# Pauluhn™ DLL

LED luminaires for land-based drilling

F·A·T·N
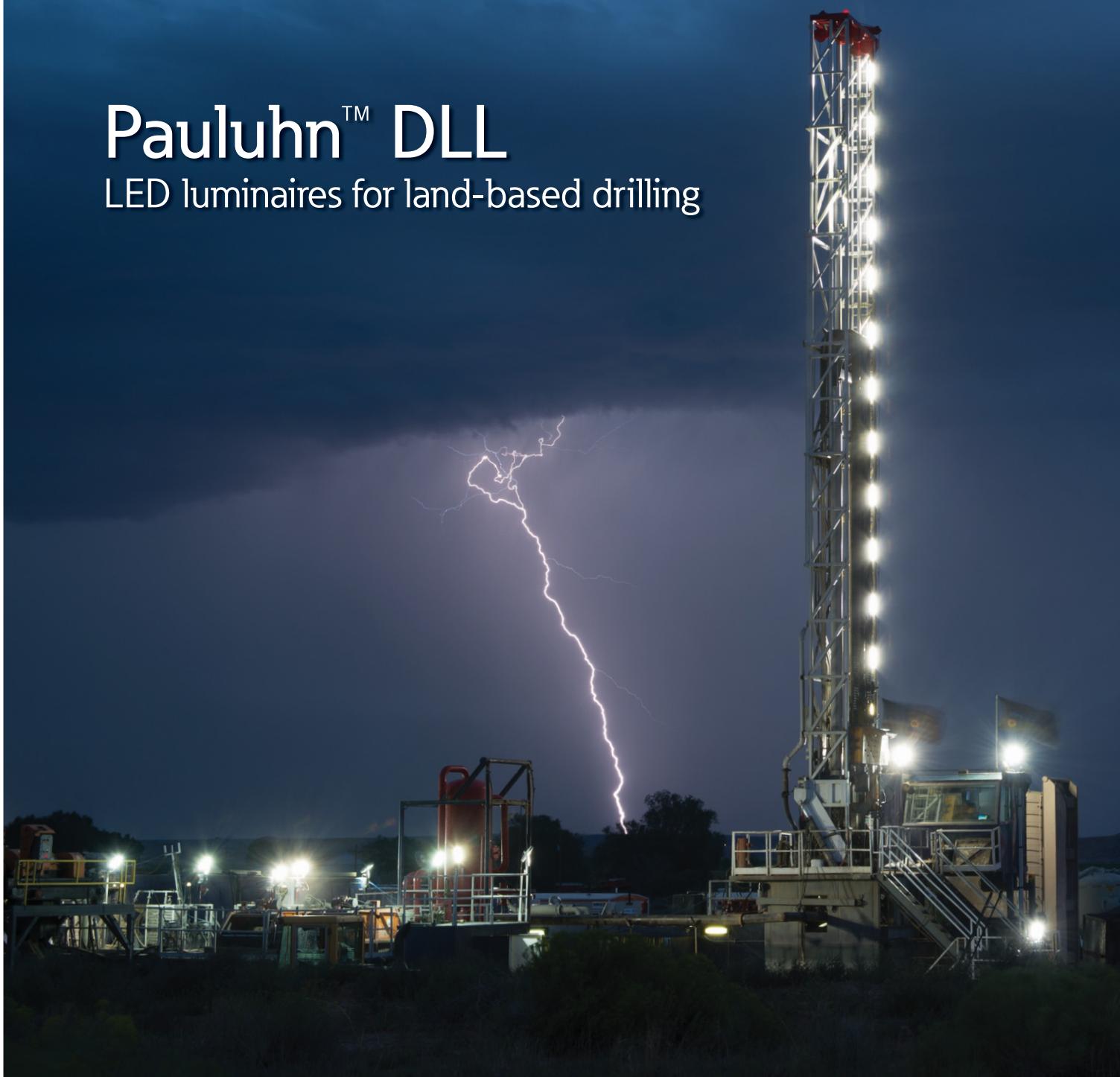
Powering Business Worldwide

Safe. Reliable. Efficient.

Featuring the industry's broadest range of LED luminaires for harsh and hazardous environments, Eaton's Crouse-Hinds can deliver a lighting solution that performs reliably in even the worst operating conditions. All the while reducing your energy, maintenance and manpower costs.

Why LED?

Useful life
Rated life is up to 60,000 hours of maintenance-free and safe operation

Energy efficiency
LED average energy consumption is 65% less than T12, T8 and T5HO fluorescent fixtures

Start/restart time
Instant illumination vs. 10 minute restrike time for fluorescent

Light quality
Higher color rendering and color temperature compared to fluorescent

Environmental benefits
Mercury-free LED eliminates disposal costs and lower energy consumption for a smaller carbon footprint

Why Crouse-Hinds?

Industry-best reliability
Built to withstand extreme temperatures, vibration, water and dust

Thermal management
Effective heat sinking ensures longer life

Quality of light
Custom optics designed to maximize light distribution and intensity

Retrofit compatibility
LED fixtures are compatible with Pauluhn DuraPro, MagnaPro, Rig-A-Lite™ and Snelson© fluorescent fixtures

Ensign Rig 89
LOCATION: Gillette, Wyoming
DETAILS: Rig retrofit with Pauluhn DLL4 LEDs

Why Pauluhn™ DLL LED?

Designed for drilling. Pauluhn DLL linear LED luminaires are engineered to stand up to the demanding conditions faced on land-based drilling rigs. The DLL stands up to high vibration, hose down, shock and impact, while delivering long life and high lumen performance for up to 20 years.

Custom optics:
- Standard wide (120°) beam spread for control room and indoor application maximizes illumination on wall panels
- Narrow (80°) beam spread option for high mast/derrick application avoids spillage and light loss

Comprehensive certification:
- Single model certified for use in Class I, Division 2 and Class II, Division 1 harsh and hazardous applications

Quick & easy installation:
- Easy access to drivers and wiring
- No custom brackets or hardware needed
- Seven mounting options available
- Easily retrofit to Pauluhn DuraPro and MagnaPro, Rig-A-Lite and Snelson

Slim profile:
- 2.7" fixture height (excluding mounting brackets)
- Perfect for mounting in confined or low height areas

Built to last:
- Ingress protection from hose down water or diesel fuel in harsh operational conditions – passed 2,000 psi high pressure test
- Vibration-, impact- and shock-resistant – passed 5G, 3-axis vibration test
- 60,000 hour lifetime @ 55°C ambient

Case study: land-rig retrofit

Location:
Ensign Rig 122, Vernal, Utah

Challenge:
Ensign was looking for a rugged, low maintenance solution to replace existing Pauluhn DuraPro fluorescent fixtures on a drilling rig.

Solution:
Install Pauluhn DLL 2 foot linear LED luminaires

Results:
Ensign was easily able to replace 21 DuraPro fixtures with 14 DLLs in only about an hour by using the existing DuraPro brackets. Ensign saw better light quality on the mast and deck, while reducing amperage load and eliminating lamp maintenance.

Pauluhn™ DLL Series LED Luminaires

The Pauluhn DLL Linear LED by Eaton's Crouse-Hinds is specifically designed to replace fluorescent T12, T8 and T5HO lighting on land-based and offshore drilling platforms. The rugged and durable design features the industry's most versatile and flexible mounting options. The Pauluhn DLL is the ideal solution for high vibration, impact and hose down in drilling applications.

Applications:

Land-based and offshore rigs; areas include: derrick, mast, SCR house, top drive, operator's house, power and pump stations.

Key features & benefits:

- Industry-leading efficacy: up to 130 LPW

- -40°C to +65°C ambient operating temperature (standard model)

- Low profile fixture (<3" height)

- Versatile ceiling/swivel, wall, flush, pole and pendant mounting options

- Wide and narrow optics for uniform illumination in control room and drill mast

- Four points of secondary retention

- 2,000 psi high pressure hose rated

- High vibration resistance

- Emergency battery back-up (90 minutes) and surge protection options (up to 10kV)‡

- DesignLights Consortium® Qualified (some models are not DLC qualified)*

- 5 year fixture warranty†

‡ One year warranty

* Refer to www.designlights.org Qualified Products List under Family Models for full listing details. Not all models are approved for all application categories.

† Refer to page 2 of the D-0716 authorized distributor price book for Crouse-Hinds standard Terms and Conditions.

Energy consumption comparison

**2 foot DLL linear LED vs. fluorescent**

T12HO 87.5	T8HO 77.5	T5HO 60.0	T12 50.0	T8 42.5	T5 35.0	DLL2 29.0

Energy consumption (watts)

4 foot DLL linear LED vs. fluorescent

T12HO 150	T8HO 135	T5HO 110	T12 100	T8 80.0	T5 70.0	DLL4 54.5

Energy consumption (watts)

Model	Typical lumens	Wattage	Lumens per watt	Equivalent HID luminaire	Typical energy savings / lifetime
				T12HO	Up to 67%
				T8HO	Up to 63%
DLL2	3,600	29	124	T5HO	Up to 52%
				T12	Up to 42%
				T8	Up to 32%
				T5	Up to 17%

Model	Typical lumens	Wattage	Lumens per watt	Equivalent HID luminaire	Typical energy savings / lifetime
				T12HO	Up to 64%
				T8HO	Up to 60%
DLL4	7,100	54.5	130	T5HO	Up to 50%
				T12	Up to 46%
				T8	Up to 32%
				T5	Up to 22%

All luminaires in the comparison are 2 lamp, 2 foot

All luminaires in the comparison are 2 lamp, 4 foot

Specifications
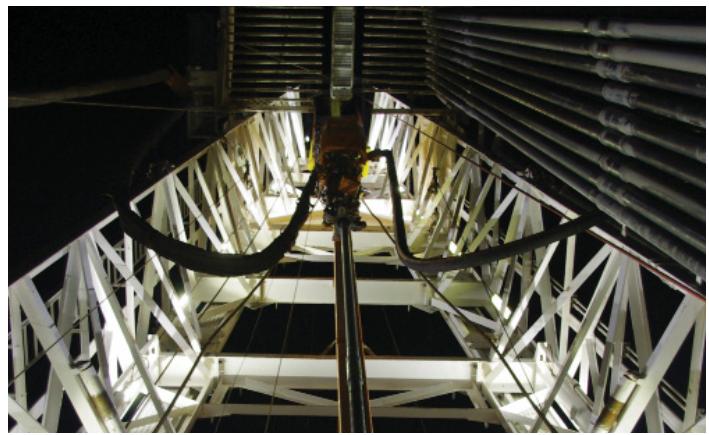
Certifications:

NEC standards:
- Class I, Division 2, Groups A, B, C, D
- Class II, Division 1, Groups F, G – *CEC (CSA/cUL) for glass lens only*
- Class I, Zone 2
- Class III
- NEMA 4X; IP66
- Marine and wet locations

UL standards:
- UL844 Electrical Fixture Hangers for Hazardous Locations
- UL1598 Luminaire
- UL1598A Luminaire for Installation on Marine Vessels
- UL924 for Emergency Lighting

CSA standard:
- C22.2 No. 137

Additional certifications:
- ABS design assessed

Materials:

Housing:
- Copper-free aluminum
- Optional Corro-free™ epoxy powder coat

Lens:
- Glass or polycarbonate
- Diffused glass or polycarbonate

Mounting:

Versatile mounting options:
- Flush back mount
- Swivel/ceiling back mount
- Offset ceiling mount
- Offset wall mount
- Pole mount
- Pendant mount

Easily retrofit to:
- Existing Pauluhn DuraPro and MagnaPro fluorescent light fixtures
- Rig-A-Lite and Snelson C1D2 fluorescent lighting fixtures

Electrical ratings:

	DLL2	DLL4
Lumen output	3,600	7,100
Frequency	50/60 Hz	50/60 Hz
Voltage	100-277 VAC/108-250 VDC; 347-480 VAC	

Model	Voltage	Current (A)	Wattage (W)	Power Factor	THD
DLL2/UNV1	100	0.28	28.2	0.97	<20%
DLL2/UNV1	277	0.12	29.4	0.97	<20%
DLL2/UNV34	347	0.09	29.2	0.97	<20%
DLL2/UNV34	480	0.07	30.1	0.97	<20%
DLL4/UNV1	100	0.55	55.0	0.95	<20%
DLL4/UNV1	277	0.20	54.5	0.95	<20%
DLL4/UNV34	347	0.16	55.8	0.95	<20%
DLL4/UNV34	480	0.12	56.2	0.95	<20%

Temperature codes:

Ambient temperature	Min. temp. wire supply	Class I, Div. 2	Class II, Div. I	Simultaneous rating — Class I, Div. 2, Div. 1
40°C	60°C	T6	T6	T6
55°C	75°C	T5	T5	T5
65°C	90°C	T5	T5	T5

Weights:

Luminaire	lbs.	kg.
DLL2	12.5	5.7
DLL4	22.5	10.2

Photometrics: high mast derrick

4 foot DLL LED with 80º optics vs. 4 foot 2 lamp T8 DuraPro

DP4-2T8 QTY=19   DLL4N/UNV1 QTY=10
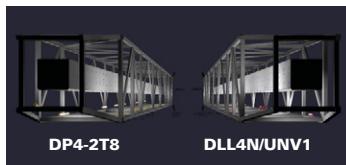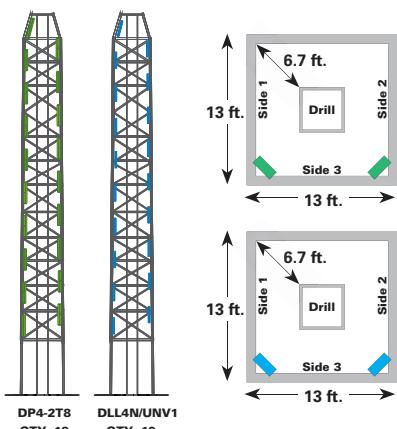
DP4-2T8   DLL4N/UNV1

| Model | Average footcandles | |
	DLL4N/UNV1	DP4-2T8
Side 1	12.37	9.18
Side 2	10.80	9.56
Side 3	21.66	16.19

47% lower fixture count (19 vs.10) and higher average illumination on the drill.
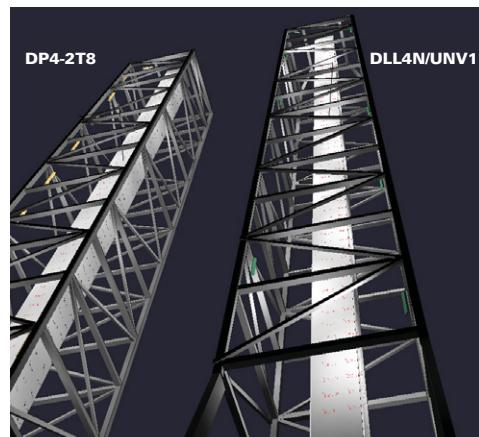
DP4-2T8   DLL4N/UNV1

4 foot DLL LED with 80º optics vs. 4 foot. 2 lamp T5HO DuraPro

DP4-2T5HO QTY=19   DLL4N/UNV1 QTY=19

DP4-2T5HO   DLL4N/UNV1
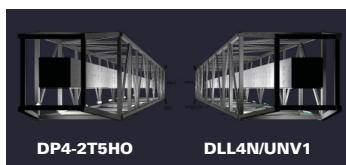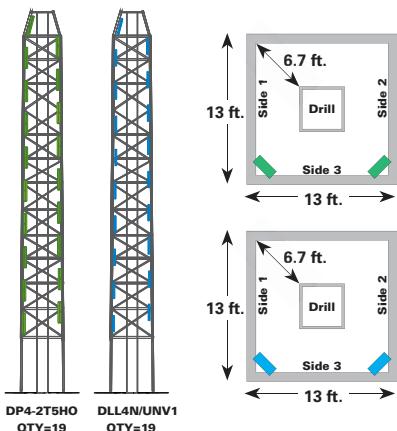
| Model | Average footcandles | |
	DLL4N/UNV1	DP4-2T5HO
Side 1	25.68	20.33
Side 2	18.88	20.52
Side 3	42.00	35.79

57% lower energy consumption and higher average illumination on the drill.

DP4-2T5HO   DLL4N/UNV1

Photometrics: control room/pump shed

2 foot DLL LED with 120º optics vs. 4 foot 2 lamp T8 MagnaPro

DLL2/UNV1   MP4-2T8
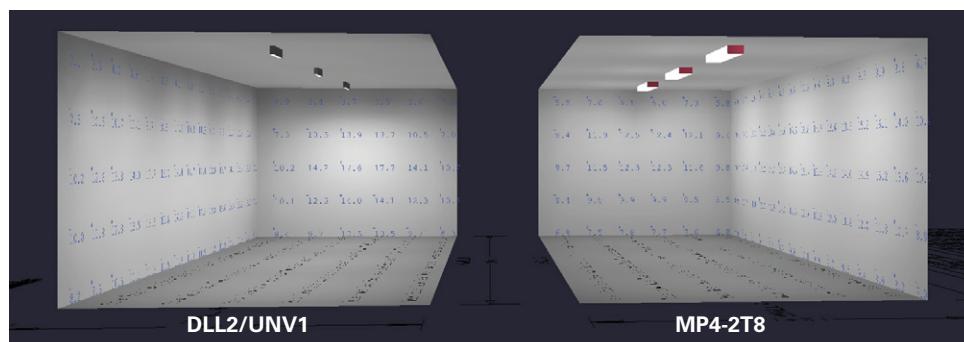
DLL2/UNV1   MP4-2T8

| Model | Average footcandles | |
	DLL2/UNV1	MP4-2T8
Wall 1	10.11	11.55
Wall 2	9.90	9.10
Wall 3	10.16	11.56
Wall 4	9.66	9.10
Floor	17.85	13.86

64% lower energy consumption and higher average illumination on floor
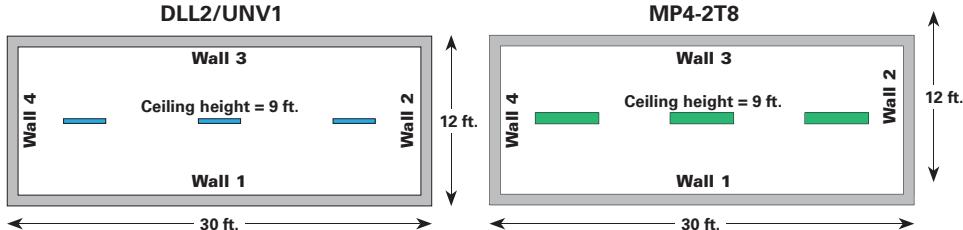
Ordering information

Part number example
DLL4N/UNV1 S903 TF P EM
DLL series linear LED, cool white, 4 foot, ½" hubs, 80° narrow light pattern, 100-277 VAC driver, polycarbonate lens, through feed hubs, painted, battery back-up

DLL 4 N /UNV1 S903 TF P EM1

Series

DLL	Pauluhn DLL series linear LED luminaire

Optics

BLANK	Wide (120°)
N	Narrow (80°)

Voltage

/UNV1	100-277 VAC; 108-250 VDC
/UNV34	347-480 VAC

Lens

BLANK	Glass
S891	Diffused glass
S903	Polycarbonate
S903D	Diffused polycarbonate

Emergency backup

EM1*	Integrated emergency battery back-up

* One year warranty. Remote EM Kit also available, contact factory for more information.

Length/lumens

4	4 foot length, 7,100 lumens
2	2 foot length, 3,600 lumens

Finish

BLANK	Natural aluminum
P	Painted (gray, epoxy)
WH	Painted (white, epoxy)

Options

TF	Pull wire included in fixture

Accessories (ordered separately)

| DP1057MTK	Flush/back mount back plate *(compatible with DuraPro)*
DP1050MTK	Ceiling/swivel mount *(compatible with DuraPro)*
DP1053MTK	Ceiling/wall mount offset *(compatible with DuraPro)*
MP1054MTK KIT	Ceiling mount bracket and adapter kit *(compatible with MagnaPro)*
DP1052MTK	Offset wall mount *(compatible with DuraPro)*
PM KIT 1.25	Pole mount kit, 1.25" conduit
PM KIT 1.5	Pole mount kit, 1.50" conduit
PM KIT 2.0	Pole mount kit, 2.00" conduit

Accessories (ordered separately)

| PEND HAZ KIT	Pendant mount kit
SS KIT	Safety chain kit
VMVL/UNV1 80W 1A KIT	1 amp driver replacement kit 100-277 VAC for 4 ft. linear
VMVL/UNV34 80W 1A KIT	1 amp driver replacement kit 347-480 VAC for 4 ft. linear
VMVL/UNV1 80W 0.5A KIT	0.5 amp driver replacement kit 100-277 VAC for 2 ft. linear
VMVL/UNV34 80W 0.5A KIT	0.5 amp driver replacement kit 347-480 VAC for 2 ft. linear

Dimensions & mounting options:

(1329.1)
52.33"

(68.58)
2.70"

DLL4

(157.9)
6.22"

(719.6)
28.33"

(68.58)
2.70"

DLL2

| Offset wall DP1052MTK | Flush ceiling DP1057MTK | Offset ceiling DP1053MTK | Ceiling/swivel DP1050MTK | Ceiling and adapter MP1054MTK KIT | Pole mount PM KIT 1.25/1.5/2.0 | Pendant mount PEND HAZ KIT |
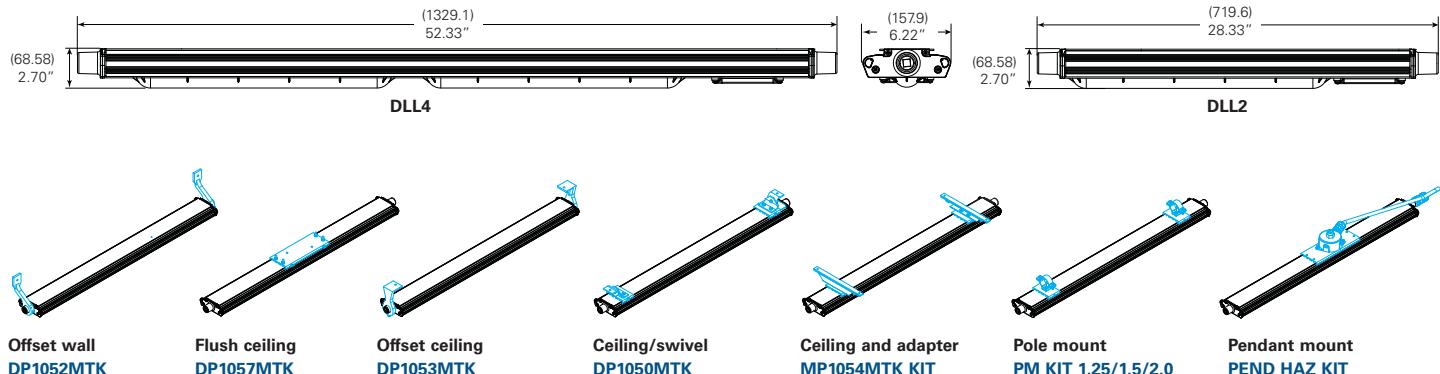
Mounting options

Ceiling/swivel mount
DP1050MTK

[157.9]
6.22

[132.8]
5.23

A

B
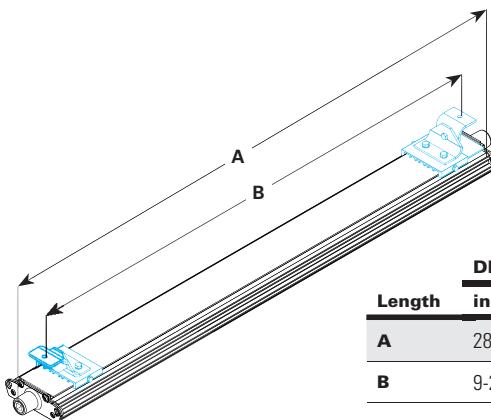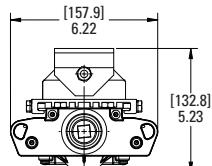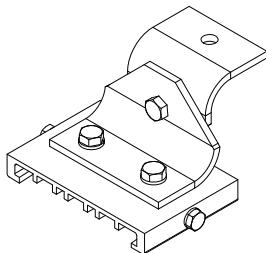
Length	DLL2		DLL4	
	in.	mm.	in.	mm.
A	28.3	720	52.3	1329
B	9-27	222-681	9-51	222-1289

Pole mount
PM KIT 1.25/1.5/2.0

A
B
Ø C
D
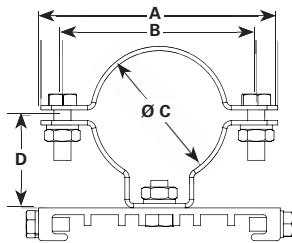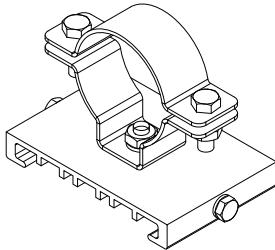
Configuration	ALL MEASUREMENTS IN INCHES			
	A	B	C	D
PM KIT 1.25	4.331	3.543	1.680	1.693
PM KIT 1.5	3.740	2.953	2.000	1.535
PM KIT 2.0	3.386	2.598	2.360	1.378

[157.9]
6.22

[151.8]
5.98

([119.8])
4.72

E

F
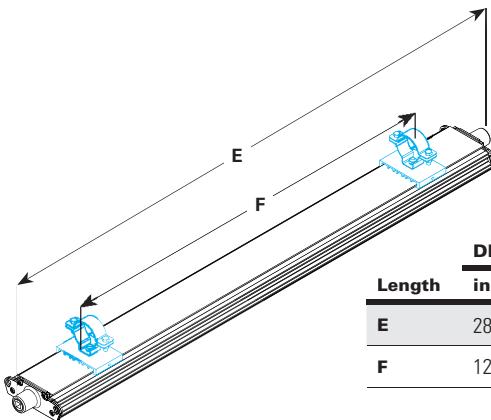
Length	DLL2		DLL4	
	in.	mm.	in.	mm.
E	28.3	720	52.3	1329
F	12-21	305-533	24-45	610-1143

MagnaPro mount
MP1054MTK KIT

[327.0]
12.88

[241.3]
9.50

[108.6]
4.28

[113.3]
4.46

A

B
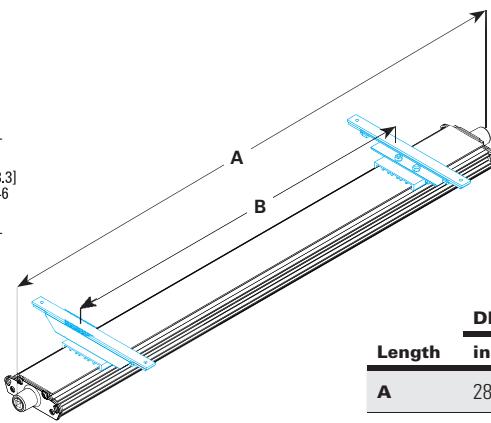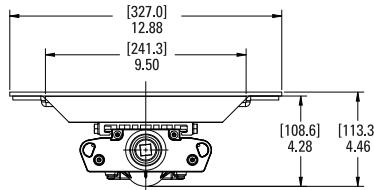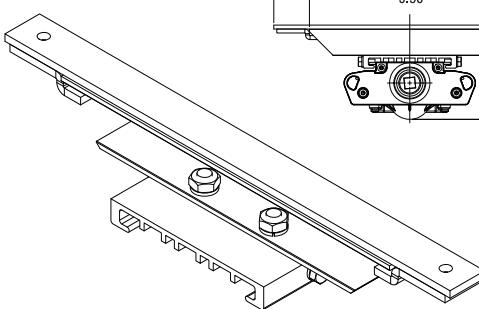
Length	DLL2		DLL4	
	in.	mm.	in.	mm.
A	28.3	720	52.3	1329
B	12-22	305-559	24-46	610-1168

Mounting options

Offset wall
DP1052MTK

[205.6]
8.10
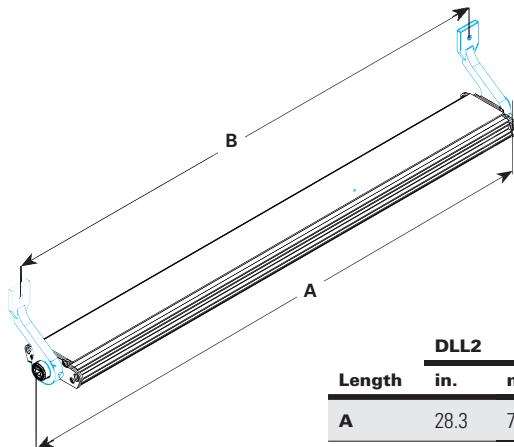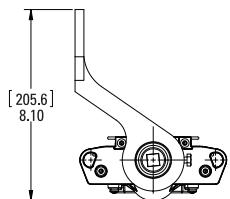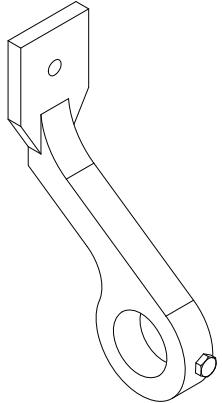
Length	DLL2		DLL4	
	in.	mm.	in.	mm.
A	28.3	720	52.3	1329
B	26.3	669	50.3	1278

Offset ceiling/wall mount
DP1053MTK

[165.1]
6.50
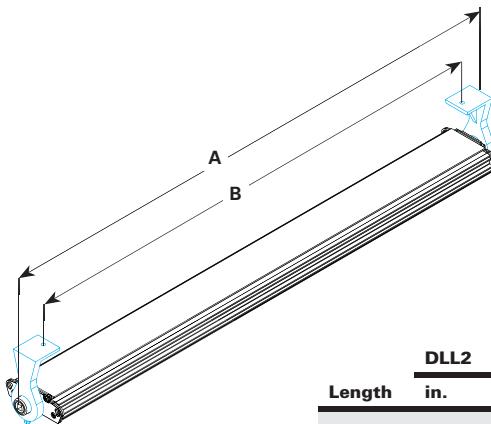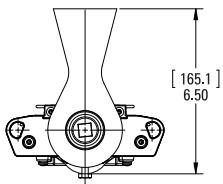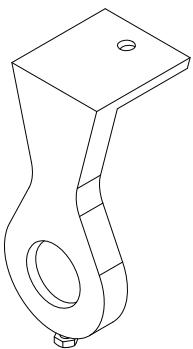
Length	DLL2		DLL4	
	in.	mm.	in.	mm.
A	28.3	720	52.3	1329
B	26.3	584	47.0	1194

Flush ceiling
DP1057MTK

[12.7 MAX]
.50 MAX

[78.2]
3.08
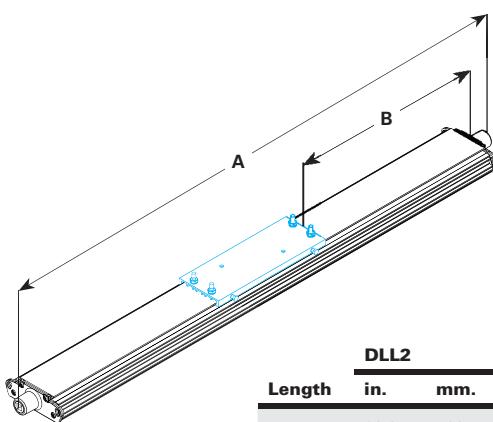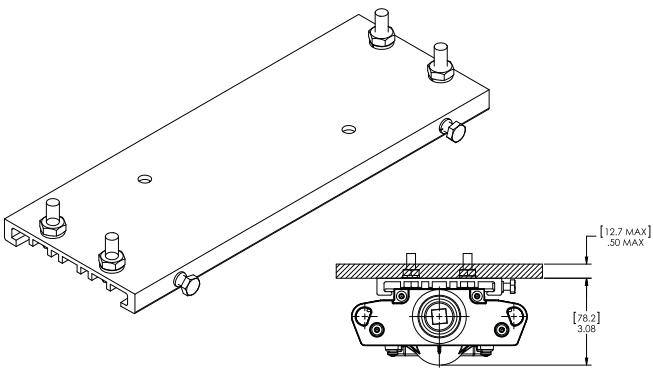
Length	DLL2		DLL4	
	in.	mm.	in.	mm.
A	28.3	720	52.3	1329
B	6.2	157.5	18.2	462

Mounting options

Pendant mount - Class I, Div. 2 only
PEND HAZ KIT

[138.8]
5.46
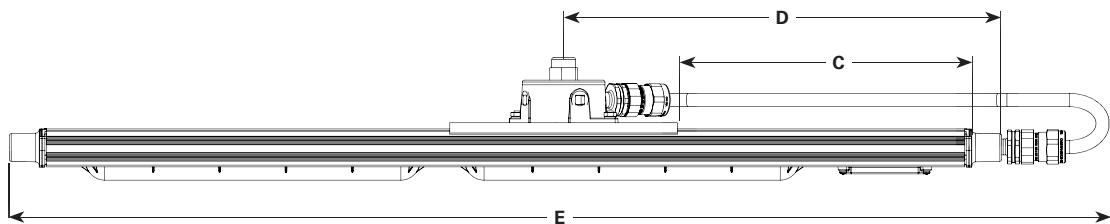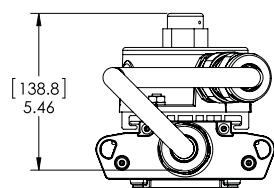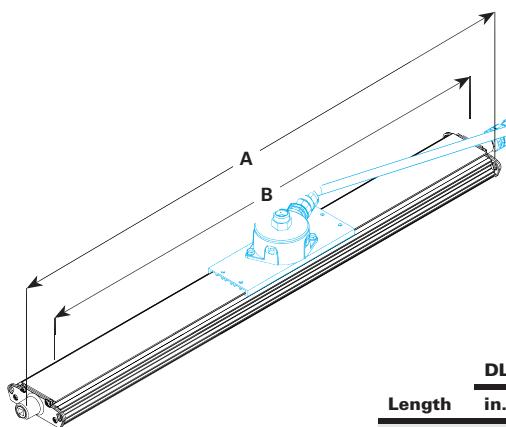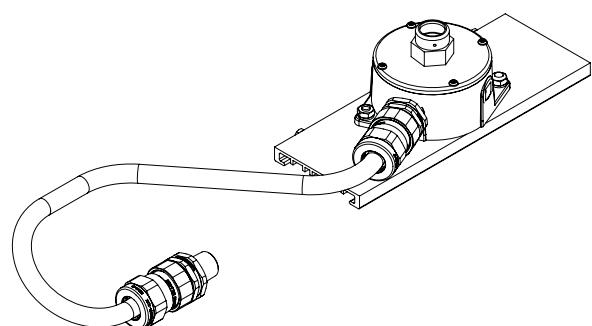
Length	DLL2		DLL4	
	in.	mm.	in.	mm.
A	31.7	805	55.8	1418
B	28.3	720	52.3	1329
C	4.2	108	16.0	406
D	12.2	310	24.0	610
E	34.9	886	58.9	1495

Battery back-up

Champ DLL linear LED luminaires are now available with an integral battery back-up module. Virtually the same size as the standard 4 foot model and up to 90 minutes of emergency lighting to keep your facility and people safe.

Model	EM output	Normal output
DLL4/UNV1 S903 EM1	1,400 lumens (100-277V)	6,720 lumens (100-277V)

Applications:

- Egress and emergency lighting for areas requiring uninterrupted lighting during power failure
- Hazardous rated indoor and outdoor emergency lighting in manufacturing plants, heavy industrial, chemical and petrochemical facilities, platforms, loading docks and parking areas.

Key features:

- Operating ambient: 0°C to +40°C
- 90 minute runtime in emergency mode
- 6,720 lumen output for normal operation
- 1,400 in emergency mode
- 50,000 hours rated life @ 40°C
- IP66 rated enclosure
- LED indicator to check battery operation
- Nickel-cadmium battery
- 1 year warranty

Certifications and compliances:

NEC/CEC

- Class I, Division 2, Groups A, B, C, D
- Wet Location, IP66, Type 4X

CSA Standard

- CSA C22.2 Nos. 250, 137, 141

UL Standards

- UL844 Hazardous (Classified)
- UL1598 Luminaires, UL1598A Marine
- UL924 Emergency Lighting

Electrical ratings:

Voltage	120	277
Amperage @ 120VAC	.48	.212
Wattage @ 120VAC	57.8	57.7
Lumen output	6,720	6,720
Frequency	50/60Hz	50/60Hz
Power factor @ 100 VAC	.997	.980
THD	6.58	11.70

Temperature codes:

Ambient temperature	Min. temp. wire supply	Class I, Div. 2	Class II, Div. I	Simultaneous rating Class I, Div. 2, Class II, Div. 1
40°C	60°C	T5	T6	T5

Dimensions:

POLYCARBONATE LENS SHOWN
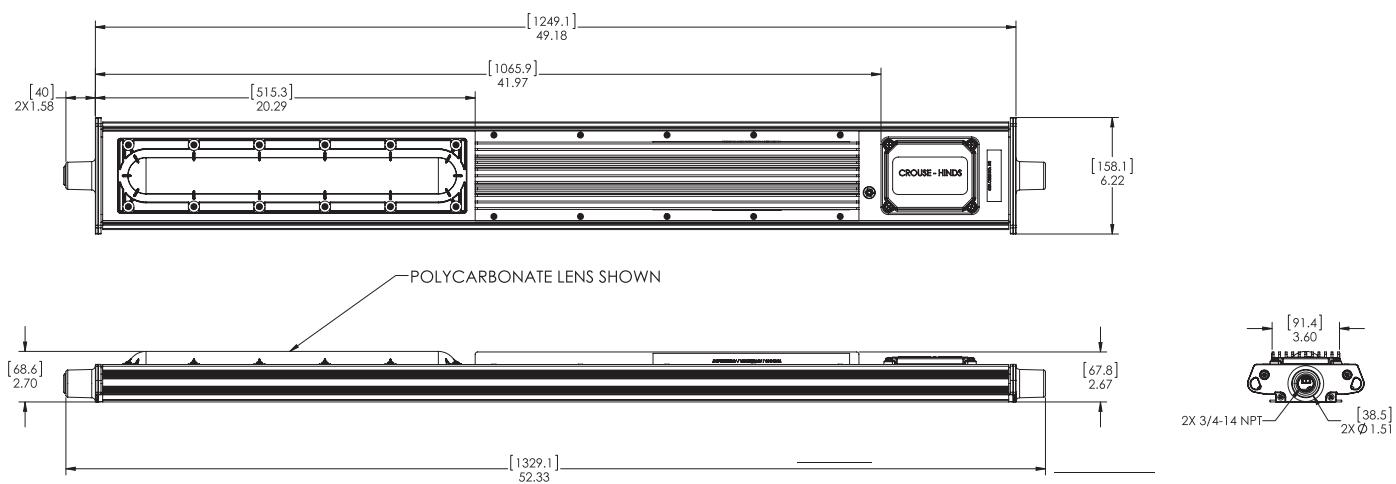
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