	0	0
3/0		0.3117		0.2679		0.2642		0.173	0	0
4/0		0.3718		0.3237		0.3197		0.219	0	0
250		0.4596		0.3970		0.3904		0.260	0	0
300		0.5281		0.4608		0.4536		0.312	0	0
350		0.5958		0.5242		0.5166		0.364	0	0
400		0.6619		0.5863		0.5782		0.416	0	0
500		0.7901		0.7073		0.6984		0.519	0	0
600		0.9729		0.8676		0.8709		0.626	0	0
700		1.1010		0.9887		0.9923		0.730	0	0
750		1.1652		1.0496		1.0532		0.782	0	0
800		1.2272		1.1085		1.1122		0.834	0	0
900		1.3561		1.2311		1.2351		0.940	0	0
1000		1.4784		1.3478		1.3519		1.042	0	0
Totals	0		5		0		0		5	0.2239

Note: "ERROR" indicates conduit size larger than 4" is required.

Conduit Sizing Worksheet - 150A Panel

Total Cross Sectional of Wire Area	0.7927	sq. inches
Calculated EMT Conduit Size (minimum size is 3/4")	1 1/2	" EMT
Calculated IMC Conduit Size (minimum size is 3/4")	1 1/2	" IMC
Calculated RMC Conduit Size (minimum size is 3/4")	1 1/2	" RMC
Calculated RNC Conduit Size (minimum size is 3/4")	1 1/2	" RNC

Ref: 2005 NEC, Tables 4, 5 and 8

									Totals	
Wize Size	TW, THW		THWN, THHN		XHHW		Bare Wire		No.	Area
	No.	Area	No.	Area	No.	Area	No.	Area		
14		0.0139		0.0097		0.0139		0.004	0	0
12		0.0181		0.0133		0.0181		0.006	0	0
10		0.0243		0.0211		0.0243		0.011	0	0
8		0.0437		0.0366		0.0437		0.017	0	0
6		0.0726	1	0.0507		0.0590		0.027	1	0.0507
4		0.0973		0.0824		0.0814		0.042	0	0
3		0.1134		0.0973		0.0962		0.053	0	0
2		0.1333		0.1158		0.1146		0.067	0	0
1		0.1901		0.1562		0.1534		0.087	0	0
1/0		0.2223	4	0.1855		0.1825		0.109	4	0.742
2/0		0.2624		0.2223		0.2190		0.137	0	0
3/0		0.3117		0.2679		0.2642		0.173	0	0
4/0		0.3718		0.3237		0.3197		0.219	0	0
250		0.4596		0.3970		0.3904		0.260	0	0
300		0.5281		0.4608		0.4536		0.312	0	0
350		0.5958		0.5242		0.5166		0.364	0	0
400		0.6619		0.5863		0.5782		0.416	0	0
500		0.7901		0.7073		0.6984		0.519	0	0
600		0.9729		0.8676		0.8709		0.626	0	0
700		1.1010		0.9887		0.9923		0.730	0	0
750		1.1652		1.0496		1.0532		0.782	0	0
800		1.2272		1.1085		1.1122		0.834	0	0
900		1.3561		1.2311		1.2351		0.940	0	0
1000		1.4784		1.3478		1.3519		1.042	0	0
Totals	0		5		0		0		5	0.7927

Note: "ERROR" indicates conduit size larger than 4" is required.

Conduit Sizing Worksheet - 225A Panel

Total Cross Sectional of Wire Area	1.3772	sq. inches
Calculated EMT Conduit Size (minimum size is 3/4")	2 1/2	" EMT
Calculated IMC Conduit Size (minimum size is 3/4")	2	" IMC
Calculated RMC Conduit Size (minimum size is 3/4")	2 1/2	" RMC
Calculated RNC Conduit Size (minimum size is 3/4")	2 1/2	" RNC

Ref: 2005 NEC, Tables 4, 5 and 8

									Totals	
Wize Size	TW, THW		THWN, THHN		XHHW		Bare Wire		No.	Area
	No.	Area	No.	Area	No.	Area	No.	Area		
14		0.0139		0.0097		0.0139		0.004	0	0
12		0.0181		0.0133		0.0181		0.006	0	0
10		0.0243		0.0211		0.0243		0.011	0	0
8		0.0437		0.0366		0.0437		0.017	0	0
6		0.0726		0.0507		0.0590		0.027	0	0
4		0.0973	1	0.0824		0.0814		0.042	1	0.0824
3		0.1134		0.0973		0.0962		0.053	0	0
2		0.1333		0.1158		0.1146		0.067	0	0
1		0.1901		0.1562		0.1534		0.087	0	0
1/0		0.2223		0.1855		0.1825		0.109	0	0
2/0		0.2624		0.2223		0.2190		0.137	0	0
3/0		0.3117		0.2679		0.2642		0.173	0	0
4/0		0.3718	4	0.3237		0.3197		0.219	4	1.2948
250		0.4596		0.3970		0.3904		0.260	0	0
300		0.5281		0.4608		0.4536		0.312	0	0
350		0.5958		0.5242		0.5166		0.364	0	0
400		0.6619		0.5863		0.5782		0.416	0	0
500		0.7901		0.7073		0.6984		0.519	0	0
600		0.9729		0.8676		0.8709		0.626	0	0
700		1.1010		0.9887		0.9923		0.730	0	0
750		1.1652		1.0496		1.0532		0.782	0	0
800		1.2272		1.1085		1.1122		0.834	0	0
900		1.3561		1.2311		1.2351		0.940	0	0
1000		1.4784		1.3478		1.3519		1.042	0	0
Totals	0		5		0		0		5	1.3772

Note: "ERROR" indicates conduit size larger than 4" is required.

Conduit Sizing Worksheet - 400A Panel

Total Cross Sectional of Wire Area	1.1874	sq. inches
Calculated EMT Conduit Size (minimum size is 3/4")	2	" EMT
Calculated IMC Conduit Size (minimum size is 3/4")	2	" IMC
Calculated RMC Conduit Size (minimum size is 3/4")	2	" RMC
Calculated RNC Conduit Size (minimum size is 3/4")	2	" RNC

Ref: 2005 NEC, Tables 4, 5 and 8

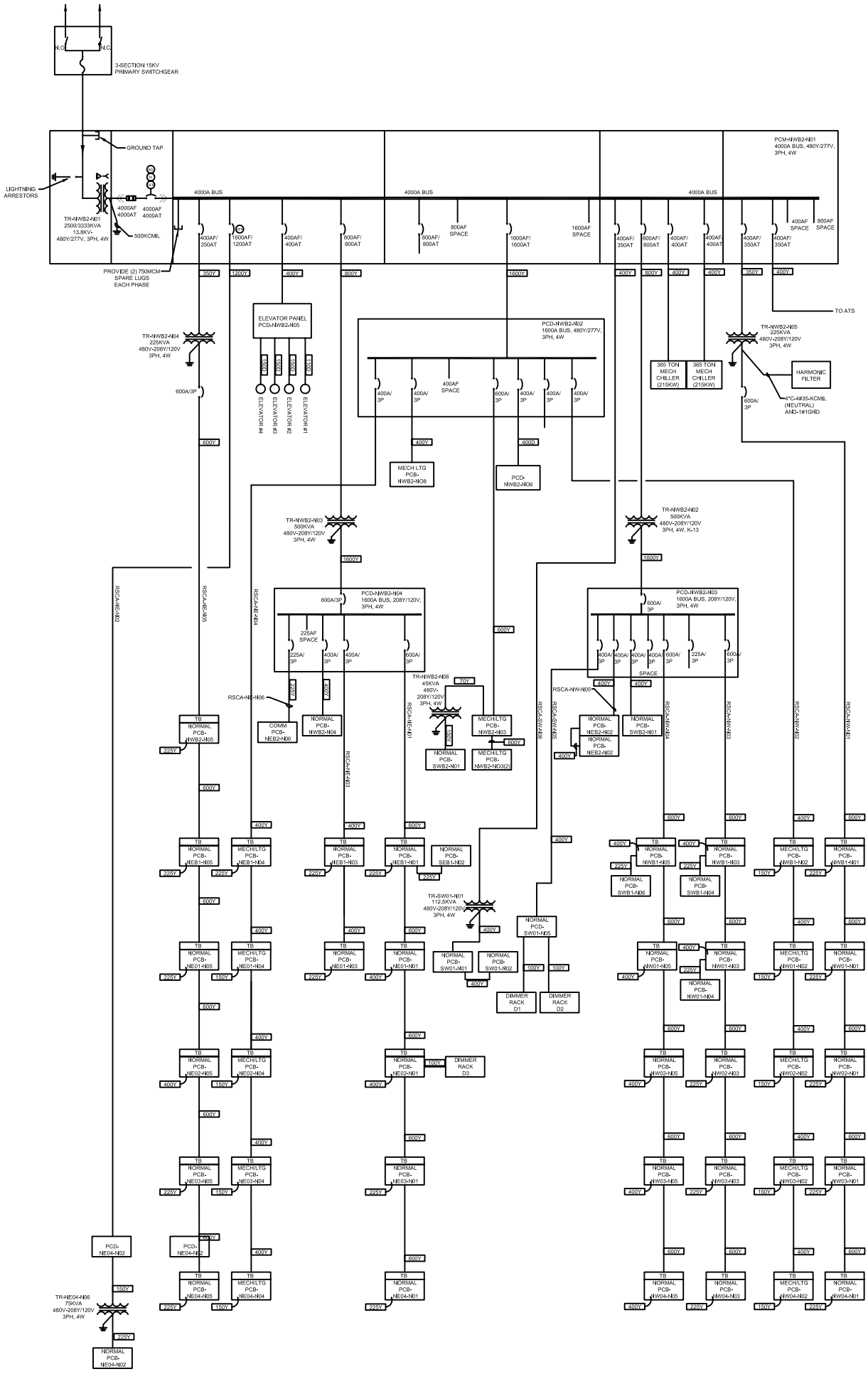
									Totals	
Wize Size	TW, THW		THWN, THHN		XHHW		Bare Wire		No.	Area
	No.	Area	No.	Area	No.	Area	No.	Area		
14		0.0139		0.0097		0.0139		0.004	0	0
12		0.0181		0.0133		0.0181		0.006	0	0
10		0.0243		0.0211		0.0243		0.011	0	0
8		0.0437		0.0366		0.0437		0.017	0	0
6		0.0726		0.0507		0.0590		0.027	0	0
4		0.0973		0.0824		0.0814		0.042	0	0
3		0.1134		0.0973		0.0962		0.053	0	0
2		0.1333	1	0.1158		0.1146		0.067	1	0.1158
1		0.1901		0.1562		0.1534		0.087	0	0
1/0		0.2223		0.1855		0.1825		0.109	0	0
2/0		0.2624		0.2223		0.2190		0.137	0	0
3/0		0.3117	4	0.2679		0.2642		0.173	4	1.0716
4/0		0.3718		0.3237		0.3197		0.219	0	0
250		0.4596		0.3970		0.3904		0.260	0	0
300		0.5281		0.4608		0.4536		0.312	0	0
350		0.5958		0.5242		0.5166		0.364	0	0
400		0.6619		0.5863		0.5782		0.416	0	0
500		0.7901		0.7073		0.6984		0.519	0	0
600		0.9729		0.8676		0.8709		0.626	0	0
700		1.1010		0.9887		0.9923		0.730	0	0
750		1.1652		1.0496		1.0532		0.782	0	0
800		1.2272		1.1085		1.1122		0.834	0	0
900		1.3561		1.2311		1.2351		0.940	0	0
1000		1.4784		1.3478		1.3519		1.042	0	0
Totals	0		5		0		0		5	1.1874

Note: "ERROR" indicates conduit size larger than 4" is required.

Appendix C

Existing One-Line Diagram

FIGURE 3.1 -EXISTIG ONE LINE DIAGRAM



Feeder Schedule

FEEDER SCHEDULE

FEEDER NUMBER	NO. OF RACEWAYS	RACEWAY SIZE	CONDUCTORS (PER RACEWAY)			FEEDER NUMBER	NO. OF RACEWAYS	RACEWAY SIZE	CONDUCTORS (PER RACEWAY)		
			PHASE	NEUTRAL	GROUND				PHASE	NEUTRAL	GROUND
3 PHASE, 3 WIRE, WITH GROUND - SERIES D:						3 PHASE,4 WIRE, WITH GROUND - SERIES Y:					
25D	1	3/4"	3#10	-	1#10	50Y	1	1-1/4"	3#6	1#6	1#10
50D	1	1"	3#6	-	1#10	70Y	1	1-1/4"	3#4	1#4	1#8
75D	1	1-1/4"	3#4	-	1#8	100Y	1	2"	3#3	1#3	1#8
110D	1	1-1/2"	3#1	-	1#6	125Y	1	2"	3#1	1#1	1#6
150D	1	1-1/2"	3# 1/0	-	1#6	150Y	1	2"	3#1/0	1#1/0	1#6
175D	1	2"	3# 2/0	-	1#6	175Y	1	2"	3#2/0	1#2/0	1#6
225D	1	2"	3# 4/0	-	1#4	200Y	1	2	3#3/0	1#3/0	1#6
250D	1	2-1/2"	3#250KCMIL	-	1#4	225Y	1	2-1/2"	3#4/0	1#4/0	1#4
350D	1	4"	3#250KCMIL	-	1#2	350Y	1	3"	3#500KCMIL	1#500KCMIL	1#3
400D	2	2"	3# 3/0	-	1#2	400Y	2	2-1/2"	3#3/0	1#3/0	1#2
600D	2	3"	3#350KCMIL	-	1#1	500Y	2	2-1/2"	3#250KCMIL	1#250KCMIL	1#2
800D	3	2-1/2"	3#300KCMIL	-	1#1/0	600Y	2	3"	3#350KCMIL	1#350KCMIL	1#1
1200D	4	3"	3#350KCMIL	-	1#3/0	800Y	3	3"	3#300KCMIL	1#300KCMIL	1#1/0
400D	2	2"	3# 3/0	-	1#2	1200Y	4	3"	3#350KCMIL	1#350KCMIL	1#3/0
800D	3	2-1/2"	3#300KCMIL	-	1#1/0	1600Y	5	3-1/2"	3#500KCMIL	1#500KCMIL	1#4/0
1200D	4	3"	3#350KCMIL	-	1#3/0	2000Y	6	3-1/2"	3#500KCMIL	1#500KCMIL	1#250KCMIL
1600D	5	4"	3#500KCMIL	-	1#4/0						

FEEDER NUMBER	NO. OF RACEWAYS	RACEWAY SIZE	CONDUCTORS (PER RACEWAY)		
			PHASE	NEUTRAL	GROUND
3 PHASE, 4 WIRE, DOUBLE NEUT, GRD & ISOL GRD - SERIES C:					
100C	1	2"	3#1	2#1	2#8
150C	1	2-1/2"	3#1/0	2#1/0	2#6
225C	1	2-1/2"	3#4/0	2#4/0	2#4
250C	1	3"	3#250KCMIL	2#250KCMIL	2#4
400C	2	3"	3#4/0	2#4/0	2#2
500C	2	3"	3#250KCMIL	2#250KCMIL	2#2
600C	2	3-1/2"	3#350KCMIL	2#350KCMIL	2#1
1600C	5	5"	3#600KCMIL	2#600KCMIL	2#4/0

Transformers

K Factor Transformers

Three-Phase, Type KT, 60 Hz, for Non-Linear Loads

Type KT

Product Description

- Suitable for indoor or outdoor applications (with weathershield).
- Ventilated enclosures (DT-3).
- 220°C Insulation system, 150°C Rise standard (self extinguishing).
- Type DT-3 is available in ratings of 15 – 1000 kVA and up to 4160 volts.

Application Description

Cutler-Hammer KT Transformers by Eaton Corporation include several major design improvements that address the problems caused by non-linear loads and harmonics. They are designed to withstand the effects of harmonic currents without exceeding the temperature rating of the insulation system. The KT design compensates for the stresses on a transformer's winding insulation which prevents insulation breakdown and premature failure. The net result is longer transformer life.

Design Features

Core

A high grade, nonaging, grain-oriented silicon steel with high magnetic permeability provides reduced core induction levels, preventing saturation as a result of the higher frequency harmonics and resultant peak voltages. In a core approaching saturation, the current in the coil will increase as voltage drops because the core cannot absorb the additional magnetic flux. This core also provides reduced eddy currents or induced currents in the steel caused by the high ratios of peak-to-rms currents and voltages found in harmonic loads.

Coils

Windings are continuous wound aluminum or optional copper construction sized and configured to reduce overheating caused by harmonic currents. These coils reduce skin and proximity effect losses which occur when current carrying conductors next to each other and coiled around steel generate magnetic fields. These magnetic fields push the currents in the conductors away from each other causing increased losses and additional heating.

Neutral Bus

The neutral bus is sized and configured to accommodate at least 200% of the rated current. This compensates for the increased neutral currents found in non-linear loads thus reducing heat.

The K Factor

A common industry term for the amount of harmonics produced by a given load is the K Factor. The larger the K Factor, the more harmonics are present. Linear loads, for example have a K Factor of 1. Transformers may carry a K Factor rating to define the transformer's ability to withstand the additional heating generated by harmonic currents.

Calculating the K Factor

All nonlinear waveforms can be broken down mathematically into a fundamental frequency and its harmonics. IEEE C57.110 establishes a direct relationship between these harmonics and transformer heating. Underwriters Laboratories has established a similar relation-ship, the K Factor, which is derived by summing the square of the percentage current at a given harmonic level multiplied by the square of the harmonic order.

$$K = \sum(I_h)^2(h)^2$$

I_h = Percent Current at Harmonic h

h = Harmonic Order, i.e., 3rd, 5th, 7th

For example, a load that is 90% of the fundamental, 30% of the third harmonic, and 20% of the fifth harmonic would yield $(.9)^2(1)^2 + (.3)^2(3)^2 + (.2)^2(5)^2$ or a K Factor of 2.62. This load would require an Eaton's Cutler-Hammer KT-4 Transformer with a K Factor rating of 4.

Transformers that carry a K Factor rating define the transformer's ability to withstand a given harmonic load while operating within the transformer's insulation class.

An analysis of harmonic loads and a calculation of the K Factor must be made to properly apply transformers in any building or facility. Note that the calculated K Factor is not constant since non-linear loads change throughout the day as equipment and lighting is turned off and on. These harmonic loads also change over the life of the building or facility as equipment is added or removed.

Harmonic Currents

Harmonic currents are found in nonlinear loads. These currents are generated by various types of equipment including switching mode power supplies that abruptly switch current on and off during each line cycle. Switching mode power supplies or diodecapacitor

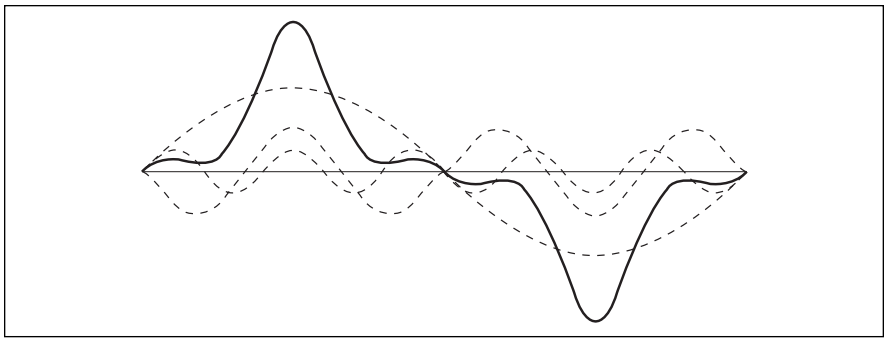


Figure 9-1. Harmonic currents found in non-linear loads cause wave shape distortion and create added stresses on transformers.

Table 9-41. Type KT-13 — Transformers for Non-Sinusoidal Current Loads with K Factor Up to 13

kVA	Full Cap. Taps		Type	°C Temp. Rise	Dimensions (Inches)			Wt. Lbs.	Dimensions (mm)			Wt. kg	Frame	Wiring Diagram Number	Weathershield		Catalog Number	Price U.S. $
	FCAN	FCBN			H	W	D		H	W	D				Catalog Number	Price U.S. $		
480 Δ Volts to 208Y/120 Volts																		
15	2@+2.5%	4@-2.5%	KT	150	30-1/8	20-1/8	14-1/8	230	765	511	359	104	FR910A	283B	**WS31**	350.	**N48M28T15A**	1,970.
30	2@+2.5%	4@-2.5%	KT	150	30-1/8	20-1/8	14-1/8	310	765	511	359	140	FR912A	283B	**WS31**	350.	**N48M28T30A**	2,845.
45	2@+2.5%	4@-2.5%	KT	150	39-3/8	26-1/8	19-1/8	480	1000	663	485	217	FR914B	283B	**WS33**	350.	**N48M28T45A**	3,370.
75	2@+2.5%	4@-2.5%	KT	150	39-3/8	26-1/8	19-1/8	600	1000	663	485	272	FR915B	283B	**WS33**	350.	**N48M28T75A**	4,660.
112.5	2@+2.5%	4@-2.5%	KT	150	46-1/8	28	23	760	1171	712	585	344	FR916A	283B	**WS19**	350.	**N48M28T12A**	6,535.
150	2@+2.5%	4@-2.5%	KT	150	56	31-1/4	24-1/4	1100	1422	793	616	499	FR917	283B	**WS34**	800.	**N48M28T49A**	8,780.
225	2@+2.5%	4@-2.5%	KT	150	62-1/4	31-1/4	30-1/4	1600	1581	794	768	728	FR918A	283B	**WS34**	800.	**N48M28T22A**	12,140.
300	2@+2.5%	4@-2.5%	KT	150	75	44-1/2	36	2400	1905	1130	914	1088	FR919	292A	**WS35**	1,360.	**N48M28T33A**	17,870.
500	2@+2.5%	4@-2.5%	KT	150	90	69	42	4500	2286	1752	1066	2041	FR922	292A	**WS36**	1,360.	**N48M28T55A**	27,570.
15	2@+2.5%	4@-2.5%	KT	115	30-1/8	20-1/8	14-1/8	230	765	511	359	104	FR910A	283B	**WS31**	350.	**N48M28F15A**	2,410.
30	2@+2.5%	4@-2.5%	KT	115	30-1/8	20-1/8	14-1/8	310	765	511	359	140	FR912A	283B	**WS31**	350.	**N48M28F30A**	2,985.
45	2@+2.5%	4@-2.5%	KT	115	39-3/8	26-1/8	19-1/8	480	1000	663	485	217	FR914B	283B	**WS33**	350.	**N48M28F45A**	3,890.
75	2@+2.5%	4@-2.5%	KT	115	39-3/8	26-1/8	19-1/8	600	1000	663	485	272	FR915B	283B	**WS33**	350.	**N48M28F75A**	5,315.
112.5	2@+2.5%	4@-2.5%	KT	115	46-1/8	28	23	760	1171	712	585	344	FR916A	283B	**WS19**	350.	**N48M28F12A**	8,120.
150	2@+2.5%	4@-2.5%	KT	115	56	31-1/4	24-1/4	1100	1422	793	616	499	FR917	283B	**WS34**	800.	**N48M28F49A**	9,560.
225	2@+2.5%	4@-2.5%	KT	115	62-1/4	31-1/4	30-1/4	1600	1581	794	768	728	FR918A	283B	**WS34**	800.	**N48M28F22A**	13,390.
300	2@+2.5%	4@-2.5%	KT	115	75	44-1/2	36	2400	1905	1130	914	1088	FR919	292A	**WS35**	1,360.	**N48M28F33A**	20,100.
500	2@+2.5%	4@-2.5%	KT	115	90	69	42	4500	2286	1752	1066	2041	FR922	292A	**WS36**	1,360.	**N48M28F55A**	30,400.
15	2@+2.5%	4@-2.5%	KT	80	30-1/8	20-1/8	14-1/8	230	765	511	359	104	FR910A	283B	**WS31**	350.	**N48M28B15A**	2,840.
30	2@+2.5%	4@-2.5%	KT	80	30-1/8	20-1/8	14-1/8	310	765	511	359	140	FR912A	283B	**WS31**	350.	**N48M28B30A**	3,730.
45	2@+2.5%	4@-2.5%	KT	80	39-3/8	26-1/8	19-1/8	480	1000	663	485	217	FR914B	283B	**WS33**	350.	**N48M28B45A**	4,755.
75	2@+2.5%	4@-2.5%	KT	80	46-1/8	28	23	760	1171	712	585	344	FR916A	283B	**WS33**	350.	**N48M28B75A**	6,160.
112.5	2@+2.5%	4@-2.5%	KT	80	56	31-1/4	24-1/4	1100	1422	793	616	499	FR917	283B	**WS19**	350.	**N48M28B12A**	8,840.
150	2@+2.5%	4@-2.5%	KT	80	62-1/4	31-1/4	30-1/4	1600	1581	794	768	728	FR918A	283B	**WS34**	800.	**N48M28B49A**	12,565.
225	2@+2.5%	4@-2.5%	KT	80	75	44-1/2	36	2400	1905	1130	914	1088	FR919	292A	**WS35**	1,360.	**N48M28B22A**	17,140.
300	2@+2.5%	4@-2.5%	KT	80	75	44-1/2	36	3600	1905	1130	914	1636	FR919	292A	**WS35**	1,360.	**N48M28B33CU**	26,780.
480 Δ Volts to 208Y/120 Volts (Copper Windings)																		
15	2@+2.5%	4@-2.5%	KT	150	30-1/8	20-1/8	14-1/8	300	65	511	359	136	FR910A	283B	**WS31**	350.	**N48M28T15CU**	2,540.
30	2@+2.5%	4@-2.5%	KT	150	30-1/8	20-1/8	14-1/8	370	765	511	359	168	FR912A	283B	**WS31**	350.	**N48M28T30CU**	2,890.
45	2@+2.5%	4@-2.5%	KT	150	39-3/8	26-1/8	19-1/8	575	1000	663	485	261	FR914B	283B	**WS33**	350.	**N48M28T45CU**	4,270.
75	2@+2.5%	4@-2.5%	KT	150	39-3/8	26-1/8	19-1/8	675	1000	663	485	306	FR915B	283B	**WS33**	350.	**N48M28T75CU**	5,690.
112.5	2@+2.5%	4@-2.5%	KT	150	46-1/8	28	23	850	1171	712	585	386	FR916A	283B	**WS19**	350.	**N48M28T12CU**	7,460.
150	2@+2.5%	4@-2.5%	KT	150	56	31-1/4	24-1/4	1200	1422	793	616	545	FR917	283B	**WS34**	800.	**N48M28T49CU**	9,770.
225	2@+2.5%	4@-2.5%	KT	150	62-1/4	31-1/4	30-1/4	2150	1581	794	768	977	FR918A	283B	**WS34**	800.	**N48M28T22CU**	13,440.
300	2@+2.5%	4@-2.5%	KT	150	75	44-1/2	36	3100	1905	1130	914	1409	FR919	292A	**WS35**	1,360.	**N48M28T33CU**	22,330.
500	2@+2.5%	4@-2.5%	KT	150	①	①	①	①	①	①	①	①	①	①	①	—	**N48M28T55CU**	28,930.
15	2@+2.5%	4@-2.5%	KT	115	30-1/8	20-1/8	14-1/8	300	65	511	359	136	FR910A	283B	**WS31**	350.	**N48M28F15CU**	2,785.
30	2@+2.5%	4@-2.5%	KT	115	30-1/8	20-1/8	14-1/8	370	765	511	359	168	FR912A	283B	**WS31**	350.	**N48M28F30CU**	3,295.
45	2@+2.5%	4@-2.5%	KT	115	39-3/8	26-1/8	19-1/8	575	1000	663	485	261	FR914B	283B	**WS33**	350.	**N48M28F45CU**	4,430.
75	2@+2.5%	4@-2.5%	KT	115	39-3/8	26-1/8	19-1/8	675	1000	663	485	360	FR915B	283B	**WS33**	350.	**N48M28F75CU**	6,290.
112.5	2@+2.5%	4@-2.5%	KT	115	46-1/8	28	23	850	1171	712	585	386	FR916A	283B	**WS19**	350.	**N48M28F12CU**	9,025.
150	2@+2.5%	4@-2.5%	KT	115	56	31-1/4	24-1/4	1200	1422	793	616	545	FR917	283B	**WS34**	800.	**N48M28F49CU**	11,950.
225	2@+2.5%	4@-2.5%	KT	115	62-1/4	31-1/4	30-1/4	2150	1581	794	768	977	FR918A	283B	**WS34**	800.	**N48M28F22CU**	16,300.
300	2@+2.5%	4@-2.5%	KT	115	75	44-1/2	36	3100	1905	1130	914	1409	FR919	292A	**WS35**	1,360.	**N48M28F33CU**	24,560.
500	2@+2.5%	4@-2.5%	KT	115	①	①	①	①	①	①	①	①	①	①	①	—	**N48M28F55CU**	31,850.
15	2@+2.5%	4@-2.5%	KT	80	30-1/8	20-1/8	14-1/8	300	65	511	359	136	FR910A	283B	**WS31**	350.	**N48M28B15CU**	3,125.
30	2@+2.5%	4@-2.5%	KT	80	30-1/8	20-1/8	14-1/8	370	765	511	359	168	FR912A	283B	**WS31**	350.	**N48M28B30CU**	4,140.
45	2@+2.5%	4@-2.5%	KT	80	39-3/8	26-1/8	19-1/8	575	1000	663	485	261	FR914B	283B	**WS33**	350.	**N48M28B45CU**	5,570.
75	2@+2.5%	4@-2.5%	KT	80	46-1/8	28	23	950	1171	712	585	431	FR916A	283B	**WS33**	350.	**N48M28B75CU**	7,100.
112.5	2@+2.5%	4@-2.5%	KT	80	56	31-1/4	24-1/4	1200	1422	793	616	545	FR917	283B	**WS19**	350.	**N48M28B12CU**	10,270.
150	2@+2.5%	4@-2.5%	KT	80	62-1/4	31-1/4	30-1/4	2150	1581	794	768	977	FR918A	283B	**WS34**	800.	**N48M28B49CU**	13,480.
225	2@+2.5%	4@-2.5%	KT	80	75	44-1/2	36	3100	1905	1130	914	1409	FR919	292A	**WS35**	1,360.	**N48M28B22CU**	20,520.
300	2@+2.5%	4@-2.5%	KT	80	75	44-1/2	36	3600	1905	1130	914	1636	FR919	292A	**WS35**	1,360.	**N48M28B33CU**	26,780.

① Refer to your Cutler-Hammer sales office.

Note: For single-phase K-factor transformers, contact your local Cutler-Hammer sales office.

Note: Contact your local Cutler-Hammer sales office for CE Mark transformer requirements.

Note: For Energy Star labeled K-factor transformers, contact your local Cutler-Hammer sales office.

For other ratings or styles not shown, or for special enclosure types (including stainless steel) refer to Eaton's Cutler-Hammer.

Discount Symbol **DT-1**

Appendix D

Motor Control Center

IT. Motor Control Centers

IT. MCC

Product Description

Eaton's offerings for motor control centers feature the Cutler-Hammer Intelligent Technologies ***(IT.)*** MCC. This product offers the highest density of motor control in the industry along with the most functionality. Its innovative design, as well as its enhanced fault performance and protective features, make it the new benchmark in the industry.

Application Description

Cutler-Hammer Motor Control Centers by Eaton Corporation are custom-made assemblies of conveniently grouped control equipment primarily used for control of motors and power distribution. Motor Control Centers are designed for 3-phase, 230-volt applications up to 200 horsepower, or 3-phase, 480-volt applications up to 400 horsepower.

Features, Benefits and Functions

Structure Design

Eaton's Cutler-Hammer Motor Control Centers are 20 inches (508 mm) wide and 90 inches (2286 mm) high with vertical compartments having 72 inches (1829 mm) of unit mounting space in 6-inch (152 mm) increments.

Structure depth is 16 inches (406 mm) or 21 inches (533 mm) deep front mounted only, and 21 inches (533 mm) deep for back-to-back mounted units.

The unique framed design permits the highest flexibility in component and structure configuration.

Accessibility

All parts and wiring are front accessible. Terminal blocks are side mounted in each unit. Vertical wireways separate from control units provide safe and convenient access to wiring and conduits without de-energizing any equipment.

Flexibility

Modular, framed design permits structure arrangements to be tailored to exactly meet any control requirements with a minimum of unusable space. Vertical compartments are incremented for maximum space utilization and unit interchangeability. A 6-inch (152 mm) size 1-2 starter unit provides users with the ability to solve demanding space requirements and still meet all NEMA and UL standards.

Safety

Design tested at Eaton's Cutler-Hammer power laboratory to assure maximum protection for control equipment. Engineered to minimize hazards to operating personnel.

Control Design

IT. Motor Control Centers are available in two basic control configurations:

- Hardwired for connection to traditional local/remote devices, PLC's DCS systems.
- DeviceNet Motor Control Centers which provide the optimal integrated package for control, communication, diagnostics and simplified wiring. Eaton's Cutler-Hammer DeviceNet MCC Solution provides users with significantly reduced installation time and increased uptime through the integration of intelligent devices and advanced software tools.
- Control products include: ODVA Compliant Motor Starters, Variable Speed Drives, Operator Interface and Block I/O.

Standards and Certifications

UL Listing

Standard structures and units are provided with UL label.

Options and Accessories

The ***IT.*** MCC features 24V DC control supplied to each control unit using a structure-mounted DC bus. The DC bus is fed from a power supply unit or by a separate customer-supplied DC source. Units feature fuseless self-protecting DC stabs which distribute control power to each unit. Optional motor lead terminal blocks can be provided through NEMA size 4 starters. The motor lead terminal block remains in the structure when a unit is withdrawn. This makes unit withdraw easy and safe.

IT. communication can be accomplished in two different configurations.

Direct DeviceNet Connection to Each Unit

Each unit will have a DeviceNet connection and will communicate the following information:

- % FLA.
- Status.
- Cause of trip.
- Breaker status.
- Run, stop, reset.

Each unit is one node on the network.

DeviceNet Using QCPort to Each Starter Unit

Each starter unit will have a QCPort interface. Each structure will contain a QCPort backplane, which will be located in the vertical bus area. Connection to the QCPort backplane will be made automatically through a QCPort stab when the unit is inserted into the MCC. The starter units connected on QCPort link to DeviceNet through a QCPort DeviceNet adapter (QCPort DNA). The QCPort DeviceNet Adapter can connect up to 21 starters and only uses one node on the DeviceNet network. One QCPort DNA module is required for every two structures. QCPort units will communicate the following information:

- % FLA.
- Status.
- Cause of trip.
- Breaker status.
- Run, stop, reset.

Product Specifications

Structure

- NEMA 1A, 2, 3R or 12 enclosure.
- Copper horizontal bus 600 – 3200A.
- Fully rated copper vertical bus 300 – 1200A.
- Labyrinth optional.
- Labyrinth barriers for insulated and isolated vertical bus.
- Optional isolating barriers between structures.
- 65 kA and 1000 kA bus bracing.
- Plug-in DC, ground and communication bus.

Units

- ***IT.*** Motor Starters:
  - ❑ NEMA size 1 through 7.
  - ❑ Heaterless overload relay with Class 10, 20 and 30 overload protection
  - ❑ Built-in phase loss, single-phase
  - ❑ Compact size
  - ❑ Longer contact life
  - ❑ Communications
  - ❑ Extended ride-through
- HMCP with combination starter ratings of 65 kAIC and 100 kAIC at 480 volts.
- Plug-in units up to 400 amperes.
- Handle mechanism with positive trip indication.
- Side-mounted positive latch terminal block.
- 6-inch (152.4 mm) NEMA size 1 and 2 units with HMCP.
- Solid-State Reduced Voltage Starters:
  - ❑ Intelligent Technologies (***IT.***) (20 – 800 hp)
- Adjustable Frequency Drives:
  - ❑ SV9000 (2 – 1100 hp)
- K-Switch visible blade disconnect:
  - ❑ 30 – 800A
  - ❑ 100 kAIC at 600 volts
- Surge protection:
  - ❑ Clipper Visor TVSS (100 – 500 kA)
- Energy monitoring:
  - ❑ IQ 320 (amperes, volts, Hz, watts, PF)
  - ❑ IQ DP-4130 (adds THD, Contact I/O)
  - ❑ IQ Analyzer (adds trending, waveform display)

Product Selection

Incoming Line

Table 18-70. Incoming Line — Main Lugs Only

Bus Rating	X-Space	Price U.S. $
600	2	262.
600	3	361.
600	4	572.
800	3	361.
800	4	461.
800	6	662.
1000	4	461.
1000	6	662.
1000	8	914.
1200	5	1000.
1200	6	1000.
1600	12	5,444.
2000	12	5,444.
2500	12	5,444.
3200 ①	12	8,167.

① NEMA 1 gasketed only.

Table 18-71. Incoming Line — Main Circuit Breaker

Frame Size (Amps)	Circuit Breaker Type	Unit Size	Enclosure Width	Price U.S. $
150	HFD	18 (457.2)	20 (508.0)	1,203.
	FDC			1,934.
225	HFD	18 (457.2)		1,518.
	FDC			4,389.
250	HJD	30 (762.0)		1,897.
	JDC			5,486.
400	HKD	30 (762.0)		3,232.
	KDC			6,107.
	CHKD ②			6,228.
	CKDC ②			9,732.
600	HLD	24 (609.6) ⑤⑥		4,149.
	LDC			4,880.
	CHLD ②③			7,346.
	CLDC ②③			8,238.
800	HMDL	30 (762.0) ⑥		6,389.
	CHMDL ②③	48 (1219.2) ⑥		10,080.
	NDC	42 (1066.8) ⑥		9,488.
	CHND ②	72 (1828.8)		10,080.
	CNDC ②	72 (1828.8)		11,580.
1200	HND ④	42 (1066.8) ⑥		7,174.
	NDC ④	42 (1066.8) ⑥		11,387.
	CHND ②③	72 (1828.8)		10,932.
	CNDC ②③	72 (1828.8)		13,993.
2000	RD ④	72 (1828.8) ⑦		14,368.
	RDC ④			16,796.
	CRD ②			17,529.
	CRDC ②			19,918.
2500	RD	72 (1828.8) ⑥	24 (609.6)	21,886.
	RDC			24,868.

② 100% rated when 90° cable applied at 75° ampacity for 100% rating. Digitrip 310 LS is required and included in the price.
③ NEMA 1 gasketed only.
④ Digitrip 310 LS is standard and included in the pricing.
⑤ Add 6-inch (152.4 mm) for top entry of incoming cables.
⑥ Install at top for cable top entry or at bottom for bottom cable entry.
⑦ The main breaker requires the complete vertical section. The rear is unusable.

Structure Modifications

Table 18-72. Structure Modifications

Description	Price U.S. $
Enclosure	
NEMA 1 Gasketed	—
NEMA 12 — Dust Tight	426.
NEMA 3R Front Mounted Only	3,240.
NEMA 3R Front & Rear	3,749.
Space Heater	528.
Thermostat	343.
Bottom Plate	75.
Channel Sills	75.
12-inch (304.8 mm) Pull Box	724.
100K Bracing	594.
DC Bus and Vertical Ground Bus	361.
QCPort Communication Bus	1,950.
Vertical Bus	
300A	—
600A	268.
800A	268.
1200A	538.
Ground Bus 300A	
Horizontal — Copper	105.
Standard Structures	
16-inch (406.4 mm) Front Mounted Only	1,422.
21-inch (533.4 mm) Front Mounted Only	1,578.
21-inch (533.4 mm) Front & Rear	2,182.
Main Horizontal Bus	
600A Copper	294.
800A Copper	751.
1200A Copper	1,158.
1600A Copper	1,757.
2000A Copper	1,882.
2500A Copper	2,321.
3200A Copper	3,318.
Vertical Bus Barrier	
Labyrinth Barrier with Shutters	Std.

Table 18-73. Neutral Bus (bottom)

Ampere Rating	Price U.S. $ Per Structure
300	197.
600 or 800	226.
1000	291.
1200	387.
1600	525.
2000	759.
2500	1,204.
3200 ⑧	1,886.

⑧ Available NEMA 1 gasketed enclosures only.
Note: 1/2 size Main Bus Copper.

Discount Symbol **1CD-2**

Table 18-74. Incoming Line Metering

IQ Meter	X-Space	Price U.S. $
IQ 100	2	2,070.
IQ 320	2	4,050.
IQ DP-4130	2	6,257.
IQ Analyzer	2	9,823.

Note: Does not include Current Transformers pricing.

Table 18-75. Transient Voltage Surge Suppression (Clipper Supervisor) — 18-inch Units with Circuit Breaker Disconnect ①

Includes power quality meter for volts, sag, swell, outage, transient counter, Form C contact, alarm.

Surge Current Per Phase	Unit Size	Price U.S. $
100 kA Model CPS ②	18 (457.2)	6,172.
120 kA Model CPS ②③		6,670.
160 kA Model CPS ②		8,680.
200 kA Model CPS ②		10,891.
250 kA Model CPS ④		14,654.
300 kA Model CPS		17,840.
400 kA Model CPS		23,980.
500 kA Model CPS		29,980.

① Available in 12-inch (304.8 mm) unit (2X) without circuit breaker disconnect.
② Optional integral IQ 200 meter in 18-inch (457.2 mm) unit for 100 kA – 200 kA = $3,900.
③ Recommended branch entrance.
④ Recommended service entrance.

Table 18-76. CPS — Control Power Supplies ⑤

Ampere Rating	Description	X-Space	Price U.S. $
6.5	Single Power Supply	1	1,430.
6.5	Dual Redundant Power Supplies	1	2,950.
12	Single Power Supply	2	3,750.

⑤ Required in all structures that will contain a starter, drive or soft start.

Combination Starters

Table 18-77. Full Voltage Non-Reversing — HMCP (T206)

Size	X-Space	Price U.S. $
1	1	1,111.
2	1	1,342.
3	2	1,956.
4	2	3,742.
5	6	7,454.
6	9	12,330.

Table 18-78. Full Voltage Reversing — HMCP (T216)

Size	X-Space	Price U.S. $
1	2	1,565.
2	2	2,175.
3	3	3,125.
4	4	5,725.
5	10	11,026.
6	12	18,906.

Table 18-79. Non-Reversing 2S, 1W HMCP (T946)

Size	X-Space	Price U.S. $
1	2	2,443.
2	3	3,918.
3	4	4,641.
4	4	9,260.

Table 18-80. Non-Reversing 2S, 2W, HMCP (T956)

Size	X-Space	Price U.S. $
1	2	2,025.
2	2	3,855.
3	3	4,074.
4	4	7,715.

Table 18-81. Fusible Disconnect Starters

Size	X-Space	Price U.S. $
Full Voltage Non-Reversing (T204)		
1	2	989.
2	2	1,332.
3	4	2,089.
4	5	4,074.
5	10	6,662.
Full Voltage Reversing (T214)		
1	3	1,580.
2	3	2,293.
3	5	3,243.
4	6	6,132.
Fusible, Non-Reversing 2S, 1W (T944)		
1	3	2,428.
2	3	3,664.
3	6	4,749.
4	7	8,884.
Fusible, Non-Reversing 2S, 2W (T954)		
1	3	2,103.
2	3	3,662.
3	5	4,052.
4	6	7,494.

Table 18-82. Contactor Only Units

Size	X-Space	Price U.S. $
Circuit Breaker (T208)		
1	1	1,072.
2	1	1,297.
3	2	1,682.
4	2	3,522.
5	5	6,740.
6	9	11,225.
Fusible (T209)		
1	2	1,072.
2	2	1,297.
3	3	1,682.
4	4	3,522.
5	9	6,740.

Discount Symbol **1CD-2**

IT. Motor Control Centers

IT. MCC

Product Description

Eaton's offerings for motor control centers feature the Cutler-Hammer Intelligent Technologies ***(IT.)*** MCC. This product offers the highest density of motor control in the industry along with the most functionality. Its innovative design, as well as its enhanced fault performance and protective features, make it the new benchmark in the industry.

Application Description

Cutler-Hammer Motor Control Centers by Eaton Corporation are custom-made assemblies of conveniently grouped control equipment primarily used for control of motors and power distribution. Motor Control Centers are designed for 3-phase, 230-volt applications up to 200 horsepower, or 3-phase, 480-volt applications up to 400 horsepower.

Features, Benefits and Functions

Structure Design

Eaton's Cutler-Hammer Motor Control Centers are 20 inches (508 mm) wide and 90 inches (2286 mm) high with vertical compartments having 72 inches (1829 mm) of unit mounting space in 6-inch (152 mm) increments.

Structure depth is 16 inches (406 mm) or 21 inches (533 mm) deep front mounted only, and 21 inches (533 mm) deep for back-to-back mounted units.

The unique framed design permits the highest flexibility in component and structure configuration.

Accessibility

All parts and wiring are front accessible. Terminal blocks are side mounted in each unit. Vertical wireways separate from control units provide safe and convenient access to wiring and conduits without de-energizing any equipment.

Flexibility

Modular, framed design permits structure arrangements to be tailored to exactly meet any control requirements with a minimum of unusable space. Vertical compartments are incremented for maximum space utilization and unit interchangeability. A 6-inch (152 mm) size 1-2 starter unit provides users with the ability to solve demanding space requirements and still meet all NEMA and UL standards.

Safety

Design tested at Eaton's Cutler-Hammer power laboratory to assure maximum protection for control equipment. Engineered to minimize hazards to operating personnel.

Control Design

IT. Motor Control Centers are available in two basic control configurations:

- Hardwired for connection to traditional local/remote devices, PLC's DCS systems.
- DeviceNet Motor Control Centers which provide the optimal integrated package for control, communication, diagnostics and simplified wiring. Eaton's Cutler-Hammer DeviceNet MCC Solution provides users with significantly reduced installation time and increased uptime through the integration of intelligent devices and advanced software tools.
- Control products include: ODVA Compliant Motor Starters, Variable Speed Drives, Operator Interface and Block I/O.

Standards and Certifications

UL Listing

Standard structures and units are provided with UL label.

Options and Accessories

The ***IT.*** MCC features 24V DC control supplied to each control unit using a structure-mounted DC bus. The DC bus is fed from a power supply unit or by a separate customer-supplied DC source. Units feature fuseless self-protecting DC stabs which distribute control power to each unit. Optional motor lead terminal blocks can be provided through NEMA size 4 starters. The motor lead terminal block remains in the structure when a unit is withdrawn. This makes unit withdraw easy and safe.

IT. communication can be accomplished in two different configurations.

Direct DeviceNet Connection to Each Unit

Each unit will have a DeviceNet connection and will communicate the following information:

- % FLA.
- Status.
- Cause of trip.
- Breaker status.
- Run, stop, reset.

Each unit is one node on the network.

DeviceNet Using QCPort to Each Starter Unit

Each starter unit will have a QCPort interface. Each structure will contain a QCPort backplane, which will be located in the vertical bus area. Connection to the QCPort backplane will be made automatically through a QCPort stab when the unit is inserted into the MCC. The starter units connected on QCPort link to DeviceNet through a QCPort DeviceNet adapter (QCPort DNA). The QCPort DeviceNet Adapter can connect up to 21 starters and only uses one node on the DeviceNet network. One QCPort DNA module is required for every two structures. QCPort units will communicate the following information:

- % FLA.
- Status.
- Cause of trip.
- Breaker status.
- Run, stop, reset.

Product Specifications

Structure

- NEMA 1A, 2, 3R or 12 enclosure.
- Copper horizontal bus 600 – 3200A.
- Fully rated copper vertical bus 300 – 1200A.
- Labyrinth optional.
- Labyrinth barriers for insulated and isolated vertical bus.
- Optional isolating barriers between structures.
- 65 kA and 1000 kA bus bracing.
- Plug-in DC, ground and communication bus.

Units

- ***IT.*** Motor Starters:
  - ❑ NEMA size 1 through 7.
  - ❑ Heaterless overload relay with Class 10, 20 and 30 overload protection
  - ❑ Built-in phase loss, single-phase
  - ❑ Compact size
  - ❑ Longer contact life
  - ❑ Communications
  - ❑ Extended ride-through
- HMCP with combination starter ratings of 65 kAIC and 100 kAIC at 480 volts.
- Plug-in units up to 400 amperes.
- Handle mechanism with positive trip indication.
- Side-mounted positive latch terminal block.
- 6-inch (152.4 mm) NEMA size 1 and 2 units with HMCP.
- Solid-State Reduced Voltage Starters:
  - ❑ Intelligent Technologies (***IT.***) (20 – 800 hp)
- Adjustable Frequency Drives:
  - ❑ SV9000 (2 – 1100 hp)
- K-Switch visible blade disconnect:
  - ❑ 30 – 800A
  - ❑ 100 kAIC at 600 volts
- Surge protection:
  - ❑ Clipper Visor TVSS (100 – 500 kA)
- Energy monitoring:
  - ❑ IQ 320 (amperes, volts, Hz, watts, PF)
  - ❑ IQ DP-4130 (adds THD, Contact I/O)
  - ❑ IQ Analyzer (adds trending, waveform display)

Product Selection

Incoming Line

Table 18-70. Incoming Line — Main Lugs Only

Bus Rating	X-Space	Price U.S. $
600	2	262.
600	3	361.
600	4	572.
800	3	361.
800	4	461.
800	6	662.
1000	4	461.
1000	6	662.
1000	8	914.
1200	5	1000.
1200	6	1000.
1600	12	5,444.
2000	12	5,444.
2500	12	5,444.
3200 ①	12	8,167.

① NEMA 1 gasketed only.

Table 18-71. Incoming Line — Main Circuit Breaker

Frame Size (Amps)	Circuit Breaker Type	Unit Size	Enclosure Width	Price U.S. $
150	HFD	18 (457.2)	20 (508.0)	1,203.
	FDC			1,934.
225	HFD	18 (457.2)		1,518.
	FDC			4,389.
250	HJD	30 (762.0)		1,897.
	JDC			5,486.
400	HKD	30 (762.0)		3,232.
	KDC			6,107.
	CHKD ②			6,228.
	CKDC ②			9,732.
600	HLD	24 (609.6) ⑤⑥		4,149.
	LDC			4,880.
	CHLD ②③			7,346.
	CLDC ②③			8,238.
800	HMDL	30 (762.0) ⑥		6,389.
	CHMDL ②③	48 (1219.2) ⑥		10,080.
	NDC	42 (1066.8) ⑥		9,488.
	CHND ②	72 (1828.8)		10,080.
	CNDC ②	72 (1828.8)		11,580.
1200	HND ④	42 (1066.8) ⑥		7,174.
	NDC ④	42 (1066.8) ⑥		11,387.
	CHND ②③	72 (1828.8)		10,932.
	CNDC ②③	72 (1828.8)		13,993.
2000	RD ④	72 (1828.8) ⑦		14,368.
	RDC ④			16,796.
	CRD ②			17,529.
	CRDC ②			19,918.
2500	RD	72 (1828.8) ⑥	24 (609.6)	21,886.
	RDC			24,868.

② 100% rated when 90° cable applied at 75° ampacity for 100% rating. Digitrip 310 LS is required and included in the price.
③ NEMA 1 gasketed only.
④ Digitrip 310 LS is standard and included in the pricing.
⑤ Add 6-inch (152.4 mm) for top entry of incoming cables.
⑥ Install at top for cable top entry or at bottom for bottom cable entry.
⑦ The main breaker requires the complete vertical section. The rear is unusable.

Structure Modifications

Table 18-72. Structure Modifications

Description	Price U.S. $
Enclosure	
NEMA 1 Gasketed	—
NEMA 12 — Dust Tight	426.
NEMA 3R Front Mounted Only	3,240.
NEMA 3R Front & Rear	3,749.
Space Heater	528.
Thermostat	343.
Bottom Plate	75.
Channel Sills	75.
12-inch (304.8 mm) Pull Box	724.
100K Bracing	594.
DC Bus and Vertical Ground Bus	361.
QCPort Communication Bus	1,950.
Vertical Bus	
300A	—
600A	268.
800A	268.
1200A	538.
Ground Bus 300A	
Horizontal — Copper	105.
Standard Structures	
16-inch (406.4 mm) Front Mounted Only	1,422.
21-inch (533.4 mm) Front Mounted Only	1,578.
21-inch (533.4 mm) Front & Rear	2,182.
Main Horizontal Bus	
600A Copper	294.
800A Copper	751.
1200A Copper	1,158.
1600A Copper	1,757.
2000A Copper	1,882.
2500A Copper	2,321.
3200A Copper	3,318.
Vertical Bus Barrier	
Labyrinth Barrier with Shutters	Std.

Table 18-73. Neutral Bus (bottom)

Ampere Rating	Price U.S. $ Per Structure
300	197.
600 or 800	226.
1000	291.
1200	387.
1600	525.
2000	759.
2500	1,204.
3200 ⑧	1,886.

⑧ Available NEMA 1 gasketed enclosures only.
Note: 1/2 size Main Bus Copper.

Discount Symbol **1CD-2**

Table 18-74. Incoming Line Metering

IQ Meter	X-Space	Price U.S. $
IQ 100	2	2,070.
IQ 320	2	4,050.
IQ DP-4130	2	6,257.
IQ Analyzer	2	9,823.

Note: Does not include Current Transformers pricing.

Table 18-75. Transient Voltage Surge Suppression (Clipper Supervisor) — 18-inch Units with Circuit Breaker Disconnect ①

Includes power quality meter for volts, sag, swell, outage, transient counter, Form C contact, alarm.

Surge Current Per Phase	Unit Size	Price U.S. $
100 kA Model CPS ②	18 (457.2)	6,172.
120 kA Model CPS ②③		6,670.
160 kA Model CPS ②		8,680.
200 kA Model CPS ②		10,891.
250 kA Model CPS ④		14,654.
300 kA Model CPS		17,840.
400 kA Model CPS		23,980.
500 kA Model CPS		29,980.

① Available in 12-inch (304.8 mm) unit (2X) without circuit breaker disconnect.
② Optional integral IQ 200 meter in 18-inch (457.2 mm) unit for 100 kA – 200 kA = $3,900.
③ Recommended branch entrance.
④ Recommended service entrance.

Table 18-76. CPS — Control Power Supplies ⑤

Ampere Rating	Description	X-Space	Price U.S. $
6.5	Single Power Supply	1	1,430.
6.5	Dual Redundant Power Supplies	1	2,950.
12	Single Power Supply	2	3,750.

⑤ Required in all structures that will contain a starter, drive or soft start.

Combination Starters

Table 18-77. Full Voltage Non-Reversing — HMCP (T206)

Size	X-Space	Price U.S. $
1	1	1,111.
2	1	1,342.
3	2	1,956.
4	2	3,742.
5	6	7,454.
6	9	12,330.

Table 18-78. Full Voltage Reversing — HMCP (T216)

Size	X-Space	Price U.S. $
1	2	1,565.
2	2	2,175.
3	3	3,125.
4	4	5,725.
5	10	11,026.
6	12	18,906.

Table 18-79. Non-Reversing 2S, 1W HMCP (T946)

Size	X-Space	Price U.S. $
1	2	2,443.
2	3	3,918.
3	4	4,641.
4	4	9,260.

Table 18-80. Non-Reversing 2S, 2W, HMCP (T956)

Size	X-Space	Price U.S. $
1	2	2,025.
2	2	3,855.
3	3	4,074.
4	4	7,715.

Table 18-81. Fusible Disconnect Starters

Size	X-Space	Price U.S. $
Full Voltage Non-Reversing (T204)		
1	2	989.
2	2	1,332.
3	4	2,089.
4	5	4,074.
5	10	6,662.
Full Voltage Reversing (T214)		
1	3	1,580.
2	3	2,293.
3	5	3,243.
4	6	6,132.
Fusible, Non-Reversing 2S, 1W (T944)		
1	3	2,428.
2	3	3,664.
3	6	4,749.
4	7	8,884.
Fusible, Non-Reversing 2S, 2W (T954)		
1	3	2,103.
2	3	3,662.
3	5	4,052.
4	6	7,494.

Table 18-82. Contactor Only Units

Size	X-Space	Price U.S. $
Circuit Breaker (T208)		
1	1	1,072.
2	1	1,297.
3	2	1,682.
4	2	3,522.
5	5	6,740.
6	9	11,225.
Fusible (T209)		
1	2	1,072.
2	2	1,297.
3	3	1,682.
4	4	3,522.
5	9	6,740.

Discount Symbol **1CD-2**

Starter Modifications

Table 18-83. Control Options

Description	Price U.S. $
Auxiliary Switch — In Breaker	128.
ETM Mini Meters	288.
Timer — Pneumatic	1,313.
Timer — Solid State	502.
Relay — AR — 600V	245.
Relay — General Purpose 300V	193.
AC Estop Relay	186.

Table 18-84. DeviceNet Options

Description	Price U.S. $
QCPort DeviceNet Adapter ①	6,410.
QCPort for *IT.* Starter ②	400.
DeviceNet for *IT.* Starter ③	1,429.
5 Amp — 24V DC Power Supply	3,495.
20 Amp — 24V DC Power Supply	6,950.
Trunk Cable and Tee	399.
Drop and Auxiliary Cable, Tee	239.
Terminating Resistors	156.

① One adapter required for every 21 starters.
② Communications bus must be added to each structure and QCPort DNA must be added.
③ Includes drop cables.

Table 18-85. Pilot Control Modules

Description	Price U.S. $
Stop	42.
Start/Stop	85.
HOA	85.
Fast Slow-Stop	164.
Fwd/Rev-Stop	164.
Fast/Slow/Off/Auto	110.
Fwd/Rev/Off/Auto	110.
Pilot Lights —	
Run (Red)	135.
Stop (Green)	135.
OL Trip (Red)	135.
CB Trip (Red)	240.
Ground Fault Trip (Red)	135.
Fwd/Rev (Red)	220.
Fast/Slow (Red)	270.

Table 18-86. Intelligent Technologies (*IT.*) SSRV Starters with Integral Bypass

Maximum Hp	X-Space	Price U.S. $
IT06 Solid-State Reduced Voltage Starters — HMCP 65 kAIC — 1.15 Service Factor — Standard Duty		
20	2	7,108.
40	2	8,275.
60	3	10,440.
75	3	11,600.
125	6	14,390.
150	6	14,990.
200	6	18,680.
300	9	29,440.
350	9	30,330.
450	12	32,440.
500	12	42,000.
600	12	53,300.
700	12 ④	68,200.
IT06 Solid-State Reduced Voltage Starters — HMCP 65 kAIC — 1.15 Service Factor — Severe Duty		
10	2	7,108.
25	2	8,275.
40	3	10,440.
50	3	12,800.
75	6	15,120.
100	6	15,550.
125	6	21,320.
150	9	26,120.
200	9	27,380.
250	9	28,450.
300	9	32,440.
350	9	42,000.
450	12 ④	68,200.

④ Requires 24-inch wide, rear is unusable, bottom exit only.

Note: Consult the *Cutler-Hammer Consulting Application Guide, 13th Edition* for more complete information including fusible type disconnects and severe duty-rated design.

Table 18-87. *IT.* SSRV Control Options ⑤

Description	Price U.S. $
Pump Control	2,000.
MOV Protection	380.
DeviceNet — Standard	785.
DeviceNet — Enhanced	3,200.

⑤ Options apply to both HMCP and thermal-magnetic breaker models.

Table 18-88. *IT.* SSRV Power Options ⑥

NEMA Bypass Starter	Price U.S. $
Size 1	686.
Size 2	826.
Size 3	1,197.
Size 4	2,409.
Size 5	4,830.
Size 6	7,859.
Size 7	13,850.

⑥ Options apply to both HMCP and thermal-magnetic breaker models.

Table 18-89. Motor Isolation Contactors

NEMA Isolation Contactor	Price U.S. $
Size 1	554.
Size 2	694.
Size 3	1,065.
Size 4	2,277.
Size 5	4,398.
Size 6	7,427.
Size 7	13,160.

Table 18-90. SV9000 Adjustable Frequency Drives — Plug-in Units NEMA 1 480V Constant / Variable Torque Rated

Hp	X-Space	Price U.S. $	
		VT	CT
3	3	7,306.	7,306.
5	4	8,680.	8,680.
7.5	4	8,878.	9,459.
10	4	9,459.	10,449.
15	4	10,449.	12,193.
20	6	12,193.	15,270.
25	6	15,270.	17,627.
30	6	17,627.	19,760.

Note: SV9000 Plug-in Units with HMCP disconnect, 3% input line reactor, 3% output line reactor, door mounted Keypad, CPT.

Table 18-91. SV9000 Options — Plug-in Units

Description	Price U.S. $
DeviceNet Communications	964.
Profibus Communications	2,620.
2000-foot (609.6 m) dV/dT Filter (3 hp)	1,431.
2000-foot (609.6 m) dV/dT Filter (5 – 15 hp)	1,540.
2000-foot (609.6 m) dV/dT Filter (20 – 30 hp)	
Input Line Fuses (3 – 30 hp)	454.
RFI Filter (3 – 30 hp)	486.

Discount Symbol **1CD-2**

Starter Modifications

Table 18-83. Control Options

Description	Price U.S. $
Auxiliary Switch — In Breaker	128.
ETM Mini Meters	288.
Timer — Pneumatic	1,313.
Timer — Solid State	502.
Relay — AR — 600V	245.
Relay — General Purpose 300V	193.
AC Estop Relay	186.

Table 18-84. DeviceNet Options

Description	Price U.S. $
QCPort DeviceNet Adapter ①	6,410.
QCPort for *IT.* Starter ②	400.
DeviceNet for *IT.* Starter ③	1,429.
5 Amp — 24V DC Power Supply	3,495.
20 Amp — 24V DC Power Supply	6,950.
Trunk Cable and Tee	399.
Drop and Auxiliary Cable, Tee	239.
Terminating Resistors	156.

① One adapter required for every 21 starters.
② Communications bus must be added to each structure and QCPort DNA must be added.
③ Includes drop cables.

Table 18-85. Pilot Control Modules

Description	Price U.S. $
Stop	42.
Start/Stop	85.
HOA	85.
Fast Slow-Stop	164.
Fwd/Rev-Stop	164.
Fast/Slow/Off/Auto	110.
Fwd/Rev/Off/Auto	110.
Pilot Lights —	
Run (Red)	135.
Stop (Green)	135.
OL Trip (Red)	135.
CB Trip (Red)	240.
Ground Fault Trip (Red)	135.
Fwd/Rev (Red)	220.
Fast/Slow (Red)	270.

Table 18-86. Intelligent Technologies (*IT.*) SSRV Starters with Integral Bypass

Maximum Hp	X-Space	Price U.S. $
IT06 Solid-State Reduced Voltage Starters — HMCP 65 kAIC — 1.15 Service Factor — Standard Duty		
20	2	7,108.
40	2	8,275.
60	3	10,440.
75	3	11,600.
125	6	14,390.
150	6	14,990.
200	6	18,680.
300	9	29,440.
350	9	30,330.
450	12	32,440.
500	12	42,000.
600	12	53,300.
700	12 ④	68,200.
IT06 Solid-State Reduced Voltage Starters — HMCP 65 kAIC — 1.15 Service Factor — Severe Duty		
10	2	7,108.
25	2	8,275.
40	3	10,440.
50	3	12,800.
75	6	15,120.
100	6	15,550.
125	6	21,320.
150	9	26,120.
200	9	27,380.
250	9	28,450.
300	9	32,440.
350	9	42,000.
450	12 ④	68,200.

④ Requires 24-inch wide, rear is unusable, bottom exit only.

Note: Consult the *Cutler-Hammer Consulting Application Guide, 13th Edition* for more complete information including fusible type disconnects and severe duty-rated design.

Table 18-87. *IT.* SSRV Control Options ⑤

Description	Price U.S. $
Pump Control	2,000.
MOV Protection	380.
DeviceNet — Standard	785.
DeviceNet — Enhanced	3,200.

⑤ Options apply to both HMCP and thermal-magnetic breaker models.

Table 18-88. *IT.* SSRV Power Options ⑥

NEMA Bypass Starter	Price U.S. $
Size 1	686.
Size 2	826.
Size 3	1,197.
Size 4	2,409.
Size 5	4,830.
Size 6	7,859.
Size 7	13,850.

⑥ Options apply to both HMCP and thermal-magnetic breaker models.

Table 18-89. Motor Isolation Contactors

NEMA Isolation Contactor	Price U.S. $
Size 1	554.
Size 2	694.
Size 3	1,065.
Size 4	2,277.
Size 5	4,398.
Size 6	7,427.
Size 7	13,160.

Table 18-90. SV9000 Adjustable Frequency Drives — Plug-in Units NEMA 1 480V Constant / Variable Torque Rated

Hp	X-Space	Price U.S. $	
		VT	CT
3	3	7,306.	7,306.
5	4	8,680.	8,680.
7.5	4	8,878.	9,459.
10	4	9,459.	10,449.
15	4	10,449.	12,193.
20	6	12,193.	15,270.
25	6	15,270.	17,627.
30	6	17,627.	19,760.

Note: SV9000 Plug-in Units with HMCP disconnect, 3% input line reactor, 3% output line reactor, door mounted Keypad, CPT.

Table 18-91. SV9000 Options — Plug-in Units

Description	Price U.S. $
DeviceNet Communications	964.
Profibus Communications	2,620.
2000-foot (609.6 m) dV/dT Filter (3 hp)	1,431.
2000-foot (609.6 m) dV/dT Filter (5 – 15 hp)	1,540.
2000-foot (609.6 m) dV/dT Filter (20 – 30 hp)	
Input Line Fuses (3 – 30 hp)	454.
RFI Filter (3 – 30 hp)	486.

Discount Symbol **1CD-2**

SV9000

Table 18-92. SV9000 Adjustable Frequency Drives — Non-Plug-in Units NEMA 1 480V Constant / Variable Torque Rated

Hp	X-Space	Price U.S. $	
		VT	CT
40	9	20,442.	23,292.
50	9	23,473.	25,186.
60	9	29,103.	32,319.
75 ①	9	32,319.	38,269.
100	12	39,748.	44,972.
125	12	48,516.	54,199.
150	12	54,199.	59,103.
200	12	68,647.	74,025.
250	12	76,725.	88,987.
300	12	89,437.	109,237.
400	12	109,237.	174,956.
500	12	174,756.	207,469.
600	12	198,039.	245,700.

① X-Space for 75 hp CT rated drive is 12X.

Note: Consult the *Cutler-Hammer Consulting Application Guide, 13th Edition* for complete details on Drive / Option Assembly Dimensions.

Note: SV9000 Non-Plug-in Units with HMCP disconnect, 3% input line reactor, 3% output line reactor, door mounted Keypad, CPT.

Note: VT — Variable Torque drives are capable of producing 200% starting torque for 10 seconds and are rated for 10 seconds, and are rated 110% overload for one minute.

Note: CT — Variable Torque drives are capable of producing 200% starting torque for 10 seconds and are rated for 10 seconds, and are rated 150% overload for one minute.

Table 18-93. SV9000 Options — Non-Plug-in Units

Description	Price U.S. $
DeviceNet Communications	964.
Profibus Communications	2,620.
2000-foot (609.6 m) dV/dT Filter (40 – 75 VT hp)	4,100.
2000-foot (609.6 m) dV/dT Filter (100 – 150 VT hp)	5,250.
2000-foot (609.6 m) dV/dT Filter (200 – 250 VT hp)	6,810.
2000-foot (609.6 m) dV/dT Filter (300 – 400 VT hp)	8,500.
2000-foot (609.6 m) dV/dT Filter (500 – 600 VT hp)	10,970.
Input Line Fuses (40 – 150 VT hp)	714.
Input Line Fuses (200 – 250 hp)	1,176.
Input Line Fuses (300 – 400 hp)	2,245.

Table 18-94. Active Harmonic Correction for AC Drives

Description	X-Space	Price U.S. $
50A Harmonic Correction	12 ②	48,813.
100A Harmonic Correction	12 ②	76,107.

② Requires 24-inch (609.6 mm) wide structure.

Table 18-95. 18-Pulse Clean Power Drives — NEMA 1, 480 Variable Torque Duty

Hp	X-Space, Inches Wide	Price U.S. $
100	12, 90	36,420.
150	12, 90	53,480.
200	12, 98	69,836.
250	12, 98	78,004.
300	12, 130	102,180.
400	12, 130	104,820.
500	12, 138	115,290.
600	12, 138	119,688.

Note: Includes, 5% Input Line reactor, 18-pulse rectifier, Delta differential transformer. Price standard SV9000 drive separately.

Feeders

Table 18-96. Circuit Breaker

Amperes	X-Space	Price U.S. $
Standard Circuit Breakers		
E125 50	1	667.
E125 125	1	981.
J250 225	1	1,465.
J250 250	1	1,816.
HKD 400	4	2,993.
HLD 600	4	3,842.
HND 800	7	5,916.
HND 1200	7	6,643.

Table 18-97. Fusible Switch

Amperes	X-Space	Price U.S. $
30 or 60	2	427.
100	3	577.
200	6	695.
400	6	1,919.
600	8	3,140.

Table 18-98. Dual Fusible Switches

Amperes	X-Space	Price U.S. $
30	2	956.
60	3	968.

Transformers

Note: Must have primary breaker. Must be located at bottom of structure.

Table 18-99. Transformers

kVA	X-Space	Price U.S. $
Single-Phase		
5	4	1,865.
10	4	2,445.
15	5	3,142.
20	5	4,452.
30	6	5,846.
45	7	8,851.
Three-Phase		
15	6	4,366.
30	6	6,111.
45	9	8,297.

Panelboards

Table 18-100. Panelboards (240V Maximum)

Circuit	X-Space	Price U.S. $
18	4	1,305.
30	5	1,892.
42	6	2,075.

Note: Space and price for MLO. Branch breakers included.

Table 18-101. ATS — Automatic Transfer Switches — Open Transition 3-Pole Only

Ampere Rating	Unit Width	Unit Size	Price U.S. $ ③
100 ④	20	36	11,840.
150 ④	(508.0)	(914.4)	15,174.
100	20	48	12,313.
150	(508.0)	(1219.2) (8X)	15,780.
225	20		16,032.
300	(508.0)		16,032.
400	24	72	20,454.
600	(609.6) ⑤	(1828.8)	25,527.
800			29,601.
1000			41,216.
1000	44		73,369.
1200	(1117.6) ⑥		73,869.
1600	44		76,373.
2000	(1117.6) ⑦		80,002.

③ Price includes option group OG9.
④ Manually operated switch:
NTVS = Electronically operated non-automatic.
MTVX = Single handle manual operation.
⑤ Requires 21-inch (533.4 mm) deep structure.
⑥ Requires 37-inch (939.8 mm) deep structure, flush at the rear. 4-inch (101.6 mm) filler required.
⑦ Requires 42-inch (1066.8 mm) deep structure. 4-inch (101.6 mm) filler required.

Discount Symbol **1CD-2**

Application Guide

Table 18-102. Motor Circuit Protector Selection Guide

NEMA	Maximum Horsepower						
	200V	208V	230V	380V	460V	575V	HMCP
1	— 3/4 2 5 7-1/2	— 1 2 5 7-1/2	— 1 2 5 7-1/2	3/4 2 3 10 —	3/4 2 5 10 —	1 3 7-1/2 10 —	3 7 15 30 50
2	— 10 —	— 10 —	— 10 15	— 15 25	— 20 25	15 25 —	30 50 70
3	— 15 25	— 20 25	— 20 30	— 30 50	— 40 50	30 50 —	50 100 150
4	40 —	40 —	40 50	60 75	100 —	100 —	150 250
5	50 75 —	50 75 —	60 75 100	— 150 —	125 200 —	150 200 —	250 400 600
6	150 —	150 —	200 —	300 —	350 400	400 —	600 1200

Note: Suitable for use with NEMA Design B and D (High Efficiency) Motors.

Table 18-103. Circuit Breaker Application Chart

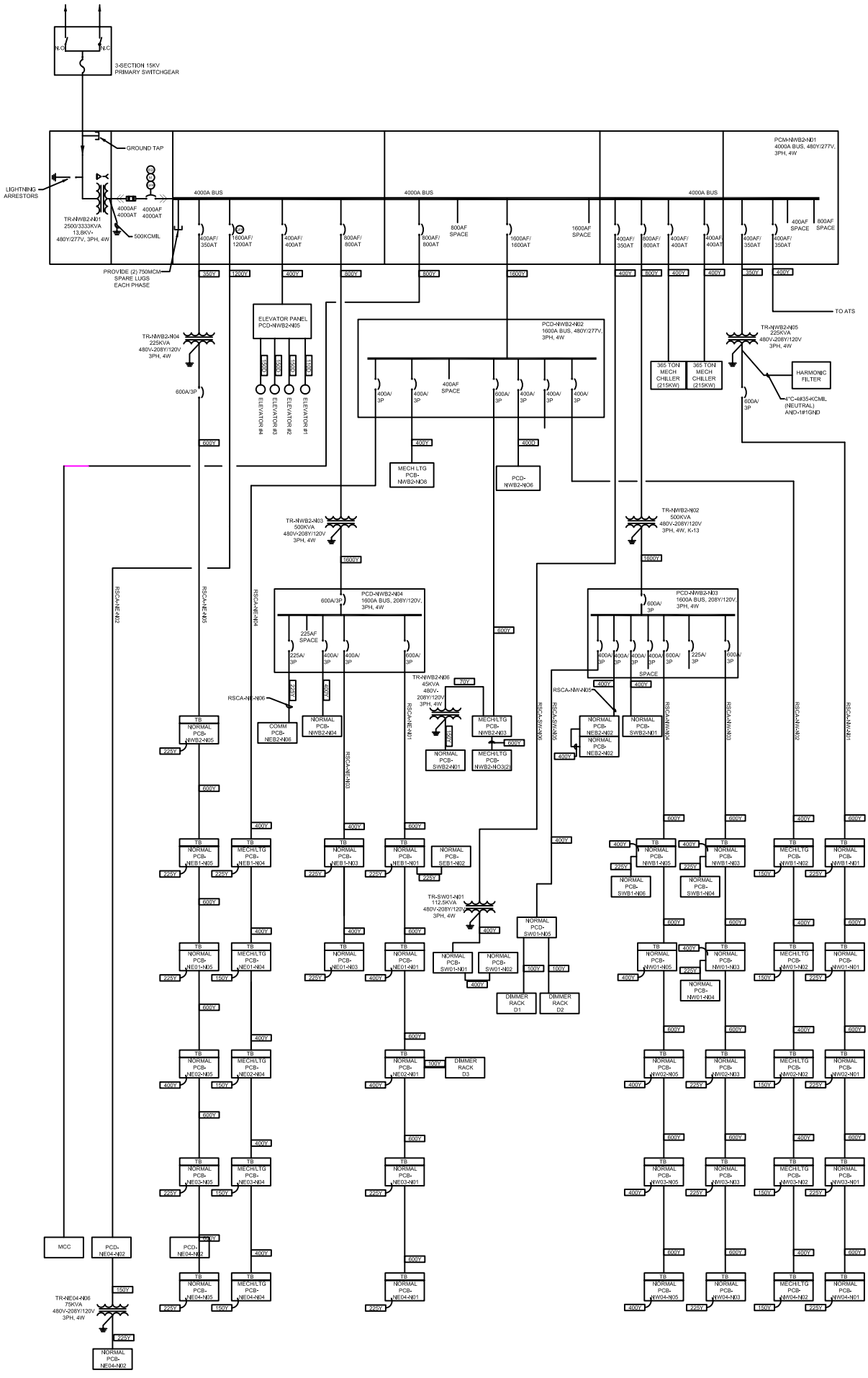
Frame	Frame Rating (Amperes)	Interrupting Rating (kA Symmetrical Amperes)		
		208/240V	480V	600V
Standard Rating Molded Case Circuit Breakers				
E125H	125	65	65	25
HFD HJD J250 HKD	150 250 250 400	100 100 65 100	65 65 65 65	25 25 25 35
HLD HND HND RD	600 800 1200 2000	100 100 100 100	65 65 65 65	35 35 35 50
High Interrupting Rating Molded Case Circuit Breakers				
FDC JDC KDC LDC	150 250 400 600	100 100 100 100	100 100 100 100	35 35 50 50
NDC NDC RDC RDC	800 1200 2000 2500	100 100 100 100	100 100 100 100	50 50 65 65
Current Limiting Molded Case Circuit Breakers				
HFD/CL NBTRIPAC	150 300 – 800	100 100	100 100	100 100
Magnum DS Air Circuit Breakers				
MDS-608 MDS-C08 MDS-616 MDS-C16	800 800 1600 1600	65 100 65 100	65 100 65 100	65 100 65 100
MDS-620 MDS-C20 MDS-632 MDS-C32	2000 2000 3200 3200	65 100 65 100	65 100 65 100	65 100 65 100

Table 18-104. Control Power Requirements (*IT.* Only)

NEMA Size	Continuous Current	Inrush
FVNR, 252W, FVR		
Size 1 Size 2 Size 3 Size 4 Size 5 Size 6 Size 7	.39 .45 .47 .47 .62 .41 .41	3.8 5.4 5.8 5.8 7.8 3.3 3.3
2S1W		
Size 1 Size 2 Size 3 Size 4 Size 5	.54 .66 .70 .70 1.00	7.6 10.8 11.6 11.6 15.6
SSRV		
24A 33 – 304A 360 – 850A	.45 1.24 1.64	3.8 10 10

Motor Control Center One-Line

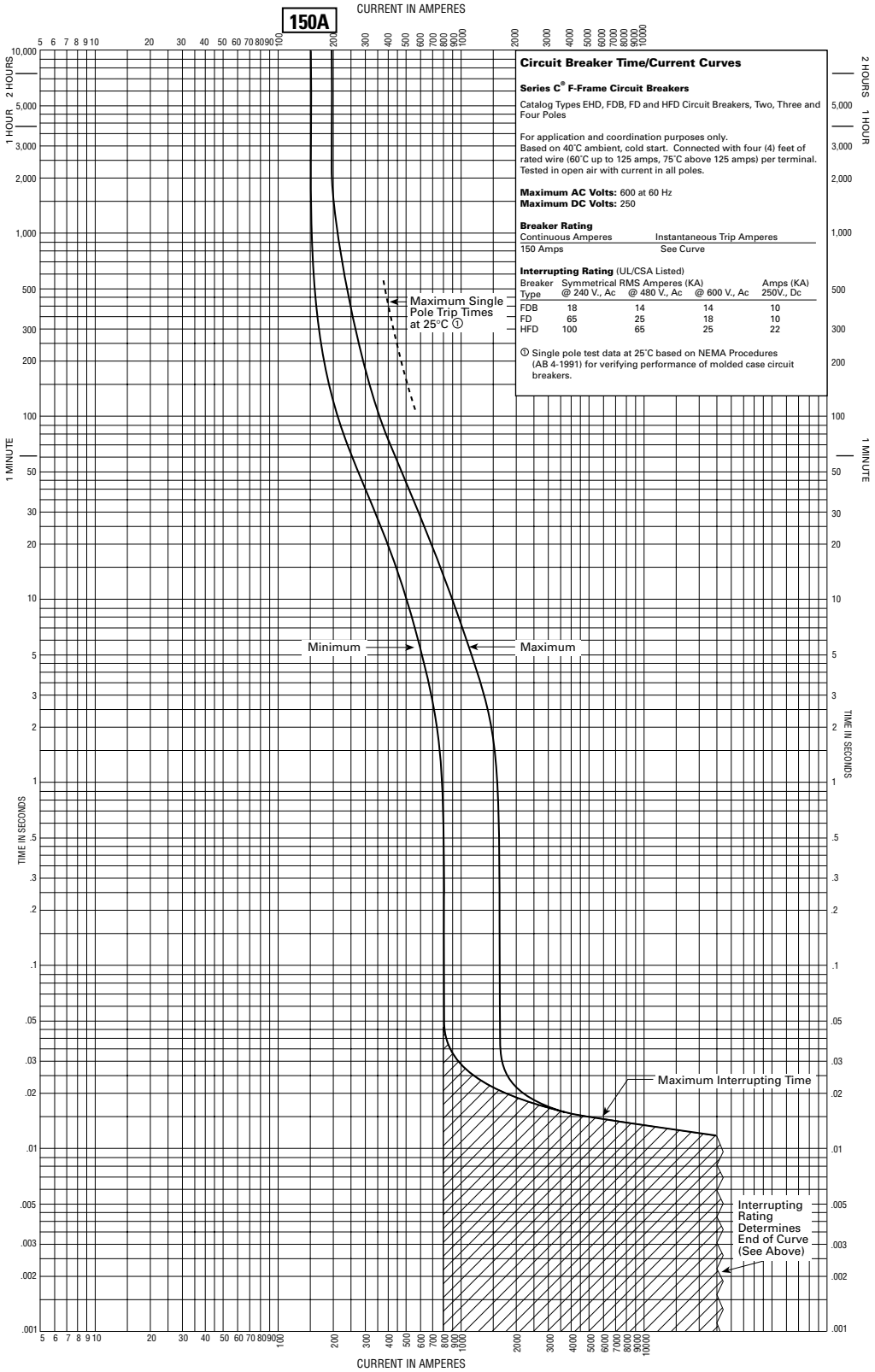
ONE-LINE DIAGRAM INCLUDING ADDITION OF MOTOR CONTORL CENTER



Appendix E

AB DE-ION Circuit Breakers

Types FDB, FD and HFD 150 Amperes



Circuit Breaker Time/Current Curves

Series C® F-Frame Circuit Breakers

Catalog Types EHD, FDB, FD and HFD Circuit Breakers, Two, Three and Four Poles

For application and coordination purposes only.
Based on 40˚C ambient, cold start. Connected with four (4) feet of rated wire (60˚C up to 125 amps, 75˚C above 125 amps) per terminal. Tested in open air with current in all poles.

Maximum AC Volts: 600 at 60 Hz
Maximum DC Volts: 250

Breaker Rating

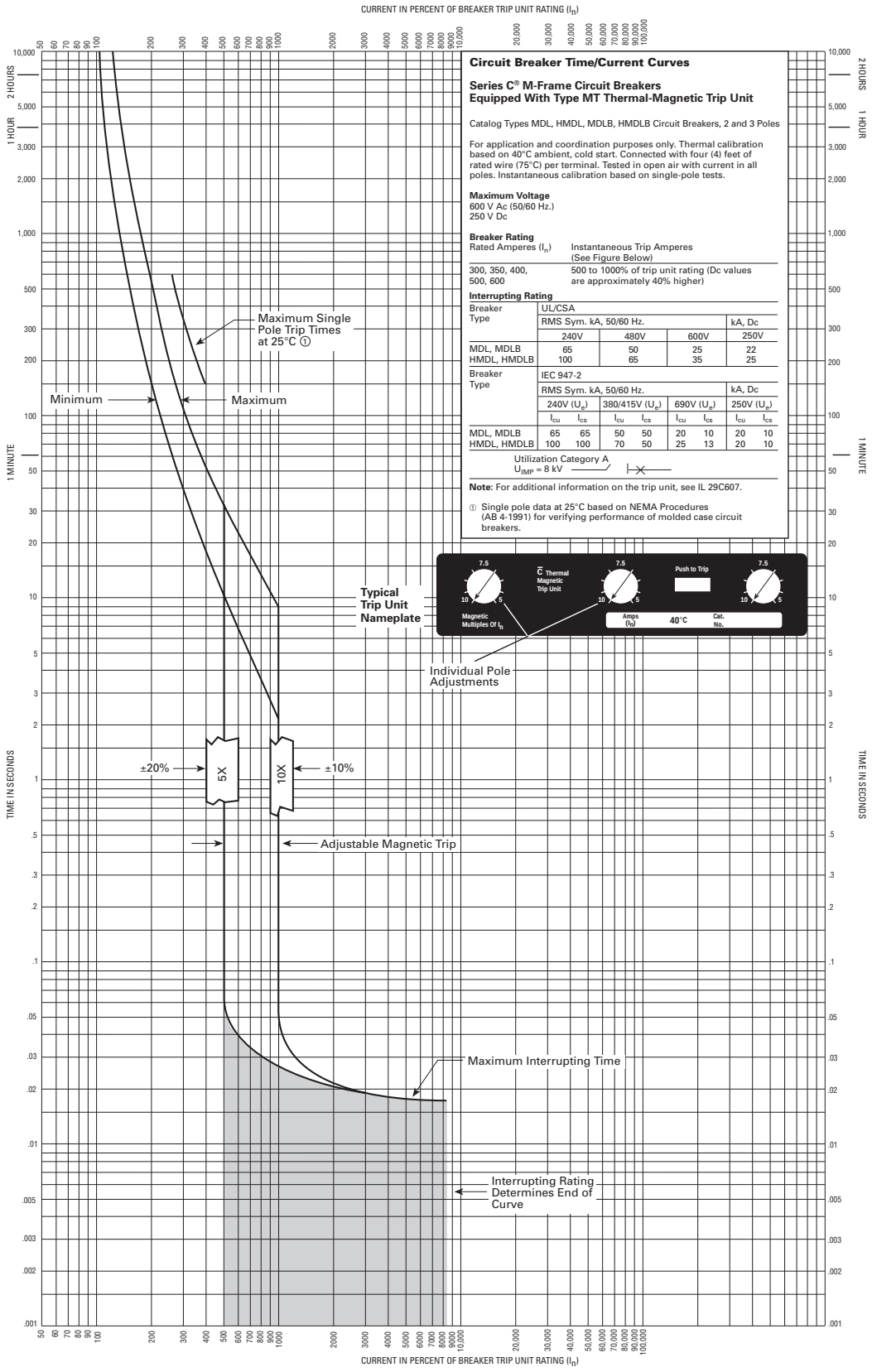
Continuous Amperes	Instantaneous Trip Amperes
150 Amps	See Curve

Interrupting Rating (UL/CSA Listed)

Breaker Type	Symmetrical RMS Amperes (KA) @ 240 V., Ac	@ 480 V., Ac	@ 600 V., Ac	Amps (KA) 250V., Dc
FDB	18	14	14	10
FD	65	25	18	10
HFD	100	65	25	22

① Single pole test data at 25˚C based on NEMA Procedures (AB 4-1991) for verifying performance of molded case circuit breakers.

Types MDL, HMDL, MDLB, and HMDLB Equipped with Type MT Thermal-Magnetic Trip Unit, 300 to 600 Amperes



Circuit Breaker Time/Current Curves

Series C® M-Frame Circuit Breakers Equipped With Type MT Thermal-Magnetic Trip Unit

Catalog Types MDL, HMDL, MDLB, HMDLB Circuit Breakers, 2 and 3 Poles

For application and coordination purposes only. Thermal calibration based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (75°C) per terminal. Tested in open air with current in all poles. Instantaneous calibration based on single-pole tests.

Maximum Voltage
600 V Ac (50/60 Hz.)
250 V Dc

Breaker Rating

Rated Amperes (I_n)	Instantaneous Trip Amperes (See Figure Below)
300, 350, 400, 500, 600	500 to 1000% of trip unit rating (Dc values are approximately 40% higher)

Interrupting Rating

Breaker Type	UL/CSA							
	RMS Sym. kA, 50/60 Hz.						kA, Dc	
	240V		480V		600V		250V	
MDL, MDLB	65		50		25		22	
HMDL, HMDLB	100		65		35		25	
Breaker Type	IEC 947-2							
	RMS Sym. kA, 50/60 Hz.						kA, Dc	
	240V (U_e)		380/415V (U_e)		690V (U_e)		250V (U_e)	
	I_{cu}	I_{cs}	I_{cu}	I_{cs}	I_{cu}	I_{cs}	I_{cu}	I_{cs}
MDL, MDLB	65	65	50	50	20	10	20	10
HMDL, HMDLB	100	100	70	50	25	13	20	10

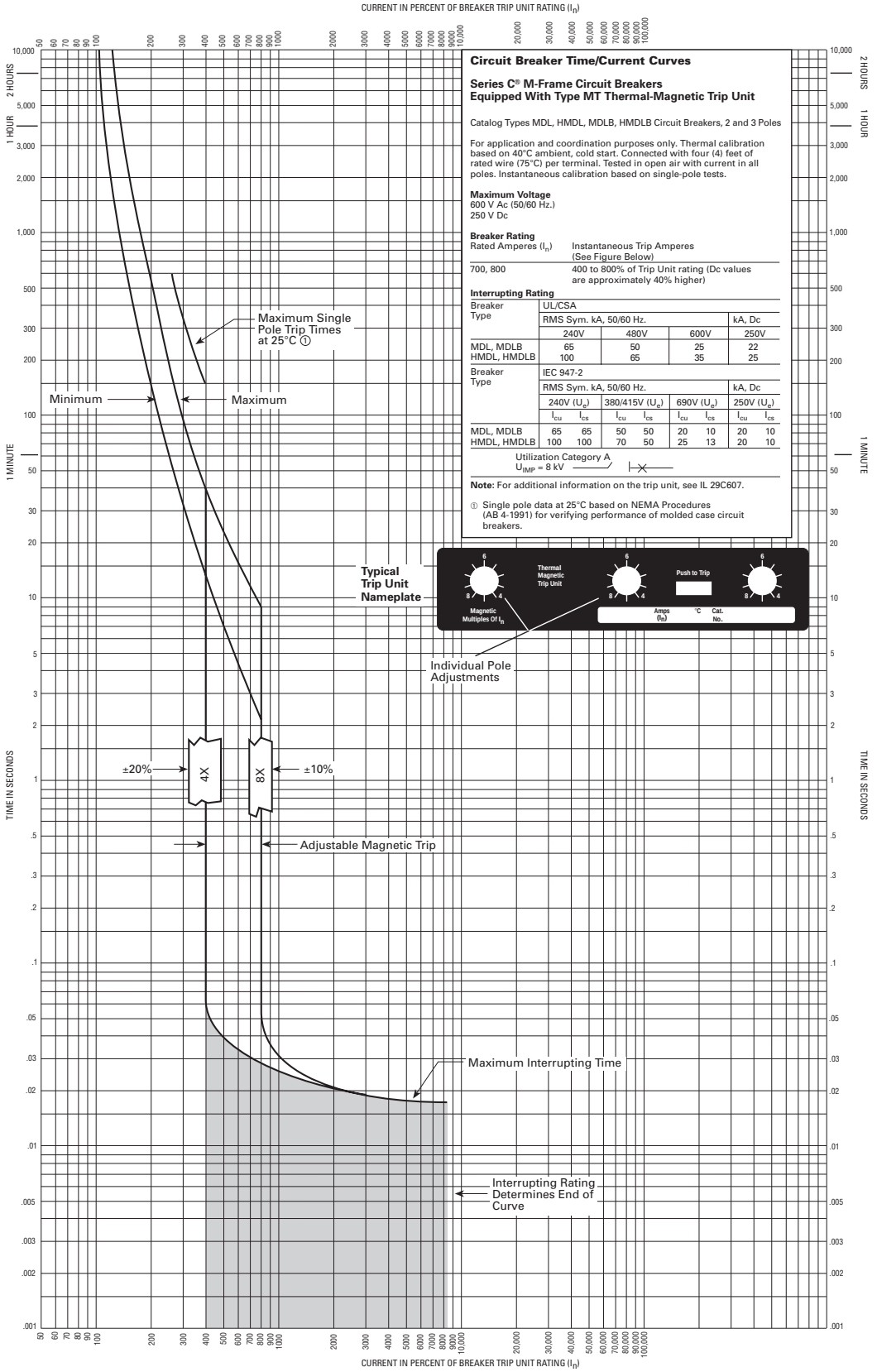
Utilization Category A
U_{IMP} = 8 kV

Note: For additional information on the trip unit, see IL 29C607.

① Single pole data at 25°C based on NEMA Procedures (AB 4-1991) for verifying performance of molded case circuit breakers.

Curve No. SC-6911-98

Types MDL, HMDL, MDLB, and HMDLB Equipped with Type MT Thermal-Magnetic Trip Unit, 700 and 800 Amperes



Circuit Breaker Time/Current Curves

Series C® M-Frame Circuit Breakers Equipped With Type MT Thermal-Magnetic Trip Unit

Catalog Types MDL, HMDL, MDLB, HMDLB Circuit Breakers, 2 and 3 Poles

For application and coordination purposes only. Thermal calibration based on 40°C ambient, cold start. Connected with four (4) feet of rated wire (75°C) per terminal. Tested in open air with current in all poles. Instantaneous calibration based on single-pole tests.

Maximum Voltage
600 V Ac (50/60 Hz.)
250 V Dc

Breaker Rating

Rated Amperes (I_n)	Instantaneous Trip Amperes (See Figure Below)
700, 800	400 to 800% of Trip Unit rating (Dc values are approximately 40% higher)

Interrupting Rating

Breaker Type	UL/CSA							
	RMS Sym. kA, 50/60 Hz.						kA, Dc	
	240V		480V		600V		250V	
MDL, MDLB	65		50		25		22	
HMDL, HMDLB	100		65		35		25	
Breaker Type	IEC 947-2							
	RMS Sym. kA, 50/60 Hz.						kA, Dc	
	240V (U_e)		380/415V (U_e)		690V (U_e)		250V (U_e)	
	I_{cu}	I_{cs}	I_{cu}	I_{cs}	I_{cu}	I_{cs}	I_{cu}	I_{cs}
MDL, MDLB	65	65	50	50	20	10	20	10
HMDL, HMDLB	100	100	70	50	25	13	20	10

Utilization Category A
U_{IMP} = 8 kV

Note: For additional information on the trip unit, see IL 29C607.

① Single pole data at 25°C based on NEMA Procedures (AB 4-1991) for verifying performance of molded case circuit breakers.

Curve No. SC-6912-98