The New York University Concourse Project

Existing Electrical Conditions

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Lighting/Electrical Option
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Executive Summary

Technical report two analyzes the existing electrical system of the renovated Tisch Hall in the New York University Concourse Project. The newly renovated three levels of Tisch Hall will house a new lobby, classrooms, offices, and student lounges.

The report examines the scope of the electrical systems and describes the characteristics of each systems. Included in the report will be a summary of the total building electrical loads and discuses about the distribution system. The technical report also involves a single-line diagram that describes the electrical systems of the renovated three levels of Tisch Hall.

The analysis shows that the majority of the electrical systems consist of supporting the lighting, receptacle, mechanical, and plumbing equipment. The power of the newly renovated Tisch Hall comes from the existing power system.

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Summary of Distribution Systems

Power is being delivered through an existing switchboard for the renovated Tisch Hall. The overall building electrical system is a radial system that operates on a 480/120V system. Four feeders are connected to the existing cogen main service switchboard which supplies 4000A switchgear. The feeders deliver power to the ground level, upper and lower concourses of Tisch Hall. The power is being delivered underground to the upper concourse into the electrical room. The incoming power is distributed throughout various panel boards on each level.

Utility Company Information

Power Company: Con Edison
Cooper Station
P.O.Box 138
New York, NY 10276-0138
1-800-752-6633(1-800-75-CONED)
http://www.coned.com/

The distribution system from Tisch Hall will be connected to the existing campus system. The building fits under the service classification no.9 for large customer rate II. The table summarizes the demand charge for each time period as of April 1, 2008.

Con Edison - Manhattan - Large Customer - Rate II - April 1, 2008	
June, July, August, and September	**Cost per kW**
Monday - Friday, 8 AM to 6PM	$5.86
Monday - Friday, 8 AM to 10PM	$11.09
All hours - all days	$10.94
All other months	
Monday through Friday, 8 AM to 10PM	$8.14
All hours - all days	$3.54

Service Entrance

Con Edison provides all of the electricity to New York City. The electrical system of the newly renovated Tisch Hall involves connecting the power system to an existing system. The existing system is where the power is connected to Con Edison's power system.

The connected power system for the renovated Tisch Hall is located on the upper concourse. The service equipment is a 480/277V, 4000A system. There are three 400A and one 200A fuses. The switchgear provides all the power to the ground level and two concourses. Four feeders are connected to the existing power system.
The electrical subcontractor will furnish and install all of the junction boxes for feeders and branch circuits as required. All installation will be in compliance with the NEC. The electrical subcontractor is responsible for the installation of the low voltage distribution equipment, panel boards, and transformers. All materials and equipment will be new.

Con Edison's supplies power to Tisch Hall, Shimkin, and Kaufman Management Center. Since these buildings are connected, the power that is supplied by Con Edison Is being shared by these buildings.

Voltage Systems

The building mainly operates at a 480/277V 3P 4 wire voltage system. The lighting system and lighting controls operates at a277 volts, 3P, 4 wire system. Incandescent luminaires and receptacles operate at 120 volt. There are three transformers within the renovated space of Tisch Hall.

Emergency Power System

The emergency power system is connected from another building. The main existing 'FACP' supports power to 120V emergency life safety system. The life safety equipments such, emergency generators are designed to sustain external forces.

Location of Switchgear

The newly renovated Tisch Hall will receive power from the existing cogen main service switchboard. Located on the upper concourse, the 4000A 'MS-CG' switchboard will supply power to the newly installed distribution panels located on the ground, upper concourse, and lower concourse. The individual distribution panels are located throughout the electrical rooms for each level.

Electrical Equipment							
Tag	**Equip Type**	**Size**	**Voltage**	**Floor**	**Room #**	**Room Name**	**Drawing**
LP1A	-	100A 42P	277/480V	Ground Floor	-	-	3E5.01
RP1A Sec 1	Distribution Panel	225A 42P	120/208V	Ground Floor	-	Electrical Closet	3E5.01, 3E6.02
RP1A Sec 2	Distribution Panel	225A 42P	120/208V	Ground Floor	-	Electrical Closet	3E5.01, 3E6.02
DP4-UC1A	-	400A	277/480V	UC	-	-	3E5.01
DP2-UC1A	-	600A	120/208V	UC	-	-	3E5.01
LP4-UC1A	Distribution Panel	100A 42P	277/480V	UC	UC19	Electrical Closet	3E5.01, 3E6.03
RP2-UC1A	Distribution Panel	225A 42P	120/208V	UC	UC 19	Electrical Closet	3E5.01, 3E6.03
RP2-UC1A Sec 2	Distribution Panel	225A 42P	120/208V	UC	UC 19	Electrical Closet	3E5.01, 3E6.03
RP2-UC2A Sec 1	Distribution Panel	100A 42P	120/208V	UC	UC19	Electrical Closet	3E5.01, 3E6.03
DP4-UC1B	-	400A	277/480V	UC	-	-	3E5.01
LP4-UC1B	Distribution Panel	100A 42P	277/480V	UC	UC04	Electrical Room	3E5.01, 3E6.03
RPSA Sec 2	-	100A 42P	120/208V	-	-	-	3E5.01
DP2-UC1B	-	250A	120/208V	UC	-	-	3E5.01
RP2-UC1B	Distribution Panel	225A 42P	120/208V	UC	UC04	Electrical Room	3E5.01, 3E6.03
RP2-UC1B Sec 2	Distribution Panel	225A 42P	120/208V	UC	UC04	Electrical Room	3E5.01, 3E6.03
RP2-UC2B	Distribution Panel	100A 42P	120/208V	UC	UC04	Electrical Room	3E5.01, 3E6.03
LVDP	Low Voltage Light Control Panel	100A 12P	277	UC	LC22	-	3E5.01, 3E6.04
DP4-LCMECH-A	Distribution Panel	400A	277/480V	LC	-	-	3E5.01, 3E6.01
DP4-LCMECH-B	Distribution Panel	225A	277/480V	LC	-	-	3E5.01
LP4-LC1A	Distribution Panel	100A 42P	277/480V	LC	LC22	Electrical Closet	3E5.01, 3E6.02
RP2-LC1A	Distribution Panel	225A 42P	120/208V	LC	LC22	Electrical Closet	3E5.01, 3E6.02
RP2-LC1A	Distribution Panel	225A	120/20	LC	LC22	Electrical	3E5.01,

Sec 2		42P	8V			Closet	3E6.02
RP2-LC2A	Distribution Panel	100A 42P	120/208V	LC	-	Electrical Closet	3E5.01, 3E6.02
LP4-LC1B	Distribution Panel	100A 42P	277/480V	LC	LC88	East Corridor	3E5.01, 3E6.02
RP2-LC1B	Distribution Panel	225A 42P	120/208V	LC	LC88	East Corridor	3E5.01, 3E6.02
RP2-LC1B Sec 1	Distribution Panel	225A 42P	120/208V	LC	LC88	East Corridor	3E5.01, 3E6.02
RP2-LC2B	Distribution Panel	100A 42P	120/208V	LC	LC88	East Corridor	3E5.01, 3E6.02

Lighting Equipment							
Tag	**Equipment Type**	**Size**	**Voltage**	**Floor**	**Room #**	**Room Name**	**Drawing**
LCP1	Lighting Control Panel	-	277/480V	LC	LC01	-	3E6.04
LCP2	Lighting Control Panel	-	277/480V	LC	LC02	-	3E6.04
LCP3	Lighting Control Panel	-	277/480V	LC	LC03	-	3E6.04
LCP4	Lighting Control Panel	-	277/480V	LC	LC04	-	3E6.04
LCP5	Lighting Control Panel	-	277/480V	LC	LC05	-	3E6.04
LCP6	Lighting Control Panel	-	277/480V	LC	LC06	-	3E6.04
LCP7	Lighting Control Panel	-	277/480V	LC	LC07	-	3E6.04
LCP8	Lighting Control Panel	-	277/480V	LC	LC08	-	3E6.04
LCP9	Lighting Control Panel	-	277/480V	LC	LC09	-	3E6.04
LCP10	Lighting Control Panel	-	277/480V	LC	LC10	-	3E6.04
LCP11	Lighting Control Panel	-	277/480V	LC	LC11	-	3E6.04
LCP12	Lighting Control Panel	-	277/480V	LC	LC12	-	3E6.04
LCP13	Lighting Control Panel	-	277/480V	LC	LC13	-	3E6.04
LCP14	Lighting Control Panel	-	277/480V	LC	LC14	-	3E6.04
LCP15	Lighting Control Panel	-	277/480V	UC	UC03	-	3E6.04
LCP16	Lighting Control Panel	-	277/480V	UC	UC05	-	3E6.04
LCP17	Lighting Control Panel	-	277/480V	UC	UC07	-	3E6.04
LCP18	Lighting Control Panel	-	277/480V	UC	UC09	-	3E6.04
LCP19	Lighting Control Panel	-	277/480V	UC	UC10	-	3E6.04
LCP20	Lighting Control Panel	-	277/480V	UC	UC06	-	3E6.04
LCP21	Lighting Control Panel	-	277/480V	UC	UC11	-	3E6.04
LCP22	Lighting Control Panel	-	277/480V	UC	UC13	-	3E6.04
LCP23	Lighting Control Panel	-	277/480V	UC	UC14	-	3E6.04
LCP24	Lighting Control Panel	-	277/480V	UC	UC15	-	3E6.04
LCP25	Lighting Control Panel	-	277/480V	UC	UC17	-	3E6.04
LCP26	Lighting Control Panel	-	277/480V	UC	UC18	-	3E6.04
DLCP1	Dimming lighting control	-	277/480V	UC	UC04	-	3E6.04

Over Current Devices

The main service switchboard is protected by a 4000A circuit breaker. Over-current devices have also being provided by the circuit breakers. The main distribution panel boards are each protected by 600A and 400A respectively.

Transformers

The newly renovated Tisch Hall has three transformers. One of the transformers is located on the ground floor while the other two are located on the upper concourse.

INDIVIDUAL TRANSFORMER SCHEDULE

TAG	PRIMARY VOLTAGE	SECONDARY VOLTAGE	SIZE	TYPE	TEMP. RISE	TAPS	MOUNTING	REMARK
T-4	480V,3PH,3W.	208Y/120V,3PH,4W	45	DRY TYPE	150 DEGREE C	5%		
T-5	480V,3PH,3W.	208Y/120V,3PH,4W	75	DRY TYPE	150 DEGREE C	2.50%		
T-7	480V,3PH,3W.	208Y/120V,3PH,4W	150	DRY TYPE	150 DEGREE C	2.50%		

NOTES:
1. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS

KEY
:
A/N=AS NOTED

Special Equipment

The three levels of Tisch Hall do not contain any special equipment.

Lighting Loads

The lighting load in Tisch Hall includes a mixture of fluorescent, halogen, LED, and high intensity discharge. Most of the fluorescent source consists of T5 and compact fluorescent sources. For halogen sources, only MR-16s are employed. As for the LEDs, they are mainly used in the lobby for the ceiling coves. Lastly, metal halide sources such as ED17 and PAR20s are used. Most of the sources use electronic ballast for dimming purposes.

Lighting Loads										
Tag	Lamp Type	Lamp Wattage	Num Lamps	Ballast Type	Oper. Volt	Input Watts	Ballast Factor	Oper. Current	Start Current	PF
L1A	T5	28	1	Electronic	277	33	1.04[1]	0.12	-	0.98
L1B	T5	21	2	Electronic	277	48	1.03[1]	0.10	-	0.95
L1C	T5	21	2	Electronic	277	48	1.03[1]	0.10	-	0.95
L8	T5	17	1	Electronic	277	18	1[1]	0.12	-	0.98
L9	ED 17	50	1	Electronic	277	58	0.95[4]	0.22	0.35	0.9
L9B	ED 17	50	1	Electronic	277	58	0.95[4]	0.22	0.35	0.9
L9C	ED 17	50	1	Electronic	277	58	0.95[4]	0.22	0.35	0.9
L9D	ED 17	50	1	Electronic	277	58	0.95[4]	0.22	0.35	0.9
L10	T5	28	1	Electronic	277	33	1.04[1]	0.12	-	0.98
L11	T5	28	1	Electronic	277	33	1.04[1]	0.12	-	0.98
L12	CMH PAR20	39	1	Electronic	277	45	0.95[4]	0.53	0.63	0.95
L12A	CMH PAR20	39	1	Electronic	277	45	0.95[4]	0.53	0.63	0.95
L13	T5	35	1	Electronic	277	41	1.01[1]	0.15	-	0.98
L13A	T5	35	1	Electronic	277	41	1.01[1]	0.15	-	0.98
L14	T5	28	1	Electronic	277	33	1.04[1]	0.12	-	0.98
L15	T5	28	1	Electronic	277	33	1.04[1]	0.12	-	0.98
L16	CFL	26	1	Electronic	277	29	1.1[2]	0.24	-	0.99
L17	CFL	26	1	Electronic	277	29	1.1[2]	0.24	-	0.99
L19	CMH PAR20	20	1	Electronic	277	23	0.95[4]	0.53	0.63	0.95
L20	T5	28	2	Electronic	277	64	0.95[1]	0.218	-	0.95
L21	ED 17	50	1	Electronic	277	58	0.95[4]	0.22	0.35	0.9
L23	MH PAR38	70	1	Electronic	277	78	0.95[4]	0.53	0.63	0.95
L23B	MH PAR38	70	1	Electronic	277	78	0.95[4]	0.53	0.63	0.95
L24	T5	28	1	Electronic	277	38	1.15	0.15	-	0.9
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
L24A	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95

	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
L24B	T5	28	1	Electronic	277	38	1.15	0.15	-	0.9
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
L24C	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
L24D	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	1	Electronic	277	38	1.15	0.15	-	0.9
L24F	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	1	Electronic	277	38	1.15	0.15	-	0.9
L24G	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
L24H	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	1	Electronic	277	38	1.15	0.15	-	0.9
L24J	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
L24K	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
L24L	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
L24M	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	2	Electronic	277	64	0.95	0.218	-	0.95
	T5	28	1	Electronic	277	38	1.15	0.15	-	0.9
L25	T5	28	1	Electronic	277	38	1.15	0.15	-	0.9
L26	T5	28	1	Electronic	277	33	1.04[1]	0.12	-	0.98
L27	CFL	26	1	Electronic	277	46	1.1[2]	0.24	-	0.99

L27A	CFL	26	1	Electronic	277	46	1.1[2]	0.24	-	0.99
L27B	CFL	26	1	Electronic	277	46	1.1[2]	0.24	-	0.99
L28	CFL	32	1	Electronic	277	46	0.97[2]	0.31	-	0.98
L28A	CFL	32	1	Electronic	277	46	0.97[2]	0.31	-	0.98
L28B	CFL	32	1	Electronic	277	46	0.97[2]	0.31	-	0.98
L28C	CFL	32	1	Electronic	277	46	0.97[2]	0.31	-	0.98
L28D	CFL	32	1	Electronic	277	46	0.97[2]	0.31	-	0.98
L29	MR16	37	1	-	120	44	-	0.31	-	1
L30	T5	28	1	Electronic	277	33	1.04[1]	0.12	-	0.98
L31	CFL	32	1	Electronic	277	36	0.97[2]	0.31	-	0.98
L32	CFL	32	1	Electronic	277	36	0.97[2]	0.31	-	0.98
L33	T5	28	1	Electronic	277	33	1.04[1]	0.12	-	0.98
L34	T5	28	1	Electronic	277	33	1.04[1]	0.12	-	0.98
L34A	T5	28	1	Electronic	277	33	1.04[1]	0.12	-	0.98
L37	LED	12W/ft	-	Driver	120	12W/ft	-	-	-	-
L38	MR16	37	1	-		87	-	0.31	-	1
	T5	40	1	Electronic	277		1[1]			
L40	LED	12W/ft	-	Driver	120	7.6W/ft	-	-	-	-
L41	CFL	26	2	Electronic	277	55	1.1[2]	0.24	-	0.99
L42A	T5	28	2	Electronic	277	144	0.95[1]	0.218		0.95
	T5	28	1	Electronic	277		1.04[1]	0.12		0.98
	T5	21	2	Electronic	277		1.03[1]	0.10	-	0.95
L44	CMH PAR20	20	1	Electronic	277	23	0.95[4]	0.53	0.63	0.95
L45	CMH PAR20	20	1	Electronic	277	23	0.95[4]	0.53	0.63	0.95
L46A	CMH PAR20	39	1	Electronic	277	23	0.95[4]	0.53	0.63	0.95
L47	CFL	32	1	Electronic	277	36	0.97[2]	0.31	-	0.98
L48	CFL	32	1	Electronic	277	36	0.97[2]	0.31	-	0.98
L49	T8	32	2	Electronic	277	63	0.88[3]	0.22	-	0.89
L50	T5	28	1	Electronic	277	33	1.04[1]	0.12	-	0.98
L51	T8	32	1	Electronic	277	36	0.99[1]	0.14	-	0.95
L54	LED	8W/SF	-	Driver	120	8W/SF	-	-	-	-

Mechanical and other Loads

The three story renovation in Tisch Hall only involves a few mechanical equipments. In terms of the plumbing equipment, only the waste water removal pump is in the renovated addition.

Mechanical Equipment Loads								
Tag	Description	Load	Amps	Voltage	Phase	PF	kVA	kW
AC-3	Water-cooled A/C	40 HP	52	480	3	0.9	43.23	38.91
AC-4	Water-cooled A/C	40 HP	52	480	3	0.9	43.23	67.39
AC-5	Water-cooled A/C	30 HP	40	480	3	0.9	33.25	51.84
RF-3	Return Fan	20 HP	27	480	3	0.9	22.45	34.99
RF-4	Return Fan	20 HP	27	480	3	0.9	22.45	34.99
RF-5	Return Fan	15 HP	21	480	3	0.9	17.46	27.21
EF-1	Exhaust Fan	1.5 HP	3	480	3	0.8	2.49	3.46
EX-1	Exhaust	2 HP	3.4	480	3	0.8	2.83	3.92
EX-2	Exhaust	1.5 HP	3	480	3	0.8	2.49	3.46
Plumbing Equipment Loads								
Tag	Description	Load	Amps	Voltage	Phase	PF	kVA	kW
WRS-1	Waste Water Removal Pump	1/3 HP	4.4	120	1	0.7	528	369.6

Service Entrance Size

Service Entrance Size: Load per Square Foot			
Building Type: College Buildings - Classroom Building 12VA/Sq.Ft.			
Area	VA/Sq.Ft.	VA	kVA
70,000	12	840000	840

Service Entrance Size: NEC Loading			
Type of Occupancy: Schools - 3 VA/sq. ft.			
Load	Area	VA/Sq.Ft.	VA
Lighting Load	70,000	3	210000
Receptacle Load	70,000	1	70000
Mechanical	70,000	7	490000
Fans/Pumps	70,000	2	140000
		Total (kVA)	910

[1]VA/Sq.Ft. taken from NEC

Service Entrance Size: Actual Loading			
Load	Load (VA)	Demand Factor	Demand Load
Lighting Load	210000	-	210000
Receptacle Load	70000	-	70000
Mechanical Load	189883	0.8	151906
Plumbing Load	528000	0.8	422400
		Total (kVA)	854

[1]Demand Factors taken from NEC

Summary Table	
Method	Load - kVA
Square Footage Method	840
NEC Loading Method	910
Actual Conditions - Service Entrance	432

Environmental Stewardship Design

Energy efficient light sources such as fluorescent lamps, compact fluorescents, and LEDs are employed on this project. These light sources provide higher efficacies of light output and significant reduce the overall energy consumption. There is also dimming involved with lighting luminaires.

In terms of LEED, the building is able to fulfill certain criteria related to the electrical system. The building uses an energy efficient HVAC system.

Design Issues

The three renovated levels of Tisch Hall ties the electrical design into the existing system. There is no clear documentation of an emergency generator been connected to the renovated systems. Another issue is the need to address the overall electrical conditions of the existing system. There is no clear indication of where the cogen main service switchboard gets its power from.

Communication Systems

Air Quality Monitoring System

The air quality monitoring system will utilize local room sensors and duct probes to sample air quality. The air quality monitoring system will continuously sample air and environmental conditions via the internet. BACNET, a data communication protocol will be employed for building automation systems.

Fire Alarm System

The Fire Alarm System Control Panel (FACP) will include manual pull stations, smoke detectors, and photoelectric smoke detectors to detect a fire. In an outbreak of fire, the FACP will sent out emergency responses

Data and Telecom System

Data and telecom systems are provided through the data jacks that are located throughout the renovated rooms of Tisch Hall. The data jacks help provide service for the internet, phone, and AV equipment.

Security System

The security system will include various video cameras and security card readers throughout the building. There will also be a security desk in the Tisch Lobby.

Appendix

LEGEND OF FEEDER SIZES

COPPER CONDUCTORS

FEEDER SYMBOL	CONDUCTORS (3 PHASE, 3 WIRE) WITH GROUND	RACEWAY SIZE CONDUIT	CONDUCTORS (3 PHASE, 4 WIRE) WITH GROUND	RACEWAY SIZE CONDUIT	NOMINAL AMPERE RATING
(1)	3#4 & 1#10G.	1"			60
(2)			4#4 & 1#10G.	1 1/4"	
(3)	3#4 & 1#8G.	1"			70
(4)			4#4 & 1#8G.	1 1/4"	
(5)	3#1 & 1#8G.	1 1/2"			100
(6)			4#1 & 1#8G.	1 1/2"	
(7)	3#1/0 & 1#6G.	1 1/2"			125
(8)			4#1/0 & 1#6G.	2"	
(9)	3#1/0 & 1#6G.	1 1/2"			150
(10)			4#1/0 & 1#6G.	2"	
(11)	3#2/0 & 1#6G.	2"			175
(12)			4#2/0 & 1#6G.	2"	
(13)	3#3/0 & 1#6G.	2"			200
(14)			4#3/0 & 1#6G.	2"	
(15)	3#4/0 & 1#4G.	2"			225
(16)			4#4/0 & 1#4G.	2 1/2"	
(17)	3#250 KCMIL & 1#4G.	2 1/2"			250
(18)			4#250 KCMIL & 1#4G.	3"	
(19)	3#350 KCMIL & 1#4G.	3"			300
(20)			4#350 KCMIL & 1#4G.	3"	
(21)	3#500 KCMIL & 1#3G.	3 1/2"			350
(22)			4#500 KCMIL & 1#3G.	4"	
(23)	3#600 KCMIL & 1#3G.	3 1/2"			400
(24)			4#600 KCMIL & 1#3G.	4"	
(25)	6#250 KCMIL & 2#2G.	2-2 1/2"			500
(26)			8#250 KCMIL & 2#2G.	2-3"	
(27)	6#350 KCMIL & 2#1G.	2-3"			600
(28)			8#350 KCMIL & 2#1G.	2-3"	
(29)	6#600 KCMIL & 2#1/0G.	2-3 1/2"			800
(30)			8#600 KCMIL & 2#1/0G.	2-4"	
(31)	9#400 KCMIL &3#2/0G.	3-3"			1000
(32)			12#400 KCMIL &3#2/0G.	3-3"	
(33)	9#600 KCMIL & 3#3/0G.	3-3 1/2"			1200
(34)			12#600 KCMIL & 3#3/0G.	3-4"	
(35)	12#600 KCMIL & 4#4/0G.	4-3 1/2"			1600
(36)			16#600 KCMIL & 4#4/0G.	4-4"	

NOTES:

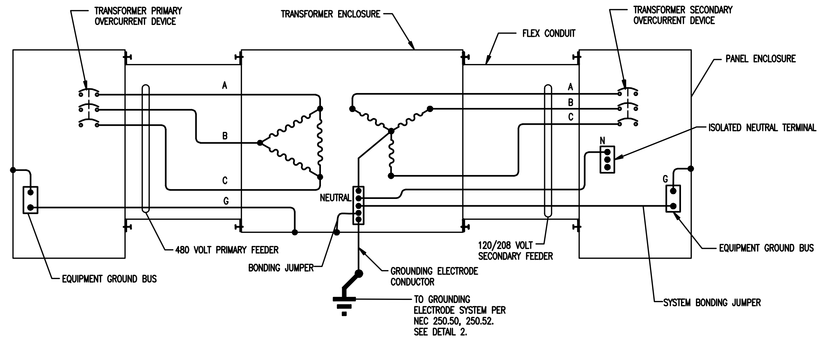
1. 600KCMIL FEEDERS SHALL BE PROVIDED WITH MAC ADAPTERS AS REQUIRED TO COORDINATE WITH BREAKER LUG SIZES.
2. SEE SPECIFICATIONS FOR ACCEPTABLE CONDUCTOR TYPES.

DRY TYPE TRANSFORMER SCHEDULE

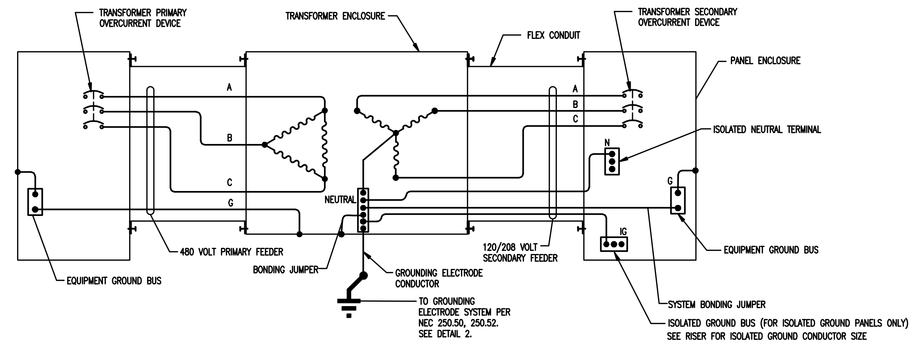
SIZE	KVA	PRIMARY AMPS	SECONDARY AMPS	480 VOLT OVERCURRENT	208 VOLT (4) OVERCURRENT	480V FEEDER	120/208V FEEDER	GROUNDING SEE NOTE #5
T1	9	11	25	20A, 3P	30A, 3P	3#12 & 1#12G – 3/4"C.	3#10 & 1#10G – 3/4"C.	1#6 – 3/4"C
T2	15	18	42	30A, 3P	50A, 3P	3#10 & 1#10G – 3/4"C.	4#6 & 1#10G – 1"C.	1#6 – 3/4"C
T3	30	36	83	60A, 3P	100A, 3P	3#4 & 1#10G – 1"C.	4#1 & 1#8G – 1 1/2"C.	1#6 – 3/4"C
T4	45	54	125	80A, 3P	150A, 3P	3#3 & 1#8G – 1 1/4"C.	4#1/0 & 1#6G – 2"C.	1#6 – 3/4"C
T5	75	90	208	150A, 3P	250A, 3P	3#1/0 & 1#6G – 1 1/2"C.	4#250 KCMIL & 1#4G – 3"C.	1#2 – 3/4"C
T6	112.5	135	313	200A, 3P	400A, 3P	3#1/0 & 1#6G – 2"C.	4#600 KCMIL & 1#1/0 G. – 4"C.	1#1/0 – 3/4"C.
T7	150	181	417	300A, 3P	500A, 3P	3#350 KCMIL & 1#4G – 3"C.	8#250 KCMIL & 2#2G 2–3"C.	1#1/0 – 3/4"C
T8	225	270	625	400A, 3P	800A, 3P	3#500 KCMIL & 1#3G – 3 1/2"C.	8#600 KCMIL & 2#2/0G. 2–4"C.	1#3/0 – 3/4"C
T9	300	361	834	600A, 3P	1000A, 3P	6#350 KCMIL & 2#1G 2–3"C.	12#400 KCMIL & 3#2/0G 3–3"C.	1#3/0 – 3/4"C
T10	500	600	1400	900A, 3P	1600A, 3P	9#350 KCMIL & 3#2/0G 3–3"C.	16#600 KCMIL & 4#4/0G 4–4"C.	1#300KCMIL–1"C.

TRANSFORMER NOTES:

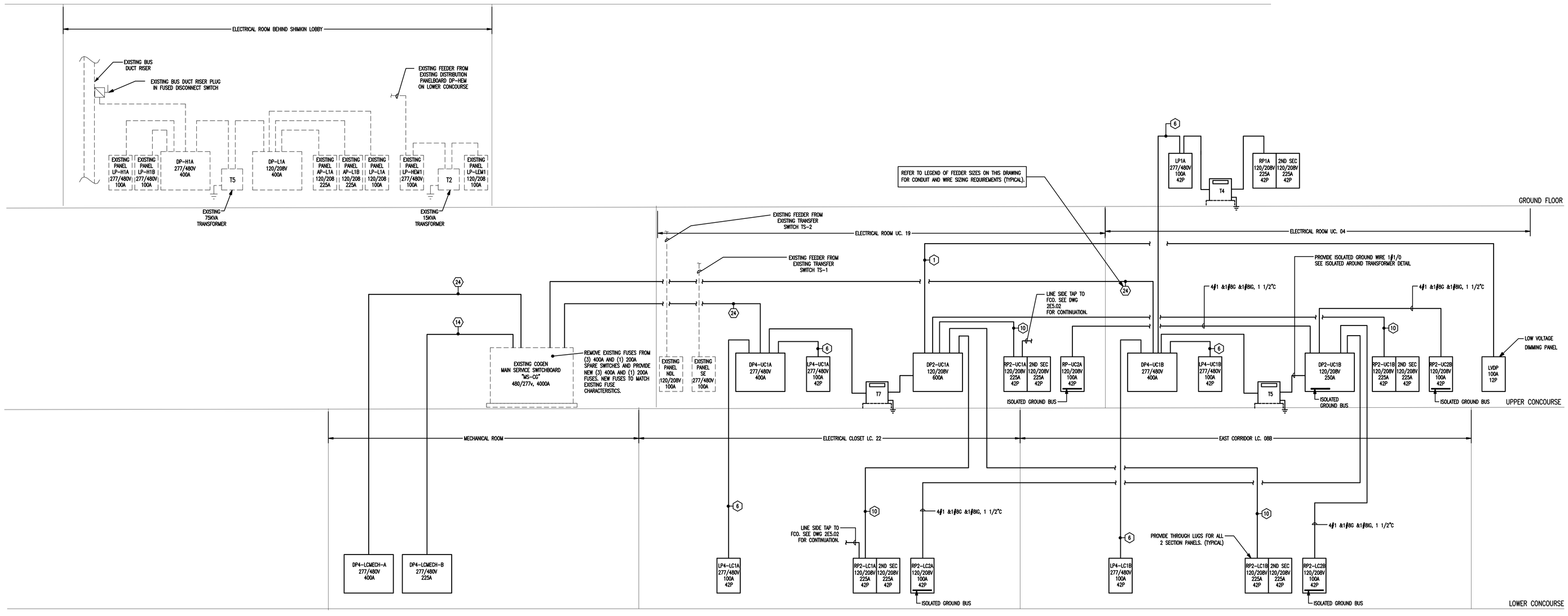
1. BOND NEUTRAL OF TRANSFORMER SECONDARY TO THE TRANSFORMER CASE, WITH BONDING JUMPER.
2. GROUND THE CASING OF THE TRANSFORMER TO NEAREST AVAILABLE EFFECTIVELY GROUNDED WATER PIPE, STRUCTURAL STEEL AND/OR DRIVEN GROUND ROD IN ACCORDANCE WITH N.E.C. 250–81 AND 250–83.
3. ALL CONDUCTOR SIZES ARE FOR COPPER CONDUCTORS. N.E.C. TABLE 310–16.
4. SECONDARY OVERCURRENT PROTECTION SHALL BE LOCATED WITHIN TEN (10) FEET OF THE TRANSFORMER SECONDARY TERMINALS EITHER IN A PANELBOARD (MAIN BREAKER) OR A INDIVIDUALLY MOUNTED CIRCUIT BREAKER.
5. TRANSFORMER BONDING JUMPER AND GROUNDING ELECTRODE CONDUCTOR.
6. 600KCMIL CONDUCTORS SHALL BE PROVIDED WITH MAC ADAPTERS AS REQUIRED TO COORDINATE WITH BREAKER LUG SIZES.



TRANSFORMER DETAIL



ISOLATED GROUND TRANSFORMER DETAIL



(1) PROPOSED NEW PARTIAL RISER DIAGRAM – LOWER AND UPPER CONCOURSE LEVELS
NOT TO SCALE

NEW YORK UNIVERSITY STERN SCHOOL OF BUSINESS

NYU STERN
NEW YORK UNIVERSITY LEONARD N. STERN SCHOOL OF BUSINESS

LOBBY & CONCOURSE RENOVATION

NYU PROJECT NO. X07E8

ARCHITECTS
PERKINS + WILL
215 Park Avenue South
New York, NY 10003
(212) 251-7000

in association with:

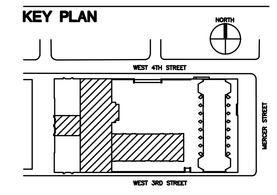
Construction Manager
StructureTone
770 Broadway, 9th Floor
New York, NY 10003

Mechanical/Electrical Engineer
Bard, Rao + Athanas
105 Madison Avenue, 10th Floor
New York, NY 10016

Structural Engineer
Severud Associates
469 Seventh Avenue
New York, NY 10018

Lighting Consultant
Cline Bettridge Bernstein Lighting Design
30 West 22nd Street
New York, NY 10010

KEY PLAN



NO.	ISSUE	DATE
2	ISSUE FOR BID	06/06/08
1	75% DESIGN DEVELOPMENT	01/25/08

SEAL

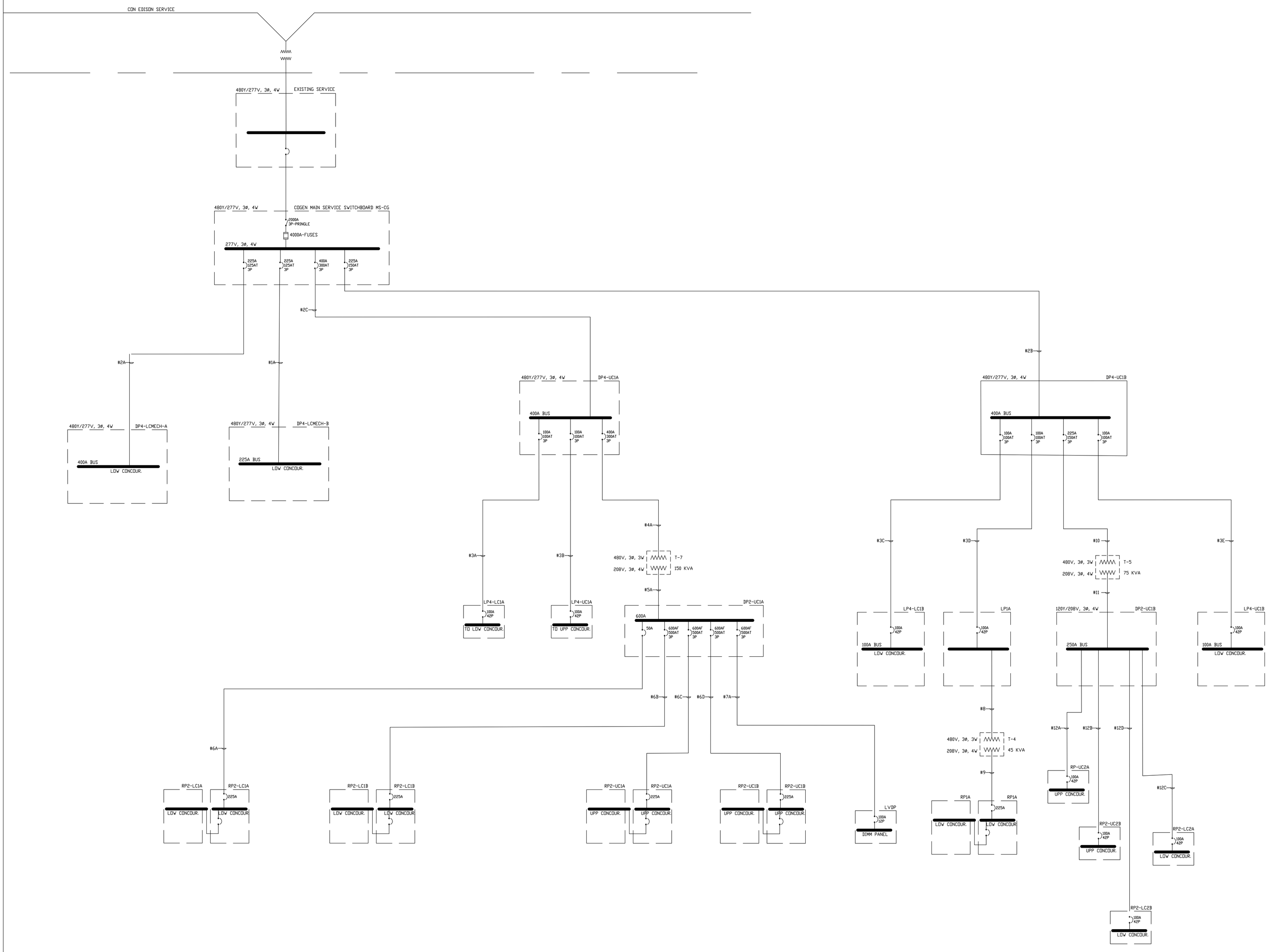
PHASE 3

SCALE NONE
JOB NO. 03.1521.000
DRAWING TITLE

ELECTRICAL POWER RISER

DRAWING NO.

3E5.01



NEW YORK CONCOURSE PROJECT

40-44 WEST
4TH STREET,
NEW YORK, NY 10012

KEVIN HSIA

AE 481 SENIOR THESIS

TITLE:
SINGLE LINE DIAGRAM

SCALE: NOT TO SCALE

NOVEMBER 4, 2008

D

FEEDER SCHEDULE

TAG	FROM	TO	NO. OF SETS	CONDUIT (PER SET)		CONDUCTORS (PER SET)									SIZE OF OVERCURRENT PROTECTION	FRAME OR SWITCH SIZE	REMARKS
						PHASE CONDUCTORS			NEUTRAL CONDUCTORS			GROUND CONDUCTORS					
				SIZE	TYPE	No.	SIZE	TYPE	No.	SIZE	TYPE	No.	SIZE	TYPE			
1A	MS-CG	DP4-LCMECH-B	1	2"	EMT	3	3/0AWG	CU THWN	1	3/0AWG	CU THWN	1	6AWG	CU THWN	225	225A/3P	
2A	MS-CG	DP4-LCMECH-A	1	4"	EMT	3	600KCMIL	CU THWN	1	600KCMIL	CU THWN	1	3AWG	CU THWN	225	225A/3P	
2B	MS-CG	DP4-UC1B	1	4"	EMT	3	600KCMIL	CU THWN	1	600KCMIL	CU THWN	1	3AWG	CU THWN	225	225A/3P	
2C	MS-CG	DP4-UC1A	1	4"	EMT	3	600KCMIL	CU THWN	1	600KCMIL	CU THWN	1	3AWG	CU THWN	400	400A/3P	
3A	DP4-UC1A	**LP4-LC1A**	**1**	**1 1/2'**	EMT	**3**	**1AWG**	CU THWN	1	**1AWG**	CU THWN	**1**	**8AWG**	CU THWN	100	100A/3P	
3B	DP4-UC1A	**LP4-UC1A**	**1**	**1 1/2'**	EMT	**3**	**1AWG**	CU THWN	1	**1AWG**	CU THWN	**1**	**8AWG**	CU THWN	100	100A/3P	
4A	DP4-UC1A	**T-7**	**1**	**3/4"**	EMT	**3**	**350KCMIL**	CU THWN	**-**	**-**	-	**1**	**4AWG**	CU THWN	300	300A/3P	
5A	**T-7**	**DP2-UC1A**	**2**	**3'**	**EMT**	**3**	**250KCMIL**	CU THWN	**1**	**250KCMIL**	CU THWN	**1**	**2AWG**	CU THWN	500	500A/3P	
6A	**DP2-UC1A**	**RP2-LC1A**	**1**	**2'**	**EMT**	**3**	**1/0AWG**	CU THWN	**1**	**1/0AWG**	CU THWN	**1**	6AWG	CU THWN	150	150A/3P	
6B	**DP2-UC1A**	**RP2-LC1B**	**1**	**2'**	**EMT**	**3**	**1/0AWG**	CU THWN	**1**	**1/0AWG**	CU THWN	**1**	6AWG	CU THWN	150	150A/3P	
6C	**DP2-UC1A**	**RP2-UC1A**	**1**	**2'**	**EMT**	**3**	**1/0AWG**	CU THWN	**1**	**1/0AWG**	CU THWN	**1**	6AWG	CU THWN	150	150A/3P	
6D	**DP2-UC1A**	**RP2-UC1B**	**1**	**2'**	**EMT**	**3**	**1/0AWG**	CU THWN	**1**	**1/0AWG**	CU THWN	**1**	6AWG	CU THWN	150	150A/3P	
7A	**DP2-UC1A**	**LVDP**	**1**	**1'**	**EMT**	**3**	**4AWG**	CU THWN	**-**	**-**	-	**1**	10AWG	CU THWN	60	60A/3P	
3C	**DP4-UC1B**	**LP4-LC1B**	**1**	**1 1/2'**	EMT	**3**	**1AWG**	CU THWN	1	**1AWG**	CU THWN	**1**	**8AWG**	CU THWN	100	100A/3P	
3D	**DP4-UC1B**	**LP1A**	**1**	**1 1/2'**	EMT	**3**	**1AWG**	CU THWN	1	**1AWG**	CU THWN	**1**	**8AWG**	CU THWN	100	100A/3P	
8	**LP1A**	**T4**	**1**	**1 1/4'**	**EMT**	**3**	**3AWG**	CU THWN	**-**	**-**	-	**1**	**8AWG**	CU THWN	80	80A/3P	
9	**T4**	**RP1A**	**1**	**2'**	**EMT**	**3**	**1/0AWG**	CU THWN	**1**	**1/0AWG**	CU THWN	**1**	6AWG	CU THWN	150	150A/3P	
10	**DP4-UC1B**	**T5**	**1**	**1 1/2'**	**EMT**	**3**	**1/0AWG**	CU THWN	**-**	**-**	-	**1**	6AWG	CU THWN	150	150A/3P	
11	**T5**	**DP2-UC1B**	**1**	**3'**	**EMT**	**3**	**250KCMIL**	CU THWN	**1**	**250KCMIL**	CU THWN	**1**	**4AWG**	CU THWN	250	250A/3P	
12A	**DP2-UC1B**	**RP2-UC2A**	**1**	**1 1/2'**	**EMT**	**3**	**1AWG**	CU THWN	1	**1AWG**	CU THWN	**1**	**8AWG**	CU THWN	100	100A/3P	
12B	**DP2-UC1B**	**RP2-UC2B**	**1**	**1 1/2'**	**EMT**	**3**	**1AWG**	CU THWN	1	**1AWG**	CU THWN	**1**	**8AWG**	CU THWN	100	100A/3P	
12C	**DP2-UC1B**	**RP2-LC2A**	**1**	**1 1/2'**	**EMT**	**3**	**1AWG**	CU THWN	1	**1AWG**	CU THWN	**1**	**8AWG**	CU THWN	100	100A/3P	
12D	**DP2-UC1B**	**RP2-LC2B**	**1**	**1 1/2'**	**EMT**	**3**	**1AWG**	CU THWN	1	**1AWG**	CU THWN	**1**	**8AWG**	CU THWN	100	100A/3P	
3E	**DP4-UC1B**	**LP4-UC1B**	**1**	**1 1/2'**	EMT	**3**	**1AWG**	CU THWN	1	**1AWG**	CU THWN	**1**	**8AWG**	CU THWN	100	100A/3P	

NOTES:
1. REFER TO RISER DIAGRAM FOR FEEDER TAGS
2. ADD PROJECT NOTES HERE

AL=ALUMINUM
CU=COPPER

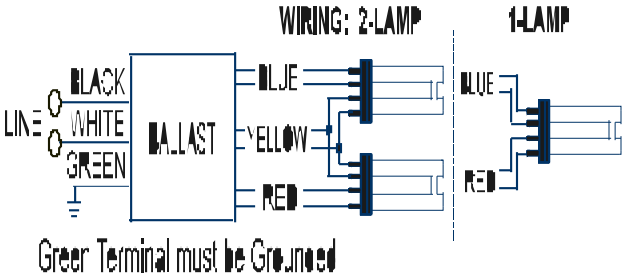
ICF2S26H1LDQS@120

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

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
CFQ26W/G24Q	2	26	0/-18	0.43	51	1.00	10	0.99	1.7	1.96
CFTR26W/GX24Q	1	26	0/-18	0.24	29	1.10	10	0.99	1.7	3.79
CFTR26W/GX24Q	2	26	0/-18	0.45	54	1.00	10	0.99	1.7	1.85
* CFTR32W/GX24Q	1	32	0/-18	0.31	36	0.98	10	0.98	1.7	2.72
CFTR42W/GX24Q	1	42	0/-18	0.38	46	0.98	10	0.98	1.7	2.13

Wiring Diagram



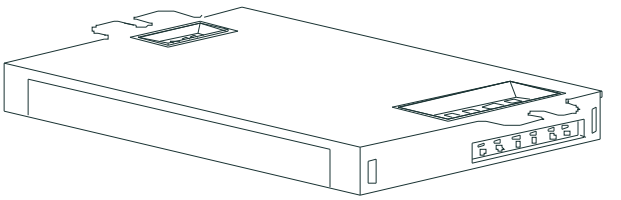
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

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

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

Enclosure



Enclosure Dimensions

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

Revised 08/05/2008

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

ICF2S26H1LDQS@120	
Brand Name	SMARTMATE-QS
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Notes:

Section I - Physical Characteristics

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

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

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

Section II - Performance Requirements

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

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

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

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

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

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

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

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

2.9 Ballast shall have a Class A sound rating.

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

2.11 Ballast shall provide Lamp EOL Protection Circuit.

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

Section III - Regulatory Requirements

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

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

3.3 Ballast shall be rated for use in air-handling spaces.

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

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

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

Section IV - Other

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

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

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

4.4 Ballast shall at 120V meet the ballast-controlled performance requirements in the ENERGY STAR Program Requirements for Residential Lite Fixtures.

Revised 08/05/2008

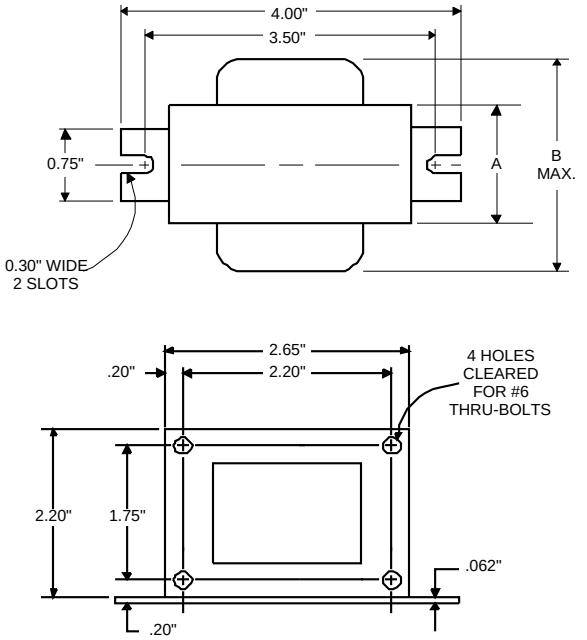
ADVANCE
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD
ROSEMONT, ILLINOIS 60018
TELEPHONE: (847) 390-5000 FAX: (847) 390-5109

Metal Halide Lamp Ballast

Catalog Number 71A5037BP
For 35/39W M130
60 Hz R-NPF
Status: Active

DIMENSIONS AND DATA

2 5/8 X 2 3/16 CORE



~~INPUT VOLTS~~		277				
CIRCUIT TYPE	R-NPF					
POWER FACTOR (min)	33%					
REGULATION						
Line Volts	±5%					
Lamp Watts	±10%					
LINE CURRENT (Amps)						
Operating		0.53				
Open Circuit		0.00				
Starting		0.63				
UL TEMPERATURE RATINGS						
Insulation Class	H(180°C)					
Coil Temperature Code	1029	A				
MIN. AMBIENT STARTING TEMP.	-20°F or -30°C					
NOM. OPEN CIRCUIT VOLTAGE	277					
INPUT VOLTAGE AT LAMP DROPOUT		190				
INPUT WATTS	48					
RECOMMENDED FUSE (Amps)		2				
CORE and COIL						
Dimension (A)	0.95					
Dimension (B)	2.70					
Weight (lbs.)	1.7					
Lead Lengths	48"					
CAPACITOR REQUIREMENT						
Microfarads						
Volts (min.)						
Fault Current Withstand (amps)						
60 Hz TEST PROCEDURES (Refer to Advance Test Procedure for HID Ballasts - Form 1270)						
High Potential Test (Volts)						
1 minute	2000					
2 seconds	2500					
Open Circuit Voltage Test (Volts)	260-290					
Short-Circuit Current Test (Amps)						
Secondary Current	0.50-0.80					
Input Current		0.50 0.80	-	-	-	-

Capacitor:

This ballast does not require the use of a capacitor.

Ignitor: INTEGRAL

An ignitor integral to the core and coil assembly is used to start the lamp.

Ballast to Lamp Distance (BTL) = 2 feet
Temp Rating: 125°C

Wiring Diagram:

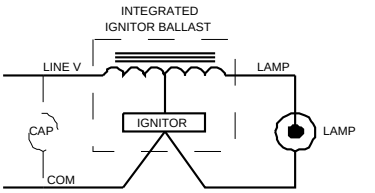


Fig. H

U.L. RECOGNIZED

Typical Ordering Information

(please call Advance for suffix availability)

Order Suffix	Description
600B	Ballast and Integral Igniter, No Capacitor
610B	Ballast w/Welded Bracket and Integral Igniter, No Capacitor

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

ADVANCE
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
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Corporate Offices: Phone: 800-322-2086

12/14/05

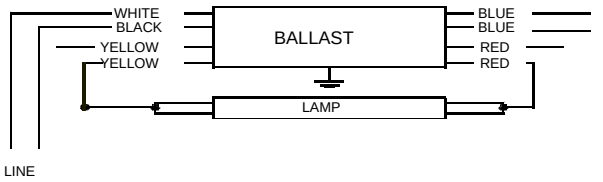
VOP-4P32-LW-SC

Brand Name	OPTANIUM
Ballast Type	Electronic
Starting Method	Instant Start
Lamp Connection	Parallel
Input Voltage	277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
* F32T8	1	32	0/-18	0.14	35	0.99	20	0.95	1.7	2.83
F32T8	2	32	0/-18	0.22	58	0.89	10	0.98	1.7	1.53
F32T8	3	32	0/-18	0.29	78	0.82	10	0.99	1.7	1.05
F32T8	4	32	0/-18	0.35	95	0.78	10	0.99	1.7	0.82

Wiring Diagram



Diag. 71B

Insulate unused lead for 1000V

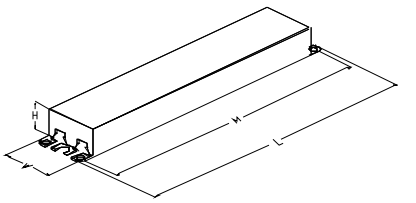
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	25L	63.5
White	25L	63.5
Blue	31R	78.7
Red	31R	78.7
Yellow	39L	99.1
Gray		0
Violet		0

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

Enclosure



Enclosure Dimensions

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

Revised 06/05/2003

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ADVANCE
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Corporate Offices: Phone: 800-322-2086

VOP-4P32-LW-SC	
Brand Name	OPTANIUM
Ballast Type	Electronic
Starting Method	Instant Start
Lamp Connection	Parallel
Input Voltage	277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Notes:

Section I - Physical Characteristics

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

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

Section II - Performance Requirements

2.1 Ballast shall be Instant Start.

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

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

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

2.5 Ballast shall be high frequency electronic type and operate lamps at a frequency between 42 kHz and 52 kHz to avoid interference with infrared devices, eliminate visible flicker and avoid Article Surveillance System, such as anti-theft devices.

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

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

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

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

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

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

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

Section III - Regulatory Requirements

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

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

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

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

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

3.6 Ballast shall meet NEMA/CEE High Performance T8 Lighting System Specifications.

Section IV - Other

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

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C. Ballasts with a "90C" designation in their catalog number shall also carry a three-year warranty at maximum case temperature of 90C.

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

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

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

Revised 06/05/2003

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ROSEMONT, ILLINOIS 60018
TELEPHONE: (847) 390-5000 FAX: (847) 390-5109

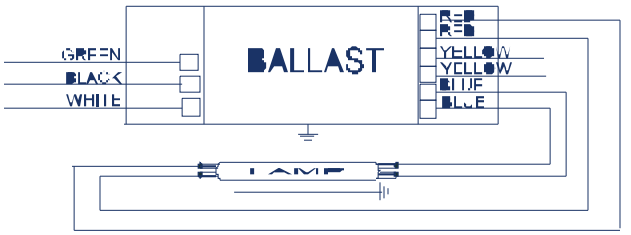
ICN-2S28@277

Brand Name	CENTIUM T5
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
F14T5	1	14	0/-18	0.07	19	1.07	20	0.90	1.7	5.63
F14T5	2	14	0/-18	0.13	34	1.06	10	0.98	1.7	3.12
F21T5	1	21	0/-18	0.10	26	1.03	15	0.95	1.7	3.96
F21T5	2	21	0/-18	0.17	48	1.02	10	0.98	1.7	2.13
F28T5	1	28	0/-18	0.12	33	1.04	10	0.98	1.7	3.15
F28T5	2	28	0/-18	0.23	63	1.03	10	0.99	1.7	1.63
* F35T5	1	35	0/-18	0.15	41	1.01	10	0.98	1.7	2.46
F35T5	2	35	0/-18	0.28	77	1.00	10	0.99	1.7	1.30

Wiring Diagram



For 1 lamp operation, do not use yellow leads

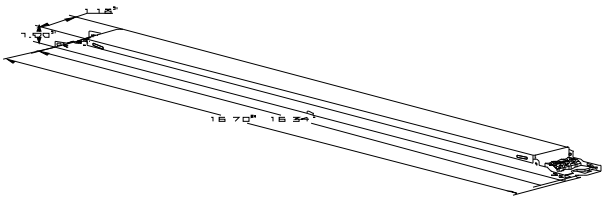
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

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

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

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
16.70 "	1.18 "	1.00 "	16.34 "
16 7/10	1 9/50	1	16 17/50
42.4 cm	3 cm	2.5 cm	41.5 cm

Revised 09/01/2004

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Corporate Offices: Phone: 800-322-2086

ICN-2S28@277	
Brand Name	CENTIUM T5
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Notes:

Section I - Physical Characteristics

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

1.2 Ballast shall be provided with integral leads or poke-in wire trap connectors color-coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be Programmed Start.

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

2.3 Ballast shall operate from 50/60 Hz input source of _____ (120V through 277V or 347V through 480V) with sustained variations of +/- 10% (voltage and frequency) with no damage to the ballast.

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

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

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

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

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

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of _____ {-18C (0F) or -29C (-20F)} for primary lamp. Consult lamp manufacturer for temperature versus light output characteristics.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

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

2.13 Ballast shall have a hi-low switching option when operating (4) F54T5/HO lamps to allow switching from 4-2 lamps, 3-2 lamps or 3-1 lamp.

2.14 Four-lamp ballast shall have semi-independent lamp operation.

Section III - Regulatory Requirements

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

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

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

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

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

3.6 Ballast shall comply with UL Type CC rating.

Section IV - Other

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

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C. Ballasts with a "90C" designation in their catalog number shall also carry a three-year warranty at a maximum case temperature of 90C.

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

Revised 09/01/2004

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B228PU95S50D

APPLICATION and PERFORMANCE SPECIFICATION

Description: High frequency, step-dimming electronic ballast

Primary application: (2) F28T5

Secondary applications: (2) F21T5; (2) F14T5

- Line Voltage: 108vac - 305vac, 50/60Hz
- Series Lamp Operation
- Programmed Rapid Start
- Active Power Factor Correction

*60 Hz data

Lamp Type	Lamp #	Volts	Power Level	Input Watts	Nominal Line Amps	Ballast Factor	Ballast Efficacy Factor	Power Factor	THD %	Crest Factor
F28T5	2	120	100%	60	0.509	0.95	1.58	> 0.95	< 10%	> 1.7
F28T5	2	120	50%	28	0.237	0.34	1.21	> 0.95	< 10%	> 1.7
F28T5	2	277	100%	59	0.218	0.95	1.61	> 0.95	< 10%	> 1.7
F28T5	2	277	50%	28	0.105	0.34	1.21	> 0.95	< 10%	> 1.7
F21T5	2	120	100%	48	0.404	0.99	2.06	> 0.95	< 10%	> 1.7
F21T5	2	120	50%	21	0.179	0.36	1.73	> 0.95	< 10%	> 1.7
F21T5	2	277	100%	47	0.173	0.99	2.10	> 0.95	< 10%	> 1.7
F21T5	2	277	50%	22	0.082	0.36	1.65	> 0.95	< 10%	> 1.7
F14T5	2	120	100%	35	0.289	1.00	2.86	> 0.95	< 10%	> 1.7
F14T5	2	120	50%	16	0.132	0.37	2.30	> 0.95	< 10%	> 1.7
F14T5	2	277	100%	35	0.131	1.00	2.86	> 0.95	< 10%	> 1.7
F14T5	2	277	50%	16	0.063	0.37	2.29	> 0.90	< 10%	> 1.7

Application and Performance Specification Information Subject to Change without Notification.

Performance:
- Meets ANSI Standard C82.11
- Meets ANSI Standard C62.41
- Meets FCC Part 18 (Class A) for EMI and RFI Non-Consumer Limits

Safety:
- No PCB's
- UL listed (Class P, Type 1 Outdoor)
- Type CC
- CSA Certified
- End of lamp life protection with auto-restart

Application:
- Minimum Starting Temperature: 50° F, 10° C
- Maximum Ambient Temperature: 104° F, 40° C
- Maximum Case Temperature [at t_c]: 167° F, 75° C
- Sound Rated: A
- Remote Mounting: 8 ft. max. lead length, 18 AWG
- Tandem Wiring: Not Recommended

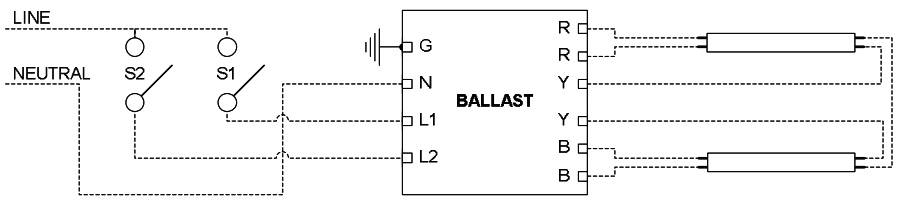
Physical Parameters

Length:	16.88"
Mounting:	16.28"
Width:	1.18"
Height:	1.00"
Weight:	1.25 lbs

Four Input Connectors: L1, L2, N, G
Six Load Connectors: (2) ea. Red, Blue, Yellow

Warranty:
Universal Lighting Technologies warrants to the purchaser that each electronic ballast will be free from defects in material or workmanship for a period of 5 years from date of manufacture when properly installed and under normal conditions of use. Call **1-800-BALLASTx800** for technical assistance.

Manufactured in North America



S1	S2	INPUT POWER
OPEN	OPEN	0%
OPEN	CLOSE	50%
CLOSE	OPEN	50%
CLOSE	CLOSE	100%

Ballast Must be Grounded

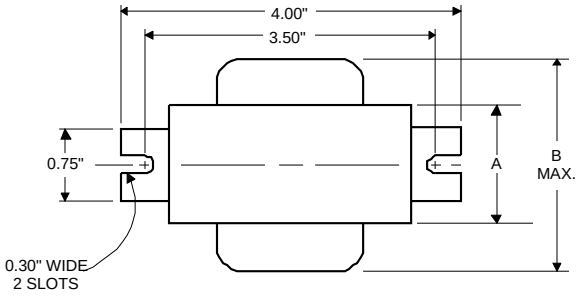
S1 & S2 must be wired on same phase.

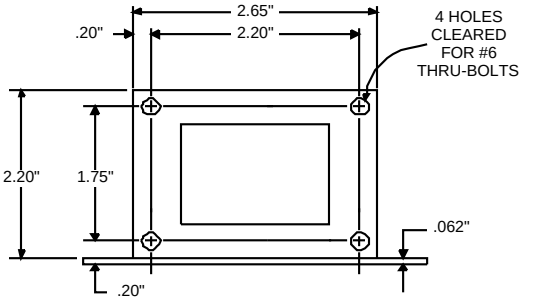
Metal Halide Lamp Ballast

Catalog Number 71A5137BP
For 50W M110
60 Hz R-HPF
Status: Active

DIMENSIONS AND DATA

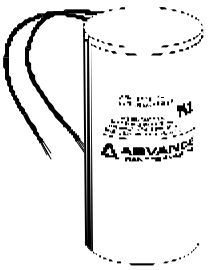
2 5/8 X 2 3/16 CORE





~~INPUT VOLTS~~		277				
CIRCUIT TYPE	R-HPF					
POWER FACTOR (min)	90%					
REGULATION						
Line Volts	±5%					
Lamp Watts	±10%					
LINE CURRENT (Amps)						
Operating		0.22				
Open Circuit		0.55				
Starting		0.35				
UL TEMPERATURE RATINGS						
Insulation Class	H(180°C)					
Coil Temperature Code	1029	A				
MIN. AMBIENT STARTING TEMP.	-20°F or -30°C					
NOM. OPEN CIRCUIT VOLTAGE	277					
INPUT VOLTAGE AT LAMP DROPOUT		190				
INPUT WATTS	62					
RECOMMENDED FUSE (Amps)		2				
CORE and COIL						
Dimension (A)	1.10					
Dimension (B)	2.60					
Weight (lbs.)	2.2					
Lead Lengths	12"					
CAPACITOR REQUIREMENT						
Microfarads	5.0					
Volts (min.)	280					
Fault Current Withstand (amps)						
60 Hz TEST PROCEDURES (Refer to Advance Test Procedure for HID Ballasts - Form 1270)						
High Potential Test (Volts)						
1 minute	2000					
2 seconds	2500					
Open Circuit Voltage Test (Volts)	260-290					
Short-Circuit Current Test (Amps)						
Secondary Current	0.65-0.95					
Input Current		0.25 0.35	-	-	-	-

Capacitor: 7C050L33



Capacitance: 5
Dia/Oval Dim: 1.25
Height: 2.9
Temp Rating: 105°C

Ignitor: INTEGRAL

An ignitor integral to the core and coil assembly is used to start the lamp.

Ballast to Lamp Distance (BTL) = 2 feet
Temp Rating: 125°C

Wiring Diagram:

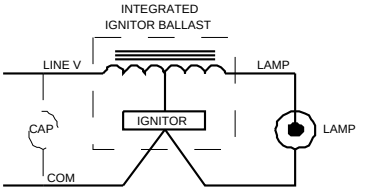


Fig. H

U.L. RECOGNIZED

Typical Ordering Information

(please call Advance for suffix availability)

Order Suffix	Description
500DB	Ballast With Integral Igniter and Dry Film Capacitor
510DB	Ballast w/Welded Bracket, Integral Igniter & Dry Film Cap.
600B	Ballast and Integral Igniter, No Capacitor
610B	Ballast w/Welded Bracket and Integral Igniter, No Capacitor

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Corporate Offices: Phone: 800-322-2086

05/15/03

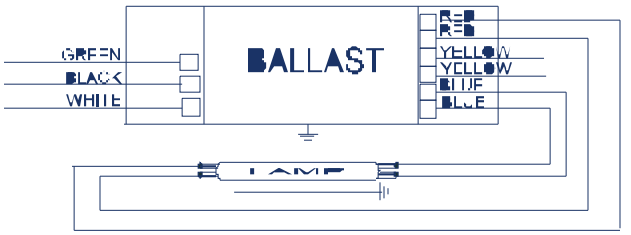
ICN-2S28@277

Brand Name	CENTIUM T5
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
F14T5	1	14	0/-18	0.07	19	1.07	20	0.90	1.7	5.63
F14T5	2	14	0/-18	0.13	34	1.06	10	0.98	1.7	3.12
* F21T5	1	21	0/-18	0.10	26	1.03	15	0.95	1.7	3.96
F21T5	2	21	0/-18	0.17	48	1.02	10	0.98	1.7	2.13
F28T5	1	28	0/-18	0.12	33	1.04	10	0.98	1.7	3.15
F28T5	2	28	0/-18	0.23	63	1.03	10	0.99	1.7	1.63
F35T5	1	35	0/-18	0.15	41	1.01	10	0.98	1.7	2.46
F35T5	2	35	0/-18	0.28	77	1.00	10	0.99	1.7	1.30

Wiring Diagram



For 1 lamp operation, do not use yellow leads

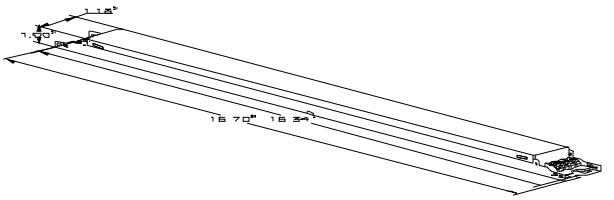
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

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

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

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
16.70 "	1.18 "	1.00 "	16.34 "
16 7/10	1 9/50	1	16 17/50
42.4 cm	3 cm	2.5 cm	41.5 cm

Revised 09/01/2004

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ICN-2S28@277	
Brand Name	CENTIUM T5
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Notes:

Section I - Physical Characteristics

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

1.2 Ballast shall be provided with integral leads or poke-in wire trap connectors color-coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be Programmed Start.

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

2.3 Ballast shall operate from 50/60 Hz input source of _____ (120V through 277V or 347V through 480V) with sustained variations of +/- 10% (voltage and frequency) with no damage to the ballast.

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

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

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

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

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

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of _____ {-18C (0F) or -29C (-20F)} for primary lamp. Consult lamp manufacturer for temperature versus light output characteristics.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

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

2.13 Ballast shall have a hi-low switching option when operating (4) F54T5/HO lamps to allow switching from 4-2 lamps, 3-2 lamps or 3-1 lamp.

2.14 Four-lamp ballast shall have semi-independent lamp operation.

Section III - Regulatory Requirements

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

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

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

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

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

3.6 Ballast shall comply with UL Type CC rating.

Section IV - Other

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

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 70C. Ballasts with a "90C" designation in their catalog number shall also carry a three-year warranty at a maximum case temperature of 90C.

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

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

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