

OVERVIEW

Modulus is a Class 1 distributed low voltage power and control system providing digital control and networked technologies for LED luminaires, available in select products from Acuity Brands. The system uses a single remote power supply and controller (the "Head Unit") to supply power and digital addressable control to up to 32ft of connected fixtures. It provides the same extensive capabilities as the best of Acuity Brands' control and driver systems, including:

- eldoLED® drivers for flicker-free dimming and tunable white
- nLight® networked lighting controls and embedded sensors
- IOTA® Emergency Lighting Inverter for emergency back-up power

Modulus provides the same benefits of integrated technologies within the luminaire while reducing the number of head units. This device allows Acuity Brands engineers to create new sizes and shapes of luminaires that aren't constricted by the size requirements needed to include advanced technologies.

FEATURES

- Grid ceiling recessed and surface mounting options
- Class 2 Plug & Play DC Power and Control Distribution system
- The integrated controls bus provides up to 100mA of bus power for connected DC/DC drivers using nLight (wired and air) control types. Provides 30mA of bus power for 0-10 volt protocol
 - Number of fixtures that can be powered by a single head unit is a function of lumen package and desired control zones.
 - Refer to fixture spec sheet for details
- UL924 certified for emergency applications
- cUL listed to UL2108

Warranty

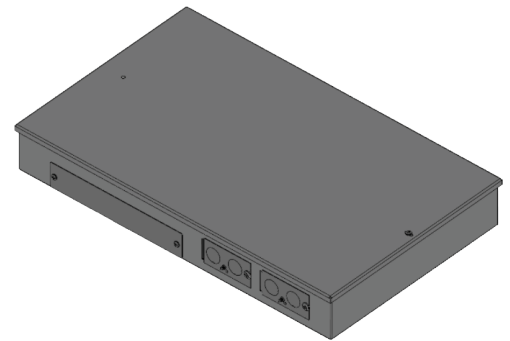
Five-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application. Specifications subject to change without notice.



Modulus™ Head Unit

*Distributed low voltage
power and control system*



ORDERING INFORMATION

ECYA1000AT				Example: DK320P STWH NLIGHT 120 F2 C202			
Series		Dynamic Feature		Control Input		Voltage	
DK320P	Peerless DC2DC Head Unit, 320W max output	STWH	Static White	ZT	0-10V	120	120V
DK320M	Mark DC2DC Head Unit, 320W max output	TUWH	Tunable White	DALI	DALI Enabled	277	277V
DK75P	Peerless DC2DC Head Unit, 75W max output			NLIGHT	NLIGHT Wired Enabled	347 ¹	347V
DK75M	Mark DC2DC Head Unit, 75W max output			NLTAIR2	NLIGHT Wireless Enabled	MVOLT	Multi Volt
				NLT	nLight nTuneinterface		

Emergency Option		Mounting/Overall Suspension		Finish		Territory Compliance	
[blank]	None	F1 ⁴	Grid Recessed	<u>Peerless:</u>		CP ³	Chicago Plenum
1EC	Single Emergency Circuit	F2	Surface Mount	C110	Painted Aluminum		
E35INV	35W Micro Inverter			C202	Textured Black		
				C210	Textured White		
				C099	Custom Color		
				<u>Mark:</u>			
				WHTT	White Textured		
				BLKT	Black Textured		
				SLVT	Silver Textured		
				RALTB ²	RAL Paint Finish		

Notes

- 347 is not available with E35INV or EC. MVOLT is not available with E35iNV.
- RALTB² is for pricing only. Replace with applicable RAL number and finish when placing order. See the [RAL BROCHURE](#) for available options.
- CP only available with F1 mounting.
- F1 mounting has no finish.

SPECIFICATIONS

Electrical

Input Ratings 120VAC, 277VAC, 120-277VAC, 347VAC @ 50/60 Hz

Low Voltage Output Ratings 30mA (0-10V), 100mA (nlight) at 15VDC, ~5mA per RJ-45 Port (nLight Wired)

DC Power Output Ratings 5.61amps @ 57V DC

Environmental

Warrantied Operating Temperature 0°C to 25°C F1 mounting, 0°C to 40°C F2 mounting

Relative Humidity Up to 90%, Non-Condensing

Standards/ Rating RoHS, Plenum rated per UL2043, UL2108, UL924, Damp location, type IC for F1 mounting style

CONTROL ZONES

Modulus head units contain a DALI master controller that can take control inputs and convert them to DALI group dimming commands. The number of addressable groups varies as a function of the control type.

Control Types and Addressable Zones

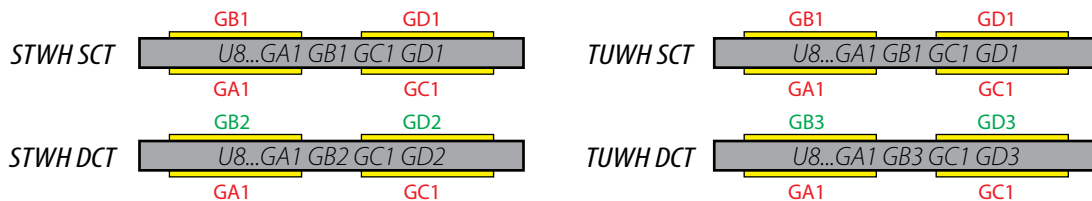
Control type	Maximum addressable groups	nLight devices	Max sensors	nLight devices consumed with max sensors
NLIGHT	16	17	5	22
DALI*	16	-	0	-
ZT (0-10V)	2	-	0	-
NLTAIR2**	1	-	0	-
TUWH NLT	8	17	5	22
TUWH ZT	1	-	0	-
NLTAIR2 with ZT***	2	-	0	-
NLTAIR2 with TUWH ZT***	1	-	0	-

*Class 1 DALI with no internal isolation from fixture run. Requires user-supplied DALI master controller and power supply

**Uses factory-installed internal single-channel rIO

***Requires 2x user-installed external rPP20D with 0-10V wiring into a standard ZT-type head unit. Order separately

SCT vs. DCT

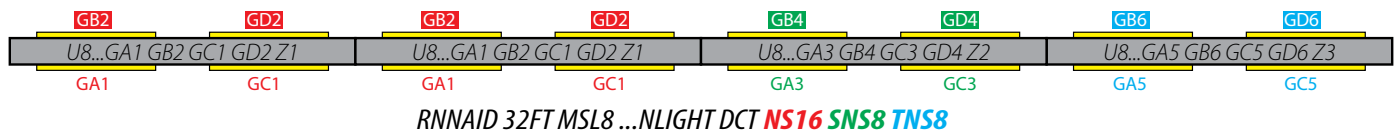


DCT (dual circuit) or SCT (single circuit) refers to independent (DCT) or dependent (SCT) control of direct and indirect lights. Since this is Modulus, you get this behavior without having actual separate circuits inside the fixture run. Instead, direct and indirect drivers are either assigned to different or the same DALI groups

For STWH, DCT requires two total addressable DALI groups (Group 0 = direct intensity, 1 = indirect intensity). SCT only requires one.

For TUWH, DCT requires four total addressable DALI groups (Group 0 = direct intensity, 1 = direct CCT, 2 = indirect intensity, 3 = indirect CCT). SCT only requires two.

Zones



Zones are independent areas of control down the length of a fixture run

Again, since this is Modulus you can get multiple control zones without having separate circuits running through the fixtures

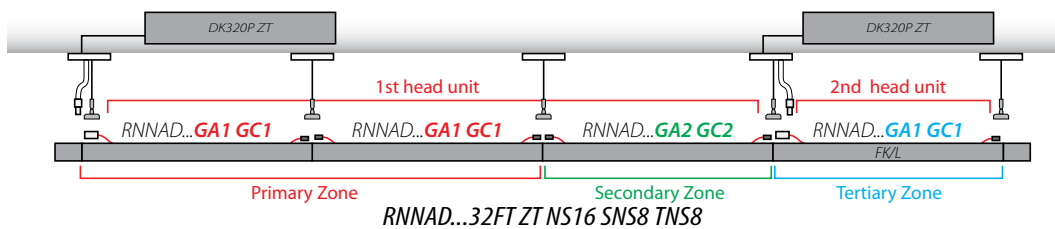
Zones can be applied independently of DCT/SCT, but they both use up available control groups

Zones can be ordered factory programmed by using the Primary Zone, Secondary Zone, and Tertiary Zone fields and a length in feet in the order line (see example above for a 3-zone + DCT run and what driver group addresses will result in the breakout nomenclature)

NLIGHT and TUWH NLT control types enable field re-grouping of drivers using SensorView software. SensorView has a discovery routine that lets you identify each driver's location and assign it to any of the 16 available groups on each head unit, and then have those groups track nLight channels or sensors.

CONTROL ZONES

Exceeding Group Limits



Default breakout rules only allow for splitting runs up over multiple head units based on wattage consumed (320W/head unit) and voltage drop (32ft max), BUT a manual breakout allows you to break runs up over multiple head units to provide more control groups than a single head unit can provide

The example above shows a ZT run that could've been done on a single head unit except for the need for a third zone of control (ZT has a max of 2 groups per head unit).

NOTE: the second head unit is unaware of the existence of the first head unit, so it's going to control DALI groups 0 and 1 just like the first head unit, but on a different physical universe of DALI. Thus fixtures in the tertiary zone need to have their drivers assigned to DALI group 0 (hence GA1 GC1).

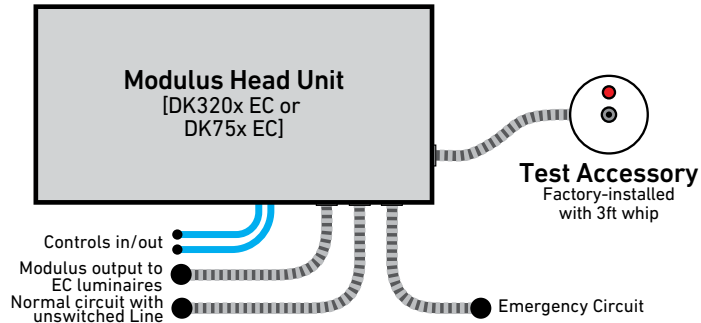
This concept applies equally to other control types besides ZT.

Only NLTAIR2 and ZT head units lack reprogrammable DALI master controllers. So those types can only control drivers assigned to DALI group 0 (for NLTAIR2) or 0 and 1 (for ZT).

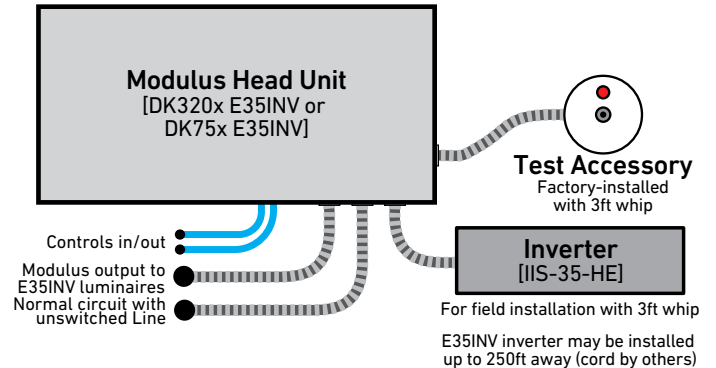
EMERGENCY

Modulus systems provide emergency functionality by using a feature of luminaires that send output levels to a preset value when power is lost on the Modulus control bus. Head units are wired so that control power is interrupted when normal power is lost. All fixtures powered by an emergency head unit remain powered up when normal power is lost, but depending on the emergency type ordered, fixture outputs may go to 100%, 0% or predefined value when normal power is lost. See the examples below for standard behavior of the two primary emergency types (EC and E35INV).

EC System Diagram



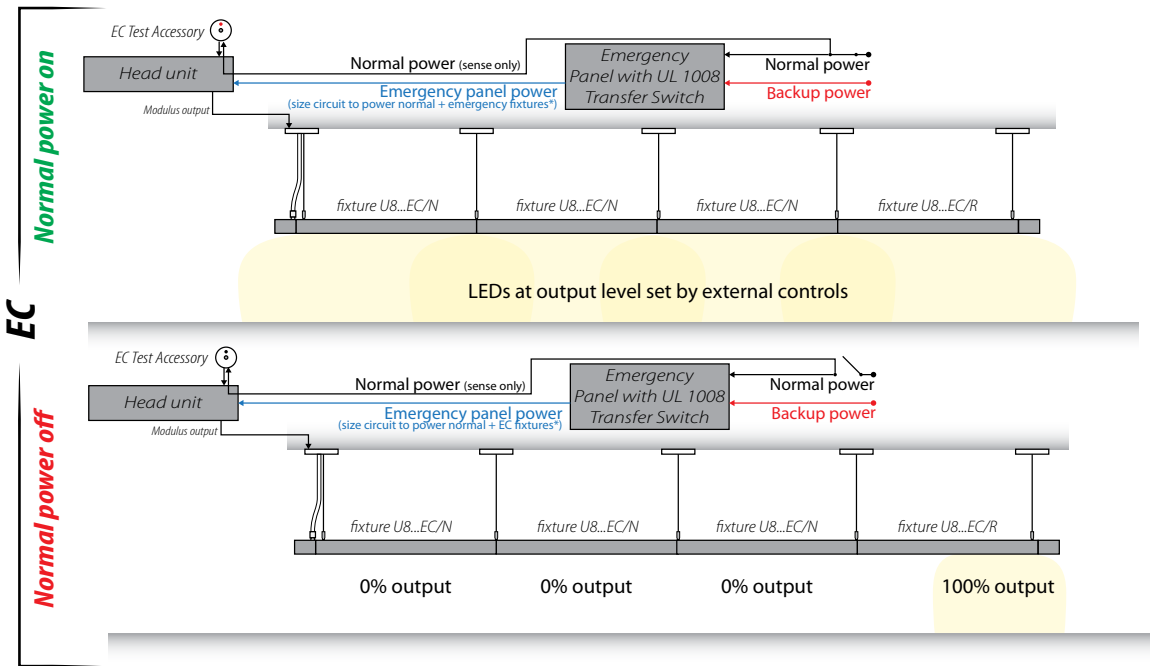
E35INV System Diagram



EMERGENCY

EMERGENCY SYSTEM: EC

The Single Emergency Circuit (EC) option should be type when a central backup power source is available in the building. EC requires an always-on emergency circuit fed by an upstream emergency panel with a UL1008 emergency transfer switch (by others). One to six sections can be specified for emergency per head unit (or "all on EC" with the WEC option). When normal power is lost, all designated sections will go to 100%, while all other sections on that head unit will go to 0%. This enables traditional emergency lighting designs where individual, spaced-out sections provide egress lighting at 100% while most fixture are off during loss of normal power.



*Since there's only one power supply in the head unit to power both EC and non-EC sections in the same run, ALL fixtures will draw power from the emergency circuit during normal power operation.

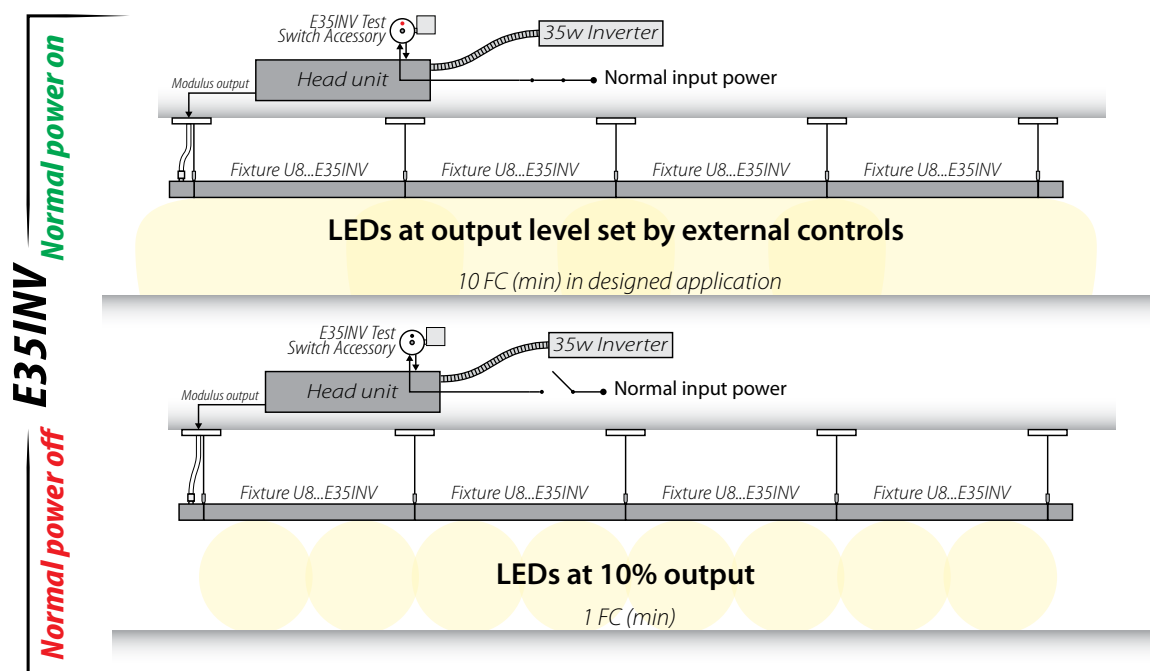
Consult the Modulus Emergency Guide on Modulus fixture web pages to calculate the normal power and emergency power consumption for your fixture run length, lumen package, and emergency type.

The Modulus Emergency Guide also shows alternative methods to use if your space has inadequate emergency circuit power for your fixtures.

EMERGENCY SYSTEM: E35INV

The 35W Micro Inverter (E35INV) option should be used for a new, simplified approach to emergency lighting design. E35INV head units come with a 35W field-installed micro-inverter (Iota model IIS-35-HE), and fixtures are programmed to go to 10% of their nominal output on loss of normal power. Therefore, as long as the normal lighting design achieves at least 10 foot-candles (FC) in the space, during loss of power the light level will meet the 1FC minimum value specified in most emergency egress codes. Emergency sections no longer have to be designed and then installed in specific locations, since all fixtures will contribute to simple, evenly illuminated emergency lighting.

***IIS-35-HE can be installed up to 250ft away from the Modulus head unit

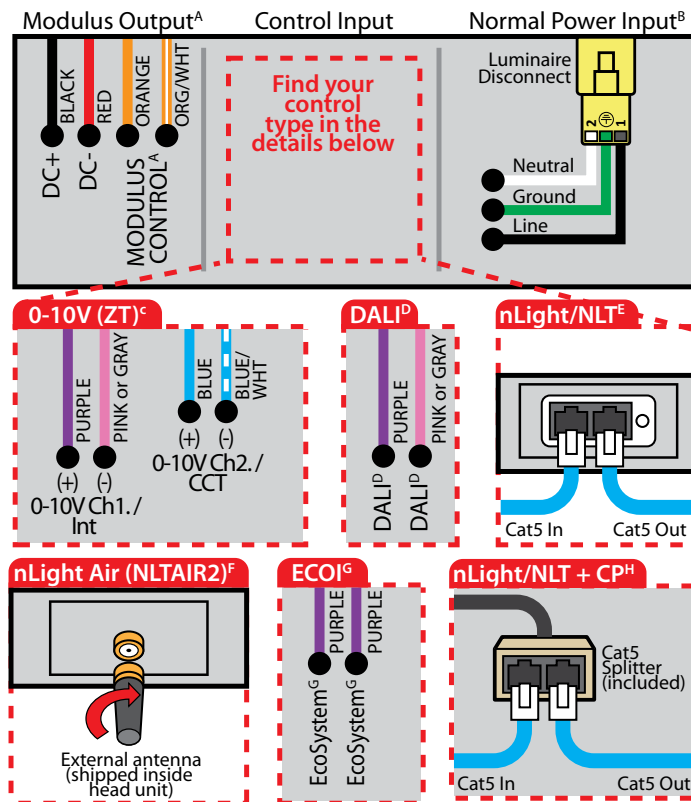


WIRING

HEAD UNIT WIRING

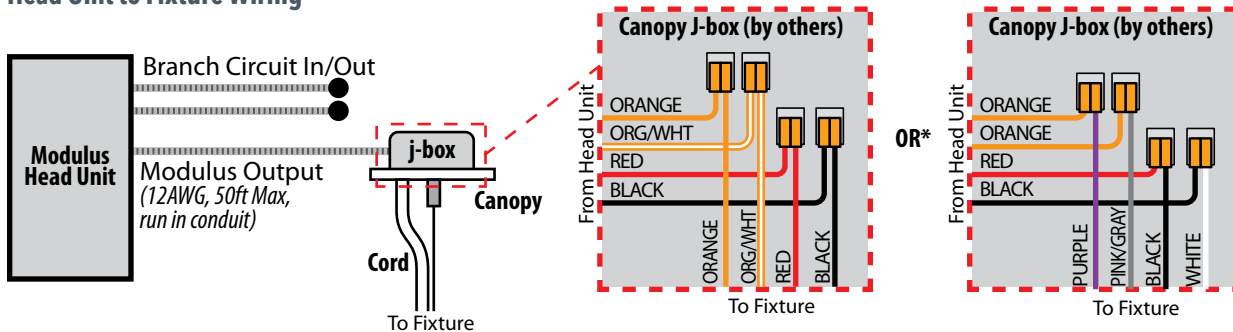
A single "head unit" takes in AC power and controls, then provides low-voltage DC power out to one or more connected luminaires that contain DC-DC drivers. Power and control runs in a 4-wire bus that can be connected through fixtures, so up to 32ft of fixture can be powered and controlled by a single drop.

Modulus Head Unit Wiring Diagrams



- Must connect to luminaires for all input control types! Modulus control lines are polarity insensitive. Use 12AWG solid wire in grounded conduit. Max distance from head unit to drop is 50ft.
- Line voltage should match ordered voltage option (120/277/MVOLT or 347V). Separate luminaire disconnect before servicing.
- Purple/pink (or gray) will control direct lights or intensity (for tunable white luminaires), blue/blue-white will control indirect lights or CCT (for tunable white). Cap blue/blue-white if second channel is unused.
- DALI - lines are polarity insensitive. Customer to supply DALI power supply external to head unit.
- Connect cat5 cables to integral nIO on outside wall of head unit
- Screw external antenna onto coax connector on outside wall of head unit after installation
- Lutron EcoSystem lines are polarity insensitive
- For Chicago Plenum (CP) applications, a cat5 splitter is located inside the Modulus outputs connection area. Installer should pull the splitter through the access plate opening, make cat5 connections, then push the connector back into the wiring compartment before replacing access plates. All connections should be made through the gasketed side access plates for CP head units - do not remove the top cover, which is factory sealed with aluminum tape

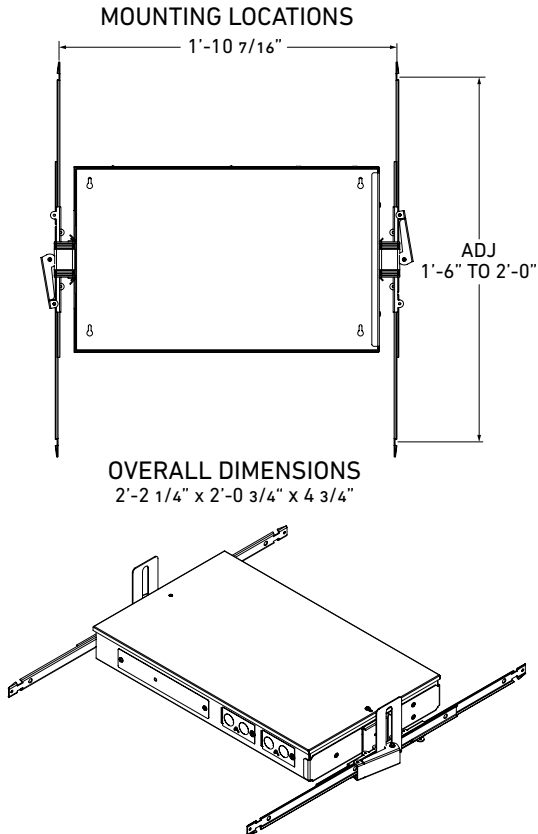
Head Unit to Fixture Wiring



*Older versions of fixture cord have Black, White, Purple, and Gray conductors while Head Unit wires are Orange, Orange, Red, and Black. Connect according to detail on right

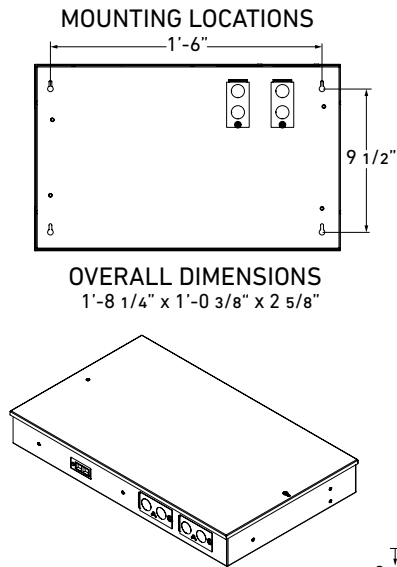
DIMENSIONS

320W and 75W F1 HEAD UNIT



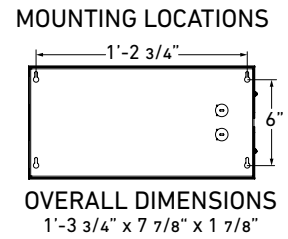
320W F2 HEAD UNIT

(All controls except ZT)



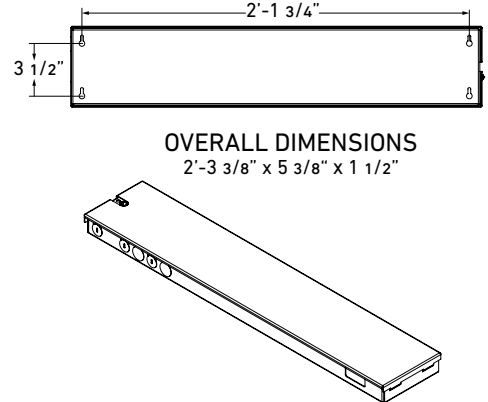
320W F2 HEAD UNIT

(ZT control only)

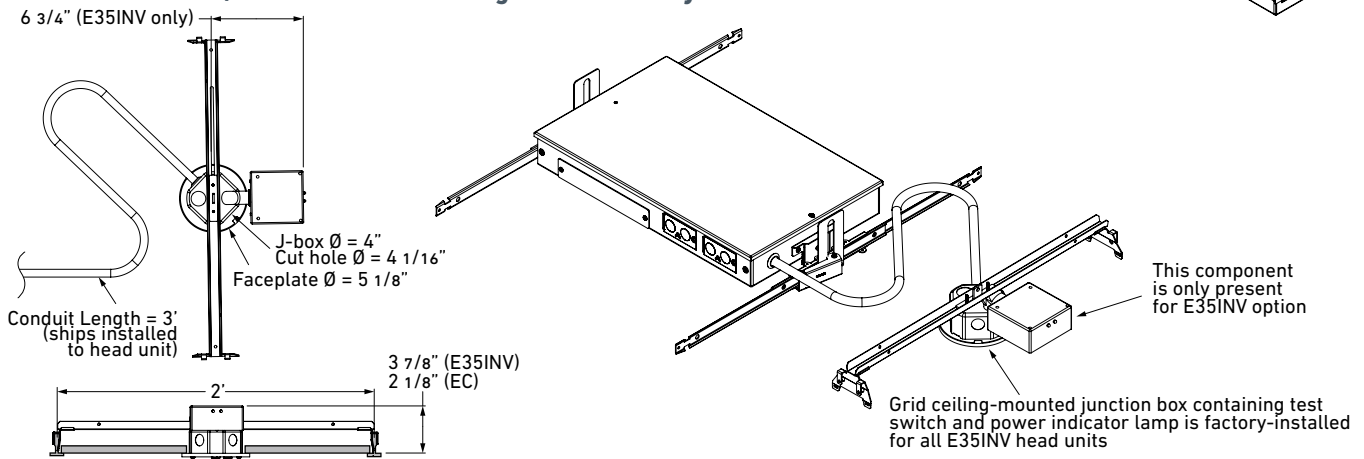


75W F2 HEAD UNIT

MOUNTING LOCATIONS



EMERGENCY OPTION: F1, E35INV and EC with integral Test Accessory



EMERGENCY OPTION: F2, E35INV and EC with integral Test Accessory

