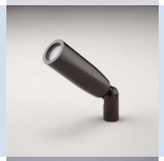
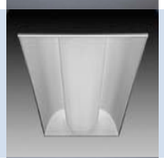
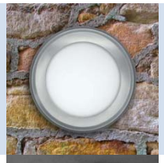
APPENDIX A:LUMINAIRE SCHEDULE

Tag	Fixture Description	Image	Mounting	Lamp	Watts	Volts	Location	Quantity	Manufacturer	Catalogue Number	Ballast
F1	5" recessed halogen accent light.		Recessed	3-MR16 37 W	120 W	277 V	Lounge	8	Amerlux	CLYR-3-37-MR16-E-BT-277-WT	None
F2	Semi-recessed LED step light.		Wall Mounted	LED	4 W	120 V	Lounge	10	Lightolier	DSL01SA	Integral Transformer
F3	Surface-mounted LED landscape light.		Ground Mounted	LED	4 W	12 V	Third Floor Deck	10	Winona Lighting	CELED-1003-12V-L!-BKS	Integral Transformer
F4	6" recessed compact fluorescent downlight.		Ceiling Recessed	1-CFQ 26W	28 W	277 V	Serving Space	23	Lightolier	8091 CCLW	QTP 2x26CF/UNV BS
F5	2’x4’ recessed indirect with perforated center basket		Ceiling Recessed	2-F28T5	63 W	277 V	Serving Space Kitchen	3	Focal Point	FLU-24-B-2-T5HO-E-277-G	QTP 2x28T5/UNV PSN NL
F6	6" recessed compact fluorescent wallwasher.		Recessed	1-CFQ 26W	28 W	277 V	Conference Room, Lounge	14	Lightolier	8081 CLW	QTP 2x26CF/UNV BS
F7	Recessed fluorescent troffer.		Recessed	1-F28T5	63 W	277 V	Conference Room	8	Focal Point	FAV6-Fl-1T5HO-1C-277-D-G1-WH-4’	QTP 2x28T5/UNV PSN NL
F8	4" recessed compact fluorescent downlight.		Recessed	1-CFQ 18W	20 W	277 V	Conference Room	4	Lightolier	8011 CCLW	QTP 1x18CF/UNV BS

F9	9" suspended compact fluorescent downlight.		Ceiling Suspended	1-CFQ 18W	20 W	277 V	Cafeteria Serving Space	21	Delray Lighting	2310-S-18-2-E	QTP 1x18CF/UNV BS
F10	Suspended LED chandelier.		Ceiling Suspended	LED	4 W	12 V	Cafeteria Serving Space	11	Winona Lighting	LED-POPS01-6-ARC-M-001-ND12V-BAL-X-STD	Integral Transformer
F11	5" recessed fluorescent wallwasher.		Recessed	1-F28T5	32 W	277 V	Cafeteria Serving Space	7	Mark Architectural Lighting	SPR-F-1T5HO-277-EB	QTP 1x28T5/UNV PSN NL
F12	Surface-mounted fluorescent strip light, rigid housing.		Ceiling Surface	1-F28T5	32 W	120 V	Dorm Room	58	Prudential Lighting	P-T5-STD-1T5-03-BWE-277	QTP 1x28T5/UNV PSN NL
F13	Recessed compact fluorescent step light.		Wall Recessed	1-CFQ 13W	16 W	12 V	Roof Deck	8	Cooper - Lumiere	1235-RD-M-4LED-120/12-BK	QTP 1x13CF/UNV
F14	12" surface-mounted compact fluorescent wallwasher.		Ceiling Surface	1-CFQ 26W	28 W	277 V	Lounge	4	Winona Lighting	P1-SS-CFQ26-277V-SS8-SGW-X-STD	QTP 2x26CF/UNV BS
F15	8" surface-mounted compact fluorescent downlight.		Ceiling Surface	2-CFQ 26W	54 W	120 V / 277 V	Lounge, Dorm Room	31	Kurt Versen	P602	QTP 2x26CF/UNV
F16	Wall-mounted fluorescent up/downlight.		Wall Surface	2-F28T5	63 W	120 V	Dorm Room	58	Mark Architectural Lighting	DUW-4-1T5-277-EB	QTP 1x28T5/UNV PSN NL

APPENDIX B:LUMINAIRE SPECIFICATIONS

Type:	F1
Location:	Lounge
Mfr/Catalogue #:	Amerlux - CLYR-3-37-MR16-E-BT-277-WT
Description:	5" Recessed halogen accent light. Spec-grade commercial.
Lamping:	3-MR16 35W
Optics:	Solite beam softening lens
Dimensions:	15.400" length, 5.187" diameter, 6.812" height
Housing:	Steel housing
Electrical:	Integral Electric Ballast
Voltage:	277 Volts
Labels:	CUL, UL. Suitable for Dry, Damp environments.

CYLINDRIX MULTIPLE RECESSED 3 LIGHT

CYLR-3
3LT MR16

APPLICATION:
Accent and display lighting for Retail, Commercial and Hospitality environments

CONSTRUCTION:
Stamped steel mounting frame with integral mounting bars
Thermally protected
Steel ballast housing
Electronic ballast outboard mounted
Steel upper housing and laser cut trim ring
Die-cast lamp housing
Formed aluminum yoke
GU5.3 Bipin socket
Powder coat paint

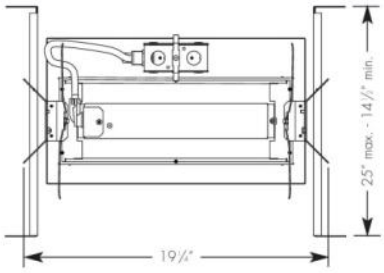
OPTICS:
0-30° x 45° tilt, 360°+ rotation
MR16 12v Bipin base, 37w max
Solite beam softening lens

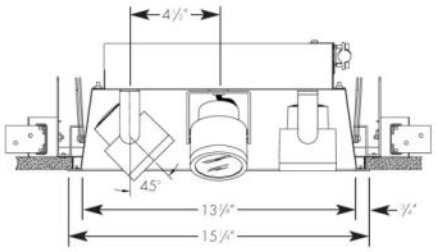
MOUNTING:
For use in T-grid or sheet rock ceilings

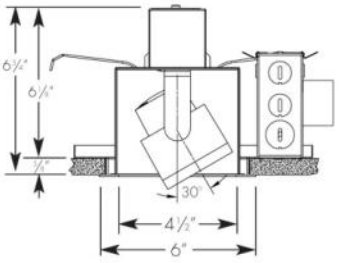
LABELING:
UL and CUL listed
Damp location

PROJECT:

TYPE:







Ceiling Cut Out Dimension: 5⁹⁄₁₆" x 14¹³⁄₁₆"

ecoTECTURAL
Architectural lighting for sustainable design.

AMERLUX
LIGHTING SOLUTIONS
ADAPT. ABILITY.™

ELECTRICAL

Ballast		Lamping 3-37w Input watts	Amps*
Electronic	120v	111	.93
	277V	111	.39

3 MR16, GU5.3 bi-pin base, 37w max

Amerlux reserves the right to change details that do not affect overall function and performance.

ORDERING INFORMATION:

Model	# Lamps	Wattage	Lamp Type	Ballast	Housing/ Head Finish	Voltage	Trim Ring Finish	Options/ Accessories
CYLR	3	37	MR16	E - electronic	WT - white texture BT - black texture ST - silver texture __ - __ (other RAL)	120 277	WT - white texture	HEX - hexcell louver

Example: CYLR-3-37-MR16-E-WT-120-WT

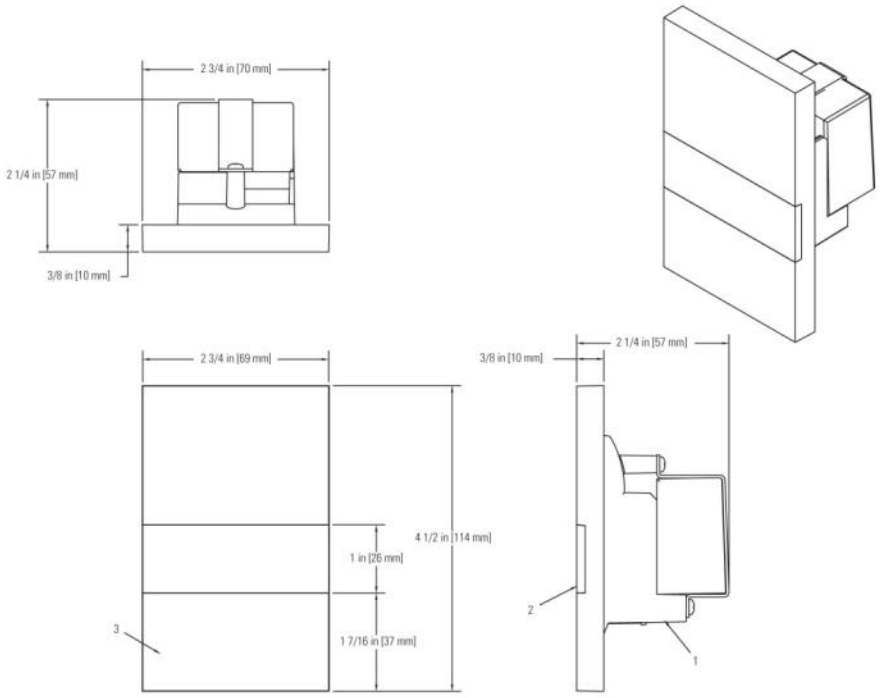
Cat #:

Amerlux, LLC. • 23 Daniel Road East, Fairfield NJ 07004 • T: 973 882 5010 F: 973 882 2605 • www.amerlux.com
LIT-0532 rev 4/08

Type:	F2
Location:	Lounge
Mfr/Catalogue #:	Lightolier - DSL01SA
Description:	Semi-recessed LED step light.
Lamping:	LED
Optics:	Polycarbonate clear lens
Dimensions:	4.500" length, 2.750" width, 2.250" height
Housing:	Die cast aluminum
Electrical:	Integral transformer
Voltage:	12 Volts
Labels:	CUL, UL. Suitable for Dry environments.

LIGHTOLIER® Architectural Decorative **DSL01**

Linear Step LED



Catalog Number	Finish	Lamp	Wattage	Color Temp	Voltage
DSL01W	White	LED	4W	3000K	120-240V
DSL01SA	Satin Aluminum	LED	4W	3000K	120-240V

Note: Order Glass/Diffuser separately.

Features

1. **Heat Sink/Driver Housing:** Die cast aluminum.
2. **Lens:** Injection molded polycarbonate clear, developed for optimum optical output.
3. **Face Plate:** Die cast aluminum.
4. **Switch Box Mounting Plate:** 18ga. C.R.S. zinc plated, for mounting to a 3 1/2" deep switch box. (Not shown)

Electrical

LED: (1) 4W 3000K white LED. Average expected life, under normal operating conditions is 50,000 hours with lumen maintenance of 70% of original light output.

Driver: Class 2 power supply.
Voltage: 120V
Output Wattage: 5 W
Input Current (max.): 100 mA
Frequency: 50/60 Hz
Output Voltage (VDC): 12 V
Constant Current: 500 mA

Finish

Satin aluminum with protective clearcoat.
Matte white powder coat.

Labels

cULus Listed. Suitable for Dry Locations.
Wall mount only.

Job Information **Type:**

Job Name:

Cat. No.:

Lamp(s):

Notes:

631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710

Lightolier is a Philips group brand

PHILIPS

Type:	F3
Location:	Roof Deck
Mfr/Catalogue #:	Winona Lighting - CELED-1003-12V-L!-BKS
Description:	Surface-mounted LED landscape light.
Lamping:	LED
Optics:	Open , tempered glass lens
Dimensions:	1.625" diameter, 1.625" height
Housing:	Aluminum, powder coat paint.
Electrical:	Integral transformer
Voltage:	277 Volts
Labels:	CUL listed Wet Location, UL listed Wet Location. Suitable for Dry, Wet, Damp environments.

Cedar LED — 12V LED

flood & accent

Construction: Body, cap and knuckle machined from 6061 - T6 ALUMINUM. Lens cut from tempered borosilicate glass for superior clarity and strength.

LED Unit: Winscape proprietary unit using one (1) High Output LED and an integral low voltage (10.5V-15.5V) AC LED driver. Available in three (3) beam spreads; 10° Spot, 20° Narrow Flood, and 36° Flood. Available in Warm White (3000K) and Cool White (6500K) color temps.

Finishes: Available in 12 standard TGIC polyester powder coat finishes. Custom powder coat finishes available (contact factory for more information).

Features: Field replaceable lens. Tapered "Sure Lock" knuckle seat for infinite aiming and unparalleled locking ability. Any combination of up to 3 lens accessories/color filter/shielding can be specified in any cap style and are held securely by a removable stainless steel clip ring.

General: This fixture requires a low voltage MAGNETIC transformer to function properly. Magnetic transformer must be purchased separately (see accessories section on our website). Mounting must be specified separately (see accessories section on our website).

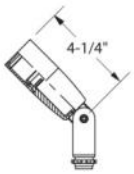
MOUNTING OPTIONS:

GROUND MOUNT | WALL MOUNT | TREE MOUNT | SURFACE MOUNT | MODIFIED STANDARD

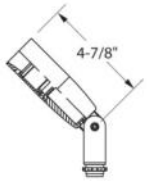
NOTE: See Accessories on our website for mounting options.

c UL — **UL Listed: Wet location** Indoor/Outdoor — **cUL Listed:** Indoor/Outdoor

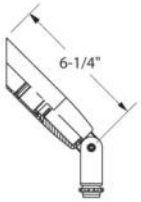
1. **CELED** — SERIES
   - **CELED** = CEDAR LED
2. LIGHT SOURCE
   - ***Warm White, 3000K, 120 lumen***
   - **1002** = 2.5W/10° SP/WW LED
   - **1003** = 2.5W/20° NFL/WW LED
   - **1004** = 2.5W/36° FL/WW LED
   - ***Cool White, 6500K, 150 lumen***
   - **1005** = 2.5W/10° SP/CW LED
   - **1006** = 2.5W/20° NFL/CW LED
   - **1007** = 2.5W/36° FL/CW LED
3. **12V** — VOLTAGE
   - **12V** = 12 VOLTAGE
4. ACCESSORY LENS
   - **L0** = NONE
   - **L1** = PRISMATIC
   - **L3** = SOFTENING
   - **L4** = WATERSHED™
5. FINISH COLOR
   - **BKS** = BLACK SMOOTH
   - **BKT** = BLACK TEXTURED
   - **BRS** = BRONZE SMOOTH
   - **BRT** = BRONZE TEXTURED
   - **WHS** = WHITE SMOOTH
   - **WHT** = WHITE TEXTURED
   - **SIS** = SILVER SMOOTH
   - **IVS** = IVORY SOMOOTH
   - **CHS** = CHROME SMOOTH
   - **NBS** = NATURAL BRONZE
   - **VET** = VERDE TEXTURED
   - **SAT** = SAND TEXTURED
6. COLOR FILTER
   - **F0** = NONE
   - **FM** = MERCURY VAPOR
   - **FR** = RED
   - **FRD** = RED DICHROIC
   - **FP** = PINK
   - **FA** = AMBER
   - **FG** = GREEN
   - **FGD** = GREEN DICHROIC
   - **FLB** = LIGHT BLUE
   - **FMB** = MEDIUM BLUE
   - **FMBD** = MEDIUM BLUE DICHROIC
7. SHIELDING
   - **SH0** = NONE
   - **SH6** = HONEYCOMB LOUVER
8. CAP STYLE
   - **C1** = SHORT FLUSH
   - **C2** = LENS RECESSED
   - **C3** = 45° CUTOFF
   - **C4** = LONG FLUSH
9. SPECIAL
   - **STD** = STANDARD
   - **MOD** = MODIFIED
   - **350R** = 2 PIECE 350° ROTATION KNUCKLE



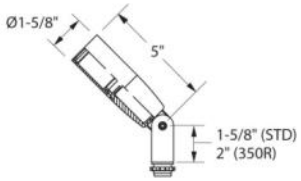
CAP C1



CAP C2



CAP C3



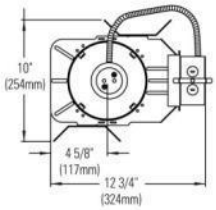
CAP C4

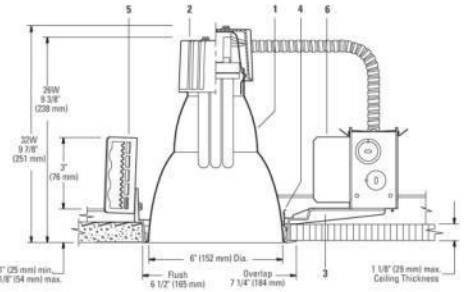
winona lighting
3760 west fourth street • winona, minnesota 55987 • 507 - 454- 5113 • fax: 507 - 454 - 1814
winona lighting on the web • www.winonalighting.com

Type:	F4
Location:	Cafeteria Serving Space
Mfr/Catalogue #:	Lightolier - 8091 CCLW
Description:	6" Recessed compact fluorescent downlight.
Lamping:	1-CFTR 26W
Optics:	Cross baffle
Dimensions:	13.875" length, 11.125" width, 6.000" height
Housing:	Die cast aluminum
Electrical:	Integral electronic 120V/277V ballast
Voltage:	277 Volts
Labels:	IBEW, UL listed Damp Location. Suitable for Damp environments.

LIGHTOLIER® Calculite® CFL Open Downlight 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

S6132BU	6" aperture, 1 lamp 26/32W Triple Tube CFL (120/277V) 4-Pin (Amalgam)
Standard Dimming Options:	
S6132B ☐	
CU3	Lightolier PowerSpec 3% Dimming (120/277V)
J1LD3	Lutron 5% Dimming (120V)
J2LD3	Lutron 5% Dimming (277V)
JUM7	Mark 7 Dimming (120/277V)
J1MX	Mark 10 Dimming (120V)
J2MX	Mark 10 Dimming (277V)
Other dimming product available, please consult factory	

Remodeler Frame-In Kits

6126BURM	6" aperture, 1 lamp 26W Triple Tube CFL (120/277V) 4-Pin (Amalgam)
6132BURM	6" aperture, 1 lamp 26/32W Triple Tube CFL (120/277V) 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.
UL Listed for through branch circuit wiring with max of (8) No 12 AWG, 90 degree C supply conductors.

Options and Accessories

Comfort Clear™ Finishes[1]		**Other Finishes**	
Diffuse	**CCD**	White	**WH**
Champagne Bronze	**CCZ**	Specular Clear	**CL**
Multigroove	**MG**		

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

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 S6132BULC

*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:**

Job Name:

Cat. No.:

Lamp(s):

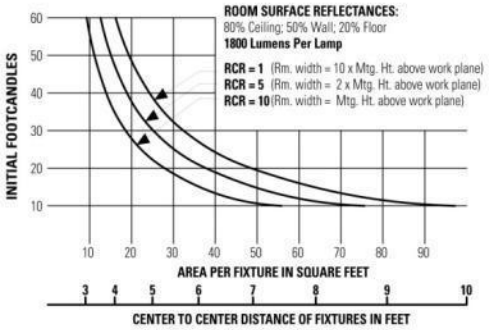
Notes:

631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710

Lightolier is a Philips group brand

PHILIPS

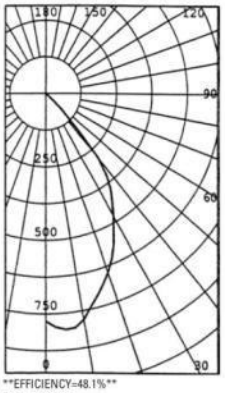
26W
Quick Calculator



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

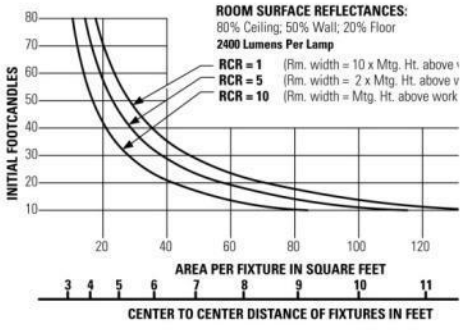
ZONE	LUMENS	%LAMP	%LUMINAIRE
0-30	533	29.66	61.66
0-40	778	43.25	89.92
0-60	863	47.98	99.75
0-90	865	48.10	100.00
40-90	87	4.85	10.08
60-90	2	.12	.25
90-180	0	.00	.00
0-180	865	48.10	100.00

Coefficients of Utilization

EFFECTIVE FLOOR CAVITY REFLECTANCE = .20

ROOM CAVITY RATIO	80			70			50			30			10			0
	WALL OF REFLECTANCE															
	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	
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

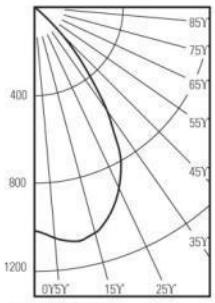
32W
Quick Calculator



This quick calculator chart determines the number and spacing of 1 lt.- 32W TTT un 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 LUMENS
DEG.	C.P.	
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			0
	WALL OF REFLECTANCE															
	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	
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:**

631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710

Type:	F5
Location:	Cafeteria Serving Space
Mfr/Catalogue #:	Focal Point - FLU-24-B-2-T5HO-E-277-G
Description:	Recessed fluorescent troffer.
Lamping:	2-F28T5
Optics:	Straight louver
Dimensions:	48.000" length, 24.000" width, 5.000" height
Housing:	One piece 20 Ga. steel
Electrical:	Integral electronic ballast
Voltage:	277 Volts
Labels:	CUL, UL. Suitable for Dry environments.

luna® 2x4

FOCAL POINT®

Covered by the following U.S. Patents: D395,727; D397,819.

features

2'x4' recessed indirect with perforated center basket.

Reflector and end caps form seamless one-piece housing.

High reflectance, low gloss Matte White finish controls glare and provides high efficiency.

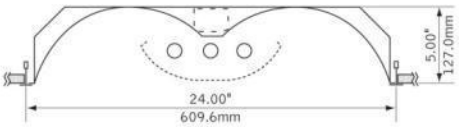
Perforated shield hinges open for quick and easy relamping.

Optional radial blade louver offers a distinct look that highlights interior architecture.

All luminaire combinations may be continuously row mounted.

Luna® provides high angle uniform distribution ideal for general illumination.

dimensional data



lamping options


T8 LAMPS


T5/T5HO LAMPS

shielding options & details

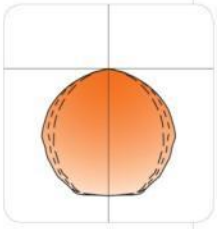

perforated

radial blade louver

july 2008

performance

2–Lamp T8
72% Efficiency
1528 cd @ 10°



Visit focalpointlights.com for complete photometric data.

www.focalpointlights.com | 1.773.247.9494

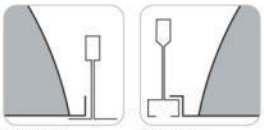
fixture:

project:

mounting information

grid

specify "G" for flat 9/16" and 15/16" tee or "ST" for 9/16" slot tee grid types.

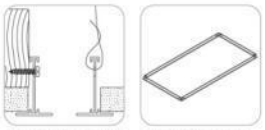


"G" flat tee "ST" slot tee

Luminaires may be installed in T-bar ceiling systems up to 1 11/16" high in T8 lamp configurations.

drywall frame kit

specify "DF" Drywall Frame Kit for drywall ceiling conditions.



Use tie-wire or screws to secure frame kit.

cut out dimensions:

2': Min: 24.125" Max: 24.563"

4': Min: 48.125" Max: 48.563"

specifications

construction

One-piece 20 Ga. steel reflector and housing.

20 Ga. steel ends form finished housing.

Lamps are shielded by detachable 22 Ga. steel perforated lamp shield with acrylic lens insert.

Lamp shield is secured by four spring-pins allowing shield to hinge down for relamping.

Optional radial blade louver: .75"H x 1" frequency fabricated of 20 Ga. steel with acrylic lens insert.

Top access 20 Ga. steel ballast compartment.

Weight: 29 lbs

optic

One-piece 20 Ga. steel reflectors finished in Matte Satin White powder coat.

electrical

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

Optional dimming ballasts available.

Consult factory for dimming specifications and availability.

UL and cUL listed.

finish

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

ordering

luminaire series		FLU
Luna	FLU	
nominal size		24
2' x 4'	24	
distribution		B
Bi-Directional	B	
lamp quantity		
Two Lamp	2	
Three Lamp	3	
lamp type		
T8 (1 11/16" maximum grid height)	T8	
T5	T5	
T5HO	T5HO	
ballast		
Electronic Instant Start <20% THD (T8 only)	E	
Electronic Program Start <10% THD	S	
Electronic Dimming Ballast*	D	
voltage		
120 Volt	120	
277 Volt	277	
347 Volt	347	
mounting		
Grid	G	
Slot Tee	ST	
Surface Mount	SM	
shielding		
Perforated Shield	PS	
Radial Blade Louver	RLP	
factory options		
Air Return	AR	
Chicago Plenum	CP	
Dust Cover	DC	
Drywall Frame Kit (Cut out dimensions: Min:24.25"/Max: 24.563" Min: 48.25"/Max 48.563")	DF	
Emergency Battery Pack*	EM	
Earthquake Clip	EQ	
HLR/GLR Fuse	FU	
Flex Whip*	FW	
Include 3000K Lamp	L830	
Include 3500K Lamp	L835	
Include 4100K Lamp	L841	
Separate Circuit*	SC	
Master Satellite*	MS	
Tandem Wiring*	TW	
Lutron™ Sensor Feed* (EcoSystem ballast required)	SF	
finish		WH
Matte Satin White	WH	

* for more information see Reference section.

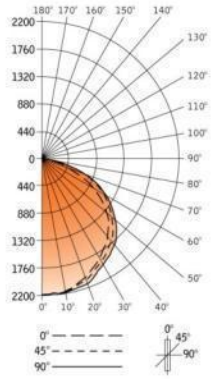
Focal Point LLC | 4141 S. Pulaski Rd, Chicago, IL 60632 | T: 773.247.9494 | F: 773.247.8484 | info@focalpointlights.com | www.focalpointlights.com

recessed

luna® 2x4

Filename: FLU242T8PS.IES
Catalog #: FLU-24-B-2-T8-E-120-G-PS-WH
Efficiency: 72%
Test #: 11161.0

CANDLEPOWER DISTRIBUTION



Vertical Angle	Horizontal Angle 0°	22.5°	45°	67.5°	90°	Zonal Lumens
0°	1510	1510	1510	1510	1510	
5°	1503	1503	1505	1511	1510	144
15°	1493	1497	1506	1524	1524	428
25°	1332	1340	1369	1402	1412	635
35°	1132	1150	1198	1257	1273	755
45°	907	941	1023	1094	1122	789
55°	6635	687	781	856	874	691
65°	386	449	531	555	560	498
75°	187	228	221	254	260	245
85°	35	39	45	48	48	47
90°	3	4	4	4	4	
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: 1.3

LUMEN SUMMARY

	Zone	Lumens	% Lamp	% Fixt
	0°-30°	1206	20.4	28.5
	0°-40°	1934	33.2	46.4
	0°-60°	3440	58.3	81.3
	0°-90°	4231	71.7	100.0
Total Luminaire	0°-180°	4231	71.7	100.0

LUMINANCE DATA (CD/M²)

Vertical Angle	0°	45°	90°
45°	1825	2059	2258
55°	1575	1937	2168
65°	1300	1788	1885
75°	1028	1215	1429
85°	571	735	784

CO-EFFICIENTS OF UTILIZATION

Floor		80				70			20		50		30		10		00
Ceiling									50								
Wall	70	50	30	10		70	50	10	50	10	50	10	50	10	50	10	00
RCR 0	85	85	85	85		83	83	83	80	80	76	76	73	73			72
1	79	76	73	71		77	74	69	71	67	68	65	66	63			62
2	72	67	63	59		71	66	58	63	57	61	56	59	54			53
3	67	60	54	50		65	58	49	56	49	54	48	53	47			45
4	61	53	47	43		59	52	42	50	42	49	41	47	41			39
5	56	47	41	36		54	46	36	45	36	43	35	42	35			33
6	51	42	36	31		50	41	31	40	31	39	31	38	30			29
7	47	38	32	27		46	37	27	36	27	35	27	34	27			25
8	43	34	28	24		42	33	24	32	23	31	23	31	23			22
9	40	30	24	20		39	30	20	29	20	28	20	27	20			19
10	37	28	22	18		36	27	18	26	18	26	18	25	18			16

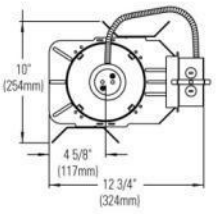
Numbers indicate percentage values of

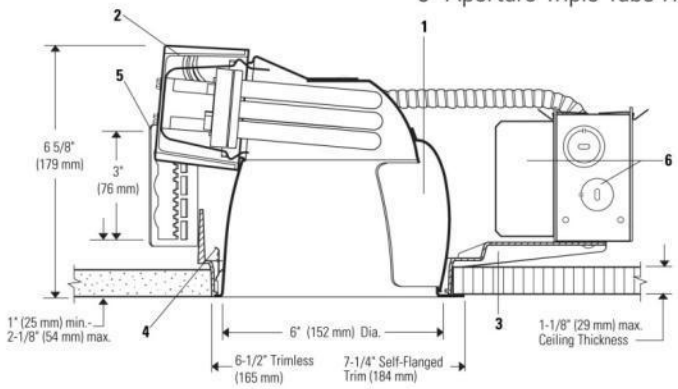
Go to www.focalpointlights.com for additional photometric data.

Type:	F6
Location:	Conference Room, Lounge
Mfr/Catalogue #:	Lightolier - 8081 CLW
Description:	6" Recessed compact fluorescent wallwasher.
Lamping:	1-CFTR 26W
Optics:	Anodized aluminum parabolic reflector
Dimensions:	13.625" length, 11.125" width, 6.625" height
Housing:	Galvanized steel
Electrical:	Integral electronic 120V/277V ballast
Voltage:	277 Volts
Labels:	IBEW, UL listed Damp Location. Suitable for Damp environments.

LIGHTOLIER® Calculite® CFL Open Wall Washer 8081

6" Aperture Triple Tube Horizontal Lamp





Reflector Trim

8081CLW	Clear Iridescence Free, White Flange
8081CLP	Clear Iridescence Free, Polished Flange
8081CL	Clear Iridescence Free, Molded Trim Ring
8081 ☐	Add suffix. See options for other finishes

Frame-In Kit

S6132BU 6" aperture, 1 lamp 26/32W Triple Tube CFL (120/277V) 4-Pin (Amalgam)

Dimming Options:

S6132B ☐

CU3	Lightolier PowerSpec 3% Dimming (120/277V)	**J1LD3**	Lutron 3% Dimming (120V)
J2LD3	Lutron 3% Dimming (277V)	**JUM7**	Mark 7 Dimming (120/277V)
J1MX	Mark 10 Dimming (120V)	**J2MX**	Mark 10 Dimming (277V)

Other dimming product available, please consult factory

Remodeler Frame-In Kits

6126BURM	6" aperture, 1 lamp 26W Triple Tube CFL (120/277V) 4-Pin (Amalgam)
6132BURM	6" aperture, 1 lamp 26/32W Triple Tube CFL (120/277V) 4-Pin (Amalgam)

Features

1. **Downlight Wall Washer Reflector:** 16 ga. Alzak® aluminum, 55° lamp cutoff to lamp and lamp image. Provides vertical surface wall wash and downlighting. Iridescence Free 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.

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

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

Options and Accessories (continued)

Emergency	Add suffix **EM***
Chicago Plenum	Use 6132BULC
Existing/Thk. Ceiling	**FA EC6***
Emergency Ltg. Kit	**FA EM3E***
	FA EM4E*
Fuse (Slow Blow)	Add suffix **F**

*See Spec. Sheets: FAEC, FAEM

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

Labels

UL listed for damp locations.

Job Information **Type:**

Job Name:

Cat. No.:

Lamp(s):

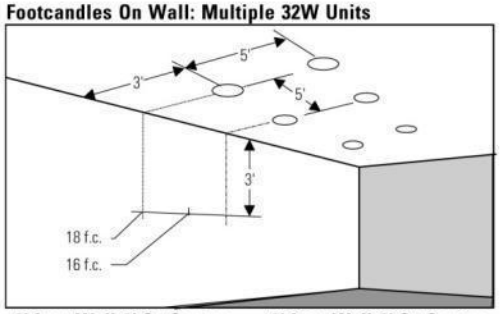
Notes:

631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710

Lightolier is a Philips group brand

PHILIPS

Footcandles On Wall: Multiple 32W Units



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 18 f.c. beneath units and 16 f.c. between units.

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

Conversion Factor: 26W: (Clear), f.c. x 0.8.

2' from Wall-2' On Center

Distance From Ceiling in Feet	2'		2'
1	48	46	48
2	68	62	68
3	50	51	50
4	37	37	37
5	27	28	27
6	21	21	21
7	16	16	16
8	13	13	13
9	11	11	11

2' from Wall-3' On Center

Distance From Ceiling in Feet	3'		3'
1	38	26	38
2	42	42	42
3	34	35	34
4	25	26	25
5	20	20	20
6	15	16	15
7	13	13	13
8	11	11	10
9	9	9	9

2' from Wall-4' On Center

Distance From Ceiling in Feet	4'		4'
1	35	14	35
2	37	24	37
3	24	27	24
4	19	20	19
5	15	15	15
6	12	12	12
7	10	10	10
8	8	8	8
9	8	8	8

3' from Wall-3' On Center

Distance From Ceiling in Feet	3'		3'
1	16	15	16
2	25	24	25
3	27	29	17
4	25	26	25
5	21	22	21
6	18	18	18
7	15	15	15
8	13	13	13
9	11	11	11

3' from Wall-4' On Center

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

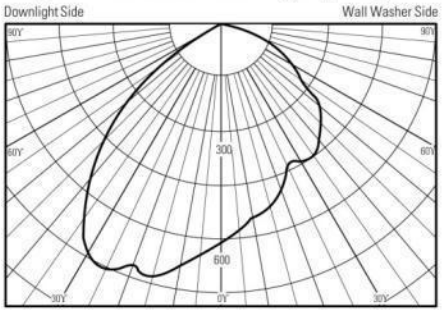
3' from Wall-5' On Center

Distance From Ceiling in Feet	5'		5'
1	12	7	12
2	10	12	10
3	18	16	18
4	15	16	15
5	13	14	13
6	11	11	11
7	9	10	9
8	8	8	8
9	7	7	7

3' from Wall-6' On Center

Distance From Ceiling in Feet	6'		6'
1	12	5	12
2	10	9	10
3	17	11	17
4	13	14	13
5	10	12	10
6	9	10	9
7	8	8	8
8	7	7	7
9	6	6	6

Candlepower Distribution



Down Light Spacing Ration 1.0

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	.69	.68	.66	.68	.66	.65	.65	.64	.63	.63	.62	.61	.61	.60	.59	.58
2	.63	.60	.58	.62	.59	.57	.60	.58	.56	.58	.56	.54	.56	.55	.53	.52
3	.58	.54	.51	.57	.53	.50	.55	.52	.49	.53	.51	.49	.52	.50	.48	.47
4	.53	.48	.45	.52	.48	.45	.50	.47	.44	.49	.46	.44	.48	.45	.43	.42
5	.48	.43	.40	.47	.43	.40	.46	.42	.39	.45	.42	.39	.44	.41	.39	.38
6	.44	.39	.36	.43	.39	.35	.42	.38	.35	.41	.38	.35	.40	.37	.35	.34
7	.40	.35	.32	.39	.35	.31	.38	.34	.31	.37	.34	.31	.37	.33	.31	.30
8	.36	.31	.28	.35	.31	.28	.35	.31	.28	.34	.30	.28	.33	.30	.27	.26
9	.33	.28	.25	.32	.28	.25	.32	.27	.25	.31	.27	.24	.30	.27	.24	.23
10	.30	.25	.22	.29	.25	.22	.29	.25	.22	.28	.24	.22	.28	.24	.21	.20

20% FLOOR CAVITY REFLECTANCE
For 26W units multiply C.U. by 1.0.

Job Information **Type:**

631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710

Lightolier is a Philips group brand

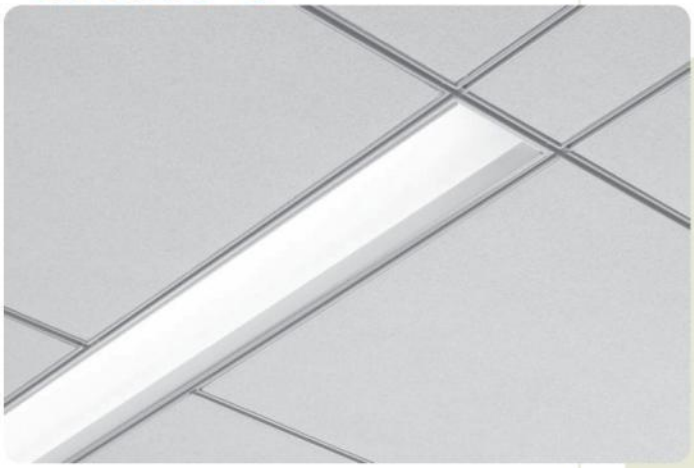
PHILIPS

Type:	F7
Location:	Conference Room
Mfr/Catalogue #:	Focal Point - FAV6-Fl-1T5HO-1C-277-D-G1-WH-4’
Description:	Recessed fluorescent troffer.
Lamping:	1-F28T5
Optics:	Flush lens
Dimensions:	48.000" length, 6.000" width, 5.500" height
Housing:	One piece 20 Ga steel
Electrical:	Integral electronic ballast
Voltage:	277 Volts
Labels:	CUL, UL. Suitable for Dry environments.

USG Logix | Armstrong® TechZone®

avenue® 6

FOCAL POINT®



FEATURES

Avenue® 6 is designed specifically for use with 6" wide USG Logix and Armstrong® TechZone® ceiling systems.

1 and 2 lamp energy efficient fluorescent T5/T5HO.

Shielding options include corrugated or solid regressed trim, flush lens or parabolic louver.

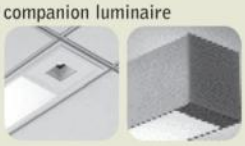
Avenue® 6 provides an integrated lighting solution that compliments the ceiling and entire space while providing comfortable general illumination.

shielding options

solid regress trim | flush lens | parabolic louver

microglow™ lens

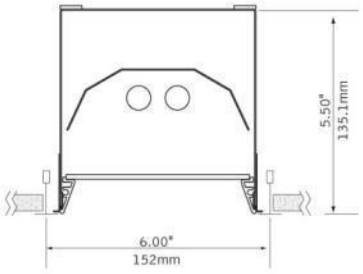
companion luminaire



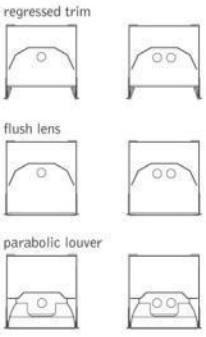
mr16 | favc & favd

april 2008

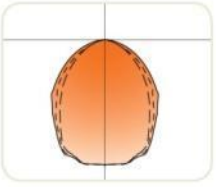
DIMENSIONAL DATA



lamping / shielding options



PERFORMANCE



1–Lamp T5HO
67% Efficiency
1392 cd @ 125°

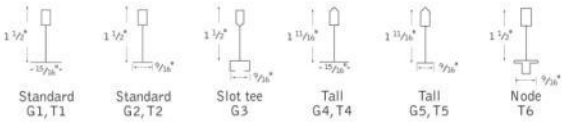
fixture type:

project name:

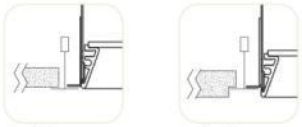
RECESSED

DETAILS

USG Logix® and Armstrong® TechZone® ceiling configurations



Standard G1, T1 | Standard G2, T2 | Slot tee G3 | Tall G4, T4 | Tall G5, T5 | Node T6



lay-in tile G1, G2, G4, G5 | tegular tile G3 & T1, T2, T4, T5, T6

Luminaire always rests at level of tile.

SPECIFICATIONS

construction
One-piece 20 Ga. steel housing
Corrugated and solid regress trim constructed of 6063-T5 extruded aluminum finished in Matte Satin White.
20 Ga. steel, universal flange rail finished in Matte Satin White.

4' unit weight: 15 lbs.
5' unit weight: 22 lbs.

optic
22 Ga. steel reflectors finished in High Reflectance White powder coat.
Acrylic lens diffuser .118" thick, frosted clear.
Parabolic louver: .75"H x 1.5" 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.
Consult factory for dimming specifications and availability.
UL and cUL listed.

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

Armstrong and TechZone are trademarks of AWI Licensing Company.

ORDERING

luminaire series		FAV6
Avenue 6	FAV6	
shielding		_____
Corrugated Regressed Trim Frst.Lns	CR	
Solid Regressed Trim Frosted Lens	SR	
Flush Frosted Lens	FL	
Parabolic Louver	PL	
White Painted Parabolic Louver	PW	
Corrugated Regressed Trim with MicroGlow™ Lens	CRM	
Solid Regressed Trim MicroGlow™ Lens	SRM	
Flush MicroGlow™ Lens	FLM	
lamping		_____
One Lamp T5	1T5	
One Lamp T5HO	1T5HO	
Two Lamp T5	2T5	
Two Lamp T5HO	2T5HO	
circuits		_____
Single Circuit	1C	
Dual Circuit	2C	
voltage		_____
120 Volt	120	
277 Volt	277	
347 Volt (Consult factory for availability)	347	
ballast		_____
Electronic Program Start <10% THD	S	
Electronic Dimming Ballast*	D	
ceiling configurations (Use only with 6" USG Logix® and Armstrong® TechZone® ceiling systems NOTE: For other ceiling systems consult factory)		_____
Std. 15/16" Lay-in	G1	
Std. 15/16" Tegular	T1	
Std. 9/16" Lay-in	G2	
Std. 9/16" Tegular	T2	
9/16" Slot-tee Tegular	G3	
Tall 15/16" Lay-in	G4	
Tall 15/16" Tegular	T4	
Tall 9/16" Lay-in	G5	
Tall 9/16" Tegular	T5	
Node 9/16" Tegular	T6	
factory options		
Chicago Plenum	CP	_____
Emergency Circuit*	EC	_____
Emergency Battery Pack* (4' Luminaires Only)	EM	
HLR/GLR Fuse	FU	_____
Include 3000K Lamp	L830	_____
Include 3500K Lamp	L835	
Include 4100K Lamp	L841	
finish		WH
Matte White Housing & Trim Plate	WH	
luminaire length		_____
4' Nominal Housing	4'	
5' Nominal Housing (Dimming not available with 5' lamps)	5'	

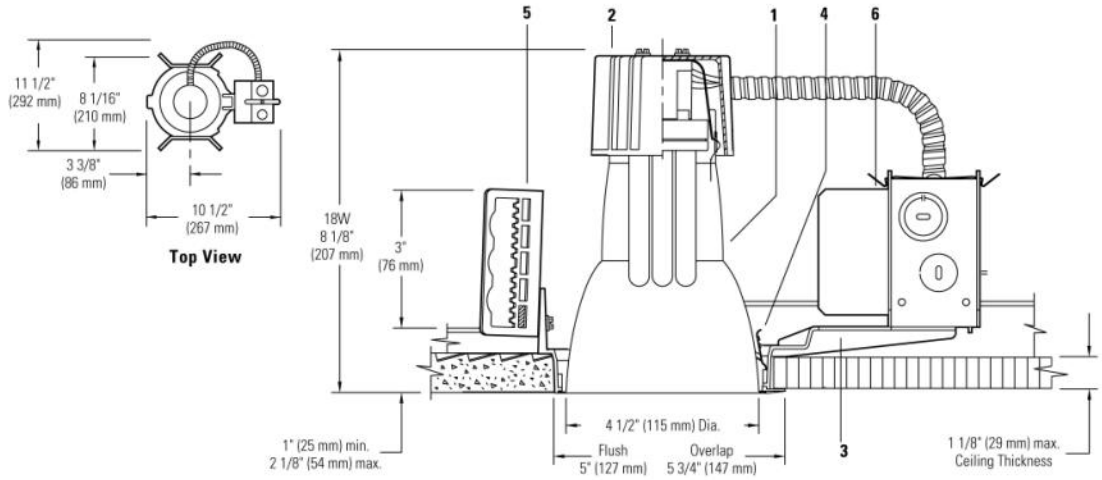
*For more information see the Reference section.

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

Type:	F8
Location:	Conference Room
Mfr/Catalogue #:	Lightolier – 8011 CCLW
Description:	4" Recessed compact fluorescent downlight. Spec-grade commercial
Lamping:	1-CFTR 18W
Optics:	Anodized aluminum parabolic reflector
Dimensions:	11.500" length, 10.500" width, 8.125" height
Housing:	Die cast aluminum
Electrical:	Integral electronic 120V/277V ballast
Voltage:	277 Volts
Labels:	IBEW, UL listed Damp Location. Suitable for Damp environments.

Calculite® Compact Fluorescent Open Downlight **8011**

4 1/2" Aperture Triple Tube Vertical Lamp



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

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

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.

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]

Diffuse	**CCD**
Champagne Bronze	**CCZ**

Other Finish

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. Sheet: 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:**

Job Name:

Cat. No.:

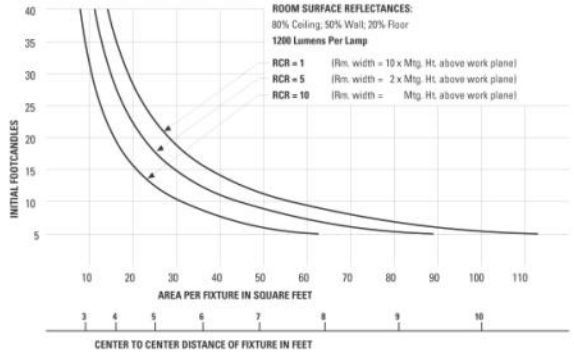
Lamp(s):

Notes:

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

LIGHTOLIER®

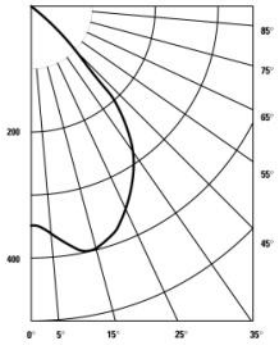
Quick Calculator



This quick calculator chart determines the number and spacing of 1 lt.-18W PL-T units with clear reflector, for any level of illumination.

Spacing Ratio = 1.2

CERTIFIED TEST REPORT NO. 0662FR
COMPUTED BY LSI PROGRAM **TEST-LITE**
CALCULITE RECESSED COMPACT FLUORESCENT OPEN DOWNLIGHT,
4 1/2" DIA. APERTURE CLEAR REFLECTOR
1-18W PLT LAMP. LUMEN RATING = 1200 LMS.



**** Efficiency = 42.38% ****

CANDLEPOWER SUMMARY

ANGLE	MEAN CP	LUMENS
0	350	
5	368	35
10	394	
15	394	110
20	374	
25	343	158
30	305	
35	254	155
40	171	
45	36	48
50	5	
55	1	2
60	0	
65	0	0
70	0	
75	0	0
80	0	
85	0	0
90	0	

ZONAL LUMENS AND PERCENTAGES

ZONE	LUMENS	% LAMP	%LUMINAIRE
0-30	303	25.30	59.81
0-40	458	38.18	90.25
0-60	507	42.30	100.00
0-90	507	42.30	100.00
40-90	49	4.13	9.75
60-90	0	.00	.00
90-180	0	.00	.00
0-180	507	42.30	100.00

Coefficients of Utilization

ZONAL CAVITY METHOD
EFFECTIVE FLOOR CAVITY REFLECTANCE = .20

CC WALL	80			70			50			30			10			
RCR	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
1	.47	.46	.46	.47	.46	.45	.45	.44	.43	.43	.43	.42	.42	.41	.41	.40
2	.44	.43	.42	.44	.42	.41	.42	.41	.40	.41	.40	.39	.40	.39	.39	.38
3	.42	.40	.38	.41	.39	.38	.40	.39	.37	.39	.38	.37	.38	.37	.36	.36
4	.39	.37	.36	.39	.37	.35	.38	.36	.35	.37	.36	.35	.36	.35	.34	.33
5	.37	.34	.33	.36	.34	.33	.36	.34	.32	.35	.33	.32	.34	.33	.32	.31
6	.35	.32	.31	.34	.32	.30	.34	.32	.30	.33	.31	.30	.33	.31	.30	.29
7	.32	.30	.28	.32	.30	.28	.32	.29	.28	.31	.29	.28	.31	.29	.28	.27
8	.30	.28	.26	.30	.28	.26	.30	.27	.26	.29	.27	.26	.29	.27	.26	.25
9	.28	.26	.24	.28	.26	.24	.28	.25	.24	.27	.25	.24	.27	.25	.24	.23
10	.26	.24	.22	.26	.24	.22	.26	.24	.22	.25	.23	.22	.25	.23	.22	.21

Job Information **Type:**

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

LIGHTOLIER®

Type:	F9
Location:	Cafeteria Serving Space
Mfr/Catalogue #:	Delray Lighting - 2310-S-18-2-E
Description:	9" Suspended compact fluorescent downlight. Standard-grade commercial
Lamping:	1-CFTR 18W
Optics:	Frosted glass diffuser
Dimensions:	9.000" diameter, 13.500" height/depth
Housing:	Extruded aluminum
Electrical:	Integral electronic ballast
Voltage:	277 Volts
Labels:	UL listed Damp Location. Suitable for Dry, Damp environments.

ASPECT REFLECTOR WITH OPAL GLASS LUMINAIRE

DELRAY LIGHTING INCORPORATED

2318 & 2328

TYPE: **PROJECT:**

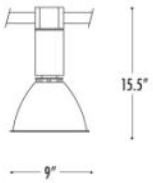
ORDER NUMBER:

2310	S	18	2	E
Model#	**Paint Finish**	**Wattage**	**Voltage**	**Ballast**
	Hammertone **S**ilver **W**hite **CC**–Custom RAL color Specify	**18**, **26** or **75**	**1**–120V **2**–277V	**E**–Electronic Dimming only for items marked ♦. Choose **D1**, **D3**, **D4**, **D5** or **D8**. (See Back Page)
Example:				
2322	W	32	1	E

ARMATURE

Suspends from cable or rod, constructed of extruded aluminum, and is securely fastened to cast wire way top. Ballast fits inside extruded cylinder attached to lamp holder for pulldown access. U.L. listed for damp locations.

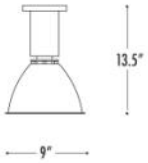
2310 Incandescent
2320 Fluorescent



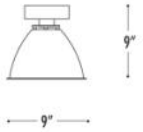
SURFACE MOUNT

Steel canopy mounts to all recessed J-boxes. Ballast fits inside extruded cylinder **2321** or horizontally in flat canopy **2325** . Specify **EM** for emergency battery pack, available on **2321** only. The 650 lumen battery pack adds 9¾" to canopy height, 13¾" with the 1300 lumen unit. U.L. listed for damp locations.

2311 Incandescent
2321 Fluorescent



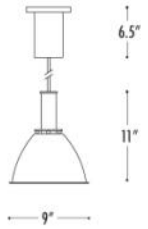
2315 Incandescent
2325♦ Fluorescent



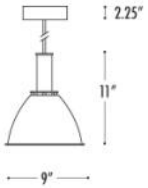
PENDANT MOUNT

Canopies mount to standard J-box. Ballast fits inside extruded cylinder **2322** or horizontally in flat canopy **2327**. Pendant is 6′ standard or can be specified in any length with 12′ max for CFL. Specify **EM** for emergency battery pack, available on **2322** only. The 650 lumen battery pack adds 9¾" to canopy height, 13¾" with the 1300 lumen unit. U.L. listed for damp locations.

2312 Incandescent
2322 Fluorescent



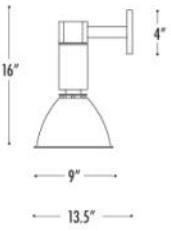
2317 Incandescent
2327♦ Fluorescent



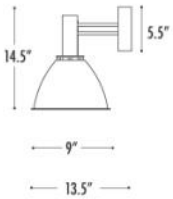
WALL MOUNT

4" square by 3/16" thick aluminum wall plate mounts to 3" mud ring on 2¾" vertical, centered holes. Fixture connects to extruded aluminum arm, which is securely fastened to cast wire way top. Ballast fits inside extruded cylinder **2323** or horizontally in flat canopy **2324** . U.L. listed for damp locations.

2313 Incandescent
2323 Fluorescent



2314 Incandescent
2324♦ Fluorescent



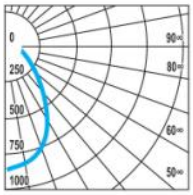
BURBANK,
CALIFORNIA,
91505
WWW.
DELRAY
LIGHTING.
COM

JULY 2008

FLUORESCENT

1-18W PLT

CP DISTRIBUTION



COEFFICIENTS OF UTILIZATION

% CEILING 80	(20% FLOOR)		
% WALL 70		50	30
0	73	62	55
1	70	60	52
2	68	57	51
3	66	55	49
4	64	53	47
5	62	51	45
6	59	49	43
7	57	46	41
8	55	42	39
9	53	41	37
10	51	39	35

NOTES

232218
1-18W triple tube
G24q-3 electronic socket
Total lumens: 1250
Spacing criteria: 1.0

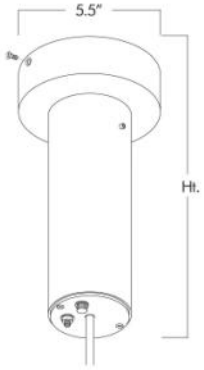
BALLAST INFO

DIMMING

- Dimming only available for items marked ♦ on page 1.
- Voltage *must* be specified.
- Controls lumen output down to ±5%.
- Compatible dimmers required for all ballasts.
- **D1** Lutron Compact SE for 26W lamp.
- **D3** Advance Mark X for 18 or 26W lamp.
- **D4** Lutron Tu-Wire for 26W lamp. 120V *only*.
- **D5** Advance Mark VII for 26W lamp.
- **D8** Lutron Hi-Lume 1% for 26W lamp. Controls lumen output down to ±1%.

EMERGENCY

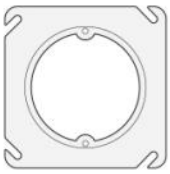
- Voltage *must* be specified.
- **EM** emergency power provides 650 lumens for one lamp for 90 minutes. Ht.=15.25"
- **EM13** emergency power provides 1300 lumens for one lamp for 90 minutes. Ht.=18.75"



WALL MOUNTING

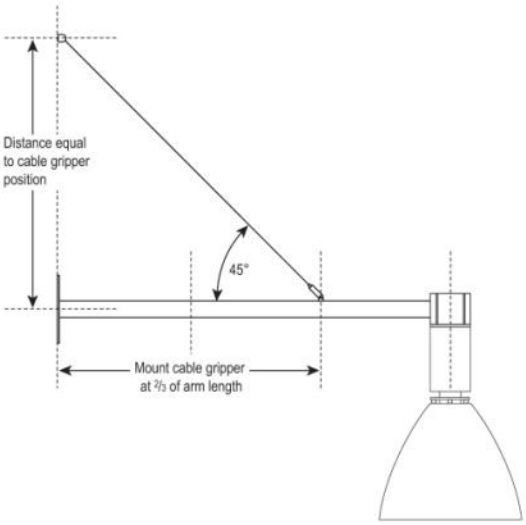
WALL PREPARATION

- For models 2313 and 2323.
- Mount holes must be aligned vertical center, as shown:



2329 ARM EXTENSION

- Specify arm length, up to 36" maximum.
  Example: **2329X** (X=length)
- Aircraft cable, grip locks and mounting hardware included.



JULY 2008

Type:	F10
Location:	Cafeteria Serving Space
Mfr/Catalogue #:	Winona Lighting - LED-POPS01-6-ARC-M-001-ND12V-BAL-X-STD
Description:	Suspended LED chandelier.
Lamping:	LED
Optics:	No optics
Dimensions:	2.000" diameter, 8.000" height/depth
Housing:	Aluminum, powder coat paint
Electrical:	Integral transformer
Voltage:	12 V
Labels:	UL listed Dry Location, UL listed Wet Location. Suitable for Dry, Wet environments.

winonaLED

POPS01 Single Pendant

Type:

Ref #:

Project Name:

Qty:

POPS01 Single Pendant is a surface mounted pendant using one LED. Eight LED colors are available in both normal and high output configurations.

Construction: All aluminum construction with galvanized steel backplate and stainless steel hardware.

Acrylic Diffuser: Twenty standard diffusers, each in three sizes, can be used with this luminaire. Machined solid acrylic diffuser is naturally UV stable. Custom shapes available - consult factory.

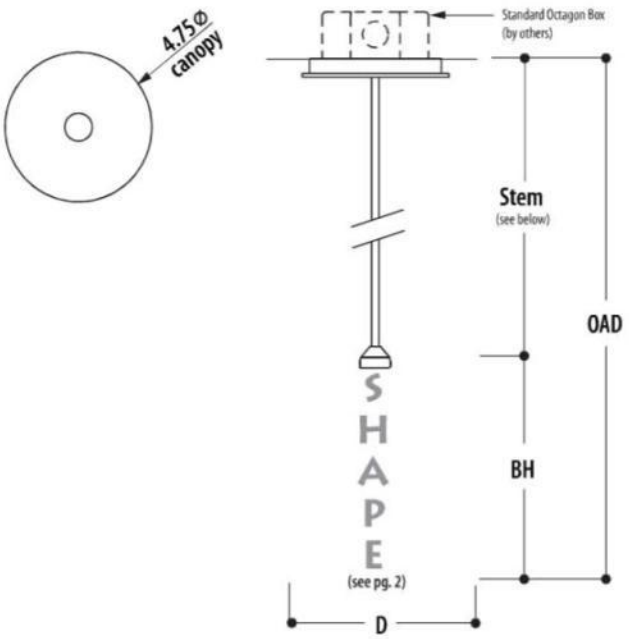
Mounting: Luminaire is mounted to standard 4" octagon junction box (supplied by others) with hidden fasteners.

Integral Driver: Integral non-dimming drivers available for 90-250V AC and 12V AC. Dimmable driver 12V-40V DC only.

Dimming: True 0-100% dimming is available with exclusive LightLink dimming system interface which is compatible with both 0V-10V sink and source-type dimmers.

Power Consumption: Luminaire consumes maximum of 4W depending on LED color.

UL Listed: Dry Location, Wet Location optional



UL LISTED

Note!
This luminaire can use any shape and any size of our standard acrylic diffusers. Refer to SHAPES page for acrylic dimensions to determine Body Height (BH) , Diameter (D), and Overall Drop (OAD).

LED	–	POPS01	–	6	–	ARC	–	M	–	001	–	ND12V	–	BAL	–	X	–	STD
SOURCE		MOUNT		STEM LENGTH		DIFFUSER SHAPE		DIFFUSER SIZE		LED CODE		VOLTAGE		FINISH		OPTIONS		SPECIAL

MOUNT:
POPS01 = SINGLE PENDANT

STEM LENGTH:
3 = 3 INCH
6 = 6 INCH
9 = 9 INCH

DIFFUSER SHAPE:
SPH = SPHERE
CYL = CYLINDER
CAT = CATTAIL
WED = WEDGE
TIK = TIKI
CLA = CLASSICAL
HOU = HOURGLASS
ALA = A-LAMP
CHA = CHARDONNAY
BEE = BEEHIVE
RIB = RIBBED
ARR = ARROW
ARC = ARC
FLU = FLUTE
VAS = VASE
DRO = DROP
SPI = SPIKE
DIS = DISCUS
PUC = PUCK
EDG = EDGE
CUS = CUSTOM (consult factory)

SIZE:
S = SMALL
M = MEDIUM
L = LARGE

CODE	COLOR	OUTPUT
001	WARM WHITE 30K	NORMAL
001/HO	WARM WHITE 30K	HIGH
002	COOL WHITE 62K	NORMAL
002/HO	COOL WHITE 62K	HIGH
003	AMBER	NORMAL
003/HO	AMBER	HIGH
004	BLUE	NORMAL
004/HO	BLUE	HIGH
005	CYAN	NORMAL
005/HO	CYAN	HIGH
006	GREEN	NORMAL
006/HO	GREEN	HIGH
007	RED-ORANGE	NORMAL
007/HO	RED-ORANGE	HIGH
008	RED	NORMAL
008/HO	RED	HIGH

*IES report available for normal & high output. (See website)

VOLTAGE:
Non-Dimming
ND120V = 90V-250VAC
ND12V = 12VAC
Dimming
DM24V = 12V-40VDC*
*LightLink dimming system interface maximum fifty luminaires per LightLink, one LightLink per dimming zone.

FINISH:
BAL = BRUSHED ALUMINUM
BBP = BRUSHED BRASS PAINT
CPF = CUSTOM PAINTED FINISH
LBPS = LIGHT BRONZE PAINT SMOOTH
LSP = LIGHT SILVER PAINT
PGP = PALE GOLD PAINT
SGB = SEMI-GLOSS BLACK
SGW = SEMI-GLOSS WHITE

OPTIONS:
X = NO OPTIONS
WL = WET LOCATION

SPECIAL:
STD = STANDARD
MOD = MODIFIED

MODIFICATIONS:
Please use this space to list any modifications.

Revised: 2/28/08

winona lighting | Winona Lighting | 3760 West Fourth Street | Winona, MN 55987 | 800-328-5291 | www.winonalighting.com

winonaLED

POPS! WIRING

All POPS! models are available with Dimming and Non-Dimming internal drivers. Non-Dimming drivers accept 90V-264V AC (ND120V code) and 11-15V AC (ND12V code). All Dimming drivers require require low voltage DC power supply to operate. Size and model of the power supply will vary according to size of installation and other requirements.

Do not connect line voltage to Dimming drivers! **Do not make live connections!**

NON-DIMMING INSTALLATIONS

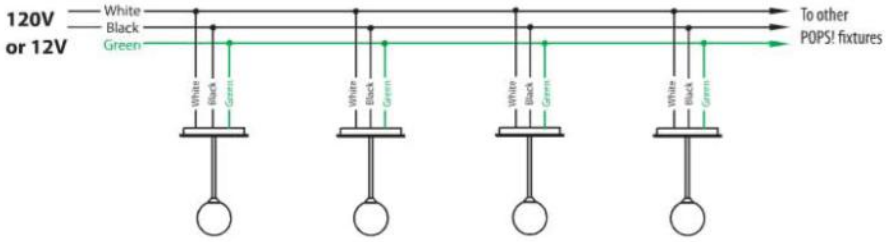
Non-dimming luminaires are supplied with an internal driver with either line voltage (90V-264V AC) or low voltage (12V AC) input. Verify you have the correct driver for your application and power supply before proceeding. Use the following diagram for either type.

Line Voltage Drivers:

1. Connect driver **WHITE** & **BLACK** to **120V** supply
2. Connect chassis **GREEN** wire to supply **GROUND**

Low Voltage Drivers:

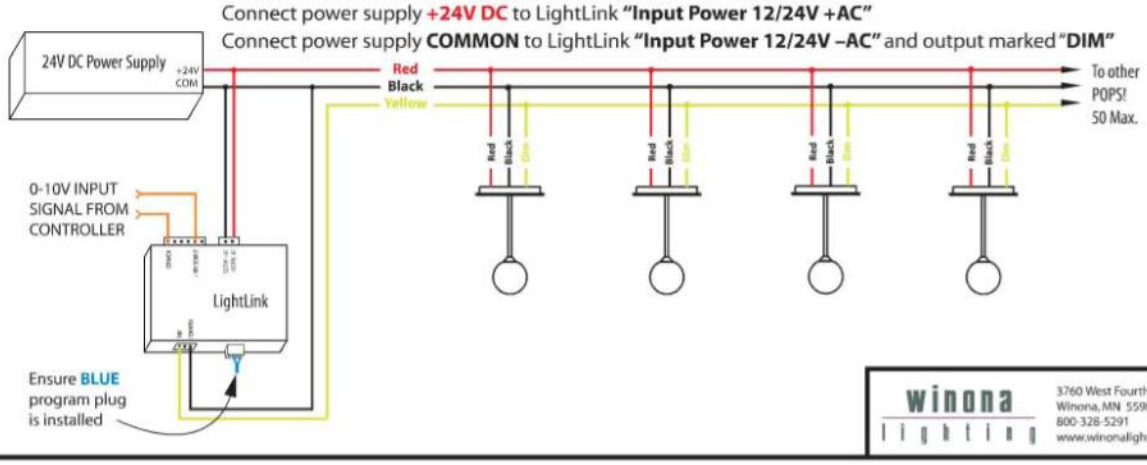
1. Connect driver GREY wires to **12V** supply
2. Connect chassis **GREEN** wire to electrcal box



DIMMING INSTALLATIONS

All dimming installations require the use of the LightLink dimming module which is spliced inline with the control signal output from the dimming control system. The LightLink module will accept any 0-10V dimming signal input (source or sink) from any dimming control system as well as PWM input and analog input from room sensors or other devices. Refer to LightLink documentation for detailed installation and operating instructions. Mount the LightLink module close to and feed it power from the same 24V DC power supply used for the POPS! luminaires. On installations requiring more than one transformer, a LightLink module must be used for each supply. Multiple LightLink modules may be connected to the same power supply. Use minimum of 12 gauge wire for remote power supply installations. **DO NOT MAKE LIVE CONNECTIONS!**

Connect STEP **RED** wire to power supply **+24V DC**
Connect STEP **BLACK** wire to power supply **COMMON**
Connect STEP **YELLOW** wire to LightLink Output marked **"DIM"**
Connect 1 to 10V Dimmer supply Wire to LightLink Control Input marked **"+10V Source"**
Connect 1 to 10V Dimmer common Wire to LightLink Control Input marked **"Common"**
Connect power supply **+24V DC** to LightLink **"Input Power 12/24V +AC"**
Connect power supply **COMMON** to LightLink **"Input Power 12/24V –AC"** and output marked **"DIM"**



winona lighting
3760 West Fourth Street
Winona, MN 55987
800-328-5291
www.winonalighting.com

Type:	F11
Location:	Cafeteria Serving Space, Lounge
Mfr/Catalogue #:	Mark Lighting - SPR-F-1T5HO-277-EB
Description:	5" Recessed fluorescent wallwasher.
Lamping:	1-T5HO 28W
Optics:	Acrylic lens
Dimensions:	Length varies, 5.250" width, 5.750" height
Housing:	Extruded aluminum housing
Electrical:	Integral electronic ballast
Voltage:	277 Volts
Labels:	IBEW, UL.

The SP Series

Product Features

- Shallow profile minimally penetrates ceiling.
- Available in semi-recessed or fully recessed versions.
- Extruded aluminum housing and fascia.
- Staggered lamps are standard.

3 Kilmer Road Edison, New Jersey 08817 telephone 732.985.2600 facsimile 732.985.8441
www.marklighting.com

The SP Series

Specification Data

Housing: Housing and vertical fascias are extruded aluminum. Internal wiring trays are 20-gauge, cold-rolled steel.

Mounting: Recessed perimeter wall wash in 8-ft., 6-ft., 4-ft., 3-ft. and 2-ft. sections.

Shielding: Extruded matte white acrylic lens snaps into housing.

Corners: 90-degree inside or outside corners.

Housing finish: Standard finish: matte white.

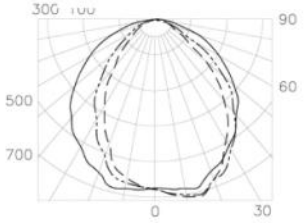
Lamps: Standard 6" stagger (1) or (2) T5, T5HO or (1) T8 (in cross section). Lamps provided by others.

Ballast: Electronic (limited to slim profile case size). Please specify voltage.

Certification: U.L. listed, I.B.E.W. (Local 3) Union made in the USA

Photometrics

Floor	20%								
Ceiling	80%			70%			50%		
Walls	70%	50%	30%	70%	50%	30%	50%	30%	10%
RCR 0	53	53	53	52	52	52	50	50	50
1	50	48	46	49	47	46	45	44	43
2	46	43	40	45	42	40	41	39	37
3	43	39	36	42	38	35	37	34	32
4	39	35	31	38	34	31	33	30	28
5	36	31	28	35	31	27	30	27	24
6	34	28	25	33	28	24	27	24	22
7	31	26	22	30	25	22	24	21	19
8	29	23	19	28	23	19	22	19	17
9	27	21	17	26	20	17	20	17	15
10	25	19	15	24	19	15	18	15	13



Catalog Number:
SP-1T8-EB-SW-120

Report Number:
BALL 13447

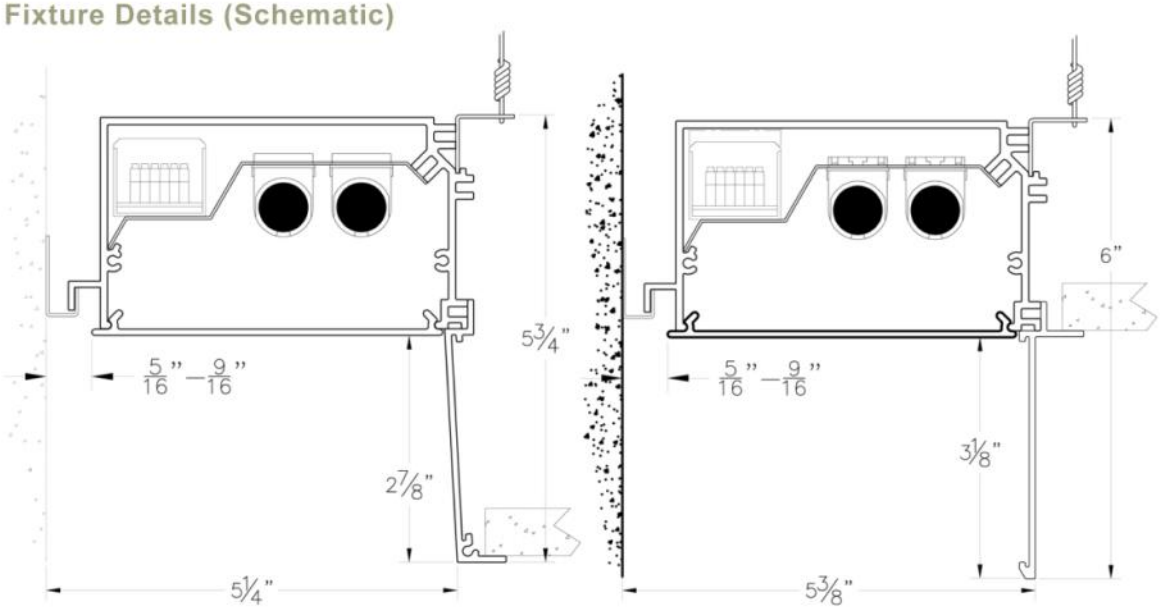
Lamps:
(1) T8 each rated 2950 lumens

Total Efficiency:
44.9%

3 Kilmer Road Edison, New Jersey 08817 telephone 732.985.2600 facsimile 732.985.8441
www.marklighting.com

The SP Series

Fixture Details (Schematic)



3 Kilmer Road Edison, New Jersey 08817 telephone 732.985.2600 facsimile 732.985.8441
www.marklighting.com

The SP Series

Ordering Info

SPR	**Product Family** SPR - The Fully Recessed SP Series SPS - The Semi-Recessed SP Series	Provide wall to wall dimentions.	**Run Length** Provide wall to wall dimentions. - Provide field dimentions when placing order. For patterns, clearly indicate wall locations. Patterns are provided with corners. Upon request, factory will prepare installation drawings for approval.
F	**Ceiling Interface** G - Grid F - Flanged	1T5	**Wattage (consult factory for other lamps)** 1T5 - (1) T5 lamp 2T5 - (2) T5 lamps 1T5HO - (1) T5HO lamp 2T5HO - (2) T5HO lamps 1T8 - (1) T8 lamp
SW	**Lens** SW - Soft White Acrylic	277	**Voltage** 120 - 120V 277 - 277V
EB	**Ballast** EB - Electronic EDB - Electronic Dimming		**Options** EMPK - Emergency Battery Pack

Company Name _____

Project Name _____

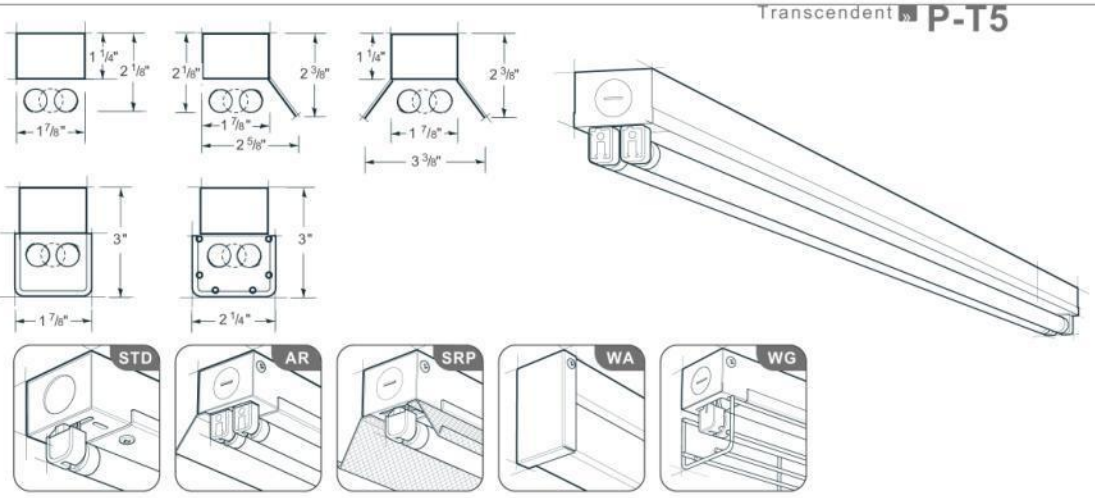
Fixture Type _____

3 Kilmer Road Edison, New Jersey 08817 telephone 732.985.2600 facsimile 732.985.8441
www.marklighting.com

Type:	F12
Location:	Dorm Room
Mfr/Catalogue #:	P-T5-STD-1T5-03-BWE-277
Description:	Surface-mounted fluorescent strip light, rigid housing.
Lamping:	1-F28T5
Optics:	No Optics
Dimensions:	36.000” length, 1.875" width, 2.125" height
Housing:	Die-formed steel
Electrical:	Integral electronic ballast
Voltage:	277 V
Labels:	IBEW, UL listed Damp Location. Suitable for Dry, Damp environments.

Type
Job Name
Catalog Number

Transcendent P-T5



ordering

series	body style	lamp rows	nominal length	color/finish	voltage	options
P-T5						
	STD standard	1T5	02'	BWE* white enamel	120	AL
	AR asymmetric reflector	2T5	03'	YGW† gloss white	277	EML*
	ARP asymmetric reflector perforated	1T5HO	04'	Y__ premium color	347*	EMH*
	SR symmetric reflector	2T5HO	06'	CC custom color	*T5HO only	DM
	SRP symmetric reflector perforated		08'	GLV galvanized		B__
	WA* white acrylic diffuser		R__*	*standard †standard on WA body style		FH
	WG wire guard		*row length			*consult factory for fixture lengths < 4'
	*T5 only					

Applications Concealed coves, small offices, retail, healthcare, schools, small profile spaces.

Features A compact T5/HO strip light with integral ballast in 1- or 2-lamp profiles. An optional white acrylic lens produces a sleek 2" x 3" lensed wrap. Options also include perforated or solid, symmetric and asymmetric reflectors, and a rugged, zinc-coated wire guard (natural finish). Dimming ballasts and emergency batteries are also available.

Construction The housing, available in 2-, 3-, 4-, 6- or 8-foot standard lengths, is made of die-formed, 20-gauge steel.

Finish The standard exterior body color is white enamel (BWE) or optional gloss white (YGW) using polyester powder paint. Refer to ordering matrix for optional metal finishes or refer to **Defining Section** for optional paint colors. White acrylic diffuser housing and optional reflectors are painted gloss white (YGW).

Electrical T5/HO fixtures have programmed-start electronic ballasts with less than 10% THD. Fixtures are U.L. Damp labeled (non-emergency) and I.B.E.W. manufactured. Maximum ballast size available: 1 5/8" width x 1 1/4" height.

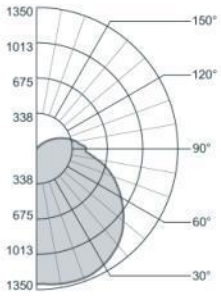
Mounting Fixture is to be surface-mounted.

Options **AL:** aluminum body; **EML:** emergency battery (T5/HO=700 lumens); **EMH:** emergency battery (T5/HO=1200 lumens); **DM:** dimming (consult factory); **B_:** specific ballast, specify manufacturer and catalog number (consult factory); **FH:** fixture fusing (slow blow).

photometric data

P-T5-AR-2T5HO-04-YGW

Report # LSI15308 D=93.6% I=6.4%
Lamp Lumens: 4500 Input Watts: 118



Candlepower Summary

Vertical Angle	Horizontal Angle 0°	22.5°	45°	67.5°	90°	Output Lumens
0	1305	1305	1305	1305	1305	
5	1310	1313	1311	1313	1313	64
15	1267	1286	1302	1322	1329	184
25	1181	1219	1262	1311	1322	291
35	1055	1119	1185	1251	1266	368
45	895	979	1061	1151	1172	407
55	704	810	910	1009	1029	401
65	493	610	730	844	874	355
75	265	407	546	682	708	279
85	50	212	346	488	512	184
90	0	127	304	433	483	
95	0	91	264	382	439	131
105	0	36	187	294	350	91
115	0	2	109	194	246	53
125	0	0	40	102	139	24
135	0	0	3	22	49	6
145	0	0	0	0	3	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	

Zonal Lumen Summary

Zone	% Lamp	% Luminaire
0-90	85.21	93.58
90-180	5.84	6.42

Efficiency = 91.1%

Luminance Summary (cd/m²)

Angle	0°	45°	90°
45	15014	14375	14798
55	14559	14122	14358
65	13837	13511	14245
75	12145	13316	14380
85	6805	12230	13650

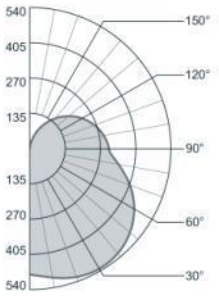
Coefficients of Utilization (%)

Floor	effective floor cavity reflectance = .20									
Ceiling	80				70				50	
Wall	70	50	30	10	70	50	30	10	50	30	10
RCR 0	107	107	107	107	104	104	104	104	98	98	98
1	97	93	89	85	94	90	86	83	85	82	79
2	88	81	74	69	85	78	72	68	74	69	65
3	80	71	63	57	78	69	62	56	65	60	55
4	74	63	54	48	71	61	54	48	58	51	46
5	67	55	47	40	64	54	46	40	51	44	39
6	61	49	41	35	59	48	40	34	45	39	34
7	56	44	36	30	55	43	35	30	41	34	29
8	52	39	31	26	50	38	31	25	37	30	25
9	48	35	27	22	46	34	27	22	33	26	22
10	44	32	24	20	43	31	24	19	30	23	19

photometric data

P-T5-WA-2T5-04-YGW

Report # LSI15304 D=74.4% I=25.6%
Spacing Criteria: Along 1.3; Across 1.6
Lamp Lumens: 2610 Input Watts: 58



Candlepower Summary

Vertical Angle	Horizontal Angle 0°	22.5°	45°	67.5°	90°	Output Lumens
0	483	483	483	483	483	
5	481	484	487	491	491	47
15	464	479	495	510	514	140
25	432	461	496	522	530	226
35	386	431	483	519	531	296
45	326	386	455	500	516	340
55	255	329	412	466	484	352
65	175	262	356	417	438	332
75	87	188	289	358	377	282
85	12	120	226	297	318	223
90	0	101	208	280	304	
95	0	92	198	272	298	194
105	0	83	183	251	277	173
115	0	71	163	225	249	144
125	0	59	138	195	213	111
135	0	44	109	155	172	76
145	0	28	78	111	127	45
155	0	14	47	71	81	20
165	0	4	17	30	35	5
175	0	0	1	1	2	0
180	0	0	0	0	0	

Zonal Lumen Summary

Zone	% Lamp	% Luminaire
0-90	42.86	74.40
90-180	14.75	25.60

Efficiency = 57.6%

Luminance Summary (cd/m²)

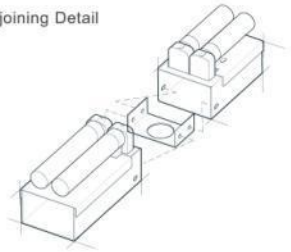
Angle	0°	45°	90°
45	7920	7248	7185
55	7642	7046	7026
65	7121	6797	6846
75	5801	6437	6617
85	2379	6316	6575

Coefficients of Utilization (%)

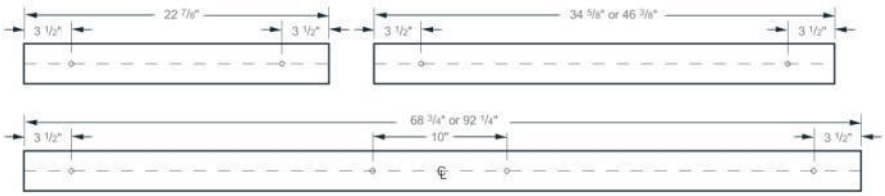
Floor	effective floor cavity reflectance = .20									
Ceiling	80				70				50	
Wall	70	50	30	10	70	50	30	10	50	30	10
RCR 0	65	65	65	65	62	62	62	62	56	56	56
1	58	55	52	49	55	52	49	47	47	45	43
2	52	47	42	39	49	44	40	37	40	37	34
3	47	41	36	32	44	39	34	30	35	31	28
4	43	36	30	26	40	34	29	25	31	26	23
5	39	31	26	22	37	30	25	21	27	23	19
6	36	28	22	19	34	26	21	18	24	20	17
7	33	25	20	16	31	24	19	15	21	17	14
8	30	22	17	14	28	21	16	13	19	15	12
9	28	20	15	12	26	19	14	11	17	13	10
10	26	18	13	10	24	17	13	10	16	12	09

installation

Adjoining Detail



Mounting Locations



In an effort to continually provide the highest quality products, Prudential reserves the right to change design specifications and/or materials, without notice.

0505 Prudential Lighting 1737 E. 22nd St. Los Angeles, CA 90058 phone 213.746.0360 fax 213.741.8590 www.prulite.com

Type:	F13
Location:	Roof Deck
Mfr/Catalogue #:	Cooper – Lumiere - 1235-RD-M-4LED-120/12-BK
Description:	Recessed compact fluorescent step light. Spec-grade residential, Spec-grade commercial
Lamping:	1-CFTR 13W
Optics:	Diffuser
Dimensions:	7.750" diameter, 4.500" width, 7.750" height
Housing:	Aluminum, powder coat paint
Electrical:	Integral electronic ballast
Voltage:	277 Volts
Labels:	CUL listed Wet Location, IBEW, UL listed Wet Location. Suitable for Dry, IC, Wet, Damp environments.

LUMIÈRE®

DESCRIPTION

Rio architectural step lights provide beauty, performance and durability. Transitional styling, low profile design and no visible fasteners provide seamless integration with architectural styles of all kinds. Logical, modular design elements facilitate fast and foolproof installation in all types of wall surfaces including drywall, concrete pour or brick/masonry. All models include IP68 rated outdoor protection, but are also suitable for indoor wall-mounted applications. All models are ADA compliant.

Catalog #		Type
Project		
Comments		Date
Prepared by		

SPECIFICATION FEATURES

A ... Construction
Back box and painted fascia are die-cast from corrosion-resistant Type 383 aluminum alloy. Back box is painted white. Natural metal fascia is precision-machined from solid brass or stainless steel.

B ... Finish
Back box and fascia are double protected by a chromate conversion undercoating and polyester powdercoat paint finish. Machined, natural finish brass or stainless steel fascia is unpainted to reveal the natural beauty of the material. Brass will patina naturally over time in outdoor environments.

C ... Electrical
Fixture includes integral, electronic ballast, transformer or LED driver mounted to Lumiere's factory-assembled POWER-TRAY(TM) optical/electrical module. The POWER-TRAY(TM) module plugs directly into the back box providing fast, easy installation.

D ... Mounting
Back box is available to ship in advance for rough-in purposes. Back box includes four (4) 3/4" conduit entry ports, concrete pour cover, UP arrow and two level vials to facilitate proper alignment. Fixture also includes the patent pending FASCIAlign(TM) fascia alignment system which provides rotation of the fascia +/- 10 degrees (total of 20 degrees), insuring proper alignment.

E ... Classification / Code Compliance
UL and cUL listed, standard wet label. IP68 rated. Also suitable for indoor recessed wall-mount applications, 4W LED source is IC-rated for direct insulation contact. Manufactured to ISO 9001-2000 Quality Systems Standard. IBEW union made.

F ... Lamp
Lamp for LED source included as standard. Lamps for other sources not included (available from Lumiere as an accessory - order separately).

G ... Warranty
Lumiere warrants its fixtures against defects in materials and workmanship for three (3) years. Auxiliary equipment such as transformers, ballasts and lamps carry the original manufacturer's warranty.

Recessed Housing
Recessed housing is available to ship in advance of complete fixture for rough-in purposes. Specify option -LBB and order separately accompanying recessed housing from below:

1235-BB-C
5" back box and pour cover for concrete pour wall

1235-BB-D
5" back box and pour cover for drywall/frame construction wall

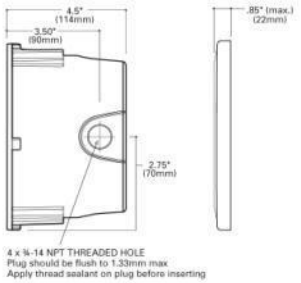
1235-BB-M
5" back box and pour cover for masonry wall

RIO
1235-RD
1235C-RD
1235E-RD
1235L-RD

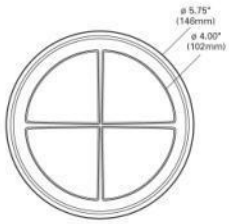
4W (max.) LED
20W (max.) T3 Halogen
Low Voltage

STEP LIGHT

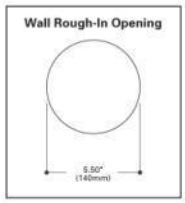
ADA IP68



1235-RD



1235C-RD



1235E-RD

1235L-RD

COOPER Lighting
www.cooperlighting.com

Specifications and Dimensions subject to change without notice.
Consult your representative for additional options and finishes.

ADL060828
08/30/2006 3:22:40 PM

ORDERING INFORMATION

Sample Number: 1235C-RD-M-4LED-120/12-NSS

Model
- **1235-RD**: 5" round, open fascia w/ clear, diffused lens
- **1235C-RD**: 5" round, cross/guard fascia w/ clear, diffused lens
- **1235E-RD**: 5" round, eyelid fascia w/ clear, diffused lens
- **1235L-RD**: 5" round, louvered fascia w/ clear lens

Wall Type
- **C**: Concrete Pour
- **D**: Drywall
- **M**: Masonry

Source [1]

12V Halogen or LED
- **20T3**: 20W / T3 / G4
- **4LED**: 4W / LED (LED lamps included)[2]

Volts

12V Halogen
- **120/12**: 120/12V electronic transformer
- **277/12**: 277/12V electronic transformer

LED
- **120/12**: 120V electronic LED driver

Finish

Painted
- **BK**: black
- **BZ**: bronze
- **CS**: city silver
- **VE**: verde
- **WT**: white

Metal
- **NBR**: brass
- **NSS**: stainless steel

Options
- **LBB**: Housing and Pour Cover Shipped in Advance (select LBB option and order recessed housing separately)

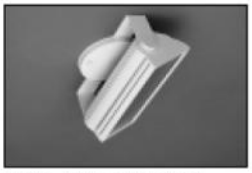
Recessed Housing (order separately)

Select housing from Recessed Housing section on previous page

Notes: 1 Unless noted otherwise, lamps not included.
2 4W LED source is IC-rated for direct insulation contact.

Type:	F14
Location:	Lounge
Mfr/Catalogue #:	Winona Lighting - P1-SS-CFQ26-277V-SS8-SGW-X-STD
Description:	12" surface-mounted compact fluorescent wallwasher.
Lamping:	1-CFQ 26W
Optics:	Anodized aluminum reflector
Dimensions:	12.000" length, 6.375" width, 5.500" height
Housing:	Extruded aluminum
Electrical:	Remote electronic ballast
Voltage:	277 V
Labels:	CUL listed Damp Location, UL listed Damp Location. Suitable for Dry, Damp environments.

Small Ceiling Mount



Profile - P1 (basic): Anodized, extruded aluminum specular reflector with solid aluminum endcaps and stainless steel hardware.

Type - Small profile with smooth or ribbed detail.
Indoor; non-gasketed, captive extruded alum. hinge for lens and baffle options.
Aperture; open aperture is standard for indoor fixtures.

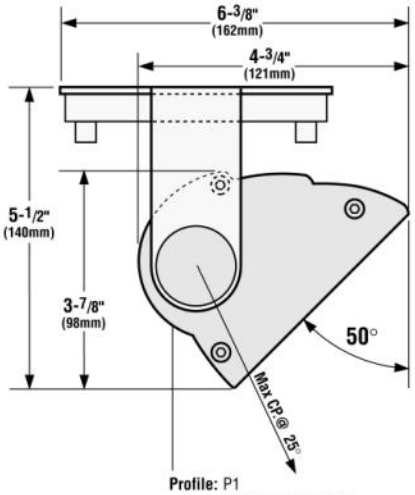
Mounting - Three standard mounts are fully adjustable and lockable. Designed for remote or integral ballast.

Performance - Asymmetric distribution provides a concentration of light on target surface for smooth illumination. Maximum candlepower aimed 25° above nadir has less than 5% spill light within the 0-25° zone and less than 2% spill light within the 90 - 180° zone.

Electrical - Electronic, HPF ballast, lamp protection circuit, Class P and thermally protected. Max distance from ballast to lamp: 15' (CFQ). Provide 90° C supply wire.

Finishes - An electrostatically applied wet paint system utilizes a multi-stage process to provide a durable acrylic enamel finish. Suitable for indoor and outdoor applications.

Options - For complete list and detailed descriptions, refer to Options Section.



Profile: P1
Type: SS, SR, SSW, SRW
Mount: SS8
Length: Refer to chart below
Scale: 3/8" = 1"

INDOOR

HOW TO SPECIFY

P1 – SS – CFQ26 – 277V – SS8 – SGW – X – STD

PROFILE

P1 (basic)

TYPE

Indoor Locations: (damp label)
SS: Small Smooth
SR: Small Ribbed

Outdoor Locations: Wet label (not available for CFQ lamp)

LAMPING - VOLTAGE

120V or 277V

Code	Description	Length	Weight
	Compact Fluorescent		
CFQ26	(1)CFQ26W/G24q	12"	6 lbs.
	Linear Fluorescent		
	- For single linear or continuous row applications see **Surface Linear Tab.**		

MOUNTING

Remote Ballast
SS8: Simple Yoke
SD8: Deco Yoke
SK8: Knuckle

Integral Ballast
SS9: Simple Yoke
SS10: Simple Yoke
SS12: Simple Yoke

FINISH

SGW: Semi-Gloss White
SGB: Semi-Gloss Black
ALP: Aluminum Paint (matte finish)
LGP: Light Gold Iridescent (gloss finish)
PBP: Pale Bronze Paint (gloss finish)
CPF: (MOD) Custom Painted Finish

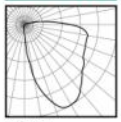
OPTIONS

X: No Options
SV: (P1 only) Short Visor
PB: Parabolic Blade Baffle (internal mount)
EM: (remote) Emergency Battery
SO: (MOD) Special Option

CLASS

STD: Indicate only when specifying a standard.
MOD: Indicate when specifying any modification.

PHOTOMETRY



CFQ26W
Refer to Technical Section for detailed Photometry Reports.
Report #9133

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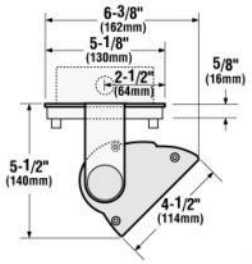
Fluorescent Small Ceiling Mount

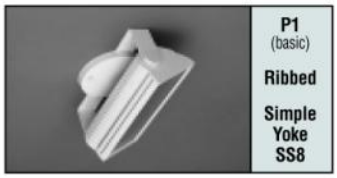
winona lighting

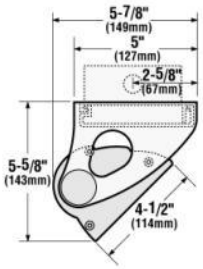
WINDIRECT™

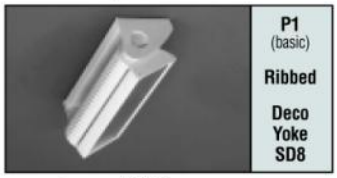
MOUNTING STYLES*

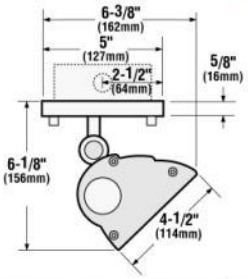
Remote Ballast



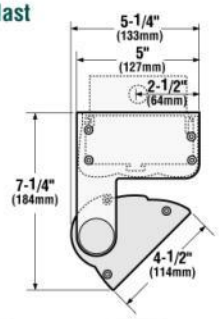


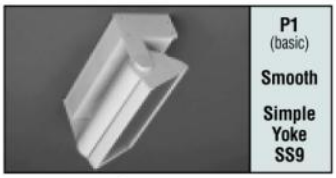


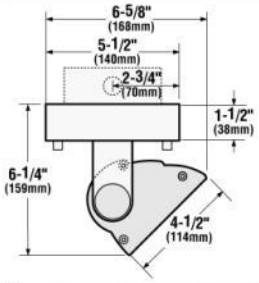


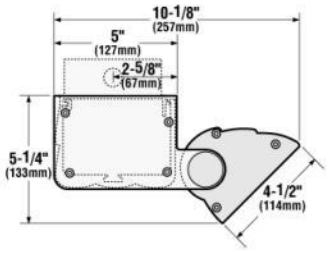


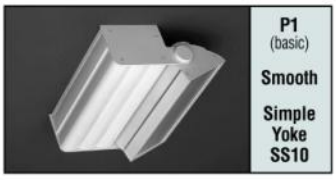
Integral Ballast











* P1 profile can be combined with any mounting style

PAGE:SC.6

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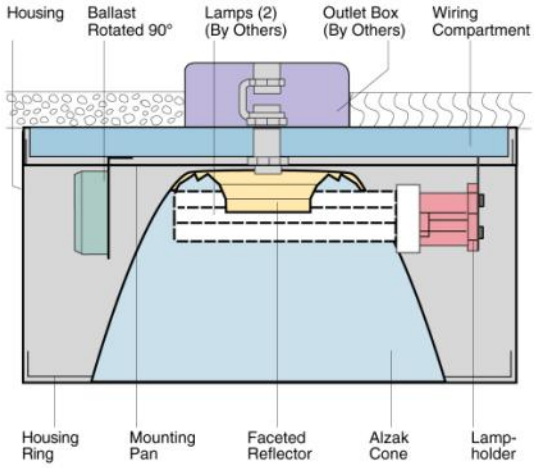
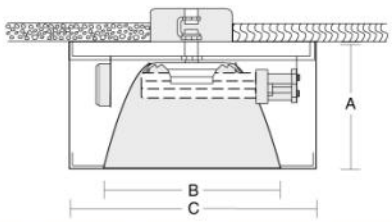
Type:	F15
Location:	Lounge, Dorm Rooms
Mfr/Catalogue #:	Kurt Versen - P602
Description:	8" Surface-mounted compact fluorescent downlight.
Lamping:	2-CFQ 26W
Optics:	Anodized aluminum parabolic reflector
Dimensions:	13.000" diameter, 6.000" height
Housing:	One piece 20 Ga steel
Electrical:	Integral electronic ballast
Voltage:	277 V
Labels:	CUL, IBEW, UL. Suitable for Dry environments.



Dimensions and Lamps



Number	A Depth	B Aperture	C Diameter	Lamps*
P602	6" 152mm	8⅜" 213mm	13" 330mm	Two 26W Quad Tube

*For 18W lamps, add 18W to catalog number.

P602 DISCONTINUED

See P639CB, Page P43

Surface Mount Cylinder
Two 26W Quad Tube lamps
8⅜" Conoid Aperture

Optics and Applications
The optical system features a two reflector system. The primary reflector is longitudinally formed and faceted. The parabolic shielding cone offers unparalleled brightness control from normal viewing angles. The pattern is slightly asymmetrical depending upon measurement perpendicular or parallel to the lamps. Use in corridors, transit areas, open spaces, foyers, restrooms, etc.

Finish
A specular clear Alzak cone is standard. Optional colors and Softglow® finishes are available. Interior finish is matte black, the cylindrical housing exterior is satin brushed, then painted matte white baked enamel.

Ballast
Fully electronic, microprocessor controlled with variable starting current for inrush protection to assure rated lamp life. Input voltage range from 120V through 277V. Power factor .98, starting temperature 0°F (-18°C), THD < 10%. Pre-heat start < 1.0 second. End of lamp life protection. Rated for > 50,000 starts.

General
Fixtures are UL and C-UL listed for thermal and electrical safety. Union made IBEW. Luminaire Efficiency Rating (LER) data is in the photometric directory located in Section Z.

Accessories

G	Gold cone.	WT	White trim flange.
H	Mocha cone.	WHT	White complete trim.
P	Graphite cone.	BA	Brushed aluminum.
T	Titanium cone.	CC	Custom color.
W	Wheat cone.	P5	Pendant adaptor, 21" length.
Y	Pewter cone.	ES	Extra stem length, specify length.
Z	Bronze cone.		

S Softglow® finishes: add S before color letters. e.g. SW for Softglow® wheat cone, SC for Softglow® clear cone.
V347 347 volt ballast.
DM Dimming ballast, contact the factory.
EM Emergency power. Includes battery pack, charger light, test switch and single lamp operation for 90 minutes. Components are remote from fixture. Specify volts.

Matching Units

Recessed downlights	Pages P5, P6
Recessed wall washers	Page P33

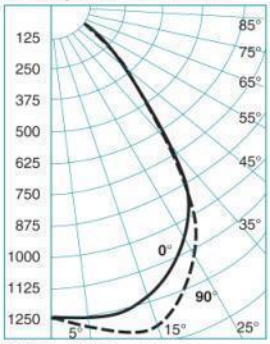
P42 P602

Performance Datachart

Single Unit Initial Footcandles, 30" Work Plane							Ceiling to Floor	Multiple Units Initial Footcandles, 30" Work Plane			
P602 Two 26W Quad Tube lamps								Ceiling 80% Walls 50% Floor 20%			
Nadir	20°		30°		40°			Spacing is Maximum Over Work Plane			
FC	FC	Diam	FC	Diam	FC	Diam		Spacing	RCR 1	RCR 3	RCR 8
42	33	4'	24	6'	9	9'	8'	7'	46	38	25
30	24	5'	17	8'	6	11'	9'	8'	33	27	18
22	18	5'	13	9'	5	13'	10'	9'	25	21	14
14	11	7'	8	11'	3	16'	12'	12'	15	13	9
10	8	8'	6	13'	2	19'	14'	14'	10	9	6

See notes 4, 5 and 6.

Candlepower Distribution



P602 Two 26W Quad Tube lamps
Eff. 56% S/M 0° 1.2 S/M 90° 1.3

Candelas

	0°	90°
o	3600*	3600*
0	1257	1257
5	1259	1281
10	1263	1307
15	1189	1336
20	1182	1283
25	1135	1237
30	1116	1163
35	931	955
40	592	618
45	383	392
50	233	280
55	96	113
60	33	38
65	11	10
70	4	3
75	0	0
80	0	0
85	0	0
90	0	0

° Vertical Angles
* Initial Lamp Lumens

Coefficients of Utilization

Ceiling	80%				70%		50%		30%		0
Wall %	70	50	30	10	50	10	50	10	50	10	0
RCR	Zonal Cavity Method - Floor Reflectance 20%										
1	.63	.61	.59	.58	.60	.57	.57	.55	.55	.53	.51
2	.59	.56	.53	.51	.55	.50	.53	.49	.51	.48	.46
3	.55	.51	.48	.45	.50	.45	.49	.44	.47	.43	.42
4	.52	.47	.43	.40	.46	.40	.45	.39	.43	.39	.38
5	.48	.43	.39	.36	.42	.36	.41	.36	.40	.35	.34
6	.45	.39	.35	.33	.39	.33	.38	.32	.37	.32	.31
7	.42	.36	.32	.30	.36	.30	.35	.29	.34	.29	.28
8	.40	.34	.30	.27	.33	.27	.33	.27	.32	.27	.26
9	.37	.31	.27	.25	.31	.25	.30	.25	.30	.25	.24
10	.35	.29	.25	.23	.29	.23	.28	.23	.28	.23	.22

P602 Two 26W Quad Tube lamps

Brightness

Number	Lamps	Plane	85°	75°	65°	55°	45°
P602	Two 26W Quad Tube	0°	10	39	436	9572	12283
		90°	11	33	75	10409	12931

Data in footlamberts. Photometer readings, Maximum Brightness Method. See note 7.

Corridor Footcandles

P602 Two 26W Quad Tube lamps												
Ceiling Height	Reflectances: Ceiling 80% Walls 50% Floor 20%											
	8' Centers					12' Centers						
	C/L	2'	4'	6'	C/L	C/L	2'	4'	6'	8'	10'	C/L
8'	31	34	35	34	31	25	25	201	17	20	25	25
9'	28	31	31	21	28	21	25	19	19	19	21	21
10'	26	27	28	27	26	18	18	18	18	18	18	18

Initial footcandles. Readings on the floor. 5' corridor width.

Notes

1 Data on all charts calculated with a clear specular cone finish.

2 Specular cone multipliers: Wheat x .88, Pewter x .82, Mocha x .85, Graphite x .81, Titanium x .81, Bronze x .75.

3 Softglow® cone multipliers: Clear x .93, Wheat x .87, Pewter x .78, Mocha x .77, Graphite x .75, Titanium x .75, Bronze x .69.

4 Single unit Datachart pattern diameters are determined by the number of degrees from each side of nadir. Therefore a 20° diameter represents a total 40° pattern width at the work plane 30" above the floor. Footcandle values are at the edge of that diameter.

5 Datachart spacing is rounded off to the nearest foot.

6 Data by IES methods. Compact fluorescent data vary due to lamp lumen differences, power input, burning position, ambient temperature and ballast characteristics. A modification factor should be applied.

7 Brightness data from the Average Luminance Method are inaccurate for small aperture downlights. They are theoretical calculations derived for large surfaces such as troffers. For a complete discussion refer to section Z brochure Z1.

8 For 18W lamps, multiply all data by .70 or contact the factory for precise data.

Kurt Versen Company, Westwood, New Jersey

Type:	F16
Location:	Dorm Rooms
Mfr/Catalogue #:	Focal Point - DUW-4-T5HO-277-EB
Description:	Wall-mounted fluorescent up/downlight.
Lamping:	1-T5HO
Optics:	Opal acrylic diffuser
Dimensions:	48.000” length, 4.000" width, 4.000" height/depth
Housing:	Steel, powder coat paint
Electrical:	Integral electronic ballast
Voltage:	277 V
Labels:	IBEW, UL. Suitable for Dry environments.

The Duet Series

Product Features

- Baffles are an integral part of the fixture housing provided in either "up" (internal) or "down" (external) configurations.
- Compact 4" X 4" profile conforms with A.D.A. (Americans with Disabilities Act) requirements.
- Available with one-lamp or two-lamp T8 or T5 configurations.

3 Kilmer Road Edison, New Jersey 08817 telephone 732.985.2600 facsimile 732.985.8441
www.marklighting.com

The Duet Series

Specification Data

Housing: Die-formed, 20-gauge, cold-rolled steel. Ballast compartments provided with 7/8" diameter KOs at either end of housing for through wiring.

Mounting: Wall wash 4" X 4" X 2-ft., 4-ft. or 8-ft. long. All units are intermediate units and are provided with field attachable finishing end caps to terminate runs.

Reflector: Die-formed, cold-rolled steel with 89% reflectance white finish.

Shielding: 3/8" high blades at 3/4" on center. Blades are an integral part of the fixture housing and can be provided in a "down" position (visible below fixture housing) or in an "up" position (concealed within the housing). Indirect component is provided with an acrylic prismatic lens. Housing/baffle combination lifts from wall plate for easy relamping and maintenence.

Finish: Baked white enamel.

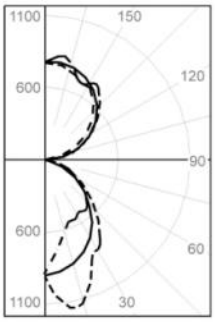
Lamps (in cross section): (1) or (2) T5, T5HO or T8 lamps. (Lamps by others.)

Ballast: Electronic. Please specify voltage.

Certification: U.L. listed, I.B.E.W. (Local 3) Union made in the U.S.A.

Photometrics

Floor	20%										
Ceiling	80%				70%				50%		
Walls	70%	50%	30%	10%	70%	50%	30%	10%	50%	30%	10%
0	.76	.76	.76	.76	.70	.70	.70	.70	.58	.58	.58
1	.70	.67	.64	.61	.64	.61	.59	.57	.51	.50	.48
2	.63	.58	.54	.51	.58	.54	.50	.47	.45	.43	.40
3	.58	.51	.46	.42	.53	.48	.43	.40	.40	.37	.34
4	.53	.46	.40	.36	.49	.42	.37	.34	.36	.32	.29
5	.49	.41	.35	.31	.45	.38	.33	.29	.32	.28	.25
6	.45	.37	.31	.27	.41	.34	.29	.25	.29	.25	.22
7	.42	.33	.28	.24	.38	.31	.26	.22	.26	.22	.20
8	.39	.30	.25	.21	.36	.28	.23	.20	.24	.20	.17
9	.36	.28	.22	.19	.33	.26	.21	.18	.22	.18	.16
10	.34	.25	.20	.17	.31	.24	.19	.16	.20	.17	.14



Catalog Number:
DUW-4-2T8-EB-LU

Report Number:
ITLL49302

Lamps:
(2) T8 each rated 2950 lumens

Total Efficiency:
71.4%

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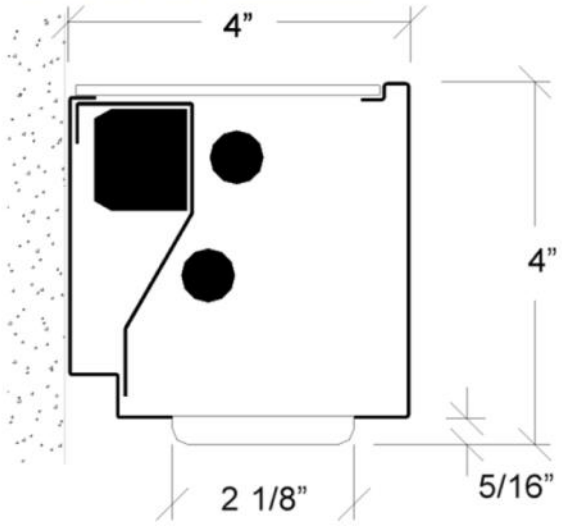
www.marklighting.com

The Duet Series

Fixture Details (Schematic)



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The Duet Series

Ordering Info

Product Family
DUW - Duet, Wall

Length
2 - 2 ft. nominal
4 - 4 ft. nominal
8 - 8 ft. nominal

Wattage (consult factory for other lamps)
1T5 - (1) T5 lamp
2T5 - (2) T5 lamps
1T5HO - (1) T5HO lamp
2T5HO - (2) T5HO lamps
1T8 - (1) T8 lamp
2T8 - (2) T8 lamps

Shielding
LU - Louver Up
LD - Louver down

Voltage
277 - 277V
120 - 120V

Ballast
EB - Electronic
EDB - Electronic dimming

Options
EMPK - Emergency Bettery Pack
SW - Soft white overlay ("LD" only)

Company Name _____
Project Name _____
Fixture Type _____

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Ballast for Fixtures F4, F6, F14

Item Number	OSRAM SYLVANIA Description	Input Voltage (VAC)	Input Current (AMPS)	Lamp Type	Rated Lumens (lm)	No. of Lamps	Ballast Factor (BF)	System Lumens	Input Wattage (W)	System Efficacy (lm/W)
QUICKTRONIC® *PROFESSIONAL* PROStart® COMPACT FLUORESCENT - UNIVERSAL VOLTAGE DUAL ENTRY[5,6]										
NORMAL BALLAST FACTOR										
51818 ○	QTP 1/2x13CF/UNV	120-277	0.25/0.11	13W DD/E,T/E	900	1	1.00	900	16	56
51850 ○	*QTP 1/2x13CF/UNV-KIT ▲*			13W DD/E,T/E	900	2	1.00	1800	29	62
51823 ○	QTP 1/2x18CF/UNV	120-277	0.32/0.14	18W DD/E,T/E	1200	1	1.00	1200	20	60
51851 ○	*QTP 1/2x18CF/UNV-KIT ▲*			18W DD/E,T/E	1200	2	1.00	2400	38	63
51833 ○	QTP 2x26CF/UNV	120-277	0.50/0.22	26W DD/E,T/E	1800	1	1.00	1800	28	64
51852 ○	*QTP 2x26CF/UNV-KIT ▲*			26W DD/E,T/E	1800	2	1.00	3600	54	67
51898	QTP 2x26CF/UNV PEM			32W DT/E	2400	1	0.98	2350	35	67
				42W DT/E	3200	1	1.00	3200	45	71
51843	QTP 2x26/32/42CF/UNV M	120-277	0.90/0.40	26W DT/E	1800	2	1.02	3670	54	68
51853 ○	*QTP 2x26/32/42CF/UNV M-KIT ▲*		0.53/0.23	32W DT/E	2400	2	0.96	4600	69	67
51863	QTP 2x26/32/42CF/UNV M PEM		0.57/0.25	42W DT/E	3200	2	0.95	6080	94	65
				57W DT/E	4300	1	1.00	4300	62	69
				70W DT/E	5200	1	0.92	4780	71	67
Also operates: see Ballast Technology & Specification Guide for additional lamp types.										
▲CF Kits include a ballast, screws, wire, mounting bracket, an instruction sheet and a wire removal tool.										
NORMAL BALLAST FACTOR - QTP CF models above replace gray shaded models below										
51718	QTP 1/2x13CF/UNV BS	120-277	0.25/0.11	13W DD/E,T/E	900	1	1.00	900	16	56
51748	QTP 1/2x13CF/UNV TS			13W DD/E,T/E	900	2	1.00	1800	29	62
51723	QTP 1/2x18CF/UNV BS	120-277	0.32/0.14	18W DD/E,T/E	1200	1	1.00	1200	20	60
51753	QTP 1/2x18CF/UNV TS			18W DD/E,T/E	1200	2	1.00	2400	38	63
51733	QTP 2x26CF/UNV BS	120-277	0.50/0.22	26W DD/E,T/E	1800	1	1.00	1800	28	64
51763	QTP 2x26CF/UNV TS			26W DD/E,T/E	1800	2	1.00	3600	54	67
				32W DT/E	2400	1	0.98	2350	35	67
				42W DT/E	3200	1	1.00	3200	45	71
51738	QTP 1/2xCF/UNV BM	120-277	0.57/0.25	26W DD/E,T/E	1800	1	1.02	1830	28	65
51798	QTP 1/2xCF/UNV PM			26W DD/E,T/E	1800	2	1.02	3670	57	64
51768	QTP 1/2xCF/UNV TM			32W DT/E	2400	1	0.97	2330	36	65
				42W DT/E	3200	1	1.00	3200	46	70
51743	QTP 2x26/32/42CF/UNV BM	120-277	0.90/0.40	26W DT/E	1800	2	1.02	3670	54	68
51803	QTP 2x26/32/42CF/UNV PM		0.53/0.23	32W DT/E	2400	2	0.96	4600	69	67
51773	QTP 2x26/32/42CF/UNV TM		0.57/0.25	42W DT/E	3200	2	0.95	6080	94	65
	Also operates one 57W or 70W CFL lamps			57W DT/E	4300	1	1.00	4300	62	69
				70W DT/E	5200	1	0.92	4780	71	67
QUICKTRONIC® *HIGH EFFICIENCY* POWERSENSE™ 32 T8 DIMMING SYSTEMS - A list of controllers is available from OSRAM SYLVANIA										
Power-line control (2-wire) or 0-10Vdc control (4-wire) - 100-5% Dimming Range - <10% THD										
50705	QTP 1x32T8/UNV DIM-TC	120-277	0.27/0.12	F032XP	3000	1	0.88 0.05	2640 150	30 8	88
50707	QTP 2x32T8/UNV DIM-TC	120-277	0.54/0.24	F032XP	3000	2	0.88 0.05	5280 300	60/58 15	88/91
50714	QTP 3x32T8/UNV DIM-TCL	120-277	0.73/0.30	F032XP	3000	3	0.88 0.05	7920 450	87/84 20	91/94
50716	QTP 4x32T8/UNV DIM-TCL	120-277	0.96/0.40	F032XP	3000	4	0.88 0.05	10560 600	114/110 27	92/96
POWERSENSE™ QTP models above also operate these lamps: F025, F017 & FB032. POWERSENSE T8 replaces former Helios T8 dimming products.										
QUICKTRONIC® *HIGH EFFICIENCY* HELIOS™ 32 T8 DIMMING SYSTEMS - A list of controllers is available from OSRAM SYLVANIA										
High Ballast Factor - "PLUS" High Light Output System - For 277V, 0-10Vdc Control Applications Only										
50718 ○	QTP 4x32T8/277 DIM PLUS-TCL	277	0.53	F032XP	3000	4	1.20 0.05	14400 600	145 28	99
QUICKTRONIC® *HIGH EFFICIENCY* POWERSENSE™ 28 T5 DIMMING SYSTEMS - A list of controllers is available from OSRAM SYLVANIA										
Power-line control (2-wire) or 0-10Vdc control (4-wire) - 100-1% Dimming Range - <10% THD										
50726 ○	QTP 2x28T5/UNV DIM-TCL	120-277	0.53/0.23	FP28	2900	2	1.00 0.01	5800 58	63/62 10	92/94
POWERSENSE™ QTP model above also operate these lamps: FP35, FP21 & FP14										
QUICKTRONIC® *PROFESSIONAL* HELIOS™ 54 T5 HO DIMMING SYSTEMS[3] - A list of controllers is available from OSRAM SYLVANIA										
(0-10Vdc control) - 100-1% Dimming Range - <10% THD										
49671	QT1x54/120PHO-DIM	120	0.54	FP54T5HO	5000	1	1.00 0.01	5000 50	62 8	81
49672	QT1x54/277PHO-DIM	277	0.23	FP54T5HO	5000	1	1.00 0.01	5000 50	61 8	82
49673	QT2x54/120PHO-DIM	120	1.07	FP54T5HO	5000	2	1.00 0.01	10000 100	120 18	83
49674	QT2x54/277PHO-DIM	277	0.45	FP54T5HO	5000	2	1.00 0.01	10000 100	117 18	85
HELIOS™ QT models above also operate these lamps: FT55DL & FPC55										

Ballast for Fixtures F5, F7

Item Number	OSRAM SYLVANIA Description	Input Voltage (VAC)	Input Current (AMPS)	Lamp Type	Rated Lumens (lm)	No. of Lamps	Ballast Factor (BF)	System Lumens	Input Wattage (W)	System Efficacy (lm/W)
QUICKTRONIC® *PROFESSIONAL* T5HO PROStart® PSN UNIVERSAL VOLTAGE SYSTEMS										
***NORMAL BALLAST FACTOR*[3]**										
49111 *(49110)*◆	QTP 2x39-24T5HO/UNV PSN NL	120-277	0.47/0.20	FP24T5HO	2000	2 1	1.00 1.00	4000 2000	55/54 29	73/74 70
49111 *(49110)*◆	QTP 2x39-24T5HO/UNV PSN NL	120-277	0.76/0.32	FP39T5HO	3500	2 1	1.00 1.00	7000 3500	85/83 42	82/84 83
49131 *(49130)*◆	QTP 2x54T5HO/UNV PSN NL	120-277	1.00/0.43	FP54T5HO	5000	2 1	1.00 1.00	10000 5000	121/118 61	83/85 82
49151 *(49150)*◆	QTP 1x80T5HO/UNV PSN NL	120-277	0.74/0.32	FP80T5HO FT80T5DL	6000 7000	1 1	1.00 1.00	7000 6000	90 90	78 67
◆ *(Item Number) = Item Number/NAED in parentheses are models with leads/wires. See Ballast Technology & Specification Guide for additional lamp types and full specifications.*										
QUICKTRONIC® *PROFESSIONAL* T5 PROStart® PSN UNIVERSAL VOLTAGE SYSTEMS										
***NORMAL BALLAST FACTOR*[3]**										
49181 *(49180)*◆	QTP 2x28T5/UNV PSN NL	120-277	0.55/0.23	FP28T5	2900	2 1	1.00 1.00	5800 2900	65/63 32	89/92 90
PROStart® QTP PSN models above also operate these lamps: FP14, FP21 & FP35 ◆ *(Item Number) = Item Number/NAED in parentheses are models with leads/wires.*										
QUICKTRONIC® *PROFESSIONAL* T5HO PROStart® UNIVERSAL VOLTAGE HIGH AMBIENT TEMP. SYSTEMS										
***FIXED OUTPUT*[3]**										
49136 *(49135)*◆	QTP 2x54T5HO/UNV PSN HT NL	120-277	1.00/0.43	FP54T5HO	5000	2 1	1.00 1.00	10000 5000	121/118 61	83/85 82
***SWITCHABLE MODEL*[3]**										
49161 *(49160)*◆	QTP 4x54T5HO/UNV PSN HTW NL	120-277	2.00/0.85	FP54T5HO	5000	4 3 2 1	1.00 1.00 1.00 1.00	20000 15000 10000 5000	241/236 182/178 121/118 61	83/85 83/85 83/85 82
PROStart® QTP PSN models above also operate these lamps: FT55DL, FPC55, L58 ◆ *(Item Number) = Item Number/NAED in parentheses are models with leads/wires.*										
QUICKTRONIC® *PROFESSIONAL* T5HO PROStart® 347- 480V HIGH AMBIENT TEMP. SYSTEMS										
***NORMAL BALLAST FACTOR*[3]**										
49146 *(49145)*◆	QTP 2x54T5HO/347-480 PSN HT NL	347-480	0.35/0.25	FP54T5HO	5000	2 1	1.00 1.00	10000 5000	121/120 61	83 82
PROStart® QTP PSN models above also operate these lamps: FT55DL, FPC55, L58 ◆ *(Item Number) = Item Number/NAED in parentheses are models with leads/wires.*										
QUICKTRONIC® *HIGH EFFICIENCY* INSTANT START DL40 UNIVERSAL VOLTAGE SYSTEMS[4]										
49428 ✪	QHE 1x40DL/UNV ISN-SC	120-277	0.30/0.13 0.27/0.12	FT40T5 FT40DL/28W/SS/IS	3150 2800	1 1	0.90 1.07	2835 2995	35 32	81 94
49429	QHE 2x40DL/UNV ISN-SC	120-277	0.56/0.26 0.54/0.24	FT40T5 FT40DL/28W/SS/IS	3150 2800	2 2	0.90 1.07	5670 5990	68/67 64/63	83/84 94/95
49430	QHE 3x40DL/UNV ISN-SC	120-277	0.84/0.36 0.79/0.35	FT40T5 FT40DL/28W/SS/IS	3150 2800	3 3	0.90 1.07	8505 8990	100/99 95/94	85/86 95/96
[4] *Ballast factor based upon 225mA nominal lamp current for FT40DL lamp and 190mA nominal lamp current for FT40DL/28W/SS/IS lamp.*										
QUICKTRONIC® *PROFESSIONAL* PROStart® DL40										
NORMAL BALLAST FACTOR										
50320	QTP 1x40TT5/120 PSN-F *Formerly: M1-PN-TT5/40-F-120*	120	0.32	FT40T5	3150	1	0.88	2770	38	73
50330	QTP 1x40TT5/277 PSN-F *Formerly: M1-PN-TT5/40-F-277*	277	0.13	FT40T5	3150	1	0.88	2770	37	75
50340	QTP 2x40TT5/120 PSN-F *Formerly: M2-PN-TT5/40-F-120*	120	0.63	FT40T5	3150	2	0.88	5545	76	73
50350	QTP 2x40TT5/277 PSN-F *Formerly: M2-PN-TT5/40-F-277*	277	0.27	FT40T5	3150	2	0.88	5545	73	76
50360	QTP 3x40TT5/120 PSN-B *Formerly: M3-PN-TT5/40-B-120*	120	0.92	FT40T5	3150	3	0.88	8315	110	76
50370	QTP 3x40TT5/277 PSN-B *Formerly: M3-PN-TT5/40-B-277*	277	0.39	FT40T5	3150	3	0.88	8315	108	77

3: Rated lamp lumens and performance data based on PENTRON® HO lamps. Rated lumens at 35°C lamp ambient temperature

Ballast for Fixtures F8, F9

Item Number	OSRAM SYLVANIA Description	Input Voltage (VAC)	Input Current (AMPS)	Lamp Type	Rated Lumens (lm)	No. of Lamps	Ballast Factor (BF)	System Lumens	Input Wattage (W)	System Efficacy (lm/W)
QUICKTRONIC® *PROFESSIONAL* PROStart® COMPACT FLUORESCENT - UNIVERSAL VOLTAGE DUAL ENTRY[5,6]										
NORMAL BALLAST FACTOR										
51818 ○	QTP 1/2x13CF/UNV	120-277	0.25/0.11	13W DD/E,T/E	900	1	1.00	900	16	56
51850 ○	*QTP 1/2x13CF/UNV-KIT* ▲			13W DD/E,T/E	900	2	1.00	1800	29	62
51823 ○	QTP 1/2x18CF/UNV	120-277	0.32/0.14	18W DD/E,T/E	1200	1	1.00	1200	20	60
51851 ○	*QTP 1/2x18CF/UNV-KIT* ▲			18W DD/E,T/E	1200	2	1.00	2400	38	63
51833 ○	QTP 2x26CF/UNV	120-277	0.50/0.22	26W DD/E,T/E	1800	1	1.00	1800	28	64
51852 ○	*QTP 2x26CF/UNV-KIT* ▲			26W DD/E,T/E	1800	2	1.00	3600	54	67
51898	QTP 2x26CF/UNV PEM			32W DT/E	2400	1	0.98	2350	35	67
				42W DT/E	3200	1	1.00	3200	45	71
51843	QTP 2x26/32/42CF/UNV M	120-277	0.90/0.40	26W DT/E	1800	2	1.02	3670	54	68
51853 ○	*QTP 2x26/32/42CF/UNV M-KIT* ▲		0.53/0.23	32W DT/E	2400	2	0.96	4600	69	67
51863	QTP 2x26/32/42CF/UNV M PEM		0.57/0.25	42W DT/E	3200	2	0.95	6080	94	65
				57W DT/E	4300	1	1.00	4300	62	69
				70W DT/E	5200	1	0.92	4780	71	67
Also operates: see Ballast Technology & Specification Guide for additional lamp types.							▲CF Kits include a ballast, screws, wire, mounting bracket, an instruction sheet and a wire removal tool.			
NORMAL BALLAST FACTOR* - *QTP CF models above replace gray shaded models below										
51718	QTP 1/2x13CF/UNV BS	120-277	0.25/0.11	13W DD/E,T/E	900	1	1.00	900	16	56
51748	QTP 1/2x13CF/UNV TS			13W DD/E,T/E	900	2	1.00	1800	29	62
51723	QTP 1/2x18CF/UNV BS	120-277	0.32/0.14	18W DD/E,T/E	1200	1	1.00	1200	20	60
51753	QTP 1/2x18CF/UNV TS			18W DD/E,T/E	1200	2	1.00	2400	38	63
51733	QTP 2x26CF/UNV BS	120-277	0.50/0.22	26W DD/E,T/E	1800	1	1.00	1800	28	64
51763	QTP 2x26CF/UNV TS			26W DD/E,T/E	1800	2	1.00	3600	54	67
				32W DT/E	2400	1	0.98	2350	35	67
				42W DT/E	3200	1	1.00	3200	45	71
51738	QTP 1/2xCF/UNV BM	120-277	0.57/0.25	26W DD/E,T/E	1800	1	1.02	1830	28	65
51798	QTP 1/2xCF/UNV PM			26W DD/E,T/E	1800	2	1.02	3670	57	64
51768	QTP 1/2xCF/UNV TM			32W DT/E	2400	1	0.97	2330	36	65
				42W DT/E	3200	1	1.00	3200	46	70
51743	QTP 2x26/32/42CF/UNV BM	120-277	0.90/0.40	26W DT/E	1800	2	1.02	3670	54	68
51803	QTP 2x26/32/42CF/UNV PM		0.53/0.23	32W DT/E	2400	2	0.96	4600	69	67
51773	QTP 2x26/32/42CF/UNV TM		0.57/0.25	42W DT/E	3200	2	0.95	6080	94	65
	Also operates one 57W or 70W CFL lamps			57W DT/E	4300	1	1.00	4300	62	69
				70W DT/E	5200	1	0.92	4780	71	67
QUICKTRONIC® *HIGH EFFICIENCY* POWERSENSE™ 32 T8 DIMMING SYSTEMS - A list of controllers is available from OSRAM SYLVANIA										
Power-line control (2-wire) or 0-10Vdc control (4-wire) - 100-5% Dimming Range - <10% THD										
50705	QTP 1x32T8/UNV DIM-TC	120-277	0.27/0.12	FO32XP	3000	1	0.88 0.05	2640 150	30 8	88
50707	QTP 2x32T8/UNV DIM-TC	120-277	0.54/0.24	FO32XP	3000	2	0.88 0.05	5280 300	60/58 15	88/91
50714	QTP 3x32T8/UNV DIM-TCL	120-277	0.73/0.30	FO32XP	3000	3	0.88 0.05	7920 450	87/84 20	91/94
50716	QTP 4x32T8/UNV DIM-TCL	120-277	0.96/0.40	FO32XP	3000	4	0.88 0.05	10560 600	114/110 27	92/96
POWERSENSE™ QTP models above also operate these lamps: FO25, FO17 & FB032. POWERSENSE T8 replaces former Helios T8 dimming products.										
QUICKTRONIC® *HIGH EFFICIENCY* HELIOS™ 32 T8 DIMMING SYSTEMS - A list of controllers is available from OSRAM SYLVANIA										
High Ballast Factor - "PLUS" High Light Output System* - *For 277V, 0-10Vdc Control Applications Only										
50718 ○	QTP 4x32T8/277 DIM PLUS-TCL	277	0.53	FO32XP	3000	4	1.20 0.05	14400 600	145 28	99
QUICKTRONIC® *HIGH EFFICIENCY* POWERSENSE™ 28 T5 DIMMING SYSTEMS - A list of controllers is available from OSRAM SYLVANIA										
Power-line control (2-wire) or 0-10Vdc control (4-wire) - 100-1% Dimming Range - <10% THD										
50726 ○	QTP 2x28T5/UNV DIM-TCL	120-277	0.53/0.23	FP28	2900	2	1.00 0.01	5800 58	63/62 10	92/94
POWERSENSE™ QTP model above also operate these lamps: FP35, FP21 & FP14										
QUICKTRONIC® *PROFESSIONAL* HELIOS™ 54 T5 HO DIMMING SYSTEMS[3] - A list of controllers is available from OSRAM SYLVANIA										
(0-10Vdc control) - 100-1% Dimming Range - <10% THD										
49671	QT1x54/120PHO-DIM	120	0.54	FP54T5HO	5000	1	1.00 0.01	5000 50	62 8	81
49672	QT1x54/277PHO-DIM	277	0.23	FP54T5HO	5000	1	1.00 0.01	5000 50	61 8	82
49673	QT2x54/120PHO-DIM	120	1.07	FP54T5HO	5000	2	1.00 0.01	10000 100	120 18	83
49674	QT2x54/277PHO-DIM	277	0.45	FP54T5HO	5000	2	1.00 0.01	10000 100	117 18	85
HELIOS™ QT models above also operate these lamps: FT55DL & FPC55										

Ballast for Fixtures F11

Item Number	OSRAM SYLVANIA Description	Input Voltage (VAC)	Input Current (AMPS)	Lamp Type	Rated Lumens (lm)	No. of Lamps	Ballast Factor (BF)	System Lumens	Input Wattage (W)	System Efficacy (lm/W)
QUICKTRONIC® *PROFESSIONAL* T5HO PROStart® PSN UNIVERSAL VOLTAGE SYSTEMS										
NORMAL BALLAST FACTOR[3]										
49111 *(49110)♦*	QTP 2x39-24T5HO/UNV PSN NL	120-277	0.47/0.20	FP24T5HO	2000	2 1	1.00 1.00	4000 2000	55/54 29	73/74 70
49111 *(49110)♦*	QTP 2x39-24T5HO/UNV PSN NL	120-277	0.76/0.32	FP39T5HO	3500	2 1	1.00 1.00	7000 3500	85/83 42	82/84 83
49131 *(49130)♦*	QTP 2x54T5HO/UNV PSN NL	120-277	1.00/0.43	FP54T5HO	5000	2 1	1.00 1.00	10000 5000	121/118 61	83/85 82
49151 *(49150)♦*	QTP 1x80T5HO/UNV PSN NL	120-277	0.74/0.32	FP80T5HO FT80T5DL	6000 7000	1 1	1.00 1.00	7000 6000	90 90	78 67
♦ (Item Number) = Item Number/NAED in parentheses are models with leads/wires. See Ballast Technology & Specification Guide for additional lamp types and full specifications.										
QUICKTRONIC® *PROFESSIONAL* T5 PROStart® PSN UNIVERSAL VOLTAGE SYSTEMS										
NORMAL BALLAST FACTOR[3]										
49181 *(49180)♦*	QTP 2x28T5/UNV PSN NL	120-277	0.55/0.23	FP28T5	2900	2 1	1.00 1.00	5800 2900	65/63 32	89/92 90
PROStart® QTP PSN models above also operate these lamps: FP14, FP21 & FP35 *♦ (Item Number) = Item Number/NAED in parentheses are models with leads/wires.*										
QUICKTRONIC® *PROFESSIONAL* T5HO PROStart® UNIVERSAL VOLTAGE HIGH AMBIENT TEMP. SYSTEMS										
FIXED OUTPUT[3]										
49136 *(49135)♦*	QTP 2x54T5HO/UNV PSN HT NL	120-277	1.00/0.43	FP54T5HO	5000	2 1	1.00 1.00	10000 5000	121/118 61	83/85 82
SWITCHABLE MODEL[3]										
49161 *(49160)♦*	QTP 4x54T5HO/UNV PSN HTW NL	120-277	2.00/0.85	FP54T5HO	5000	4 3 2 1	1.00 1.00 1.00 1.00	20000 15000 10000 5000	241/236 182/178 121/118 61	83/85 83/85 83/85 82
PROStart® QTP PSN models above also operate these lamps: FT55DL, FPC55, L58 *♦ (Item Number) = Item Number/NAED in parentheses are models with leads/wires.*										
QUICKTRONIC® *PROFESSIONAL* T5HO PROStart® 347- 480V HIGH AMBIENT TEMP. SYSTEMS										
NORMAL BALLAST FACTOR[3]										
49146 *(49145)♦*	QTP 2x54T5HO/347-480 PSN HT NL	347-480	0.35/0.25	FP54T5HO	5000	2 1	1.00 1.00	10000 5000	121/120 61	83 82
PROStart® QTP PSN models above also operate these lamps: FT55DL, FPC55, L58 *♦ (Item Number) = Item Number/NAED in parentheses are models with leads/wires.*										
QUICKTRONIC® *HIGH EFFICIENCY* INSTANT START DL40 UNIVERSAL VOLTAGE SYSTEMS[4]										
49428 ✪	QHE 1x40DL/UNV ISN-SC	120-277	0.30/0.13 0.27/0.12	FT40T5 FT40DL/28W/SS/IS	3150 2800	1 1	0.90 1.07	2835 2995	35 32	81 94
49429	QHE 2x40DL/UNV ISN-SC	120-277	0.56/0.26 0.54/0.24	FT40T5 FT40DL/28W/SS/IS	3150 2800	2 2	0.90 1.07	5670 5990	68/67 64/63	83/84 94/95
49430	QHE 3x40DL/UNV ISN-SC	120-277	0.84/0.36 0.79/0.35	FT40T5 FT40DL/28W/SS/IS	3150 2800	3 3	0.90 1.07	8505 8990	100/99 95/94	85/86 95/96
[4] Ballast factor based upon 225mA nominal lamp current for FT40DL lamp and 190mA nominal lamp current for FT40DL/28W/SS/IS lamp.										
QUICKTRONIC® *PROFESSIONAL* PROStart® DL40										
NORMAL BALLAST FACTOR										
50320	QTP 1x40TT5/120 PSN-F *Formerly: M1-PN-TT5/40-F-120*	120	0.32	FT40T5	3150	1	0.88	2770	38	73
50330	QTP 1x40TT5/277 PSN-F *Formerly: M1-PN-TT5/40-F-277*	277	0.13	FT40T5	3150	1	0.88	2770	37	75
50340	QTP 2x40TT5/120 PSN-F *Formerly: M2-PN-TT5/40-F-120*	120	0.63	FT40T5	3150	2	0.88	5545	76	73
50350	QTP 2x40TT5/277 PSN-F *Formerly: M2-PN-TT5/40-F-277*	277	0.27	FT40T5	3150	2	0.88	5545	73	76
50360	QTP 3x40TT5/120 PSN-B *Formerly: M3-PN-TT5/40-B-120*	120	0.92	FT40T5	3150	3	0.88	8315	110	76
50370	QTP 3x40TT5/277 PSN-B *Formerly: M3-PN-TT5/40-B-277*	277	0.39	FT40T5	3150	3	0.88	8315	108	77

Ballast for Fixture F12

Item Number	OSRAM SYLVANIA Description	Input Voltage (VAC)	Input Current (AMPS)	Lamp Type	Rated Lumens (lm)	No. of Lamps	Ballast Factor (BF)	System Lumens	Input Wattage (W)	System Efficacy (lm/W)
QUICKTRONIC® *PROFESSIONAL* T5HO PROStart® PSN UNIVERSAL VOLTAGE SYSTEMS										
NORMAL BALLAST FACTOR[3]										
49111 *(49110)◆*	QTP 2x39-24T5HO/UNV PSN NL	120-277	0.47/0.20	FP24T5HO	2000	2 1	1.00 1.00	4000 2000	55/54 29	73/74 70
49111 *(49110)◆*	QTP 2x39-24T5HO/UNV PSN NL	120-277	0.76/0.32	FP39T5HO	3500	2 1	1.00 1.00	7000 3500	85/83 42	82/84 83
49131 *(49130)◆*	QTP 2x54T5HO/UNV PSN NL	120-277	1.00/0.43	FP54T5HO	5000	2 1	1.00 1.00	10000 5000	121/118 61	83/85 82
49151 *(49150)◆*	QTP 1x80T5HO/UNV PSN NL	120-277	0.74/0.32	FP80T5HO FT80T5DL	6000 7000	1 1	1.00 1.00	7000 6000	90 90	78 67
◆ (Item Number) = Item Number/NAED in parentheses are models with leads/wires. See Ballast Technology & Specification Guide for additional lamp types and full specifications.										
QUICKTRONIC® *PROFESSIONAL* T5 PROStart® PSN UNIVERSAL VOLTAGE SYSTEMS										
NORMAL BALLAST FACTOR[3]										
49181 *(49180)◆*	QTP 2x28T5/UNV PSN NL	120-277	0.55/0.23	FP28T5	2900	2 1	1.00 1.00	5800 2900	65/63 32	89/92 90
PROStart® QTP PSN models above also operate these lamps: FP14, FP21 & FP35 *◆ (Item Number) = Item Number/NAED in parentheses are models with leads/wires.*										
QUICKTRONIC® *PROFESSIONAL* T5HO PROStart® UNIVERSAL VOLTAGE HIGH AMBIENT TEMP. SYSTEMS										
FIXED OUTPUT[3]										
49136 *(49135)◆*	QTP 2x54T5HO/UNV PSN HT NL	120-277	1.00/0.43	FP54T5HO	5000	2 1	1.00 1.00	10000 5000	121/118 61	83/85 82
SWITCHABLE MODEL[3]										
49161 *(49160)◆*	QTP 4x54T5HO/UNV PSN HTW NL	120-277	2.00/0.85	FP54T5HO	5000	4 3 2 1	1.00 1.00 1.00 1.00	20000 15000 10000 5000	241/236 182/178 121/118 61	83/85 83/85 83/85 82
PROStart® QTP PSN models above also operate these lamps: FT55DL, FPC55, L58 *◆ (Item Number) = Item Number/NAED in parentheses are models with leads/wires.*										
QUICKTRONIC® *PROFESSIONAL* T5HO PROStart® 347- 480V HIGH AMBIENT TEMP. SYSTEMS										
NORMAL BALLAST FACTOR[3]										
49146 *(49145)◆*	QTP 2x54T5HO/347-480 PSN HT NL	347-480	0.35/0.25	FP54T5HO	5000	2 1	1.00 1.00	10000 5000	121/120 61	83 82
PROStart® QTP PSN models above also operate these lamps: FT55DL, FPC55, L58 *◆ (Item Number) = Item Number/NAED in parentheses are models with leads/wires.*										
QUICKTRONIC® *HIGH EFFICIENCY* INSTANT START DL40 UNIVERSAL VOLTAGE SYSTEMS[4]										
49428 ✪	QHE 1x40DL/UNV ISN-SC	120-277	0.30/0.13 0.27/0.12	FT40T5 FT40DL/28W/SS/IS	3150 2800	1 1	0.90 1.07	2835 2995	35 32	81 94
49429	QHE 2x40DL/UNV ISN-SC	120-277	0.56/0.26 0.54/0.24	FT40T5 FT40DL/28W/SS/IS	3150 2800	2 2	0.90 1.07	5670 5990	68/67 64/63	83/84 94/95
49430	QHE 3x40DL/UNV ISN-SC	120-277	0.84/0.36 0.79/0.35	FT40T5 FT40DL/28W/SS/IS	3150 2800	3 3	0.90 1.07	8505 8990	100/99 95/94	85/86 95/96
[4] Ballast factor based upon 225mA nominal lamp current for FT40DL lamp and 190mA nominal lamp current for FT40DL/28W/SS/IS lamp.										
QUICKTRONIC® *PROFESSIONAL* PROStart® DL40										
NORMAL BALLAST FACTOR										
50320	QTP 1x40TT5/120 PSN-F *Formerly: M1-PN-TT5/40-F-120*	120	0.32	FT40T5	3150	1	0.88	2770	38	73
50330	QTP 1x40TT5/277 PSN-F *Formerly: M1-PN-TT5/40-F-277*	277	0.13	FT40T5	3150	1	0.88	2770	37	75
50340	QTP 2x40TT5/120 PSN-F *Formerly: M2-PN-TT5/40-F-120*	120	0.63	FT40T5	3150	2	0.88	5545	76	73
50350	QTP 2x40TT5/277 PSN-F *Formerly: M2-PN-TT5/40-F-277*	277	0.27	FT40T5	3150	2	0.88	5545	73	76
50360	QTP 3x40TT5/120 PSN-B *Formerly: M3-PN-TT5/40-B-120*	120	0.92	FT40T5	3150	3	0.88	8315	110	76
50370	QTP 3x40TT5/277 PSN-B *Formerly: M3-PN-TT5/40-B-277*	277	0.39	FT40T5	3150	3	0.88	8315	108	77

3: Rated lamp lumens and performance data based on PENTRON® HO lamps. Rated lumens at 35°C lamp ambient temperature

Ballast for Fixture F13

Item Number	OSRAM SYLVANIA Description	Input Voltage (VAC)	Input Current (AMPS)	Lamp Type	Rated Lumens (lm)	No. of Lamps	Ballast Factor (BF)	System Lumens	Input Wattage (W)	System Efficacy (lm/W)
QUICKTRONIC® *PROFESSIONAL* PROStart® COMPACT FLUORESCENT - UNIVERSAL VOLTAGE DUAL ENTRY[5,6]										
NORMAL BALLAST FACTOR										
51818 ○	QTP 1/2x13CF/UNV	120-277	0.25/0.11	13W DD/E,T/E	900	1	1.00	900	16	56
51850 ○	*QTP 1/2x13CF/UNV-KIT* ▲			13W DD/E,T/E	900	2	1.00	1800	29	62
51823 ○	QTP 1/2x18CF/UNV	120-277	0.32/0.14	18W DD/E,T/E	1200	1	1.00	1200	20	60
51851 ○	*QTP 1/2x18CF/UNV-KIT* ▲			18W DD/E,T/E	1200	2	1.00	2400	38	63
51833 ○	QTP 2x26CF/UNV	120-277	0.50/0.22	26W DD/E,T/E	1800	1	1.00	1800	28	64
51852 ○	*QTP 2x26CF/UNV-KIT* ▲			26W DD/E,T/E	1800	2	1.00	3600	54	67
51898	QTP 2x26CF/UNV PEM			32W DT/E	2400	1	0.98	2350	35	67
				42W DT/E	3200	1	1.00	3200	45	71
51843	QTP 2x26/32/42CF/UNV M	120-277	0.90/0.40	26W DT/E	1800	2	1.02	3670	54	68
51853 ○	*QTP 2x26/32/42CF/UNV M-KIT* ▲		0.53/0.23	32W DT/E	2400	2	0.96	4600	69	67
51863	QTP 2x26/32/42CF/UNV M PEM		0.57/0.25	42W DT/E	3200	2	0.95	6080	94	65
				57W DT/E	4300	1	1.00	4300	62	69
				70W DT/E	5200	1	0.92	4780	71	67
Also operates: see Ballast Technology & Specification Guide for additional lamp types.								▲CF Kits include a ballast, screws, wire, mounting bracket, an instruction sheet and a wire removal tool.		
NORMAL BALLAST FACTOR* - *QTP CF models above replace gray shaded models below										
51718	QTP 1/2x13CF/UNV BS	120-277	0.25/0.11	13W DD/E,T/E	900	1	1.00	900	16	56
51748	QTP 1/2x13CF/UNV TS			13W DD/E,T/E	900	2	1.00	1800	29	62
51723	QTP 1/2x18CF/UNV BS	120-277	0.32/0.14	18W DD/E,T/E	1200	1	1.00	1200	20	60
51753	QTP 1/2x18CF/UNV TS			18W DD/E,T/E	1200	2	1.00	2400	38	63
51733	QTP 2x26CF/UNV BS	120-277	0.50/0.22	26W DD/E,T/E	1800	1	1.00	1800	28	64
51763	QTP 2x26CF/UNV TS			26W DD/E,T/E	1800	2	1.00	3600	54	67
				32W DT/E	2400	1	0.98	2350	35	67
				42W DT/E	3200	1	1.00	3200	45	71
51738	QTP 1/2xCF/UNV BM	120-277	0.57/0.25	26W DD/E,T/E	1800	1	1.02	1830	28	65
51798	QTP 1/2xCF/UNV PM			26W DD/E,T/E	1800	2	1.02	3670	57	64
51768	QTP 1/2xCF/UNV TM			32W DT/E	2400	1	0.97	2330	36	65
				42W DT/E	3200	1	1.00	3200	46	70
51743	QTP 2x26/32/42CF/UNV BM	120-277	0.90/0.40	26W DT/E	1800	2	1.02	3670	54	68
51803	QTP 2x26/32/42CF/UNV PM		0.53/0.23	32W DT/E	2400	2	0.96	4600	69	67
51773	QTP 2x26/32/42CF/UNV TM		0.57/0.25	42W DT/E	3200	2	0.95	6080	94	65
	Also operates one 57W or 70W CFL lamps			57W DT/E	4300	1	1.00	4300	62	69
				70W DT/E	5200	1	0.92	4780	71	67
QUICKTRONIC® *HIGH EFFICIENCY* POWERSENSE™ 32 T8 DIMMING SYSTEMS - A list of controllers is available from OSRAM SYLVANIA										
Power-line control (2-wire) or 0-10Vdc control (4-wire) - 100-5% Dimming Range - <10% THD										
50705	QTP 1x32T8/UNV DIM-TC	120-277	0.27/0.12	F032XP	3000	1	0.88 0.05	2640 150	30 8	88
50707	QTP 2x32T8/UNV DIM-TC	120-277	0.54/0.24	F032XP	3000	2	0.88 0.05	5280 300	60/58 15	88/91
50714	QTP 3x32T8/UNV DIM-TCL	120-277	0.73/0.30	F032XP	3000	3	0.88 0.05	7920 450	87/84 20	91/94
50716	QTP 4x32T8/UNV DIM-TCL	120-277	0.96/0.40	F032XP	3000	4	0.88 0.05	10560 600	114/110 27	92/96
POWERSENSE™ QTP models above also operate these lamps: F025, F017 & FB032. POWERSENSE T8 replaces former Helios T8 dimming products.										
QUICKTRONIC® *HIGH EFFICIENCY* HELIOS™ 32 T8 DIMMING SYSTEMS - A list of controllers is available from OSRAM SYLVANIA										
High Ballast Factor - "PLUS" High Light Output System* - *For 277V, 0-10Vdc Control Applications Only										
50718 ○	QTP 4x32T8/277 DIM PLUS-TCL	277	0.53	F032XP	3000	4	1.20 0.05	14400 600	145 28	99
QUICKTRONIC® *HIGH EFFICIENCY* POWERSENSE™ 28 T5 DIMMING SYSTEMS - A list of controllers is available from OSRAM SYLVANIA										
Power-line control (2-wire) or 0-10Vdc control (4-wire) - 100-1% Dimming Range - <10% THD										
50726 ○	QTP 2x28T5/UNV DIM-TCL	120-277	0.53/0.23	FP28	2900	2	1.00 0.01	5800 58	63/62 10	92/94
POWERSENSE™ QTP model above also operate these lamps: FP35, FP21 & FP14										
QUICKTRONIC® *PROFESSIONAL* HELIOS™ 54 T5 HO DIMMING SYSTEMS[3] - A list of controllers is available from OSRAM SYLVANIA										
(0-10Vdc control) - 100-1% Dimming Range - <10% THD										
49671	QT1x54/120PHO-DIM	120	0.54	FP54T5HO	5000	1	1.00 0.01	5000 50	62 8	81
49672	QT1x54/277PHO-DIM	277	0.23	FP54T5HO	5000	1	1.00 0.01	5000 50	61 8	82
49673	QT2x54/120PHO-DIM	120	1.07	FP54T5HO	5000	2	1.00 0.01	10000 100	120 18	83
49674	QT2x54/277PHO-DIM	277	0.45	FP54T5HO	5000	2	1.00 0.01	10000 100	117 18	85
HELIOS™ QT models above also operate these lamps: FT55DL & FPC55										

Ballast for Fixture F15

Item Number	OSRAM SYLVANIA Description	Input Voltage (VAC)	Input Current (AMPS)	Lamp Type	Rated Lumens (lm)	No. of Lamps	Ballast Factor (BF)	System Lumens	Input Wattage (W)	System Efficacy (lm/W)
QUICKTRONIC® *PROFESSIONAL* PROStart® COMPACT FLUORESCENT - UNIVERSAL VOLTAGE DUAL ENTRY[5,6]										
NORMAL BALLAST FACTOR										
51818 ○	QTP 1/2x13CF/UNV	120-277	0.25/0.11	13W DD/E,T/E	900	1	1.00	900	16	56
51850 ○	*QTP 1/2x13CF/UNV-KIT* ▲			13W DD/E,T/E	900	2	1.00	1800	29	62
51823 ○	QTP 1/2x18CF/UNV	120-277	0.32/0.14	18W DD/E,T/E	1200	1	1.00	1200	20	60
51851 ○	*QTP 1/2x18CF/UNV-KIT* ▲			18W DD/E,T/E	1200	2	1.00	2400	38	63
51833 ○	QTP 2x26CF/UNV	120-277	0.50/0.22	26W DD/E,T/E	1800	1	1.00	1800	28	64
51852 ○	*QTP 2x26CF/UNV-KIT* ▲			26W DD/E,T/E	1800	2	1.00	3600	54	67
51898	QTP 2x26CF/UNV PEM			32W DT/E	2400	1	0.98	2350	35	67
				42W DT/E	3200	1	1.00	3200	45	71
51843	QTP 2x26/32/42CF/UNV M	120-277	0.90/0.40	26W DT/E	1800	2	1.02	3670	54	68
51853 ○	*QTP 2x26/32/42CF/UNV M-KIT* ▲		0.53/0.23	32W DT/E	2400	2	0.96	4600	69	67
51863	QTP 2x26/32/42CF/UNV M PEM		0.57/0.25	42W DT/E	3200	2	0.95	6080	94	65
				57W DT/E	4300	1	1.00	4300	62	69
				70W DT/E	5200	1	0.92	4780	71	67
Also operates: see Ballast Technology & Specification Guide for additional lamp types.								▲CF Kits include a ballast, screws, wire, mounting bracket, an instruction sheet and a wire removal tool.		
NORMAL BALLAST FACTOR - *QTP CF models above replace gray shaded models below*										
51718	QTP 1/2x13CF/UNV BS	120-277	0.25/0.11	13W DD/E,T/E	900	1	1.00	900	16	56
51748	QTP 1/2x13CF/UNV TS			13W DD/E,T/E	900	2	1.00	1800	29	62
51723	QTP 1/2x18CF/UNV BS	120-277	0.32/0.14	18W DD/E,T/E	1200	1	1.00	1200	20	60
51753	QTP 1/2x18CF/UNV TS			18W DD/E,T/E	1200	2	1.00	2400	38	63
51733	QTP 2x26CF/UNV BS	120-277	0.50/0.22	26W DD/E,T/E	1800	1	1.00	1800	28	64
51763	QTP 2x26CF/UNV TS			26W DD/E,T/E	1800	2	1.00	3600	54	67
				32W DT/E	2400	1	0.98	2350	35	67
				42W DT/E	3200	1	1.00	3200	45	71
51738	QTP 1/2xCF/UNV BM	120-277	0.57/0.25	26W DD/E,T/E	1800	1	1.02	1830	28	65
51798	QTP 1/2xCF/UNV PM			26W DD/E,T/E	1800	2	1.02	3670	57	64
51768	QTP 1/2xCF/UNV TM			32W DT/E	2400	1	0.97	2330	36	65
				42W DT/E	3200	1	1.00	3200	46	70
51743	QTP 2x26/32/42CF/UNV BM	120-277	0.90/0.40	26W DT/E	1800	2	1.02	3670	54	68
51803	QTP 2x26/32/42CF/UNV PM		0.53/0.23	32W DT/E	2400	2	0.96	4600	69	67
51773	QTP 2x26/32/42CF/UNV TM		0.57/0.25	42W DT/E	3200	2	0.95	6080	94	65
	Also operates one 57W or 70W CFL lamps			57W DT/E	4300	1	1.00	4300	62	69
				70W DT/E	5200	1	0.92	4780	71	67
QUICKTRONIC® *HIGH EFFICIENCY* POWERSENSE™ 32 T8 DIMMING SYSTEMS - A list of controllers is available from OSRAM SYLVANIA										
Power-line control (2-wire) or 0-10Vdc control (4-wire) - 100-5% Dimming Range - <10% THD										
50705	QTP 1x32T8/UNV DIM-TC	120-277	0.27/0.12	FO32XP	3000	1	0.88 0.05	2640 150	30 8	88
50707	QTP 2x32T8/UNV DIM-TC	120-277	0.54/0.24	FO32XP	3000	2	0.88 0.05	5280 300	60/58 15	88/91
50714	QTP 3x32T8/UNV DIM-TCL	120-277	0.73/0.30	FO32XP	3000	3	0.88 0.05	7920 450	87/84 20	91/94
50716	QTP 4x32T8/UNV DIM-TCL	120-277	0.96/0.40	FO32XP	3000	4	0.88 0.05	10560 600	114/110 27	92/96
POWERSENSE™ QTP models above also operate these lamps: FO25, FO17 & FB032. POWERSENSE T8 replaces former Helios T8 dimming products.										
QUICKTRONIC® *HIGH EFFICIENCY* HELIOS™ 32 T8 DIMMING SYSTEMS - A list of controllers is available from OSRAM SYLVANIA										
High Ballast Factor - "PLUS" High Light Output System - *For 277V, 0-10Vdc Control Applications Only*										
50718 ○	QTP 4x32T8/277 DIM PLUS-TCL	277	0.53	FO32XP	3000	4	1.20 0.05	14400 600	145 28	99
QUICKTRONIC® *HIGH EFFICIENCY* POWERSENSE™ 28 T5 DIMMING SYSTEMS - A list of controllers is available from OSRAM SYLVANIA										
Power-line control (2-wire) or 0-10Vdc control (4-wire) - 100-1% Dimming Range - <10% THD										
50726 ○	QTP 2x28T5/UNV DIM-TCL	120-277	0.53/0.23	FP28	2900	2	1.00 0.01	5800 58	63/62 10	92/94
POWERSENSE™ QTP model above also operate these lamps: FP35, FP21 & FP14										
QUICKTRONIC® *PROFESSIONAL* HELIOS™ 54 T5 HO DIMMING SYSTEMS[3] - A list of controllers is available from OSRAM SYLVANIA										
(0-10Vdc control) - 100-1% Dimming Range - <10% THD										
49671	QT1x54/120PHO-DIM	120	0.54	FP54T5HO	5000	1	1.00 0.01	5000 50	62 8	81
49672	QT1x54/277PHO-DIM	277	0.23	FP54T5HO	5000	1	1.00 0.01	5000 50	61 8	82
49673	QT2x54/120PHO-DIM	120	1.07	FP54T5HO	5000	2	1.00 0.01	10000 100	120 18	83
49674	QT2x54/277PHO-DIM	277	0.45	FP54T5HO	5000	2	1.00 0.01	10000 100	117 18	85
HELIOS™ QT models above also operate these lamps: FT55DL & FPC55										

Ballast for F16

Item Number	OSRAM SYLVANIA Description	Input Voltage (VAC)	Input Current (AMPS)	Lamp Type	Rated Lumens (lm)	No. of Lamps	Ballast Factor (BF)	System Lumens	Input Wattage (W)	System Efficacy (lm/W)
QUICKTRONIC® *PROFESSIONAL* T5HO PROStart® PSN UNIVERSAL VOLTAGE SYSTEMS										
NORMAL BALLAST FACTOR[3]										
49111 *(49110)*◆	QTP 2x39-24T5HO/UNV PSN NL	120-277	0.47/0.20	FP24T5HO	2000	2 1	1.00 1.00	4000 2000	55/54 29	73/74 70
49111 *(49110)*◆	QTP 2x39-24T5HO/UNV PSN NL	120-277	0.76/0.32	FP39T5HO	3500	2 1	1.00 1.00	7000 3500	85/83 42	82/84 83
49131 *(49130)*◆	QTP 2x54T5HO/UNV PSN NL	120-277	1.00/0.43	FP54T5HO	5000	2 1	1.00 1.00	10000 5000	121/118 61	83/85 82
49151 *(49150)*◆	QTP 1x80T5HO/UNV PSN NL	120-277	0.74/0.32	FP80T5HO FT80T5DL	6000 7000	1 1	1.00 1.00	7000 6000	90 90	78 67
◆ (Item Number) = Item Number/NAED in parentheses are models with leads/wires. See Ballast Technology & Specification Guide for additional lamp types and full specifications.										
QUICKTRONIC® *PROFESSIONAL* T5 PROStart® PSN UNIVERSAL VOLTAGE SYSTEMS										
NORMAL BALLAST FACTOR[3]										
49181 *(49180)*◆	QTP 2x28T5/UNV PSN NL	120-277	0.55/0.23	FP28T5	2900	2 1	1.00 1.00	5800 2900	65/63 32	89/92 90
PROStart® QTP PSN models above also operate these lamps: FP14, FP21 & FP35 *◆ (Item Number) = Item Number/NAED in parentheses are models with leads/wires.*										
QUICKTRONIC® *PROFESSIONAL* T5HO PROStart® UNIVERSAL VOLTAGE HIGH AMBIENT TEMP. SYSTEMS										
FIXED OUTPUT[3]										
49136 *(49135)*◆	QTP 2x54T5HO/UNV PSN HT NL	120-277	1.00/0.43	FP54T5HO	5000	2 1	1.00 1.00	10000 5000	121/118 61	83/85 82
SWITCHABLE MODEL[3]										
49161 *(49160)*◆	QTP 4x54T5HO/UNV PSN HTW NL	120-277	2.00/0.85	FP54T5HO	5000	4 3 2 1	1.00 1.00 1.00 1.00	20000 15000 10000 5000	241/236 182/178 121/118 61	83/85 83/85 83/85 82
PROStart® QTP PSN models above also operate these lamps: FT55DL, FPC55, L58 *◆ (Item Number) = Item Number/NAED in parentheses are models with leads/wires.*										
QUICKTRONIC® *PROFESSIONAL* T5HO PROStart® 347- 480V HIGH AMBIENT TEMP. SYSTEMS										
NORMAL BALLAST FACTOR[3]										
49146 *(49145)*◆	QTP 2x54T5HO/347-480 PSN HT NL	347-480	0.35/0.25	FP54T5HO	5000	2 1	1.00 1.00	10000 5000	121/120 61	83 82
PROStart® QTP PSN models above also operate these lamps: FT55DL, FPC55, L58 *◆ (Item Number) = Item Number/NAED in parentheses are models with leads/wires.*										
QUICKTRONIC® *HIGH EFFICIENCY* INSTANT START DL40 UNIVERSAL VOLTAGE SYSTEMS[4]										
49428 ✪	QHE 1x40DL/UNV ISN-SC	120-277	0.30/0.13 0.27/0.12	FT40T5 FT40DL/28W/SS/IS	3150 2800	1 1	0.90 1.07	2835 2995	35 32	81 94
49429	QHE 2x40DL/UNV ISN-SC	120-277	0.56/0.26 0.54/0.24	FT40T5 FT40DL/28W/SS/IS	3150 2800	2 2	0.90 1.07	5670 5990	68/67 64/63	83/84 94/95
49430	QHE 3x40DL/UNV ISN-SC	120-277	0.84/0.36 0.79/0.35	FT40T5 FT40DL/28W/SS/IS	3150 2800	3 3	0.90 1.07	8505 8990	100/99 95/94	85/86 95/96
[4] Ballast factor based upon 225mA nominal lamp current for FT40DL lamp and 190mA nominal lamp current for FT40DL/28W/SS/IS lamp.										
QUICKTRONIC® *PROFESSIONAL* PROStart® DL40										
NORMAL BALLAST FACTOR										
50320	QTP 1x40TT5/120 PSN-F *Formerly: M1-PN-TT5/40-F-120*	120	0.32	FT40T5	3150	1	0.88	2770	38	73
50330	QTP 1x40TT5/277 PSN-F *Formerly: M1-PN-TT5/40-F-277*	277	0.13	FT40T5	3150	1	0.88	2770	37	75
50340	QTP 2x40TT5/120 PSN-F *Formerly: M2-PN-TT5/40-F-120*	120	0.63	FT40T5	3150	2	0.88	5545	76	73
50350	QTP 2x40TT5/277 PSN-F *Formerly: M2-PN-TT5/40-F-277*	277	0.27	FT40T5	3150	2	0.88	5545	73	76
50360	QTP 3x40TT5/120 PSN-B *Formerly: M3-PN-TT5/40-B-120*	120	0.92	FT40T5	3150	3	0.88	8315	110	76
50370	QTP 3x40TT5/277 PSN-B *Formerly: M3-PN-TT5/40-B-277*	277	0.39	FT40T5	3150	3	0.88	8315	108	77

3: Rated lamp lumens and performance data based on PENTRON® HO lamps. Rated lumens at 35°C lamp ambient temperature

Lamp for Fixture F1

TRU-AIM IR® MR16 LAMPS

UV Filter capsule with axial filament in covered constant color, hard coated dichroic reflector and infrared reflective coating on the lamp capsule.

Watts	Bulb	Base	Product Number	Symbols & Footnotes	Ordering Abbreviation	Volts	Pkg Qty	Beam Type	Class & Filament	Avg Rated Life(hrs)	Lumens CCT	CBCP	Beam Angle	MOL (in)
20	MR16	GU5.3 Bipin	58531	47,62,66, 91,93	20MR16/IR/SP10/C	12	20	SP	C,AXIAL	5000	3000	6000	10	1.75
			58532	47,62,66, 91,93	20MR16/IR/NFL25/C	12	20	NFL	C,AXIAL	5000	3000	2300	25	1.75
			58533	47,62,66, 91,93	20MR16/IR/FL35/C	12	20	FL	C,AXIAL	5000	3000	1000	35	1.75
			58838	47,62,66, 91,93	20MR16/IR/WFL60/C	12	20	WFL	C, AXIAL	5000	3000	450	60	1.75
37	MR16	GU5.3 Bipin	58641	37,47,62, 92,93	37MR16/IR/SP10/C	12	20	SP	C, AXIAL	5000	3000	12500	10	1.75
			58634	37,47,62, 92,93	37MR16/IR/NFL25/C	12	20	NFL	C, AXIAL	5000	3000	4400	25	1.75
			58633	37,47,62, 92,93	37MR16/IR/FL35/C	12	20	FL	C, AXIAL	5000	3000	2200	35	1.75
			58837	47,62,66, 92,93	37MR16/IR/WFL60/C	12	20	WFL	C, AXIAL	5000	3000	1100	60	1.75
50	MR16	GU5.3 Bipin	54175	37,47,62, 92,93	50MR16/IR/SP10/C	12	20	SP	C, AXIAL	5000	3000	15000	10	1.75
			54174	37,47,62, 92,93	50MR16/IR/NFL25/C	12	20	NFL	C, AXIAL	5000	3000	5700	25	1.75
			54173	37,47,62, 92,93	50MR16/IR/FL35/C	12	20	FL	C, AXIAL	5000	3000	2850	35	1.75
			54237	47,62,66, 92,93	50MR16/IR/WFL60/C	12	20	WFL	C, AXIAL	5000	3000	1430	60	1.75

TRU-AIM TITAN® MR16 LAMPS

UV Filter capsule with axial filament in covered constant color, hard coated dichroic reflector.

Watts	Bulb	Base	Product Number	Symbols & Footnotes	Ordering Abbreviation	Volts	Pkg Qty	Beam Type	Class & Filament	Avg Rated Life(hrs)	Lumens CCT	CBCP	Beam Angle	MOL (in)
20	MR16	GU5.3 Bipin	58300	62,65,91, 145	20MR16/T/SP10/C(ESX)	12	20	SP	C, AXIAL	4000	3000	5000	10	1.75
			58301	62,65,91, 93,145	20MR16/T/FL35/C(BAB)	12	20	FL	C, AXIAL	4000	3000	780	35	1.75
			58302	62,65,91, 93,145	20MR16/T/WFL60/C	12	20	WFL	C, AXIAL	4000	3000	350	60	1.75
35	MR16	GU5.3 Bipin	58303	62,65,91, 93,145	35MR16/T/SP10/C(FRB)	12	20	SP	C, AXIAL	4000	3000	9100	10	1.75
			58304	62,65,91, 93,145	35MR16/T/NFL25/C	12	20	NFL	C, AXIAL	4000	3000	3100	25	1.75
			58305	62,65,91, 93,145	35MR16/T/FL35/C(FMW)	12	20	FL	C, AXIAL	4000	3000	1500	35	1.75
			58306	62,65,91, 93,145	35MR16/T/WFL60/C	12	20	WFL	C, AXIAL	4000	3000	700	60	1.75
50	MR16	GU5.3 Bipin	58307	62,65,91, 93,145	50MR16/T/SP10/C(EXT)	12	20	SP	C, AXIAL	4000	3000	11500	10	1.75
			58308	62,65,91, 93,145	50MR16/T/NFL25/C(EXZ)	12	20	NFL	C, AXIAL	4000	3000	4400	25	1.75
			58309	62,65,91, 93,145	50MR16/T/FL35/C(EXN)	12	20	FL	C, AXIAL	4000	3000	2200	35	1.75

Lamp for Fixtures F4, F6, F14

DULUX® D/E 4-PIN ECOLOGIC® COMPACT FLUORESCENT LAMPS

for Dimming and Electronic Ballast. Lamps have End-of-lamp Life (EOL) Protection

Nominal Wattage	Bulb	MOL (in)	MOL (mm)	Base	Product Number	Ordering Abbreviation	NEMA Generic Designation	Pkg Qty	Avg Rated Life (hrs)	CCT (K)	CRI	Approx Lumens Initial @25°C/77°F	Approx Lumens Mean @25°C/77°F	Symbols & Footnotes
13	D (T4)	5.2	131	G24Q-1	20682	**CF13DD/E/827/ECO**	CFQ13W/G24Q/827	50	12000	2700	82	900	774	1,2,5,6, 7,12,20
					20721	**CF13DD/E/830/ECO**	CFQ13W/G24Q/830	50	12000	3000	82	900	774	1,2,5,6, 7,12,20
					20671	**CF13DD/E/835/ECO**	CFQ13W/G24Q/835	50	12000	3500	82	900	774	1,2,5,6, 7,12,20
					20667	**CF13DD/E/841/ECO**	CFQ13W/G24Q/841	50	12000	4100	82	900	774	1,2,5,6, 7,12,20
18	D (T4)	5.8	147	G24Q-2	20683	**CF18DD/E/827/ECO**	CFQ18W/G24Q/827	50	12000	2700	82	1150	989	1,2,5,6, 7,12,20
					20724	**CF18DD/E/830/ECO**	CFQ18W/G24Q/830	50	12000	3000	82	1150	989	1,2,5,6, 7,12,20
					20672	**CF18DD/E/835/ECO**	CFQ18W/G24Q/835	50	12000	3500	82	1150	989	1,2,5,6, 7,12,20
					20668	**CF18DD/E/841/ECO**	CFQ18W/G24Q/841	50	12000	4100	82	1150	989	1,2,5,6, 7,12,20
26	D (T4)	6.5	166	G24Q-3	20684	**CF26DD/E/827/ECO**	CFQ26W/G24Q/827	50	12000	2700	82	1710	1470	1,2,5,6, 7,12,20
					20722	**CF26DD/E/830/ECO**	CFQ26W/G24Q/830	50	12000	3000	82	1710	1470	1,2,5,6, 7,12,20
					20673	**CF26DD/E/835/ECO**	CFQ26W/G24Q/835	50	12000	3500	82	1710	1470	1,2,5,6, 7,12,20
					20669	**CF26DD/E/841/ECO**	CFQ26W/G24Q/841	50	12000	4100	82	1710	1470	1,2,5,6, 7,12,20

DULUX T PREHEAT 2-PIN ECOLOGIC® COMPACT FLUORESCENT LAMPS

With starter in Lamp Base for Magnetic Ballast

Nominal Wattage	Bulb	MOL (in)	MOL (mm)	Base	Product Number	Ordering Abbreviation	NEMA Generic Designation	Pkg Qty	Avg Rated Life (hrs)	CCT (K)	CRI	Approx Lumens Initial @25°C/77°F	Approx Lumens Mean @25°C/77°F	Symbols & Footnotes
18	T (T4)	4.8	123	GX24D-2	20756	**CF18DT/827/ECO**	CFTR18W/GX24D/827	50	12000	2700	82	1200	1032	1,4,6,11, 12,20,22
26	T (T4)	5.4	138	GX24D-3	20752	**CF26DT/827/ECO**	CFTR26W/GX24D/827	50	12000	2700	82	1800	1548	1,4,6,11, 12,20,22

DULUX T/E 4-PIN ECOLOGIC® COMPACT FLUORESCENT LAMPS

For dimming and electronic ballast. Lamps have End-of-Lamp Life (EOL) Protection

Nominal Wattage	Bulb	MOL (in)	MOL (mm)	Base	Product Number	Ordering Abbreviation	NEMA Generic Designation	Pkg Qty	Avg Rated Life (hrs)	CCT (K)	CRI	Approx Lumens Initial @25°C/77°F	Approx Lumens Mean @25°C/77°F	Symbols & Footnotes
13	T (T4)	4.2	106	GX24Q-1	20891	**CF13DT/E/827/ECO**	CFTR13W/GX24Q/827	50	12000	2700	82	900	774	1,2,5,6, 7,12,20
					20892	**CF13DT/E/830/ECO**	CFTR13W/GX24Q/830	50	12000	3000	82	900	774	1,2,5,6, 7,12,20
					20893	**CF13DT/E/835/ECO**	CFTR13W/GX24Q/835	50	12000	3500	82	900	774	1,2,5,6, 7,12,20
					20894	**CF13DT/E/841/ECO**	CFTR13W/GX24Q/841	50	12000	4100	82	900	774	1,2,5,6, 7,12,20
18	T (T4)	4.6	116	GX24Q-2	20760	**CF18DT/E/827/ECO**	CFTR18W/GX24Q/827	50	12000	2700	82	1200	1032	1,2,5,6, 7,12,20

Lamp for Fixtures F5, F7, F11, F12, F16

PENTRON® T5 FLUORESCENT LAMPS

PENTRON® T5 lamps are designed to operate on dedicated electronic programmed rapid start (also know as programmed start) ballasts only. These lamps are globally standardized and are designed to operate with their peak light output at 35°C (95°F) ambient temperature. For comparison purposes and to accommodate existing lamp measurement standards, ratings are given at both 25°C (77°F) and 35°C (95°F). The new lamp dimensions allow for innovative fixture designs and improved fixture performance

PENTRON® High Performance T5 Lamps

Nominal Wattage	Bulb	Nominal Length (in)	MOL (in)	Base	Product Number	Ordering Abbreviation	Pkg Qty	Avg Rated Life @3hrs/start (@12hrs/start)	CCT (K)	CRI	Approx Lumens Initial @25°C/77°F (@35°C/95°F)	Mean @25°C/77°F (@35°C/95°F)	Symbols & Footnotes
28	T5	48	45.8	Mini Bipin	20868	**FP28/830/ECO**	40	20000	3000	85	2600 2900	2418 2697	CRI 31,33,38,48, 74,76
					20901	**FP28/835/ECO**	40	20000	3500	85	2600 2900	2418 2697	CRI 31,33,38,48, 74,76
					20902	**FP28/841/ECO**	40	20000	4100	85	2600 2900	2418 2697	CRI 31,33,38,48, 74,76
					22203	**FP28/850/ECO**	40	20000	5000	85	2545 2840	2367 2641	CRI 31,33,38,48, 74,76
					20990	**FP28/865/ECO**	40	20000	6500	85	2400 2750	2232 2558	CRI 31,33,38,48, 74,76
					20977	**FP28RED 40/CS 1/SKU**	40	20000			2100		15,31,33,38,48,74
					20978	**FP28GREEN 40/CS 1/SKU**	40	20000			3500		15,31,33,38,48,74
					20986	**FP28BLUE 40/CS 1/SKU**	40	20000			700		15,31,33,38,48,74
14	T5	24	22.2	Mini Bipin	20907	**FP14/830/ECO**	40	20000	3000	85	1200 1350	1116 1256	CRI 31,33,38,48, 74,76
					20908	**FP14/835/ECO**	40	20000	3500	85	1200 1350	1116 1256	CRI 31,33,38,48, 74,76
					20914	**FP14/841/ECO**	40	20000	4100	85	1200 1350	1116 1256	CRI 31,33,38,48, 74,76
					20988	**FP14/865/ECO**	40	20000	6500	85	1100 1300	1045 1209	CRI 31,33,38,48, 74,76
21	T5	36	34	Mini Bipin	20919	**FP21/830/ECO**	40	20000	3000	85	1900 2100	1767 1953	CRI 31,33,38,48, 74,76
					20921	**FP21/835/ECO**	40	20000	3500	85	1900 2100	1767 1953	CRI 31,33,38,48, 74,76
					20924	**FP21/841/ECO**	40	20000	4100	85	1900 2100	1767 1953	CRI 31,33,38,48, 74,76
					20989	**FP21/865/ECO**	40	20000	6500	85	1750 2000	1662 1860	CRI 31,33,38,48, 74,76
35	T5	60	57.6	Mini Bipin	20925	**FP35/830/ECO**	40	20000	3000	85	3300 3650	3069 3394	CRI 31,33,38,48, 74,76
					20926	**FP35/835/ECO**	40	20000	3500	85	3300 3650	3069 3394	CRI 31,33,38,48, 74,76
					20927	**FP35/841/ECO**	40	20000	4100	85	3300 3650	3069 3394	CRI 31,33,38,48, 74,76

PENTRON® PREMIER™ High Performance T5 Lamps

Nominal Wattage	Bulb	Nominal Length (in)	MOL (in)	Base	Product Number	Ordering Abbreviation	Pkg Qty	Avg Rated Life @3hrs/start (@12hrs/start)	CCT (K)	CRI	Approx Lumens Initial @25°C/77°F (@35°C/95°F)	Mean @25°C/77°F (@35°C/95°F)	Symbols & Footnotes
28	T5	48	45.8	Mini Bipin	20948	**FP28/830PM/ECO**	40	20000	3000	85	2730 3050	2594 2898	CRI 31,33,38,48, 74,76
					20943	**FP28/835PM/ECO**	40	20000	3500	85	2730 3050	2594 2898	CRI 31,33,38,48, 74,76
					20944	**FP28/841PM/ECO**	40	20000	4100	85	2730 3050	2594 2898	CRI 31,33,38,48, 74,76

Lamp for Fixtures F8, F9

DULUX® D/E 4-PIN ECOLOGIC® COMPACT FLUORESCENT LAMPS

for Dimming and Electronic Ballast. Lamps have End-of-lamp Life (EOL) Protection

Nominal Wattage	Bulb	MOL (in)	MOL (mm)	Base	Product Number	Ordering Abbreviation	NEMA Generic Designation	Pkg Qty	Avg Rated Life (hrs)	CCT (K)	CRI	Approx Lumens Initial @25°C/77°F	Approx Lumens Mean @25°C/77°F	Symbols & Footnotes
13	D (T4)	5.2	131	G24Q-1	20682	**CF13DD/E/827/ECO**	CFQ13W/G24Q/827	50	12000	2700	82	900	774	1,2,5,6, 7,12,20
					20721	**CF13DD/E/830/ECO**	CFQ13W/G24Q/830	50	12000	3000	82	900	774	1,2,5,6, 7,12,20
					20671	**CF13DD/E/835/ECO**	CFQ13W/G24Q/835	50	12000	3500	82	900	774	1,2,5,6, 7,12,20
					20667	**CF13DD/E/841/ECO**	CFQ13W/G24Q/841	50	12000	4100	82	900	774	1,2,5,6, 7,12,20
18	D (T4)	5.8	147	G24Q-2	20683	**CF18DD/E/827/ECO**	CFQ18W/G24Q/827	50	12000	2700	82	1150	989	1,2,5,6, 7,12,20
					20724	**CF18DD/E/830/ECO**	CFQ18W/G24Q/830	50	12000	3000	82	1150	989	1,2,5,6, 7,12,20
					20672	**CF18DD/E/835/ECO**	CFQ18W/G24Q/835	50	12000	3500	82	1150	989	1,2,5,6, 7,12,20
					20668	**CF18DD/E/841/ECO**	CFQ18W/G24Q/841	50	12000	4100	82	1150	989	1,2,5,6, 7,12,20
26	D (T4)	6.5	166	G24Q-3	20684	**CF26DD/E/827/ECO**	CFQ26W/G24Q/827	50	12000	2700	82	1710	1470	1,2,5,6, 7,12,20
					20722	**CF26DD/E/830/ECO**	CFQ26W/G24Q/830	50	12000	3000	82	1710	1470	1,2,5,6, 7,12,20
					20673	**CF26DD/E/835/ECO**	CFQ26W/G24Q/835	50	12000	3500	82	1710	1470	1,2,5,6, 7,12,20
					20669	**CF26DD/E/841/ECO**	CFQ26W/G24Q/841	50	12000	4100	82	1710	1470	1,2,5,6, 7,12,20

DULUX T PREHEAT 2-PIN ECOLOGIC® COMPACT FLUORESCENT LAMPS

With starter in Lamp Base for Magnetic Ballast

Nominal Wattage	Bulb	MOL (in)	MOL (mm)	Base	Product Number	Ordering Abbreviation	NEMA Generic Designation	Pkg Qty	Avg Rated Life (hrs)	CCT (K)	CRI	Approx Lumens Initial @25°C/77°F	Approx Lumens Mean @25°C/77°F	Symbols & Footnotes
18	T (T4)	4.8	123	GX24D-2	20756	**CF18DT/827/ECO**	CFTR18W/GX24D/827	50	12000	2700	82	1200	1032	1,4,6,11, 12,20,22
26	T (T4)	5.4	138	GX24D-3	20752	**CF26DT/827/ECO**	CFTR26W/GX24D/827	50	12000	2700	82	1800	1548	1,4,6,11, 12,20,22

DULUX T/E 4-PIN ECOLOGIC® COMPACT FLUORESCENT LAMPS

For dimming and electronic ballast. Lamps have End-of-Lamp Life (EOL) Protection

Nominal Wattage	Bulb	MOL (in)	MOL (mm)	Base	Product Number	Ordering Abbreviation	NEMA Generic Designation	Pkg Qty	Avg Rated Life (hrs)	CCT (K)	CRI	Approx Lumens Initial @25°C/77°F	Approx Lumens Mean @25°C/77°F	Symbols & Footnotes
13	T (T4)	4.2	106	GX24Q-1	20891	**CF13DT/E/827/ECO**	CFTR13W/GX24Q/827	50	12000	2700	82	900	774	1,2,5,6, 7,12,20
					20892	**CF13DT/E/830/ECO**	CFTR13W/GX24Q/830	50	12000	3000	82	900	774	1,2,5,6, 7,12,20
					20893	**CF13DT/E/835/ECO**	CFTR13W/GX24Q/835	50	12000	3500	82	900	774	1,2,5,6, 7,12,20
					20894	**CF13DT/E/841/ECO**	CFTR13W/GX24Q/841	50	12000	4100	82	900	774	1,2,5,6, 7,12,20
18	T (T4)	4.6	116	GX24Q-2	20760	**CF18DT/E/827/ECO**	CFTR18W/GX24Q/827	50	12000	2700	82	1200	1032	1,2,5,6, 7,12,20

Lamp for Fixtures F13

DULUX® D/E 4-PIN ECOLOGIC® COMPACT FLUORESCENT LAMPS

for Dimming and Electronic Ballast. Lamps have End-of-lamp Life (EOL) Protection

Nominal Wattage	Bulb	MOL (in)	MOL (mm)	Base	Product Number	Ordering Abbreviation	NEMA Generic Designation	Pkg Qty	Avg Rated Life (hrs)	CCT (K)	CRI	Approx Lumens Initial @25°C/77°F	Approx Lumens Mean @25°C/77°F	Symbols & Footnotes
13	D (T4)	5.2	131	G24Q-1	20682	**CF13DD/E/827/ECO**	CFQ13W/G24Q/827	50	12000	2700	82	900	774	1,2,5,6, 7,12,20
					20721	**CF13DD/E/830/ECO**	CFQ13W/G24Q/830	50	12000	3000	82	900	774	1,2,5,6, 7,12,20
					20671	**CF13DD/E/835/ECO**	CFQ13W/G24Q/835	50	12000	3500	82	900	774	1,2,5,6, 7,12,20
					20667	**CF13DD/E/841/ECO**	CFQ13W/G24Q/841	50	12000	4100	82	900	774	1,2,5,6, 7,12,20
18	D (T4)	5.8	147	G24Q-2	20683	**CF18DD/E/827/ECO**	CFQ18W/G24Q/827	50	12000	2700	82	1150	989	1,2,5,6, 7,12,20
					20724	**CF18DD/E/830/ECO**	CFQ18W/G24Q/830	50	12000	3000	82	1150	989	1,2,5,6, 7,12,20
					20672	**CF18DD/E/835/ECO**	CFQ18W/G24Q/835	50	12000	3500	82	1150	989	1,2,5,6, 7,12,20
					20668	**CF18DD/E/841/ECO**	CFQ18W/G24Q/841	50	12000	4100	82	1150	989	1,2,5,6, 7,12,20
26	D (T4)	6.5	166	G24Q-3	20684	**CF26DD/E/827/ECO**	CFQ26W/G24Q/827	50	12000	2700	82	1710	1470	1,2,5,6, 7,12,20
					20722	**CF26DD/E/830/ECO**	CFQ26W/G24Q/830	50	12000	3000	82	1710	1470	1,2,5,6, 7,12,20
					20673	**CF26DD/E/835/ECO**	CFQ26W/G24Q/835	50	12000	3500	82	1710	1470	1,2,5,6, 7,12,20
					20669	**CF26DD/E/841/ECO**	CFQ26W/G24Q/841	50	12000	4100	82	1710	1470	1,2,5,6, 7,12,20

DULUX T PREHEAT 2-PIN ECOLOGIC® COMPACT FLUORESCENT LAMPS

With starter in Lamp Base for Magnetic Ballast

Nominal Wattage	Bulb	MOL (in)	MOL (mm)	Base	Product Number	Ordering Abbreviation	NEMA Generic Designation	Pkg Qty	Avg Rated Life (hrs)	CCT (K)	CRI	Approx Lumens Initial @25°C/77°F	Approx Lumens Mean @25°C/77°F	Symbols & Footnotes
18	T (T4)	4.8	123	GX24D-2	20756	**CF18DT/827/ECO**	CFTR18W/GX24D/827	50	12000	2700	82	1200	1032	1,4,6,11, 12,20,22
26	T (T4)	5.4	138	GX24D-3	20752	**CF26DT/827/ECO**	CFTR26W/GX24D/827	50	12000	2700	82	1800	1548	1,4,6,11, 12,20,22

DULUX T/E 4-PIN ECOLOGIC® COMPACT FLUORESCENT LAMPS

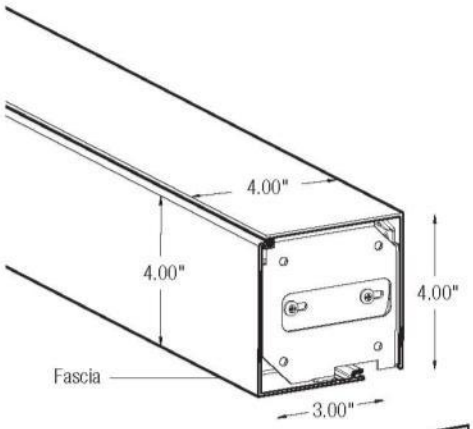
For dimming and electronic ballast. Lamps have End-of-Lamp Life (EOL) Protection

Nominal Wattage	Bulb	MOL (in)	MOL (mm)	Base	Product Number	Ordering Abbreviation	NEMA Generic Designation	Pkg Qty	Avg Rated Life (hrs)	CCT (K)	CRI	Approx Lumens Initial @25°C/77°F	Approx Lumens Mean @25°C/77°F	Symbols & Footnotes
13	T (T4)	4.2	106	GX24Q-1	20891	**CF13DT/E/827/ECO**	CFTR13W/GX24Q/827	50	12000	2700	82	900	774	1,2,5,6, 7,12,20
					20892	**CF13DT/E/830/ECO**	CFTR13W/GX24Q/830	50	12000	3000	82	900	774	1,2,5,6, 7,12,20
					20893	**CF13DT/E/835/ECO**	CFTR13W/GX24Q/835	50	12000	3500	82	900	774	1,2,5,6, 7,12,20
					20894	**CF13DT/E/841/ECO**	CFTR13W/GX24Q/841	50	12000	4100	82	900	774	1,2,5,6, 7,12,20
18	T (T4)	4.6	116	GX24Q-2	20760	**CF18DT/E/827/ECO**	CFTR18W/GX24Q/827	50	12000	2700	82	1200	1032	1,2,5,6, 7,12,20

4" Fascia and Top-Back Cover

The 4" Fascia and Top-Back Cover system provides a top treatment to enclose either manual or motorized rollershade mechanisms. The Top-Back Cover blocks light that could enter the room over the top of the rollershade, while concealing the rollershade mechanism from viewers outside of the treated window.

The Fascia engages smoothly with the Top-Back Cover to complete the light seal and conceal the rollershade system from viewers inside the room being treated. When used in conjunction with side channels and sill angle, Fascia and Top-Back Cover provides one of the basic elements of a complete light blocking rollershade system.



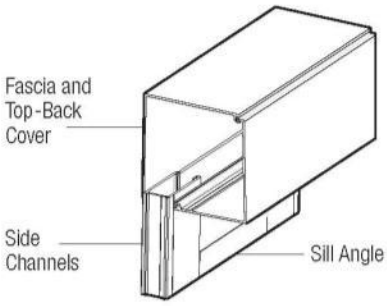
Fascia Endcap
Endcaps are available to finish outside mount applications

Specifications

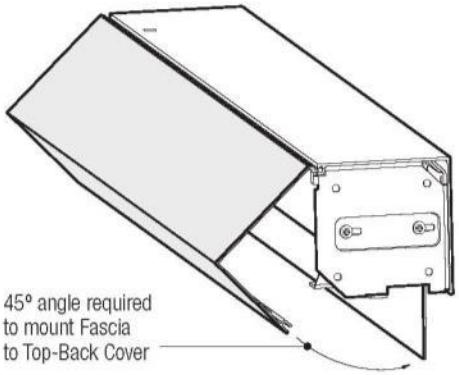
Material	0.075" Extruded Aluminum
Color	White, Bronze, and Anodized Custom colors are available and may result in additional lead time and cost
Length	Available in custom lengths up to 150"

Mounting

When designing trim around the Fascia system note that a 45° angle is required to mount the Fascia on the brackets and Top-Back Cover. For systems with ends that are either partially or completely exposed, end caps are available to create a finished appearance.



Blackout System Components



Attach Fascia

LUTRON. SPECIFICATION SUBMITTAL Page 1

Job Name:	Model Numbers:	
Job Number:		

Worldwide Technical and Sales Assistance

Lutron Shading Solutions by VIMCO
11520 Sun Shade Lane
Ashland, VA 23005

www.lutron.com
www.vimco.com
customer service: 1.800.446.1503
fax: 1.804.752.3366
24/7 tech support: 1.800.523.9466
email: shadinginfo@lutron.com

Limited Warranty

Lutron Shading Solutions by VIMCO offers an 8-year limited warranty for our shading systems. Please contact customer service or visit our website for a complete warranty statement.

Lutron Shading Solutions by VIMCO reserves the right to make improvements or changes to these products without prior notice. Although every attempt is made to ensure that this information is accurate and up to date, please check with Lutron Shading Solutions by VIMCO to confirm product availability, latest specifications, and suitability for your application.

These products may be covered by one or more of the following US patents: 4,803,380; 4,835,343; 4,924,349; 5,180,886; 5,671,387; 5,848,634; 6,100,659; 6,313,588; 6,346,781; 6,497,267; D310,349; D370,663; D391,924; D422,567; D436,930; D453,742; D456,783; D461,782; D462,332; D465,460; D465,770; D466,090; D466,091; D466,484; D475,024; D475,025; and corresponding foreign patents. US and foreign patents pending.

Job Name:	Model Numbers:	
Job Number:		

Sivoia QED | roller 20

The *Sivoia QED* roller 20 shade utilizes the ultra-quiet, precision controlled Electronic Drive Unit (EDU). The *Sivoia QED* EDU is housed inside the roller shade assembly and controls the movement of the shade, keeps track of the shade's position, and adjusts the shade to the user's desired preset positions.

Sivoia QED roller 20 shade

Features

- Smooth, ultra-quiet operation
- Shades start, move and stop with precision
- Offers programmable stop points. The EDU tracks the position of the shade and is able to adjust it to predetermined locations at the touch of a button
- Provides maximum window coverage with small, symmetrical light gaps, 0.75 in (19 mm) between the shade fabric and the mounting bracket
- Easy-to-read and easy-to-use controls
- Optional infrared (IR) system provides easy, convenient control from anywhere in the room
- Integrates with Lutron lighting control systems and other AV equipment
- Does not require group controllers or relay systems to create shade groups and sub-groups
- The EDU requires only low-voltage wiring
- Power failure memory for the lifetime of the product
- 8 year limited warranty

Specifications

Power

- Requires 24 V~, 50 VA
- One transformer is required per EDU
- Power must be provided by a Lutron approved NEC Class 2 power source
- One EDU can power one accessory control (keypads and accessories)

System Capacity

- System allows for a total of 96 devices, including any type of *Sivoia QED* EDU, keypads, Contact Closure Input (CCI) or other interfaces
- If the number of keypads and interfaces in an installation exceeds the number of EDUs, external keypad power supplies are required
- Typical maximum shade size is 20 ft^2 (1.86 m^2)
- Maximum shade size is determined from shade width, fabric type, fabric weight, hembar type etc. (refer to Lutron Shade Configuration Tool (SCT) for your application)

Performance

- Ultra-quiet operation (will not exceed 44dBA measured 3 ft (1 m) from the EDU)
- System allows for symmetrical light gaps as small as 0.75 in (19 mm) on each side
- Each EDU stores programmable presets including open, closed, and any other position
- Presets can be recalled from keypads, CCI's, IR receivers, and other lighting control system interfaces
- Presets can be set with a 5 second button push and hold from the keypads, CCI's, or hand-held remote controls
- Keypad adjustment of presets can be disabled with the "lock out" function on the keypad
- Open and close limits are programmable from the EDU, wall-mounted keypads, and hand-held remote controls
- All system components are Electro Static Discharge (ESD) protected

Grouping

- Keypads and CCIs can control any EDU or group of EDUs without a separate group controller
- System groups and subgroups can be configured at the point of control without rewiring and without access to the EDU
- System may contain multiple EDU types
- Keypads and interfaces within the system are able to operate any group or subgroup of EDUs

Integration

- EDUs seamlessly integrate with Lutron lighting control systems including, GRAFIK Eye®, RadioRA®, HomeWorks®, and RadioTouch®
- Contact closure available to integrate with A/V equipment such as time clocks and security systems.

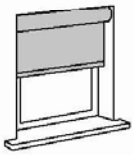
Controls

- Keypads and CCIs are low-voltage and receive their power from the EDUs
- All system devices must be connected through a common communication link
- IR controls available. IR receivers can be wired directly to EDU. There are also *Sivoia QED* keypads and CCIs with built in IR receivers

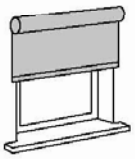
Sivoia QED roller 20™ shade options

Mounting options

Depending on window dimensions, brackets can be mounted inside the window frame, outside the window frame, to the ceiling, or in a pocket.



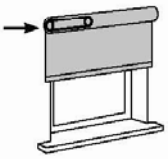
Inside mount



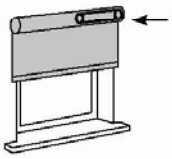
Outside mount

Drive side options

EDU can be mounted on the left or right of the shade:

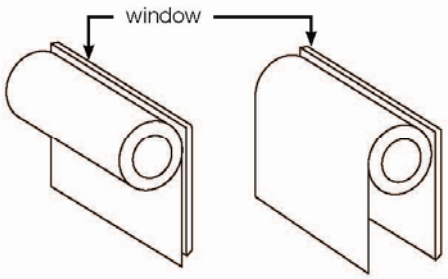


Left drive side



Right drive side

Fabric drop options

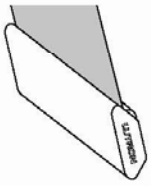


Regular roll

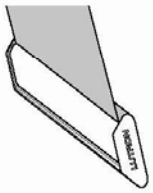
Reverse roll

Architectural bottom bar options

The bottom bar comes in two varieties:



Exposed bottom bar
Available in: white, bronze, anodized, and custom color. Welded bottom bars also available.



Half-wrap bottom bar (reverse view shown)

Fabric options

Sivoia QED roller shades are available in a wide variety of fabric types including:
Sheer Filter sun light, UV protection, view
Privacy Minimal translucence, UV protection
Blackout Total darkness, maximum UV protection, no view

For complete fabric selection, visit www.lutron.com

APPENDIX D : KALWALL SPEC

2007 MASTER FORMAT™ SECTION 08 45 23

INSULATED TRANSLUCENT FIBERGLASS SANDWICH PANEL SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the insulated translucent sandwich panel system as shown and specified. Work includes providing and installing:

1. Flat (curved) factory prefabricated structural insulated translucent sandwich panels.

2. Aluminum installation system.

3. Aluminum sill flashing.

1.2 SUBMITTALS

A. Submit manufacturer's product data. Include construction details, material descriptions, profiles and finishes of components.

B. Submit shop drawings. Include elevations, details, dimensions and attachments to other work.

C. Submit manufacturer's color charts showing the full range of colors available for factory finished aluminum.

1. When requested, submit samples for each exposed finish required, in same thickness and material indicated for the work and in size indicated below. If finishes involve normal color variations, include sample sets consisting of two or more units showing the full range of variations expected.

a. Sandwich panels: 14" x 28" units

b. Factory finished aluminum: 5" long sections

D. Submit Installer Certificate, signed by installer, certifying compliance with project qualification requirements.

E. Submit product test reports from a qualified independent testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed test reports will be acceptable if for current manufacturer and indicative of products used on this project.

1. Test reports required are:

a. Flame Spread and Smoke Developed (UL 723) – Submit UL Card

b. Burn Extent (ASTM D-635)

c. Color Difference (ASTM D-2244)

d. Abrasion/Erosion Resistance (ASTM D-4060)

e. Impact Strength (UL 972)

f. Bond Tensile Strength (ASTM C-297 after aging by ASTM D-1037)

g. Bond Shear Strength (ASTM D-1002)

h. Beam Bending Strength (ASTM E-72)

i. Insulation U-Factor (NFRC-100)

j. NFRC System Certification

k. Condensation Resistance Factor (AAMA 1503)

l. Class 1 Fire Approval (FM 4881) (Optional)

m. Blast Analysis and Testing of Translucent Sandwich Panels Demonstrating Equivalent Performance to 1/4" Laminated Glass per DoD UFC 4-010-01 (Optional)

F. Submit current documentation indicating regular, independent quality control monitoring under a nationally recognized building code review and listing program.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications

1. Material and products shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least ten (10) consecutive years and which can show evidence of those materials being satisfactorily used on at least six (6) projects of similar size, scope and location. At least three (3) of the projects shall have been in successful use for ten (10) years or longer.

2. Panel system must be listed by the International Code Council – Evaluation Service (ICC-ES) which requires quality control inspections and fire, structural and water infiltration testing of sandwich panel systems by an approved agency.

3. Quality control inspections and required testing shall be conducted at least once each year and shall include manufacturing facilities, sandwich panel components and production sandwich panels for conformance with “Acceptance Criteria for Sandwich Panels” as regulated by the ICC-ES.

B. Installer’s Qualifications: Installation shall be by an experienced installer, which has been in the business of installing specified panel systems for at least five (5) consecutive years and can show evidence of satisfactory completion of projects of similar size, scope and type.

C. Performance Requirements: The manufacturer shall be responsible for the configuration and fabrication of the complete panel system.

1. When requested, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 DELIVERY STORAGE AND HANDLING

A. Deliver panel system, components and materials in manufacturer's standard protective packaging.

B. Store panels on the long edge, several inches above the ground, blocked and under cover in accordance with manufacturer's storage and handling instructions.

1.5 WARRANTY

A. Submit manufacturer's and installer's written warranty agreeing to repair or replace panel system work which fails in materials or workmanship within one (1) year of the date of delivery. Failure of materials or workmanship shall include leakage, excessive deflection, deterioration of finish on metal in excess of normal weathering and defects in accessories, insulated translucent sandwich panels and other components of the work. (Contact local representative for extended warranty periods.)

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Kalwall Corporation, tel: (800) 258-9777 – fax: (603) 627-7905 – email: info@kalwall.com

2.2 PANEL COMPONENTS

A. Face Sheets

1. Translucent faces: Manufactured from glass fiber reinforced thermoset resins, formulated specifically for architectural use.

a. Thermoplastic (e.g. polycarbonate, acrylic) faces are not acceptable.

2. Flammability of interior face sheets:

a. Flamespread: Underwriters Laboratories (UL) listed, which requires periodic unannounced retesting, with flamespread rating no greater than 50 (20) and smoke developed no greater than 250 (200) when tested in accordance with UL 723.

b. Burn extent by ASTM D-635 shall be no greater than 1”.

c. Face sheets shall not deform, deflect or drip when subjected to fire or flame.

d. Face sheets shall not delaminate when exposed to 200°F for 30 minutes per IBC and NBC (300°F for 25 minutes per UBC and SBC).

3. Weatherability of exterior face sheets:

a. Color stability: Full thickness of the exterior face sheet shall not change color more than 3.0 CIE Units DELTA E by ASTM D-2244 after 5 years outdoor South Florida weathering at 5 degrees facing south, determined by the average of at least three (3) white samples with and without a protective film or coating to ensure long-term color stability. Color stability shall be unaffected by abrasion or scratching.

b. Erosion barrier: Exterior face shall have a permanent glass erosion barrier embedded beneath the surface to provide long-term resistance to reinforcing fiber exposure. Exterior face surface loss shall not exceed .7 mils and 40 mgs when tested in accordance with ASTM D-4060 employing CS17 abrasive wheels at a head load of 500 grams for 1000 cycles. Sacrificial surface films or coatings are not acceptable erosion barriers.

4. Appearance:

a. Exterior face sheets: Smooth, 0.070" thick and _____ in color.

b. Interior face sheets: Smooth, 0.045" thick and _____ in color.

c. Face sheets shall not vary more than +/- 10% in thickness and be uniform in color.

5. Strength: Exterior face sheet shall be uniform in strength, impenetrable by hand held pencil and repel an impact equal to 70 (230) ft. lbs. without fracture or tear when impacted by a 3-1/4" diameter, 5 lb. free-falling ball per UL 972.

B. Grid Core

1. Thermally broken (aluminum) I-beam grid core shall be of 6063-T6 or 6005-T5 alloy and temper with provisions for mechanical interlocking of muntin-mullion and perimeter. Width of I- beam shall be no less than 7/16". The I-beam grid shall be machined to tolerances of not greater than +/- .002".

2. Thermal break: Minimum 1".

C. Laminate Adhesive

1. Heat and pressure resin type adhesive engineered for structural sandwich panel use, with minimum 25-years field use. Adhesive shall pass testing requirements specified by the International Code Council "Acceptance Criteria for Sandwich Panel Adhesives."

2. Minimum tensile strength of 750 PSI when the panel assembly is tested by ASTM C-297 after two (2) exposures to six (6) cycles each of the aging conditions prescribed by ASTM D-1037.

3. Minimum shear strength of the panel adhesive by ASTM D-1002 after exposure to five (5) separate conditions:

a. 50% Relative Humidity at 73° F: 540 PSI

b. 182° F: 100 PSI

c. Accelerated Aging by ASTM D-1037 at room temperature: 800 PSI

d. Accelerated Aging by ASTM D-1037 at 182° F: 250 PSI

e. 500 Hour Oxygen Bomb by ASTM D-572: 1400 PSI

2.3 PANEL CONSTRUCTION

A. Provide sandwich panels of flat fiberglass reinforced translucent face sheets laminated to a grid core of mechanically interlocking thermally broken (aluminum) I-beams. The adhesive bonding line shall be straight, cover the entire width of the I-beam and have a neat sharp edge.

1. Thickness: 2-3/4”

2. Light transmission: _____.

3. Solar heat gain coefficient: _____.

4. U-factor by NFRC certified laboratory:(0.23, 0.14, 0.10, 0.05) thermally broken [OR (0.53, 0.29, 0.22, 0.18) aluminum I-beam].

a. Complete insulated panel system shall have NFRC certified U-factor of _____.

5. Grid pattern: Nominal 12” x 24” (8” x 20”, 12” x 12”, other) shoji (reverse shoji, square, staggered)..

B. Panels shall deflect no more than 1.9” at 30 psf in 10’-0” span without a supporting frame by ASTM E-72.

C. Panels shall withstand 1200ºF fire for minimum one (1) hour without collapse or exterior flaming.

D. Thermally broken panels:

1. Minimum Condensation Resistance Factor of 80 by AAMA 1503 measured on the bond line.

2. Minimum CRF of 90 at center of grid cell.

E. (OPTIONAL) Panel system shall be a Factory Mutual (FM) tested and approved Class 1 wall system in accordance with FM 4881.

F. (OPTIONAL) Panels shall demonstrate performance equivalent to 1/4" laminated glass under blast loading as specified in DoD UFC 4-010-01.

2.4 BATTENS AND PERIMETER CLOSURE SYSTEM

A. Closure system: Extruded aluminum 6063-T6 and 6063-T5 alloy and temper clamp-tite screw type closure system.

1. (Optional) Thermally broken perimeter system shall have a urethane bridge.

2. (Optional) Perimeter system shall be factory prefabricated “Superbreak” as shown on drawings.

3. (Optional) Curved closure system may be roll formed.

B. Sealing tape: Manufacturer's standard, pre-applied to closure system at the factory under controlled conditions.

C. Fasteners: 300 series stainless steel screws for aluminum closures, excluding final fasteners to the building.

D. Finish: Exposed aluminum to be manufacturer's factory applied finish that meets the performance requirements of AAMA 2604. (Mill)

1. Color _____ (selected from manufacturer's standard colors).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, supporting structure and installation conditions. Do not proceed with panel erection until unsatisfactory conditions have been corrected.

3.2 PRERARATION

A. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

3.2 PREPARATION (continued)

2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint or method recommended by manufacturer.

3. Where aluminum will contact pressure-treated wood, separate dissimilar materials by methods recommended by manufacturer.

3.3 INSTALLATION

A. Install the panel system in accordance with the manufacturer's installation recommendations and approved shop drawings.

1. Anchor component parts securely in place by permanent mechanical attachment system.

2. Accommodate thermal and mechanical movements.

3. Set perimeter framing in a full bed of sealant compound, or with joint fillers or gaskets to provide weather-tight construction.

B. Install joint sealants at perimeter joints and within the panel system in accordance with manufacturer's installation instructions.

3.4 CLEANING

A. Clean the panel system inside and outside, immediately after installation, according to manufacturer's written recommendations.

END OF SECTION 08 45 23

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 ----------------------------------------------------------------------
 SKM POWER*TOOLS FOR WINDOWS
 SHORT CIRCUIT ANALYSIS REPORT
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Apr 01, 2009    15:21:56                                        PAGE   2


     ALL PU VALUES ARE EXPRESSED ON A 100 MVA BASE

          SWING GENERATORS
 SOURCE NAME          VOLTAGE   ANGLE
 ==========          =======   =====
 NSTAR                 1.00      0.00

          PQ MACHINES
 SOURCE          kW        kVAR
 ==========      ==========  ==========
 Emergency Gene   300.      375.
Apr 01, 2009    15:21:56                                        PAGE   3

 ************** P R E - F A U L T   V O L T A G E   P R O F I L E  **************

 BUS#  NAME       BASE VOLTS    PU VOLTS    ANGLE (D)

  BUS-0001        13800.00      1.1930         8.
  BUS-0007          480.00      1.2549         8.
  BUS-0009          480.00      1.2549         8.
  BUS-0020          480.00      1.2541         8.
  BUS-0021          480.00      1.2541         8.
  BUS-0022          480.00      1.2544         8.
  BUS-0023          208.00      1.2544         8.
  BUS-0030          480.00      1.2544         8.
  BUS-0031          480.00      1.2544         8.
  BUS-0037          480.00      1.2543         8.
  BUS-0047          480.00      0.0000         0.
                                      Page 1
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  BUS-0048          480.00      0.0000         0.
  BUS-0052          480.00      1.2543         8.
  BUS-0053          480.00      1.2543         8.
  BUS-0054          480.00      1.2543         8.
  BUS-0055          480.00      1.2543         8.
  BUS-0056          480.00      1.2543         8.
  BUS-0057          480.00      1.2543         8.
  BUS-0058          480.00      1.2543         8.
  BUS-0059          480.00      1.2543         8.
  BUS-0060          480.00      1.2543         8.
  BUS-0061          480.00      1.2543         8.
  BUS-0062          480.00      1.2543         8.
  BUS-0063          480.00      1.2543         8.
  BUS-0064          480.00      1.2543         8.
  BUS-0065          480.00      1.2543         8.
  BUS-0066          480.00      1.2545         8.
  BUS-0068          480.00      1.2549         8.
  BUS-0069          480.00      0.0000         0.
  D848              480.00      1.2541         8.
  Generator         208.00      1.2556         8.
  KC2               208.00      1.2544         8.
  KCP               208.00      1.2549         8.
  LS2B              208.00      1.2547         8.
  LS42              480.00      1.2547         8.
  LS45              480.00      1.2547         8.
  LSDP4             480.00      1.2547         8.
  MP27A             480.00      1.2543         8.
  MS2               208.00      1.2543         8.
  MSB               480.00      1.2541         8.
  MSK               208.00      1.2544         8.
  OS21              208.00      1.2556         8.
  OS24              208.00      1.2556         8.
  OSZBK             208.00      1.2556         8.
Apr 01, 2009    15:21:56                                        PAGE   4

 ************** P R E - F A U L T   V O L T A G E   P R O F I L E  **************

 BUS#  NAME       BASE VOLTS    PU VOLTS    ANGLE (D)

  OSDP2B            208.00      1.2556         8.
  OSDP4             480.00      1.2556         8.
  RP21              208.00      1.2543         8.
  RP22              208.00      1.2543         8.
  RP23              208.00      1.2543         8.
  RP24              208.00      1.2543         8.
  RP25              208.00      1.2543         8.
  RP26              208.00      1.2543         8.
  RP2B              208.00      1.2543         8.
  RP2BA             208.00      1.2543         8.
  RP2K              208.00      1.2544         8.
  RP2P              208.00      1.2545       -22.
Apr 01, 2009    15:21:56                                        PAGE   5

 ************** F A U L T   A N A L Y S I S   R E P O R T  **************
                                      Page 2
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```
                FAULT TYPE: 3PH
                MODEL INDUCTION MOTOR CONTRIBUTION: YES
                MODEL TRANSFORMER TAPS: YES
                MODEL TRANSFORMER PHASE SHIFT: YES
 ================================================================

□Apr 01, 2009     15:21:56                                    PAGE    6



  DB4B            VOLTAGE BASE LL:                 480.0 (VOLTS)
                  INI. SYM. RMS FAULT CURRENT:   2432.7 /  -77. ( AMPS/DEG )
                  THEVENIN EQUIVALENT IMPEDANCE:    5.399 +j  61.774 (PU)
                  THEVENIN IMPEDANCE X/R RATIO:    11.442

                   ASYM     RMS    INTERRUPTING AMPS
                  1/2 CYCLES     2 CYCLES     3 CYCLES     5 CYCLES     8 CYCLES
                      3571.0       2689.6       2521.2       2442.7       2433.0

                  INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                          AT TIME =      0.5 CYCLES
                  ---PHASE A---        ---PHASE B---        ---PHASE C---
                  0.0000 /    0.0      0.0000 /    0.0      0.0000 /    0.0

                  INI.     RMS    FAULTED CURRENT ( AMPS / DEG )
                          AT TIME =      0.5 CYCLES
                  ---PHASE A---        ---PHASE B---        ---PHASE C---
                   2432.7 / -76.8       2432.7 / 163.2       2432.7 /  43.2

  DB4B            ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ======
                      FIRST BUS FROM FAULT     AT TIME =      0.5 CYCLES
                            ---PHASE A---      ---PHASE B---      ---PHASE C---
    MSB                 480.0  0.0239 / -32.  0.0239 /-152.  0.0239 /  88.
    DB4B              ================ INI.    RMS    SYSTEM BRANCH FLOWS ( AMPS )
================

                                FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                               BRANCH NAME   VBASE LL  -PHASE A-      -PHASE B-

-PHASE C-
 AHU-1          DB4B                          480.   187.3/ -76.   187.3/ 164.
187.3/  44.
 AHU-1a         DB4B                          480.   187.3/ -76.   187.3/ 164.
187.3/  44.
 BP             DB4B                          480.    25.1/ -76.    25.1/ 164.
25.1/  44.
 MSB            DB4B          Wire 4          480.  2033.1/ -77.  2033.1/ 163.
2033.1/  43.

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  Generator       VOLTAGE BASE LL:                 208.0 (VOLTS)
                  INI. SYM. RMS FAULT CURRENT:   5396.3 /  -75. ( AMPS/DEG )
                  THEVENIN EQUIVALENT IMPEDANCE:    7.617 +j  64.134 (PU)
                                  Page 3
```

```
                  THEVENIN IMPEDANCE X/R RATIO:     8.420

                   ASYM     RMS    INTERRUPTING AMPS
                  1/2 CYCLES     2 CYCLES     3 CYCLES     5 CYCLES     8 CYCLES
                      7532.3       5662.5       5457.3       5399.4       5396.3

                  INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                          AT TIME =      0.5 CYCLES
                  ---PHASE A---        ---PHASE B---        ---PHASE C---
                  0.0000 /    0.0      0.0000 /    0.0      0.0000 /    0.0

                  INI.     RMS    FAULTED CURRENT ( AMPS / DEG )
                          AT TIME =      0.5 CYCLES
                  ---PHASE A---        ---PHASE B---        ---PHASE C---
                   5396.3 / -75.0       5396.3 / 165.0       5396.3 /  45.0

  Generator       ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ======
                      FIRST BUS FROM FAULT     AT TIME =      0.5 CYCLES
                            ---PHASE A---      ---PHASE B---      ---PHASE C---
    OSDP2B              208.0  0.0275 / -30.  0.0275 /-150.  0.0275 /  90.
    Generator         ================ INI.    RMS    SYSTEM BRANCH FLOWS ( AMPS )
==============

                                FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                               BRANCH NAME   VBASE LL  -PHASE A-      -PHASE B-

-PHASE C-
 OSDP2B         Generator      Wire 54          208.  5396.3/ -75.  5396.3/ 165.
5396.3/  45.

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  KC2             VOLTAGE BASE LL:                 208.0 (VOLTS)
                  INI. SYM. RMS FAULT CURRENT:   5390.5 /  -75. ( AMPS/DEG )
                  THEVENIN EQUIVALENT IMPEDANCE:    7.718 +j  64.129 (PU)
                  THEVENIN IMPEDANCE X/R RATIO:     8.309

                   ASYM     RMS    INTERRUPTING AMPS
                  1/2 CYCLES     2 CYCLES     3 CYCLES     5 CYCLES     8 CYCLES
                      7506.0       5646.3       5447.9       5393.3       5390.6

                  INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                          AT TIME =      0.5 CYCLES
                  ---PHASE A---        ---PHASE B---        ---PHASE C---
                  0.0000 /    0.0      0.0000 /    0.0      0.0000 /    0.0

                  INI.     RMS    FAULTED CURRENT ( AMPS / DEG )
                          AT TIME =      0.5 CYCLES
                  ---PHASE A---        ---PHASE B---        ---PHASE C---
                   5390.5 / -74.9       5390.5 / 165.1       5390.5 /  45.1

  KC2             ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ======
                      FIRST BUS FROM FAULT     AT TIME =      0.5 CYCLES
                            ---PHASE A---      ---PHASE B---      ---PHASE C---
    MSK                 208.0  0.0274 / -30.  0.0274 /-150.  0.0274 /  90.
    KC2               ================ INI.    RMS    SYSTEM BRANCH FLOWS ( AMPS )
==============

                                  Page 4
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                                    SC
                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                               BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 MSK              KC2           Wire 42          208.  5390.5/ -75.  5390.5/ 165.
5390.5/  45.

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  KCP            VOLTAGE BASE LL:                208.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:   5390.5 /  -75. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:    7.718 +j  64.129 (PU)
                 THEVENIN IMPEDANCE X/R RATIO:     8.309

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                    7506.0      5646.3      5447.9      5393.3      5390.6

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                         AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                         AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                  5390.5 / -74.9     5390.5 / 165.1      5390.5 /  45.1

  KCP            ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    MSK              208.0  0.0274 / -30.  0.0274 /-150.  0.0274 /  90.
    KCP            ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================
                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                               BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 MSK              KCP           Wire 41          208.  5390.5/ -75.  5390.5/ 165.
5390.5/  45.

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  LS2B           VOLTAGE BASE LL:                208.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:   5388.1 /  -75. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:    7.727 +j  64.184 (PU)
                 THEVENIN IMPEDANCE X/R RATIO:     8.307

                  ASYM    RMS   INTERRUPTING AMPS
                                    Page 5
```

```
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                    7502.3      5643.6      5445.4      5390.9      5388.1

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                         AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                         AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                  5388.1 / -74.9     5388.1 / 165.1      5388.1 /  45.1

  LS2B           ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    BUS-0068         480.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    LS2B           ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================
                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                               BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 BUS-0068       LS2B          T2               208.  5388.1/ -75.  5388.1/ 165.
5388.1/  45.

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  LS42           VOLTAGE BASE LL:                480.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:   2335.3 /  -75. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:    7.724 +j  64.158 (PU)
                 THEVENIN IMPEDANCE X/R RATIO:     8.307

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                    3251.7      2446.0      2360.2      2336.5      2335.3

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                         AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                         AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                  2335.3 / -74.9     2335.3 / 165.1      2335.3 /  45.1

  LS42           ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    LSDP4            480.0  0.0275 / -30.  0.0275 /-150.  0.0275 /  90.
    LS42           ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================
                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                               BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
                                    Page 6
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 LSDP4          LS42          Wire 44          480.  2335.3/ -75.  2335.3/ 165.
2335.3/  45.

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  LS45          VOLTAGE BASE LL:                 480.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:   2335.3 /  -75. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:    7.724 +j  64.158 (PU)
                THEVENIN IMPEDANCE X/R RATIO:     8.307

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                   3251.7      2446.0      2360.2      2336.5      2335.3

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                 2335.3 / -74.9      2335.3 / 165.1      2335.3 /  45.1

  LS45          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    LSDP4            480.0  0.0275 / -30.  0.0275 /-150.  0.0275 /  90.
    LS45           ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
==============
                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                               BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 LSDP4          LS45          Wire 45          480.  2335.3/ -75.  2335.3/ 165.
2335.3/  45.

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  LSDP4         VOLTAGE BASE LL:                 480.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:   2376.0 /  -76. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:    6.724 +j  63.158 (PU)
                THEVENIN IMPEDANCE X/R RATIO:     9.393

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                   3380.7      2534.4      2418.6      2379.0      2376.1

                                Page 7
```

```
                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                 2376.0 / -75.7      2376.0 / 164.3      2376.0 /  44.3

  LSDP4         ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    BUS-0031         480.0  0.0279 / -31.  0.0279 /-151.  0.0279 /  89.
    LS45             480.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    LS42             480.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    BUS-0068         480.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    LSDP4          ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
==============
                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                               BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 BUS-0031       LSDP4         Wire 9           480.  2376.0/ -76.  2376.0/ 164.
2376.0/  44.
 LSDP4          LS45          Wire 45          480.     0.0/   0.     0.0/   0.
0.0/   0.
 LSDP4          LS42          Wire 44          480.     0.0/   0.     0.0/   0.
0.0/   0.
 LSDP4          BUS-0068      Wire 43          480.     0.0/   0.     0.0/   0.
0.0/   0.

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  MP27A         VOLTAGE BASE LL:                 480.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:   2459.8 /  -77. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:    4.769 +j  61.146 (PU)
                THEVENIN IMPEDANCE X/R RATIO:    12.821

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                   3669.3      2784.8      2586.6      2478.1      2460.8

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                 2459.8 / -77.3      2459.8 / 162.7      2459.8 /  42.7

  MP27A         ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
                                Page 8
```

```
    MSB             480.0  0.0078 / -33.  0.0078 /-153.  0.0078 /  87.
    BUS-0052        480.0  0.0003 / -31.  0.0003 /-151.  0.0003 /  89.
    BUS-0053        480.0  0.0003 / -31.  0.0003 /-151.  0.0003 /  89.
    BUS-0054        480.0  0.0001 / -31.  0.0001 /-151.  0.0001 /  89.
    BUS-0055        480.0  0.0005 / -31.  0.0005 /-151.  0.0005 /  89.
    BUS-0056        480.0  0.0013 / -31.  0.0013 /-151.  0.0013 /  89.
    BUS-0057        480.0  0.0005 / -31.  0.0005 /-151.  0.0005 /  89.
    BUS-0058        480.0  0.0007 / -31.  0.0007 /-151.  0.0007 /  89.
    BUS-0059        480.0  0.0005 / -31.  0.0005 /-151.  0.0005 /  89.
    BUS-0060        480.0  0.0007 / -31.  0.0007 /-151.  0.0007 /  89.
    BUS-0061        480.0  0.0005 / -31.  0.0005 /-151.  0.0005 /  89.
    BUS-0062        480.0  0.0005 / -31.  0.0005 /-151.  0.0005 /  89.
    BUS-0063        480.0  0.0005 / -31.  0.0005 /-151.  0.0005 /  89.
    BUS-0064        480.0  0.0018 / -31.  0.0018 /-151.  0.0018 /  89.
    BUS-0065        480.0  0.0018 / -31.  0.0018 /-151.  0.0018 /  89.
    BUS-0066        480.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
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    MP27A          ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================

                                 FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                                 BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 CP-2            MP27A                          480.     4.2/ -76.     4.2/ 164.
4.2/  44.
 CP-1            MP27A                          480.     4.2/ -76.     4.2/ 164.
4.2/  44.
 AHU-2B          MP27A                          480.   149.8/ -76.   149.8/ 164.
149.8/  44.
 AHU-2A          MP27A                          480.   149.8/ -76.   149.8/ 164.
149.8/  44.
 MSB             MP27A          Wire 2          480.  1320.8/ -78.  1320.8/ 162.
1320.8/  42.
 MP27A           BUS-0052       Wire 27         480.    25.1/ 104.    25.1/ -16.
25.1/-136.
 MP27A           BUS-0053       Wire 28         480.    25.1/ 104.    25.1/ -16.
25.1/-136.
 MP27A           BUS-0054       Wire 26         480.     6.3/ 104.     6.3/ -16.
6.3/-136.
 MP27A           BUS-0055       Wire 25         480.    41.9/ 104.    41.9/ -16.
41.9/-136.
 MP27A           BUS-0056       Wire 24         480.   112.3/ 104.   112.3/ -16.
112.3/-136.
 MP27A           BUS-0057       Wire 23         480.    41.9/ 104.    41.9/ -16.
41.9/-136.
 MP27A           BUS-0058       Wire 22         480.    56.2/ 104.    56.2/ -16.
56.2/-136.
 MP27A           BUS-0059       Wire 21         480.    41.9/ 104.    41.9/ -16.
41.9/-136.
 MP27A           BUS-0060       Wire 20         480.    56.2/ 104.    56.2/ -16.
56.2/-136.
 MP27A           BUS-0061       Wire 19         480.    41.9/ 104.    41.9/ -16.
41.9/-136.
 MP27A           BUS-0062       Wire 18         480.    41.9/ 104.    41.9/ -16.
41.9/-136.
 MP27A           BUS-0063       Wire 17         480.    41.9/ 104.    41.9/ -16.
41.9/-136.
 MP27A           BUS-0064       Wire 16         480.   149.7/ 104.   149.7/ -16.
149.7/-136.
 MP27A           BUS-0065       Wire 15         480.   149.7/ 104.   149.7/ -16.
```



```
149.7/-136.
 MP27A           BUS-0066       Wire 31         480.     0.0/   0.     0.0/   0.
0.0/   0.

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  MS2            VOLTAGE BASE LL:                208.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:   5629.8 /  -77. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:    5.220 +j  61.619 (PU)
                 THEVENIN IMPEDANCE X/R RATIO:    11.804

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                     8301.9      6263.8      5856.2      5657.2      5631.0

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                         AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                         AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                  5629.8 / -76.9     5629.8 / 163.1      5629.8 /  43.1

  MS2            ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                                  ---PHASE A---     ---PHASE B---     ---PHASE C---
    BUS-0037          480.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    RP21              208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    RP22              208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    RP23              208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    RP24              208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    RP25              208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    RP26              208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    RP2B              208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    RP2BA             208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    MS2            ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================

                                 FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                                 BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 BUS-0037        MS2            T8              480.  2439.6/ -77.  2439.6/ 163.
2439.6/  43.
 MS2             RP21           Wire 47         208.     0.0/   0.     0.0/   0.
0.0/   0.
 MS2             RP22           Wire 48         208.     0.0/   0.     0.0/   0.
0.0/   0.
 MS2             RP23           Wire 49         208.     0.0/   0.     0.0/   0.
0.0/   0.
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    MS2          ================  FIRST BUS FROSYSTEM BRANCH FLOWS ( AMPS )
==============

 MS2             RP24            Wire 50          208.     0.0/   0.     0.0/   0.
0.0/   0.
 MS2             RP25            Wire 51          208.     0.0/   0.     0.0/   0.
0.0/   0.
 MS2             RP26            Wire 52          208.     0.0/   0.     0.0/   0.
0.0/   0.
 MS2             RP2B            Wire 46          208.     0.0/   0.     0.0/   0.
0.0/   0.
 MS2             RP2BA           Wire 53          208.     0.0/   0.     0.0/   0.
0.0/   0.

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  MSB            VOLTAGE BASE LL:                 480.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:   2461.3 /  -77. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:    4.719 +j  61.107 (PU)
                 THEVENIN IMPEDANCE X/R RATIO:    12.949

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                     3676.4      2792.4      2591.7      2480.4      2462.3

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                  2461.3 / -77.4     2461.3 / 162.6      2461.3 /  42.6

  MSB            ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                           ---PHASE A---       ---PHASE B---       ---PHASE C---
    BUS-0001       13800.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    MP27A            480.0  0.0067 / -31.  0.0067 /-151.  0.0067 /  89.
    BUS-0007         480.0  0.0008 / -31.  0.0008 /-151.  0.0008 /  89.
    DB4B             480.0  0.0047 / -31.  0.0047 /-151.  0.0047 /  89.
    BUS-0020         480.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    BUS-0021         480.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    BUS-0022         480.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    BUS-0030         480.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    BUS-0037         480.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    MSB            ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
==============

                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                               BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 BUS-0001        MSB             T              13800.    31.4/ -80.    31.4/ 160.
31.4/  40.
 MSB             MP27A           Wire 2           480.  1135.0/ 104.  1135.0/ -16.
                                    Page 11
```

```
1135.0/-136.
 MSB             BUS-0007        Wire 11          480.    71.3/ 104.    71.3/ -16.
71.3/-136.
 MSB             DB4B            Wire 4           480.   398.5/ 104.   398.5/ -16.
398.5/-136.
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    MSB          ================  FIRST BUS FROSYSTEM BRANCH FLOWS ( AMPS )
==============

 MSB             BUS-0020        Wire 6           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MSB             BUS-0021        Wire 7           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MSB             BUS-0022        Wire 8           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MSB             BUS-0030        Wire 12          480.     0.0/   0.     0.0/   0.
0.0/   0.
 MSB             BUS-0037        Wire 10          480.     0.0/   0.     0.0/   0.
0.0/   0.

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  MSK            VOLTAGE BASE LL:                 208.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:   5484.3 /  -76. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:    6.720 +j  63.131 (PU)
                 THEVENIN IMPEDANCE X/R RATIO:     9.395

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                     7803.7      5850.0      5582.6      5491.2      5484.5

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                  5484.3 / -75.7     5484.3 / 164.3      5484.3 /  44.3

  MSK            ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                           ---PHASE A---       ---PHASE B---       ---PHASE C---
    BUS-0023         208.0  0.0279 / -31.  0.0279 /-151.  0.0279 /  89.
    RP2K             208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    KCP              208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    KC2              208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    MSK            ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
==============

                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                    Page 12
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                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 BUS-0023       MSK             Wire 8A          208.  5484.3/ -76.  5484.3/ 164.
5484.3/  44.
 MSK            RP2K            Wire 40          208.     0.0/   0.     0.0/   0.
0.0/    0.
 MSK            KCP             Wire 41          208.     0.0/   0.     0.0/   0.
0.0/    0.
 MSK            KC2             Wire 42          208.     0.0/   0.     0.0/   0.
0.0/    0.

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  OS21          VOLTAGE BASE LL:                208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:   5396.3 /  -75. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:    7.617 +j  64.134 (PU)
                THEVENIN IMPEDANCE X/R RATIO:     8.420

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                    7532.3      5662.5      5457.3      5399.4      5396.3

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                 5396.3 / -75.0     5396.3 / 165.0      5396.3 /  45.0

  OS21          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    OSDP2B          208.0  0.0275 / -30.  0.0275 /-150.  0.0275 /  90.
    OS21          ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
===============
                               FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                              BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 OSDP2B         OS21            Wire 55          208.  5396.3/ -75.  5396.3/ 165.
5396.3/  45.

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  OS24          VOLTAGE BASE LL:                208.0 (VOLTS)
                                    Page 13
```

```
                INI. SYM. RMS FAULT CURRENT:   5396.5 /  -75. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:    7.615 +j  64.132 (PU)
                THEVENIN IMPEDANCE X/R RATIO:     8.422

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                    7532.9      5662.9      5457.6      5399.6      5396.6

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                 5396.5 / -75.0     5396.5 / 165.0      5396.5 /  45.0

  DS24          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    OSDP2B          208.0  0.0275 / -30.  0.0275 /-150.  0.0275 /  90.
    OS24          ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
===============
                               FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                              BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 OSDP2B         DS24            Wire 56          208.  5396.5/ -75.  5396.5/ 165.
5396.5/  45.

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  DS2BK         VOLTAGE BASE LL:                208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:   5396.3 /  -75. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:    7.617 +j  64.134 (PU)
                THEVENIN IMPEDANCE X/R RATIO:     8.420

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                    7532.3      5662.5      5457.3      5399.4      5396.3

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                 5396.3 / -75.0     5396.3 / 165.0      5396.3 /  45.0

  DS2BK         ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    OSDP2B          208.0  0.0275 / -30.  0.0275 /-150.  0.0275 /  90.
                                    Page 14
```

```
    OS2BK          ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================
                                 FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 OSDP2B         OS2BK          Wire 36          208.  5396.3/ -75.  5396.3/ 165.
5396.3/  45.

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  OSDP2B         VOLTAGE BASE LL:                 208.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:   5490.3 /  -76. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:    6.616 +j  63.133 (PU)
                 THEVENIN IMPEDANCE X/R RATIO:     9.542

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                     7832.7      5871.3      5595.0      5497.9      5490.5

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =      0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =      0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                  5490.3 / -75.8      5490.3 / 164.2      5490.3 /  44.2

  OSDP2B         ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                           ---PHASE A---       ---PHASE B---       ---PHASE C---
    OSDP4             480.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    Generator         208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    OS2BK             208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    OS21              208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    OS24              208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    OSDP2B         ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================
                                 FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 OSDP4          OSDP2B         T5               480.  2379.1/ -76.  2379.1/ 164.
2379.1/  44.
 OSDP2B         Generator      Wire 54          208.     0.0/   0.     0.0/   0.
0.0/   0.
 OSDP2B         OS2BK          Wire 36          208.     0.0/   0.     0.0/   0.
0.0/   0.
 OSDP2B         OS21           Wire 55          208.     0.0/   0.     0.0/   0.
0.0/   0.
 OSDP2B         OS24           Wire 56          208.     0.0/   0.     0.0/   0.
0.0/   0.

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                                    Page 15
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  OSDP4          VOLTAGE BASE LL:                 480.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:   2379.1 /  -76. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:    6.616 +j  63.133 (PU)
                 THEVENIN IMPEDANCE X/R RATIO:     9.543

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                     3394.2      2544.3      2424.5      2382.4      2379.2

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =      0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =      0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                  2379.1 / -75.8      2379.1 / 164.2      2379.1 /  44.2

  OSDP4          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                           ---PHASE A---       ---PHASE B---       ---PHASE C---
    BUS-0009          480.0  0.0271 / -31.  0.0271 /-151.  0.0271 /  89.
    OSDP2B            208.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    OSDP4          ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================
                                 FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 JP-1           OSDP4                            480.    12.6/ -76.    12.6/ 164.
12.6/  44.
 SE-1           OSDP4                            480.    41.9/ -76.    41.9/ 164.
41.9/  44.
 SP-1           OSDP4                            480.    16.8/ -76.    16.8/ 164.
16.8/  44.
 BUS-0009       OSDP4          Wire 11A          480.  2307.9/ -76.  2307.9/ 164.
2307.9/  44.
 OSDP4          OSDP2B         T5                480.     0.0/   0.     0.0/   0.
0.0/   0.

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  RP21           VOLTAGE BASE LL:                 208.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:   5532.7 /  -76. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:    6.219 +j  62.618 (PU)
                 THEVENIN IMPEDANCE X/R RATIO:    10.069

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                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                    7963.3      5971.3      5662.1      5543.5      5532.9

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                 5532.7 / -76.1      5532.7 / 163.9      5532.7 /  43.9

  RP21          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                        ---PHASE A---       ---PHASE B---       ---PHASE C---
    MS2              208.0  0.0281 / -31.  0.0281 /-151.  0.0281 /  89.
    RP21           ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================
                                 FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 MS2            RP21          Wire 47          208.  5532.7/ -76.  5532.7/ 164.
5532.7/  44.

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  RP22          VOLTAGE BASE LL:                208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:   5532.7 /  -76. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:    6.219 +j  62.618 (PU)
                THEVENIN IMPEDANCE X/R RATIO:    10.069

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                    7963.3      5971.3      5662.1      5543.5      5532.9

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                 5532.7 / -76.1      5532.7 / 163.9      5532.7 /  43.9

  RP22          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                        ---PHASE A---       ---PHASE B---       ---PHASE C---
    MS2              208.0  0.0281 / -31.  0.0281 /-151.  0.0281 /  89.
    RP22           ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================
                                 FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
                                      Page 17
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-PHASE C-
 MS2            RP22          Wire 48          208.  5532.7/ -76.  5532.7/ 164.
5532.7/  44.

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  RP23          VOLTAGE BASE LL:                208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:   5532.7 /  -76. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:    6.219 +j  62.618 (PU)
                THEVENIN IMPEDANCE X/R RATIO:    10.069

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                    7963.3      5971.3      5662.1      5543.5      5532.9

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /    0.0     0.0000 /    0.0     0.0000 /    0.0

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                 5532.7 / -76.1      5532.7 / 163.9      5532.7 /  43.9

  RP23          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                        ---PHASE A---       ---PHASE B---       ---PHASE C---
    MS2              208.0  0.0281 / -31.  0.0281 /-151.  0.0281 /  89.
    RP23           ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================
                                 FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 MS2            RP23          Wire 49          208.  5532.7/ -76.  5532.7/ 164.
5532.7/  44.

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  RP24          VOLTAGE BASE LL:                208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:   5532.7 /  -76. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:    6.219 +j  62.618 (PU)
                THEVENIN IMPEDANCE X/R RATIO:    10.069

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                    7963.3      5971.3      5662.1      5543.5      5532.9
                                      Page 18
```

```
                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                                    AT TIME =       0.5 CYCLES
                ---PHASE A---      ---PHASE B---      ---PHASE C---
                0.0000 /  0.0      0.0000 /  0.0      0.0000 /  0.0

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                                    AT TIME =       0.5 CYCLES
                ---PHASE A---      ---PHASE B---      ---PHASE C---
                5532.7 / -76.1     5532.7 / 163.9     5532.7 /  43.9

        RP24    ===== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ======
                     FIRST BUS FROM FAULT    AT TIME =       0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
                     208.0  0.0281 / -31.   0.0281 /-151.   0.0281 /  89.
   MS2           ========== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
  RP24
==========
                                FIRST BUS FROM FAULT    AT TIME =       0.5 CYCLES
-PHASE C-                       BRANCH NAME   VBASE LL   -PHASE A-      -PHASE B-
 MS2
5532.7/  44.    RP24            Wire 50          208.   5532.7/ -76.   5532.7/ 164.


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        RP25    VOLTAGE BASE LL:                    208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:     5532.7 / -76. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:     6.219 +j  62.618 (PU)
                THEVENIN IMPEDANCE X/R RATIO:     10.069

                ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                   7963.3       5971.3      5662.1      5543.5      5532.9

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                                    AT TIME =       0.5 CYCLES
                ---PHASE A---      ---PHASE B---      ---PHASE C---
                0.0000 /  0.0      0.0000 /  0.0      0.0000 /  0.0

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                                    AT TIME =       0.5 CYCLES
                ---PHASE A---      ---PHASE B---      ---PHASE C---
                5532.7 / -76.1     5532.7 / 163.9     5532.7 /  43.9

        RP25    ===== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ======
                     FIRST BUS FROM FAULT    AT TIME =       0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
                     208.0  0.0281 / -31.   0.0281 /-151.   0.0281 /  89.
   MS2           ========== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
  RP25
==========
                                FIRST BUS FROM FAULT    AT TIME =       0.5 CYCLES
-PHASE C-                       BRANCH NAME   VBASE LL   -PHASE A-      -PHASE B-
 MS2
5532.7/  44.    RP25            Wire 51          208.   5532.7/ -76.   5532.7/ 164.


                                                Page 19
```

```
                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                                    AT TIME =       0.5 CYCLES
                ---PHASE A---      ---PHASE B---      ---PHASE C---
 Apr 01, 2009   0.0000 /  0.0      0.0000 /  0.0      0.0000 /  0.0
                                                                        PAGE  31

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                                    AT TIME =       0.5 CYCLES
                ---PHASE A---      ---PHASE B---      ---PHASE C---
        RP26    5532.7 / -76.1     5532.7 / 163.9     5532.7 /  43.9

                ===== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ======
                     FIRST BUS FROM FAULT    AT TIME =       0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
                     208.0  0.0281 / -31.   0.0281 /-151.   0.0281 /  89.
   MS2           ========== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
  RP26
==========
                                FIRST BUS FROM FAULT    AT TIME =       0.5 CYCLES
-PHASE C-                       BRANCH NAME   VBASE LL   -PHASE A-      -PHASE B-
 MS2
5532.7/  44.    RP26            Wire 52          208.   5532.7/ -76.   5532.7/ 164.


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        RP28    VOLTAGE BASE LL:                    208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:     5532.7 / -76. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:     6.219 +j  62.618 (PU)
                THEVENIN IMPEDANCE X/R RATIO:     10.069

                ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                   7963.3       5971.3      5662.1      5543.5      5532.9

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                                    AT TIME =       0.5 CYCLES
                ---PHASE A---      ---PHASE B---      ---PHASE C---
                0.0000 /  0.0      0.0000 /  0.0      0.0000 /  0.0

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                                    AT TIME =       0.5 CYCLES
                ---PHASE A---      ---PHASE B---      ---PHASE C---
                5532.7 / -76.1     5532.7 / 163.9     5532.7 /  43.9

                INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG )
                                    AT TIME =       0.5 CYCLES
                ---PHASE A---      ---PHASE B---      ---PHASE C---
                0.0000 /  0.0      0.0000 /  0.0      0.0000 /  0.0

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                                    AT TIME =       0.5 CYCLES
                ---PHASE A---      ---PHASE B---      ---PHASE C---
                5532.7 / -76.1     5532.7 / 163.9     5532.7 /  43.9

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                                    AT TIME =       0.5 CYCLES
                                                Page 20
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```
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                0.0000 /    0.0      0.0000 /    0.0      0.0000 /    0.0

                INI.     RMS    FAULTED CURRENT ( AMPS / DEG )
                         AT TIME =      0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                 5532.7 / -76.1       5532.7 / 163.9       5532.7 /  43.9

  RP2B          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    MS2             208.0  0.0281 / -31.  0.0281 /-151.  0.0281 /  89.
    RP2B          ================ INI.    RMS    SYSTEM BRANCH FLOWS ( AMPS )
================
                                 FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                                BRANCH NAME    VBASE LL  -PHASE A-      -PHASE B-
-PHASE C-
 MS2            RP2B            Wire 46          208.  5532.7/ -76.  5532.7/ 164.
5532.7/  44.

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  RP2BA         VOLTAGE BASE LL:                208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:   5532.7 /  -76. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:    6.219 +j  62.618 (PU)
                THEVENIN IMPEDANCE X/R RATIO:    10.069

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                   7963.3      5971.3      5662.1      5543.5      5532.9

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                         AT TIME =      0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                0.0000 /    0.0      0.0000 /    0.0      0.0000 /    0.0

                INI.     RMS    FAULTED CURRENT ( AMPS / DEG )
                         AT TIME =      0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                 5532.7 / -76.1       5532.7 / 163.9       5532.7 /  43.9

  RP2BA         ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    MS2             208.0  0.0281 / -31.  0.0281 /-151.  0.0281 /  89.
    RP2BA         ================ INI.    RMS    SYSTEM BRANCH FLOWS ( AMPS )
================
                                 FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                                BRANCH NAME    VBASE LL  -PHASE A-      -PHASE B-
-PHASE C-
 MS2            RP2BA           Wire 53          208.  5532.7/ -76.  5532.7/ 164.
5532.7/  44.

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```

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  RP2K          VOLTAGE BASE LL:                208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:   5390.5 /  -75. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:    7.718 +j  64.129 (PU)
                THEVENIN IMPEDANCE X/R RATIO:     8.309

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                   7506.0      5646.3      5447.9      5393.3      5390.6

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                         AT TIME =      0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                0.0000 /    0.0      0.0000 /    0.0      0.0000 /    0.0

                INI.     RMS    FAULTED CURRENT ( AMPS / DEG )
                         AT TIME =      0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                 5390.5 / -74.9       5390.5 / 165.1       5390.5 /  45.1

  RP2K          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    MSK             208.0  0.0274 / -30.  0.0274 /-150.  0.0274 /  90.
    RP2K          ================ INI.    RMS    SYSTEM BRANCH FLOWS ( AMPS )
================
                                 FIRST BUS FROM FAULT    AT TIME =      0.5 CYCLES
                                BRANCH NAME    VBASE LL  -PHASE A-      -PHASE B-
-PHASE C-
 MSK            RP2K            Wire 40          208.  5390.5/ -75.  5390.5/ 165.
5390.5/  45.

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  RP2P          VOLTAGE BASE LL:                208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:   5577.0 / -106. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:    5.771 +j  62.172 (PU)
                THEVENIN IMPEDANCE X/R RATIO:    10.773

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                   8112.9      6094.0      5743.0      5593.3      5577.5

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                         AT TIME =      0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                0.0000 /    0.0      0.0000 /    0.0      0.0000 /    0.0

                                    Page 22
```

```
                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                 5577.0 /-106.5      5577.0 / 133.5       5577.0 /  13.5

  RP2P          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    BUS-0066        480.0  0.0000 /   0.  0.0000 /   0.  0.0000 /   0.
    RP2P          ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================

                              FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                             BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 BUS-0066       RP2P          T3              480.  2366.8/ -79.  2366.8/ 161.
2366.8/  41.

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 ***************** F A U L T    A N A L Y S I S    R E P O R T ****************

                FAULT TYPE: SLG
                MODEL INDUCTION MOTOR CONTRIBUTION: YES
                MODEL TRANSFORMER TAPS: YES
                MODEL TRANSFORMER PHASE SHIFT: YES
 ================================================================

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  DB4B          VOLTAGE BASE LL:                 480.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:      0.0 /  -37. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                THEVENIN IMPEDANCE X/R RATIO:     1.000
                SEQUENCE EQUIVALENT IMPEDANCE Z1:   5.399 +j  61.774 (PU)
                                              Z2:   5.399 +j  61.774 (PU)
                                              Z0: INFINITE

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                      0.0         0.0         0.0         0.0         0.0

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                0.0000 /    0.0     2.1722 / -141.8      2.1722 /  158.2

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                    0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

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```

```
  DB4B          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    MSB             480.0  0.0000 /   0.  2.1722 /-142.  2.1722 / 158.
    DB4B          ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================

                              FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                             BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 AHU-1          DB4B                          480.     0.0/ -36.     0.0/   0.
0.0/   0.
 AHU-1a         DB4B                          480.     0.0/ -36.     0.0/   0.
0.0/   0.
 BP             DB4B                          480.     0.0/   0.     0.0/   0.
0.0/   0.
 MSB            DB4B          Wire 4          480.     0.0/ -37.     0.0/   0.
0.0/   0.

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  Generator     VOLTAGE BASE LL:                 208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:      0.0 /    8. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                THEVENIN IMPEDANCE X/R RATIO:     0.000
                SEQUENCE EQUIVALENT IMPEDANCE Z1:   7.617 +j  64.134 (PU)
                                              Z2:   7.617 +j  64.134 (PU)
                                              Z0: INFINITE

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                      0.0         0.0         0.0         0.0         0.0

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                0.0000 /    0.0     2.1748 / -141.8      2.1748 /  158.2

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                    0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

  Generator     ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    DSDP2B          208.0  0.0000 /   0.  2.1748 /-142.  2.1748 / 158.
    Generator     ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================

                              FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                             BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 OSDP2B         Generator     Wire 54          208.     0.0/   8.     0.0/   0.
0.0/   0.

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```

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  KC2             VOLTAGE BASE LL:                  208.0 (VOLTS)
                  INI. SYM. RMS FAULT CURRENT:      0.0 /    8. ( AMPS/DEG )
                  THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                  THEVENIN IMPEDANCE X/R RATIO:     0.000
                  SEQUENCE EQUIVALENT IMPEDANCE Z1:   7.718 +j  64.129 (PU)
                                                Z2:   7.718 +j  64.129 (PU)
                                                Z0: INFINITE

                   ASYM     RMS   INTERRUPTING AMPS
                  1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                        0.0         0.0         0.0         0.0         0.0

                  INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                          AT TIME =     0.5 CYCLES
                  ---PHASE A---       ---PHASE B---       ---PHASE C---
                  0.0000 /    0.0     2.1727 / -141.8     2.1727 /  158.2

                  INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                          AT TIME =     0.5 CYCLES
                  ---PHASE A---       ---PHASE B---       ---PHASE C---
                      0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

  KC2             ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ======
                      FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                            ---PHASE A---       ---PHASE B---       ---PHASE C---
    MSK                 208.0  0.0000 /   0.  2.1727 /-142.  2.1727 / 158.
    KC2               ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================
                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                               BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 MSK          KC2              Wire 42          208.     0.0/   8.     0.0/   0.
0.0/   0.

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  KCP             VOLTAGE BASE LL:                  208.0 (VOLTS)
                  INI. SYM. RMS FAULT CURRENT:      0.0 /    8. ( AMPS/DEG )
                  THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                  THEVENIN IMPEDANCE X/R RATIO:     0.000
                  SEQUENCE EQUIVALENT IMPEDANCE Z1:   7.718 +j  64.129 (PU)
                                                Z2:   7.718 +j  64.129 (PU)
                                                Z0: INFINITE

                   ASYM     RMS   INTERRUPTING AMPS
                  1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                                      Page 25
```

```
                        0.0         0.0         0.0         0.0         0.0

                  INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                          AT TIME =     0.5 CYCLES
                  ---PHASE A---       ---PHASE B---       ---PHASE C---
                  0.0000 /    0.0     2.1727 / -141.8     2.1727 /  158.2

                  INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                          AT TIME =     0.5 CYCLES
                  ---PHASE A---       ---PHASE B---       ---PHASE C---
                      0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

  KCP             ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ======
                      FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                            ---PHASE A---       ---PHASE B---       ---PHASE C---
    MSK                 208.0  0.0000 /   0.  2.1727 /-142.  2.1727 / 158.
    KCP               ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================
                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                               BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 MSK          KCP              Wire 41          208.     0.0/   8.     0.0/   0.
0.0/   0.

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  LS2B            VOLTAGE BASE LL:                  208.0 (VOLTS)
                  INI. SYM. RMS FAULT CURRENT:      0.0 /    8. ( AMPS/DEG )
                  THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                  THEVENIN IMPEDANCE X/R RATIO:     0.000
                  SEQUENCE EQUIVALENT IMPEDANCE Z1:   7.727 +j  64.184 (PU)
                                                Z2:   7.727 +j  64.184 (PU)
                                                Z0: INFINITE

                   ASYM     RMS   INTERRUPTING AMPS
                  1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                        0.0         0.0         0.0         0.0         0.0

                  INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                          AT TIME =     0.5 CYCLES
                  ---PHASE A---       ---PHASE B---       ---PHASE C---
                  0.0000 /    0.0     2.1736 / -141.8     2.1736 /  158.2

                  INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                          AT TIME =     0.5 CYCLES
                  ---PHASE A---       ---PHASE B---       ---PHASE C---
                      0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

  LS2B            ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ======
                      FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                            ---PHASE A---       ---PHASE B---       ---PHASE C---
    BUS-0068            480.0  1.2549 /   8.  1.2549 /-112.  1.2549 / 128.
    LS2B              ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================
                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                      Page 26
```

```
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 BUS-0068        LS28           T2              208.     0.0/   0.     0.0/   0.
0.0/   0.

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  LS42           VOLTAGE BASE LL:                480.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:     0.0 /  -37. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                 THEVENIN IMPEDANCE X/R RATIO:    1.000
                 SEQUENCE EQUIVALENT IMPEDANCE Z1:   7.724 +j  64.158 (PU)
                                               Z2:   7.724 +j  64.158 (PU)
                                               Z0: INFINITE

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                       0.0         0.0         0.0         0.0         0.0

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                          AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     2.1731 / -141.8     2.1731 /  158.2

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                          AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                    0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

  LS42           ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                           ---PHASE A---       ---PHASE B---       ---PHASE C---
    LSDP4             480.0  0.0000 /   0.  2.1731 /-142.  2.1731 / 158.
    LS42            ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
==============
                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 LSDP4           LS42           Wire 44         480.     0.0/ -37.     0.0/   0.
0.0/   0.

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  LS45           VOLTAGE BASE LL:                480.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:     0.0 /  -37. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                 THEVENIN IMPEDANCE X/R RATIO:    1.000
                                  Page 27
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```
                 SEQUENCE EQUIVALENT IMPEDANCE Z1:   7.724 +j  64.158 (PU)
                                               Z2:   7.724 +j  64.158 (PU)
                                               Z0: INFINITE

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                       0.0         0.0         0.0         0.0         0.0

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                          AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     2.1731 / -141.8     2.1731 /  158.2

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                          AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                    0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

  LS45           ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                           ---PHASE A---       ---PHASE B---       ---PHASE C---
    LSDP4             480.0  0.0000 /   0.  2.1731 /-142.  2.1731 / 158.
    LS45            ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
==============
                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 LSDP4           LS45           Wire 45         480.     0.0/ -37.     0.0/   0.
0.0/   0.

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  LSDP4          VOLTAGE BASE LL:                480.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:     0.0 /  -37. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                 THEVENIN IMPEDANCE X/R RATIO:    1.000
                 SEQUENCE EQUIVALENT IMPEDANCE Z1:   6.724 +j  63.158 (PU)
                                               Z2:   6.724 +j  63.158 (PU)
                                               Z0: INFINITE

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                       0.0         0.0         0.0         0.0         0.0

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                          AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     2.1731 / -141.8     2.1731 /  158.2

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                          AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                    0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

  LSDP4          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                                  Page 28
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```
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                         ---PHASE A---      ---PHASE B---      ---PHASE C---
    BUS-0031          480.0  0.0003 /-172.  2.1729 /-142.  2.1729 / 158.
    LS45              480.0  0.0000 /   0.  2.1731 /-142.  2.1731 / 158.
    LS42              480.0  0.0000 /   0.  2.1731 /-142.  2.1731 / 158.
    BUS-0068          480.0  0.0003 /   8.  2.1733 /-142.  2.1734 / 158.
    LSDP4          ============== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
==============

                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                     BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 BUS-0031       LSDP4          Wire 9           480.     0.0/ -37.     0.0/   0.
0.0/   0.
 LSDP4          LS45           Wire 45          480.     0.0/   0.     0.0/   0.
0.0/   0.
 LSDP4          LS42           Wire 44          480.     0.0/   0.     0.0/   0.
0.0/   0.
 LSDP4          BUS-0068       Wire 43          480.     0.0/   0.     0.0/   0.
0.0/   0.

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  MP27A          VOLTAGE BASE LL:                  480.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:      0.0 /  -37. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                 THEVENIN IMPEDANCE X/R RATIO:     1.000
                 SEQUENCE EQUIVALENT IMPEDANCE Z1:   4.769 +j  61.146 (PU)
                                               Z2:   4.769 +j  61.146 (PU)
                                               Z0: INFINITE

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                       0.0         0.0         0.0         0.0         0.0

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                       AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     2.1724 / -141.8     2.1725 /  158.2

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                       AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                     0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

  MP27A          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---      ---PHASE B---      ---PHASE C---
    MSB               480.0  0.0001 /-172.  2.1723 /-142.  2.1723 / 158.
    BUS-0052          480.0  0.0000 /   0.  2.1724 /-142.  2.1725 / 158.
    BUS-0053          480.0  0.0000 /   0.  2.1724 /-142.  2.1725 / 158.
    BUS-0054          480.0  0.0000 /   0.  2.1724 /-142.  2.1725 / 158.
    BUS-0055          480.0  0.0000 /   0.  2.1724 /-142.  2.1725 / 158.
    BUS-0056          480.0  0.0000 /   0.  2.1724 /-142.  2.1725 / 158.
    BUS-0057          480.0  0.0000 /   0.  2.1724 /-142.  2.1725 / 158.
    BUS-0058          480.0  0.0000 /   0.  2.1724 /-142.  2.1725 / 158.
                                  Page 29
```

```
    BUS-0059          480.0  0.0000 /   0.  2.1724 /-142.  2.1725 / 158.
    BUS-0060          480.0  0.0000 /   0.  2.1724 /-142.  2.1725 / 158.
    BUS-0061          480.0  0.0000 /   0.  2.1724 /-142.  2.1725 / 158.
    BUS-0062          480.0  0.0000 /   0.  2.1724 /-142.  2.1725 / 158.
    BUS-0063          480.0  0.0000 /   0.  2.1724 /-142.  2.1725 / 158.
    BUS-0064          480.0  0.0000 /   0.  2.1724 /-142.  2.1725 / 158.
    BUS-0065          480.0  0.0000 /   0.  2.1724 /-142.  2.1725 / 158.
    BUS-0066          480.0  0.0003 /   8.  2.1727 /-142.  2.1727 / 158.
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    MP27A          ============== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
==============

                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                     BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 CP-2           MP27A                            480.     0.0/   0.     0.0/   0.
0.0/   0.
 CP-1           MP27A                            480.     0.0/   0.     0.0/   0.
0.0/   0.
 AHU-2B         MP27A                            480.     0.0/   0.     0.0/   0.
0.0/   0.
 AHU-2A         MP27A                            480.     0.0/   0.     0.0/   0.
0.0/   0.
 MSB            MP27A          Wire 2            480.     0.0/ -37.     0.0/ 142.
0.0/ 142.
 MP27A          BUS-0052       Wire 27           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MP27A          BUS-0053       Wire 28           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MP27A          BUS-0054       Wire 26           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MP27A          BUS-0055       Wire 25           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MP27A          BUS-0056       Wire 24           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MP27A          BUS-0057       Wire 23           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MP27A          BUS-0058       Wire 22           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MP27A          BUS-0059       Wire 21           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MP27A          BUS-0060       Wire 20           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MP27A          BUS-0061       Wire 19           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MP27A          BUS-0062       Wire 18           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MP27A          BUS-0063       Wire 17           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MP27A          BUS-0064       Wire 16           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MP27A          BUS-0065       Wire 15           480.     0.0/   0.     0.0/   0.
0.0/   0.
 MP27A          BUS-0066       Wire 31           480.     0.0/   0.     0.0/   0.
0.0/   0.

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                                  Page 30
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 MS2             VOLTAGE BASE LL:                  208.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:       0.0 /    8. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                 THEVENIN IMPEDANCE X/R RATIO:     0.000
                 SEQUENCE EQUIVALENT IMPEDANCE Z1:   5.220 +j  61.619 (PU)
                                               Z2:   5.220 +j  61.619 (PU)
                                               Z0: INFINITE

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                       0.0         0.0         0.0         0.0         0.0

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                          AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     2.1725 / -141.8     2.1725 /  158.2

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                          AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                     0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

 MS2             ==== INI. SYM. RMS SYSTEN BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---       ---PHASE B---       ---PHASE C---
    BUS-0037          480.0  1.2543 /   8.  1.2543 /-112.  1.2543 / 128.
    RP21              208.0  0.0000 /   0.  2.1725 /-142.  2.1725 / 158.
    RP22              208.0  0.0000 /   0.  2.1725 /-142.  2.1725 / 158.
    RP23              208.0  0.0000 /   0.  2.1725 /-142.  2.1725 / 158.
    RP24              208.0  0.0000 /   0.  2.1725 /-142.  2.1725 / 158.
    RP25              208.0  0.0000 /   0.  2.1725 /-142.  2.1725 / 158.
    RP26              208.0  0.0000 /   0.  2.1725 /-142.  2.1725 / 158.
    RP2B              208.0  0.0000 /   0.  2.1725 /-142.  2.1725 / 158.
    RP2BA             208.0  0.0000 /   0.  2.1725 /-142.  2.1725 / 158.
    MS2            ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
==============
                                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                    BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 BUS-0037        MS2                T8              480.     0.0/   0.     0.0/   0.
0.0/   0.
 MS2             RP21               Wire 47         208.     0.0/   0.     0.0/   0.
0.0/   0.
 MS2             RP22               Wire 48         208.     0.0/   0.     0.0/   0.
0.0/   0.
 MS2             RP23               Wire 49         208.     0.0/   0.     0.0/   0.
0.0/   0.
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    MS2          ================  FIRST BUS FROSYSTEM BRANCH FLOWS ( AMPS )
==============

 MS2             RP24               Wire 50         208.     0.0/   0.     0.0/   0.
0.0/   0.
                                    Page 31
```

```
 MSZ             RP25               Wire 51         208.     0.0/   0.     0.0/   0.
0.0/   0.
 MS2             RP26               Wire 52         208.     0.0/   0.     0.0/   0.
0.0/   0.
 MS2             RP2B               Wire 46         208.     0.0/   0.     0.0/   0.
0.0/   0.
 MS2             RP2BA              Wire 53         208.     0.0/   0.     0.0/   0.
0.0/   0.

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 MSB             VOLTAGE BASE LL:                  480.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:       0.0 /  -37. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                 THEVENIN IMPEDANCE X/R RATIO:     1.000
                 SEQUENCE EQUIVALENT IMPEDANCE Z1:   4.719 +j  61.107 (PU)
                                               Z2:   4.719 +j  61.107 (PU)
                                               Z0: INFINITE

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                       0.0         0.0         0.0         0.0         0.0

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                          AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     2.1722 / -141.8     2.1722 /  158.2

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                          AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                     0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

 MSB             ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---       ---PHASE B---       ---PHASE C---
    BUS-0001       13800.0  1.1930 /   8.  1.1930 /-112.  1.1930 / 128.
    MP27A            480.0  0.0001 /   8.  2.1723 /-142.  2.1723 / 158.
    BUS-0007         480.0  0.0007 /   8.  2.1729 /-142.  2.1729 / 158.
    DB4B             480.0  0.0000 /   0.  2.1722 /-142.  2.1722 / 158.
    BUS-0020         480.0  0.0000 /   0.  2.1722 /-142.  2.1722 / 158.
    BUS-0021         480.0  0.0000 /   0.  2.1722 /-142.  2.1722 / 158.
    BUS-0022         480.0  0.0003 /   8.  2.1724 /-142.  2.1725 / 158.
    BUS-0030         480.0  0.0003 /   8.  2.1724 /-142.  2.1725 / 158.
    BUS-0037         480.0  0.0001 /   8.  2.1723 /-142.  2.1723 / 158.
    MSB            ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
==============
                                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                    BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 BUS-0001        MSB                T              13800.     0.0/   0.     0.0/   0.
0.0/   0.
 MSB             MP27A              Wire 2           480.     0.0/ 144.     0.0/ 142.
0.0/ 142.
 MSB             BUS-0007           Wire 11          480.     0.0/   0.     0.0/   0.
                                    Page 32
```

```
0.0/   0.
 MSB            DB4B          Wire 4          480.     0.0/ 144.     0.0/   0.
0.0/   0.
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    MSB           ===============  FIRST BUS FROSYSTEM BRANCH FLOWS ( AMPS )
===============

 MSB            BUS-0020      Wire 6          480.     0.0/   0.     0.0/   0.
0.0/   0.
 MSB            BUS-0021      Wire 7          480.     0.0/   0.     0.0/   0.
0.0/   0.
 MSB            BUS-0022      Wire 8          480.     0.0/   0.     0.0/   0.
0.0/   0.
 MSB            BUS-0030      Wire 12         480.     0.0/   0.     0.0/   0.
0.0/   0.
 MSB            BUS-0037      Wire 10         480.     0.0/   0.     0.0/   0.
0.0/   0.

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  MSK            VOLTAGE BASE LL:                208.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:     0.0 /    8. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                 THEVENIN IMPEDANCE X/R RATIO:    0.000
                 SEQUENCE EQUIVALENT IMPEDANCE Z1:   6.720 +j  63.131 (PU)
                                               Z2:   6.720 +j  63.131 (PU)
                                               Z0: INFINITE

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                       0.0         0.0         0.0         0.0         0.0

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                          AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     2.1727 / -141.8     2.1727 /  158.2

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                          AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                     0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

  MSK            ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                           ---PHASE A---      ---PHASE B---      ---PHASE C---
    BUS-0023          208.0  0.0000 /   0.  2.1727 /-142.  2.1727 / 158.
    RP2K              208.0  0.0000 /   0.  2.1727 /-142.  2.1727 / 158.
    KCP               208.0  0.0000 /   0.  2.1727 /-142.  2.1727 / 158.
    KC2               208.0  0.0000 /   0.  2.1727 /-142.  2.1727 / 158.
    MSK             ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================

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```

```
                                 FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 BUS-0023       MSK            Wire 8A         208.     0.0/   0.     0.0/   0.
0.0/   0.
 MSK            RP2K           Wire 40         208.     0.0/   0.     0.0/   0.
0.0/   0.
 MSK            KCP            Wire 41         208.     0.0/   0.     0.0/   0.
0.0/   0.
 MSK            KC2            Wire 42         208.     0.0/   0.     0.0/   0.
0.0/   0.

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  DS21           VOLTAGE BASE LL:                208.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:     0.0 /    8. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                 THEVENIN IMPEDANCE X/R RATIO:    0.000
                 SEQUENCE EQUIVALENT IMPEDANCE Z1:   7.617 +j  64.134 (PU)
                                               Z2:   7.617 +j  64.134 (PU)
                                               Z0: INFINITE

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                       0.0         0.0         0.0         0.0         0.0

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                          AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     2.1748 / -141.8     2.1748 /  158.2

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                          AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                     0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

  DS21           ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                           ---PHASE A---      ---PHASE B---      ---PHASE C---
    OSDP2B            208.0  0.0000 /   0.  2.1748 /-142.  2.1748 / 158.
    OS21            ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================

                                 FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 OSDP2B         DS21           Wire 55         208.     0.0/   8.     0.0/   0.
0.0/   0.

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```
DS24      VOLTAGE BASE LL:                    208.0 (VOLTS)
          INI. SYM. RMS FAULT CURRENT:          0.0 /   8. ( AMPS/DEG )
          THEVENIN EQUIVALENT IMPEDANCE:     INFINITE
          THEVENIN IMPEDANCE X/R RATIO:         0.000
          SEQUENCE EQUIVALENT IMPEDANCE Z1:    7.615 +j  64.132 (PU)
                                        Z2:    7.615 +j  64.132 (PU)
                                        Z0: INFINITE

          ASYM    RMS   INTERRUPTING AMPS
          1/2 CYCLES   2 CYCLES   3 CYCLES    5 CYCLES    8 CYCLES
                 0.0         0.0         0.0         0.0         0.0

          INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                    AT TIME =        0.5 CYCLES
          ---PHASE A---     ---PHASE B---     ---PHASE C---
          0.0000 /   0.0    2.1748 / -141.8    2.1748 /  158.2

          INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                    AT TIME =        0.5 CYCLES
          ---PHASE A---     ---PHASE B---     ---PHASE C---
                0.0 /   0.0         0.0 /   0.0

DS24      ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ========
                FIRST BUS FROM FAULT    AT TIME =        0.5 CYCLES
                          ---PHASE A---     ---PHASE B---     ---PHASE C---
OSDP2B          208.0  0.0000 /   0.  2.1748 /-142.  2.1748 / 158.
OS24      ==========  INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS ) ========
                FIRST BUS FROM FAULT    AT TIME =        0.5 CYCLES
                BRANCH NAME   VBASE LL  -PHASE A-      -PHASE B-
-PHASE C-
OSDP2B
0.0/   0.
OS24            Wire 56          208.    0.0/   8.    0.0/   0.

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DS2BK     VOLTAGE BASE LL:                    208.0 (VOLTS)
          INI. SYM. RMS FAULT CURRENT:          0.0 /   8. ( AMPS/DEG )
          THEVENIN EQUIVALENT IMPEDANCE:     INFINITE
          THEVENIN IMPEDANCE X/R RATIO:         0.000
          SEQUENCE EQUIVALENT IMPEDANCE Z1:    7.617 +j  64.134 (PU)
                                        Z2:    7.617 +j  64.134 (PU)
                                        Z0: INFINITE

          ASYM    RMS   INTERRUPTING AMPS
          1/2 CYCLES   2 CYCLES   3 CYCLES    5 CYCLES    8 CYCLES
                 0.0         0.0         0.0         0.0         0.0

          INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                    AT TIME =        0.5 CYCLES
          ---PHASE A---     ---PHASE B---     ---PHASE C---
          0.0000 /   0.0    2.1748 / -141.8    2.1748 /  158.2
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          INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                    AT TIME =        0.5 CYCLES
          ---PHASE A---     ---PHASE B---     ---PHASE C---
                0.0 /   0.0         0.0 /   0.0

DS2BK     ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ========
                FIRST BUS FROM FAULT    AT TIME =        0.5 CYCLES
                          ---PHASE A---     ---PHASE B---     ---PHASE C---
OSDP2B          208.0  0.0000 /   0.  2.1748 /-142.  2.1748 / 158.
OS24      ==========  INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS ) ========
                FIRST BUS FROM FAULT    AT TIME =        0.5 CYCLES
                BRANCH NAME   VBASE LL  -PHASE A-      -PHASE B-
-PHASE C-
OSDP2B
0.0/   0.
OS24            Wire 36          208.    0.0/   8.    0.0/   0.

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DS2BK     VOLTAGE BASE LL:                    208.0 (VOLTS)
          INI. SYM. RMS FAULT CURRENT:          0.0 /   8. ( AMPS/DEG )
          THEVENIN EQUIVALENT IMPEDANCE:     INFINITE
          THEVENIN IMPEDANCE X/R RATIO:         0.000
          SEQUENCE EQUIVALENT IMPEDANCE Z1:    6.616 +j  63.133 (PU)
                                        Z2:    6.616 +j  63.133 (PU)
                                        Z0: INFINITE

          ASYM    RMS   INTERRUPTING AMPS
          1/2 CYCLES   2 CYCLES   3 CYCLES    5 CYCLES    8 CYCLES
                 0.0         0.0         0.0         0.0         0.0

          INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                    AT TIME =        0.5 CYCLES
          ---PHASE A---     ---PHASE B---     ---PHASE C---
          0.0000 /   0.0    2.1748 / -141.8    2.1748 /  158.2

          INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                    AT TIME =        0.5 CYCLES
          ---PHASE A---     ---PHASE B---     ---PHASE C---
                0.0 /   0.0         0.0 /   0.0

DSDP2B    ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ========
                FIRST BUS FROM FAULT    AT TIME =        0.5 CYCLES
                          ---PHASE A---     ---PHASE B---     ---PHASE C---
          OSDP4          480.0  1.2556 /-112.  1.2556 /-112.  1.2556 / 128.
          Generator      208.0  0.0000 /   0.  2.1748 /-142.  2.1748 / 158.
          OS2BK          208.0  0.0000 /   0.  2.1748 /-142.  2.1748 / 158.
          OS21           208.0  0.0000 /   0.  2.1748 /-142.  2.1748 / 158.
          OS24           208.0  0.0000 /   0.  2.1748 /-142.  2.1748 / 158.
          OSDP2B      ==========  INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS ) ========
                FIRST BUS FROM FAULT    AT TIME =        0.5 CYCLES
                BRANCH NAME   VBASE LL  -PHASE A-      -PHASE B-
-PHASE C-
                                Page 36
```

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 OSDP4          OSDP2B         T5              480.     0.0/   0.     0.0/   0.
0.0/   0.
 OSDP2B         Generator      Wire 54         208.     0.0/   0.     0.0/   0.
0.0/   0.
 OSDP2B         OS2BK          Wire 36         208.     0.0/   0.     0.0/   0.
0.0/   0.
 OSDP2B         OS21           Wire 55         208.     0.0/   0.     0.0/   0.
0.0/   0.
 OSDP2B         OS24           Wire 56         208.     0.0/   0.     0.0/   0.
0.0/   0.

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  OSDP4          VOLTAGE BASE LL:                 480.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:      0.0 /  -37. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                 THEVENIN IMPEDANCE X/R RATIO:     1.000
                 SEQUENCE EQUIVALENT IMPEDANCE Z1:   6.616 +j  63.133 (PU)
                                               Z2:   6.616 +j  63.133 (PU)
                                               Z0: INFINITE

                  ASYM     RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                       0.0         0.0         0.0         0.0         0.0

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     2.1748 / -141.8     2.1748 /  158.2

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                    0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

  OSDP4          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---       ---PHASE B---       ---PHASE C---
    BUS-0009          480.0  0.0007 /-172.  2.1741 /-142.  2.1741 / 158.
    OSDP2B            208.0  1.2556 /   8.  1.2556 /-112.  1.2556 / 128.
    OSDP4           ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================

                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                               BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 JP-1           OSDP4                          480.     0.0/   0.     0.0/   0.
0.0/   0.
 SE-1           OSDP4                          480.     0.0/   0.     0.0/   0.
0.0/   0.
 SP-1           OSDP4                          480.     0.0/   0.     0.0/   0.
0.0/   0.
 BUS-0009       OSDP4          Wire 11A        480.     0.0/ -36.     0.0/   0.
0.0/   0.
 OSDP4          OSDP2B         T5              480.     0.0/   0.     0.0/   0.
0.0/   0.
                                      Page 37
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  RP21           VOLTAGE BASE LL:                 208.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:      0.0 /    8. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                 THEVENIN IMPEDANCE X/R RATIO:     0.000
                 SEQUENCE EQUIVALENT IMPEDANCE Z1:   6.219 +j  62.618 (PU)
                                               Z2:   6.219 +j  62.618 (PU)
                                               Z0: INFINITE

                  ASYM     RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                       0.0         0.0         0.0         0.0         0.0

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                 0.0000 /    0.0     2.1725 / -141.8     2.1725 /  158.2

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                 ---PHASE A---       ---PHASE B---       ---PHASE C---
                    0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

  RP21           ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---       ---PHASE B---       ---PHASE C---
    MS2             208.0  0.0000 /   0.  2.1725 /-142.  2.1725 / 158.
    RP21          ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================

                                FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                               BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 MS2            RP21           Wire 47         208.     0.0/   8.     0.0/   0.
0.0/   0.

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  RP22           VOLTAGE BASE LL:                 208.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:      0.0 /    8. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                 THEVENIN IMPEDANCE X/R RATIO:     0.000
                 SEQUENCE EQUIVALENT IMPEDANCE Z1:   6.219 +j  62.618 (PU)
                                               Z2:   6.219 +j  62.618 (PU)
                                               Z0: INFINITE
                                      Page 38
```

```
 ASYM     RMS   INTERRUPTING AMPS
1/2 CYCLES   2 CYCLES   3 CYCLES    5 CYCLES    8 CYCLES
     0.0         0.0         0.0         0.0         0.0

 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
          AT TIME =     0.5 CYCLES
   ---PHASE A---    ---PHASE B---    ---PHASE C---
0.0000 /   0.0     2.1725 / -141.8     2.1725 /  158.2

 INI.     RMS   FAULTED CURRENT ( AMPS / DEG )
          AT TIME =     0.5 CYCLES
   ---PHASE A---    ---PHASE B---    ---PHASE C---
     0.0 /   0.0        0.0 /   0.0        0.0 /   0.0

RP22      ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ======
               FIRST BUS FROM FAULT     AT TIME =     0.5 CYCLES
                  ---PHASE A---    ---PHASE B---    ---PHASE C---
     MS2            208.0  0.0000 /   0.   2.1725 /-142.  2.1725 / 158.
     RP22      ==================== INI.   RMS   SYSTEM BRANCH FLOWS ( AMPS )
                                                                    0.5 CYCLES
                     FIRST BUS FROM FAULT     AT TIME =     -PHASE A-     -PHASE B-
                        BRANCH NAME    VBASE LL    -PHASE A-     -PHASE B-
RP22                    Wire 48          208.      0.0/   8.     0.0/   0.
-PHASE C-
 MS2
0.0/   0.

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RP23      VOLTAGE BASE LL:                  208.0 (VOLTS)
          INI. SYM. RMS FAULT CURRENT:        0.0 /   8. ( AMPS/DEG )
          THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
          THEVENIN IMPEDANCE X/R RATIO:      0.000
          SEQUENCE EQUIVALENT IMPEDANCE Z1:   6.219 +j  62.618 (PU)
                                        Z2:   6.219 +j  62.618 (PU)
                                        Z0:  INFINITE

           ASYM     RMS   INTERRUPTING AMPS
          1/2 CYCLES   2 CYCLES   3 CYCLES    5 CYCLES    8 CYCLES
               0.0         0.0         0.0         0.0         0.0

          INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                    AT TIME =     0.5 CYCLES
             ---PHASE A---    ---PHASE B---    ---PHASE C---
          0.0000 /   0.0     2.1725 / -141.8     2.1725 /  158.2

          INI.     RMS   FAULTED CURRENT ( AMPS / DEG )
                   AT TIME =     0.5 CYCLES
             ---PHASE A---    ---PHASE B---    ---PHASE C---
               0.0 /   0.0        0.0 /   0.0        0.0 /   0.0

RP23      ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ======
               FIRST BUS FROM FAULT     AT TIME =     0.5 CYCLES
                  ---PHASE A---    ---PHASE B---    ---PHASE C---
     MS2            208.0  0.0000 /   0.   2.1725 /-142.  2.1725 / 158.
     RP23      ==================== INI.   RMS   SYSTEM BRANCH FLOWS ( AMPS )
                                  Page 39
```

```
                                                                    0.5 CYCLES
                     FIRST BUS FROM FAULT     AT TIME =     -PHASE A-     -PHASE B-
                        BRANCH NAME    VBASE LL    -PHASE A-     -PHASE B-
RP23                    Wire 49          208.      0.0/   8.     0.0/   0.
-PHASE C-
 MS2
0.0/   0.

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RP24      VOLTAGE BASE LL:                  208.0 (VOLTS)
          INI. SYM. RMS FAULT CURRENT:        0.0 /   8. ( AMPS/DEG )
          THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
          THEVENIN IMPEDANCE X/R RATIO:      0.000
          SEQUENCE EQUIVALENT IMPEDANCE Z1:   6.219 +j  62.618 (PU)
                                        Z2:   6.219 +j  62.618 (PU)
                                        Z0:  INFINITE

           ASYM     RMS   INTERRUPTING AMPS
          1/2 CYCLES   2 CYCLES   3 CYCLES    5 CYCLES    8 CYCLES
               0.0         0.0         0.0         0.0         0.0

          INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                    AT TIME =     0.5 CYCLES
             ---PHASE A---    ---PHASE B---    ---PHASE C---
          0.0000 /   0.0     2.1725 / -141.8     2.1725 /  158.2

          INI.     RMS   FAULTED CURRENT ( AMPS / DEG )
                   AT TIME =     0.5 CYCLES
             ---PHASE A---    ---PHASE B---    ---PHASE C---
               0.0 /   0.0        0.0 /   0.0        0.0 /   0.0

RP24      ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) ======
               FIRST BUS FROM FAULT     AT TIME =     0.5 CYCLES
                  ---PHASE A---    ---PHASE B---    ---PHASE C---
     MS2            208.0  0.0000 /   0.   2.1725 /-142.  2.1725 / 158.
     RP24      ==================== INI.   RMS   SYSTEM BRANCH FLOWS ( AMPS )
                                                                    0.5 CYCLES
                     FIRST BUS FROM FAULT     AT TIME =     -PHASE A-     -PHASE B-
                        BRANCH NAME    VBASE LL    -PHASE A-     -PHASE B-
RP24                    Wire 50          208.      0.0/   8.     0.0/   0.
-PHASE C-
 MS2
0.0/   0.

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RP25      VOLTAGE BASE LL:                  208.0 (VOLTS)
          INI. SYM. RMS FAULT CURRENT:        0.0 /   8. ( AMPS/DEG )
                                  Page 40
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                THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                THEVENIN IMPEDANCE X/R RATIO:     0.000
                SEQUENCE EQUIVALENT IMPEDANCE Z1:   6.219 +j  62.618 (PU)
                                              Z2:   6.219 +j  62.618 (PU)
                                              Z0: INFINITE

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                      0.0         0.0         0.0         0.0         0.0

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /    0.0     2.1725 / -141.8     2.1725 /  158.2

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                    0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

  RP25          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---       ---PHASE B---       ---PHASE C---
    MS2             208.0  0.0000 /   0.  2.1725 /-142.  2.1725 / 158.
    RP25          ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
==============
                                 FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 MS2            RP25           Wire 51          208.     0.0/   8.     0.0/   0.
0.0/   0.

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  RP25          VOLTAGE BASE LL:                208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:      0.0 /    8. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                THEVENIN IMPEDANCE X/R RATIO:     0.000
                SEQUENCE EQUIVALENT IMPEDANCE Z1:   6.219 +j  62.618 (PU)
                                              Z2:   6.219 +j  62.618 (PU)
                                              Z0: INFINITE

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                      0.0         0.0         0.0         0.0         0.0

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /    0.0     2.1725 / -141.8     2.1725 /  158.2

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                    0.0 /   0.0         0.0 /   0.0         0.0 /   0.0
                                  Page 41

  RP26          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---       ---PHASE B---       ---PHASE C---
    MS2             208.0  0.0000 /   0.  2.1725 /-142.  2.1725 / 158.
    RP26          ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
==============
                                 FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 MS2            RP26           Wire 52          208.     0.0/   8.     0.0/   0.
0.0/   0.

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  RP2B          VOLTAGE BASE LL:                208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:      0.0 /    8. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                THEVENIN IMPEDANCE X/R RATIO:     0.000
                SEQUENCE EQUIVALENT IMPEDANCE Z1:   6.219 +j  62.618 (PU)
                                              Z2:   6.219 +j  62.618 (PU)
                                              Z0: INFINITE

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                      0.0         0.0         0.0         0.0         0.0

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /    0.0     2.1725 / -141.8     2.1725 /  158.2

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                    0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

  RP2B          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---       ---PHASE B---       ---PHASE C---
    MS2             208.0  0.0000 /   0.  2.1725 /-142.  2.1725 / 158.
    RP2B          ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
==============
                                 FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 MS2            RP2B           Wire 46          208.     0.0/   8.     0.0/   0.
0.0/   0.

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 RP2BA          VOLTAGE BASE LL:                  208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:       0.0 /    8. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                THEVENIN IMPEDANCE X/R RATIO:      0.000
                SEQUENCE EQUIVALENT IMPEDANCE Z1:   6.219 +j  62.618 (PU)
                                              Z2:   6.219 +j  62.618 (PU)
                                              Z0: INFINITE

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                      0.0         0.0         0.0         0.0         0.0

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /    0.0     2.1725 / -141.8     2.1725 /  158.2

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                    0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

 RP2BA          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                       ---PHASE A---       ---PHASE B---       ---PHASE C---
    MS2               208.0  0.0000 /   0.  2.1725 /-142.  2.1725 / 158.
    RP2BA           ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================

                                 FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 MS2          RP2BA          Wire 53          208.     0.0/   8.     0.0/   0.
0.0/   0.

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 RP2K           VOLTAGE BASE LL:                  208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:       0.0 /    8. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
                THEVENIN IMPEDANCE X/R RATIO:      0.000
                SEQUENCE EQUIVALENT IMPEDANCE Z1:   7.718 +j  64.129 (PU)
                                              Z2:   7.718 +j  64.129 (PU)
                                              Z0: INFINITE

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                      0.0         0.0         0.0         0.0         0.0

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
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```
                0.0000 /    0.0     2.1727 / -141.8     2.1727 /  158.2

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                    0.0 /   0.0         0.0 /   0.0         0.0 /   0.0

 RP2K           ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                       ---PHASE A---       ---PHASE B---       ---PHASE C---
    MSK               208.0  0.0000 /   0.  2.1727 /-142.  2.1727 / 158.
    RP2K            ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================

                                 FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 MSK          RP2K           Wire 40          208.     0.0/   8.     0.0/   0.
0.0/   0.

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 RP2P           VOLTAGE BASE LL:                  208.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:   8365.5 / -106. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:   11.543 +j 124.343 (PU)
                THEVENIN IMPEDANCE X/R RATIO:    10.773
                SEQUENCE EQUIVALENT IMPEDANCE Z1:   5.771 +j  62.172 (PU)
                                              Z2:   5.771 +j  62.172 (PU)
                                              Z0:   0.000 +j   0.000 (PU)

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                   12169.3      9141.0      8614.5      8390.0      8366.3

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /    0.0     1.0865 / -111.8     1.0865 /   68.2

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                8365.5 /-106.5        0.0 /   0.0         0.0 /   0.0

 RP2P           ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                       ---PHASE A---       ---PHASE B---       ---PHASE C---
    BUS-0066        480.0  0.6273 /   68.  1.2545 /-112.  0.6273 /   68.
    RP2P            ================ INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS )
================

                                 FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                                BRANCH NAME   VBASE LL  -PHASE A-     -PHASE B-
-PHASE C-
 BUS-0066     RP2P           T3               480.  2107.7/-106.     0.0/   0.
2107.7/  74.

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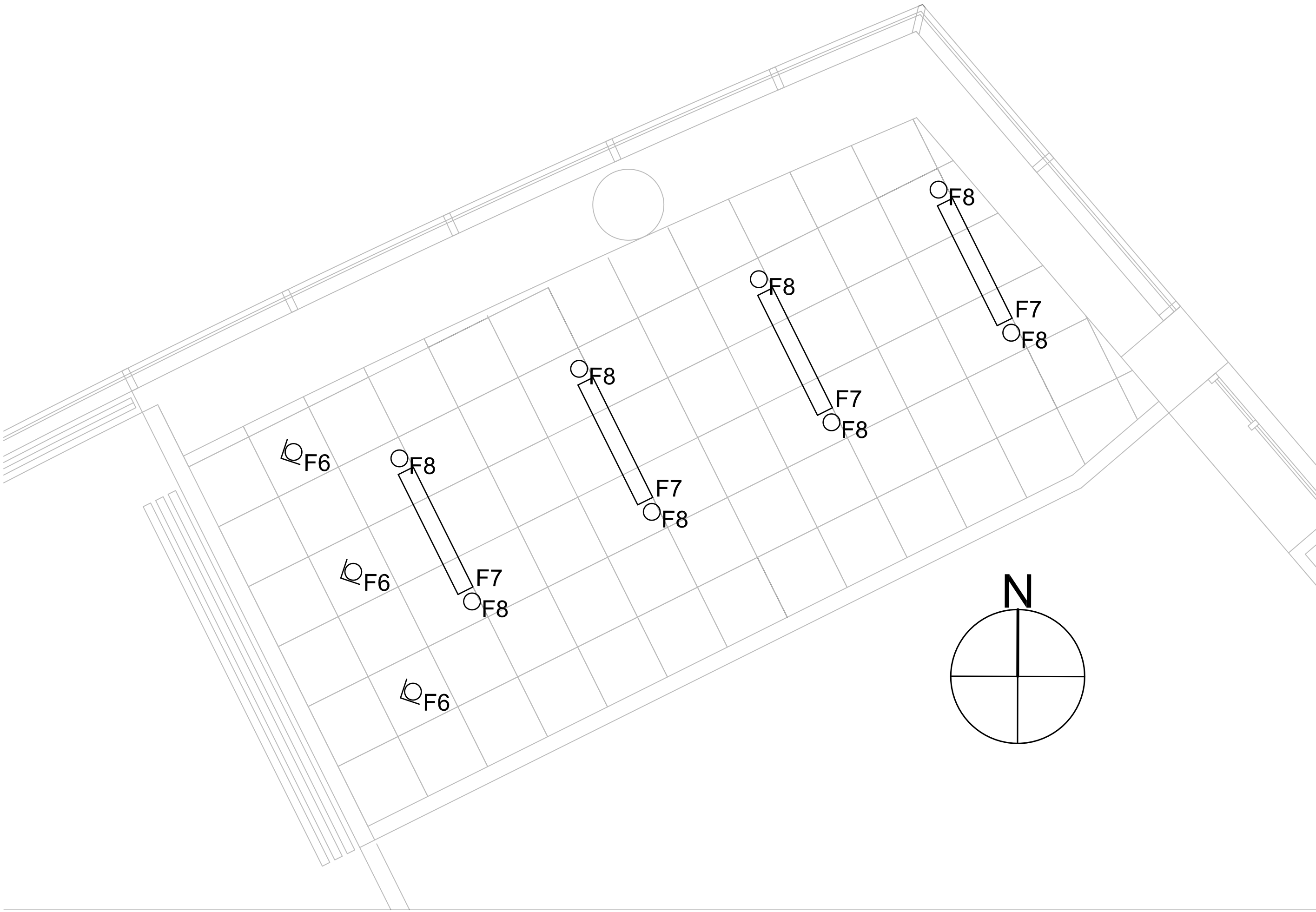
********** FAULT ANALYSIS SUMMARY **********

BUS NAME	VOLTAGE L-L	AVAILABLE FAULT CURRENT 3 PHASE	X/R	CURRENT LINE/GRND	X/R
DB4B	480.	2432.7	11.4	0.02	1.0
Generator	208.	5396.3	8.4	0.00	0.0
KC2	208.	5390.5	8.3	0.00	0.0
KCP	208.	5390.5	8.3	0.00	0.0
LS2B	208.	5388.1	8.3	0.00	0.0
LS42	480.	2335.3	8.3	0.02	1.0
LS45	480.	2335.3	8.3	0.02	1.0
LSDP4	480.	2376.0	9.4	0.02	1.0
MP27A	480.	2459.8	12.8	0.02	1.0
MS2	208.	5629.8	11.8	0.00	0.0
MSB	480.	2461.3	12.9	0.02	1.0
MSK	208.	5484.3	9.4	0.00	0.0
OS21	208.	5396.3	8.4	0.00	0.0
OS24	208.	5396.5	8.4	0.00	0.0
OS2BK	208.	5396.3	8.4	0.00	0.0
OSDP2B	208.	5490.3	9.5	0.00	0.0
OSDP4	480.	2379.1	9.5	0.02	1.0
RP21	208.	5532.7	10.1	0.00	0.0
RP22	208.	5532.7	10.1	0.00	0.0
RP23	208.	5532.7	10.1	0.00	0.0
RP24	208.	5532.7	10.1	0.00	0.0
RP25	208.	5532.7	10.1	0.00	0.0
RP26	208.	5532.7	10.1	0.00	0.0
RP2B	208.	5532.7	10.1	0.00	0.0
RP2BA	208.	5532.7	10.1	0.00	0.0
RP2K	208.	5390.5	8.3	0.00	0.0
RP2P	208.	5577.0	10.8	8365.51	10.8

********** FAULT ANALYSIS REPORT COMPLETED **********



WHEELOCK COLLEGE

CAMPUS CENTER AND STUDENT RESIDENCE

CONFERENCE ROOM LIGHTING PLAN

DRAWN BY: AC
DATE: 04/07/09

SCALE: $\frac{3}{8}$" = 1'-0"

A-101

WHEELOCK COLLEGE

CAMPUS CENTER AND STUDENT RESIDENCE

STUDENT LOUNGE LIGHTING PLAN

DRAWN BY: AC
DATE: 04/07/09

SCALE: $\frac{1}{8}$" = 1'-0"

A-102

WHEELOCK COLLEGE

CAMPUS CENTER AND STUDENT RESIDENCE

CAFETERIA SERVING SPACE LIGHTING PLAN

DRAWN BY: AC
DATE: 04/07/09

SCALE: $\frac{3}{16}$" = 1'-0"

A-103

WHEELOCK COLLEGE

CAMPUS CENTER AND STUDENT RESIDENCE

ROOF DECK LIGHTING PLAN

DRAWN BY: AC
DATE: 04/07/09

SCALE: $\frac{3}{16}$" = 1'-0"

A-104

F16

F16

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F15

F12

F12

WHEELOCK COLLEGE

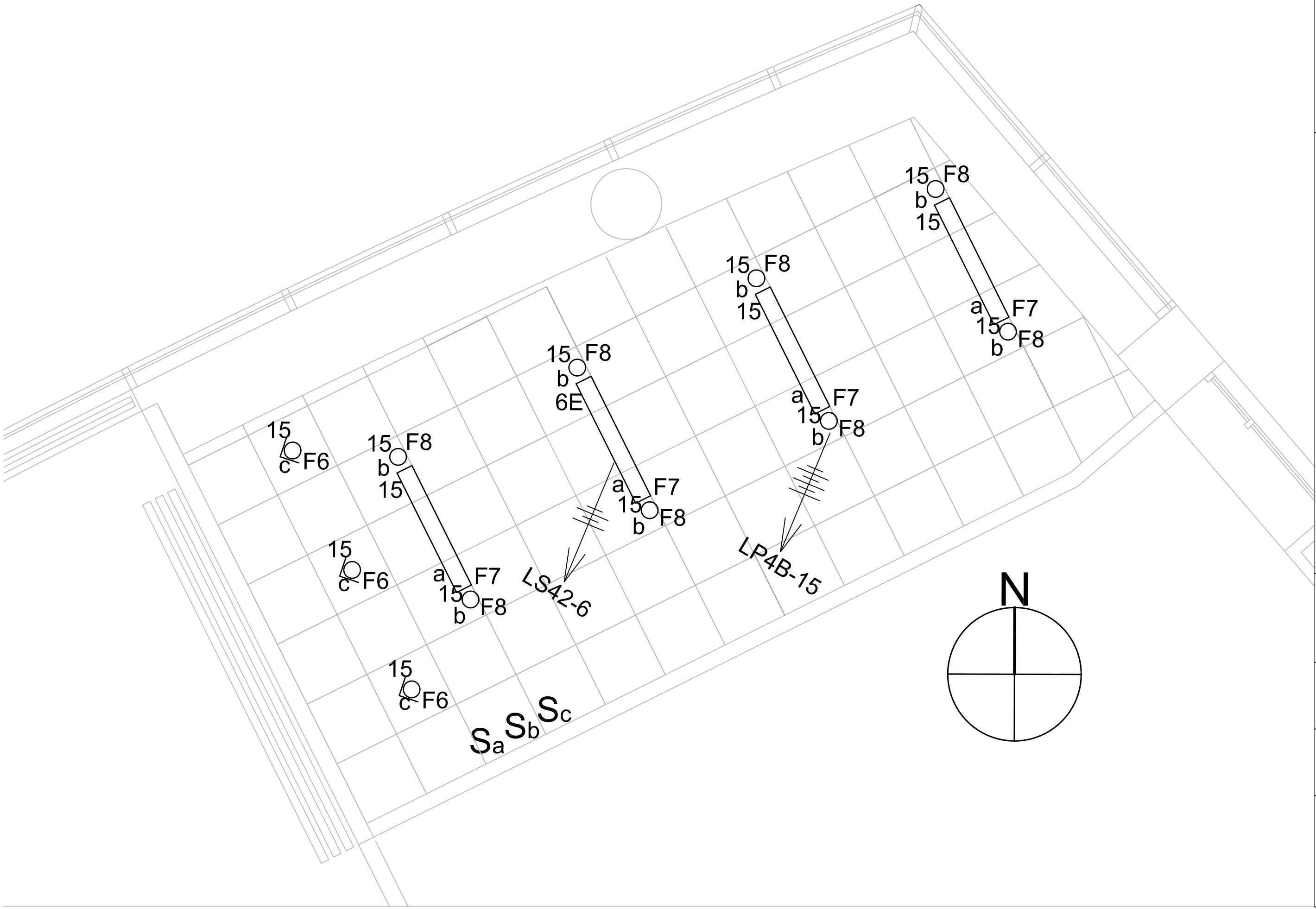
CAMPUS CENTER AND STUDENT RESIDENCE

DORM ROOM LIGHTING PLAN

DRAWN BY: AC
DATE: 04/07/09

SCALE: $\frac{3}{8}$" = 1'-0"

A-105



WHEELOCK COLLEGE

CAMPUS CENTER AND STUDENT RESIDENCE

CONFERENCE ROOM ELECTRICAL PLAN

DRAWN BY: AC
DATE: 04/07/09

SCALE: $\frac{3}{8}$" = 1'-0"

E-101

WHEELOCK COLLEGE

CAMPUS CENTER AND STUDENT RESIDENCE

STUDENT LOUNGE ELECTRICAL PLAN

DRAWN BY: AC
DATE: 04/07/09

SCALE: $\frac{1}{8}$" = 1'-0"

E-102

WHEELOCK COLLEGE

CAMPUS CENTER AND STUDENT RESIDENCE

CAFETERIA SERVING SPACE ELECTRICAL PLAN

DRAWN BY: AC
DATE: 04/07/09

SCALE: $\frac{3}{16}$" = 1'-0"

E-103

WHEELOCK COLLEGE

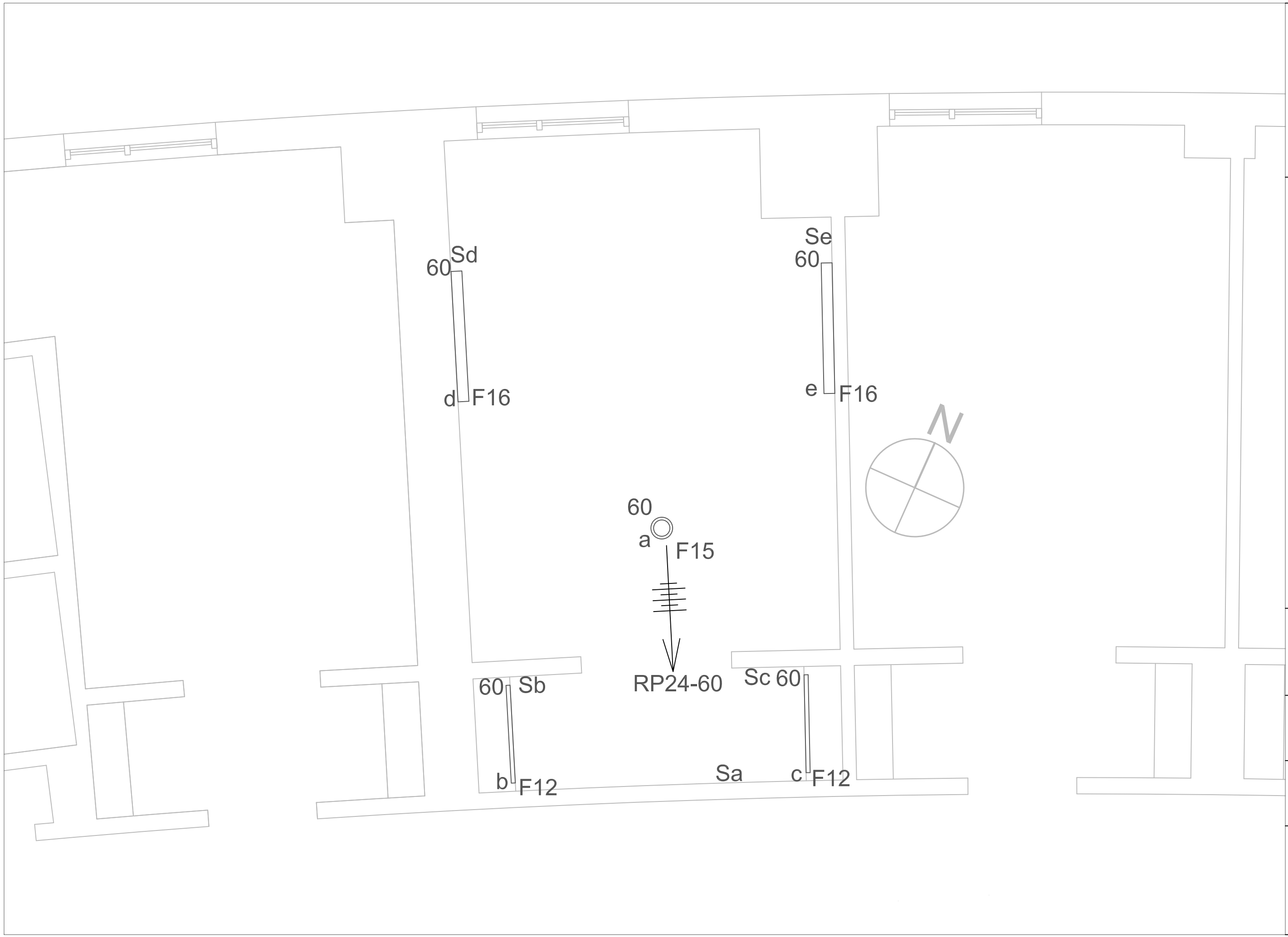
CAMPUS CENTER AND STUDENT RESIDENCE

ROOF DECK ELECTRICAL PLAN

DRAWN BY: AC
DATE: 04/07/09

SCALE: $\frac{3}{16}$" = 1'-0"

E-104



WHEELOCK COLLEGE

CAMPUS CENTER AND STUDENT RESIDENCE

DORM ROOM ELECTRICAL PLAN

DRAWN BY: AC
DATE: 04/07/09

SCALE: $\frac{3}{8}$" = 1'-0"

E-105