Cap Lamp 2.0
Datasheet

NTX-NPD-L3Z

Rev 2.1

NEWTRAX

1 DESCRIPTION

The cap lamp 2.0 is an advanced sensor platform for Proximity Detection, Positioning, and Communications that is built for workers in underground hard rock mines and has a field-replaceable head piece, belt piece and cord.

Cap Lamp 2.0 (NTX-NPD-L3Z)

Safety Features:

- Proximity warning to vehicles in range
- Emergency stop signal to vehicles in range
- Positioning (MineHop®)
- Unique identification of cap lamp
- Emergency assistance request
- Evacuation notification via flashing of light and acknowledgment (MineHop®)
- Inertial sensor to detect unconscious workers due to heat stroke, heart attack, or gas intoxication.

1.1 Features

Legend

Description	Legend
Features currently available.	●
Features will become available with future software upgrade.	○

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User Identification	
The input of worker ID via USB 1.1 charging rack network	●
Output of worker ID via NFC-A (ISO/IEC 14443A) @ 106 kbps	
Output of worker ID via passive RFID (ISO 15693) @ 13.56 MHz	
Proximity Detection	
MineProx® 900-919.6 MHz	●
MineProx® 863-870 MHz	●
Chirp Spread Spectrum (CSS) 2.4 to 2.4835 GHz	
Ultra-Wide Band (UWB) 3.5 to 6.5 GHz	
Distress	●
Proximity Yield	
Tracking (Positioning + Communication)	
BLE over Wi-Fi	
BLE over LTE-M1	
MineHop® over MineHop®, to Ethernet or Leaky Feeder Gateways	●
BLE 4.2 (positioning)	
Wi-Fi (network agnostic)	
Lifeline Applications	
Evacuation notification with RX via VHF leaky feeder	
Evacuation notification with RX via UHF leaky feeder	
Evacuation notification with RX via MineHop®	●
Evacuation notification with RX via Wi-Fi	
Evacuation notification with RX via LTE	
Evacuation acknowledgement with TX via MineHop®	●
Evacuation acknowledgment with TX via Wi-Fi	
Evacuation acknowledgment with TX via LTE	
Unconscious worker notification with TX via MineProx®	●
Unconscious worker notification with TX via MineHop®	●

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Unconscious worker notification with TX via Wi-Fi	
Unconscious worker notification with TX via LTE	
Distress call with TX via MineProx®	●
Distress call with TX via MineHop®	●
Distress call with TX via Wi-Fi	
Distress call with TX via LTE	
User Interface	
Light power button	●
Distress buttons (x2)	●
Proximity yield button	
Flashing of main light notification	●
Audio notification	
Status LEDs notification in head piece	●
LCD display on belt pack	
Warning LED/LCD on belt pack for remote object interaction notification	
Communications	
Wi-Fi 802.11 b/g/n 2.4 GHz	
LTE Cat M1 Bands: (B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/ B20/B25/B26/B27/B28/B66/B85) Output Power: 20 dBm (100 mW)	
Leaky feeder VHF RX (150-159 MHz)	
Leaky feeder UHF RX (450-485MHz)	
MineHop® 9xx MHz	●
USB 1.1 (upgrade and configuration in rack)	
NFC-A (ISO/IEC 14443A) 106 kbps for User Identification	
Passive RFID (ISO 15693) 13.56 MHz for User Identification	●
Battery Pack	
Capacity (Watt-hour (Wh))	48
Typical continuous discharging time at +50 °C	18 h
Typical continuous discharging time at - 20 °C	12 h
Low battery notification	●
Charging time at +20 °C from complete discharge	8 h

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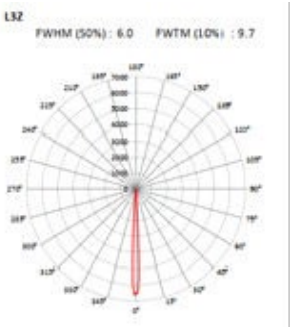
Charging temperature	10 to +27 °C
Operating temperature	-20 to +50 °C
Storage temperature	-20 to +50 °C
Physical Characteristics	
Headpiece dimensions (mm)	90 x 70 x 60
Headpiece weight (g)	150
Head movement angle [°]:	90
Beltpack dimensions (mm)	95 x 111 x 38
Beltpack weight (g)	350
Available cord length (m)	1.3 / 1.5 / 1.7
Electrical Safety	
Arc flash resistant UL 94 V0	●
Minimum separation distance to electric blasting cap due to Radiated RF of MineHop® and MineProx® (cm) (IME-20)	0
SAR (Specific Absorption Rate of RF energy absorbed by body) KD447498, KDB248227, KDB941225, RSS-102, EN62311, EN62479, EN62209-1528 and EN50566	●
Photometrics	
Viewing angle (Full width half maximum) FWHM	6
Viewing angle (Full width tenth maximum) FWTM	10
Intensity at 0° (lux)	6500
Flux (lumen)	150
Illuminance at 1 m (lux)	9000
Illuminance at 2 m (lux)	1600
Main LED color temperature (Kelvin)	6500
Main LED color rendering index (CRI)	70
Aux LED color temperature (Kelvin)	5000
Aux LED color rendering index (CRI)	70
Intensity profile	

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IES profile (Illuminating Engineering Society)	
Focus light pattern	
In-Rack Automated Testing and Controlled Release	
Battery Level	
Button Press Detection	●
Proximity RF Radio Testing	
Positioning RF Radio Testing	
Communications RF Radio Testing (MineHop®)	●
User Fault Reporting	
Confirmation of User Assignment by Server	
Confirmation of User Assignment by Distribution Kiosk	
Maintainability	
Field repairable	●
Remote firmware and configuration updates	
Built-in diagnostics	
Remote diagnostics	
Asset location (Quickly find cap lamp in a charging room)	
Display of percentage battery level and status	

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2 CLIENT ACCESS LICENSES (CAL)

PART NUMBER	DESCRIPTION
NTX-NPD-CAL-PDS	Proximity Detection.
NTX-NPD-CAL-MHP	Positioning and communication over MineHop®.

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3 CAP LAMP ACCESSORIES – Cap Lamp 2.0

Part Number	Description	Image
NTX-NPD-A1x-15 **NTX-NPD-A1x-13** **NTX-NPD-A1x-17**	Cord connectorized at both ends • 13 (1.3 m) default • 15 (1.5 m) • 17 (1.7 m).	
NTX-NPD-Cxz	Charging cradle for Cap Lamp 2.0.	
NTX-NPD-CxZ-Axz	Charging cradle for Cap Lamp 2.0 with universal power supply.	
NTX-NPD-H3Z	Headpiece replacement for Cap Lamp 2.0.	
NTX-NPD-B3Z	Beltpack replacement for Cap Lamp 2.0.	
NTX-NPD-A3Z	Protective film for Cap Lamp 2.0 (100 Lens).	
PT-T-XXX	RFID label for personal identification. Can be applied on existing ID cards.	
PT-T-002	RFID card for personal identification.	

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4 RUGGED DESIGN

DESCRIP-TION	TEST STANDARD	CAP LAMP 2.0 (L3Z) HEAD PIECE AND BATTERY PACK	RACK & CRADLE
Drop	MSHA 30 CFR ASTP 2218 & ASTP 2225 20 cycles @ 25° on multiple sides SANS 1438 7.14 and 7.16 headpiece.	Headpiece 1.8 m Belt pack 1 m.	N/A
Impact	MSHA 30 CFR ASTP 2210 16 cycles @ 25° on multiple sides SANS 1438 7.4 headpiece.	Direct impact of a 50 mm steel ball of 900 g from 30 cm.	N/A
Vibration	MIL-STD 810G Test method 514.7.	Force of 20G.	N/A
Ingress Protection	IP Rating IEC 60529:2013 SANS 1438 7.16 headpiece.	IP 66, 67 Protection from solid objects like dust and sand and immersion in water for 30 minutes at 1 m.	IP 21 Protected from touch by fingers greater than 12 mm. Protected from condensation.
Chemical Resistance	ISO 16750-5:2010 (Brake cleaner, Degreaser, Alcohol-based disinfectant).	Immersion application, with 22 h exposure (Brake cleaner, degreaser).	Rack: 2 h immersion. Cradle: immersion application, with 22 h exposure. (Brake cleaner, degreaser, alcohol-based disinfectant).
Salt Fog Corrosion	MIL-STD 810G Test method 509.5.	4 cycles of 24 h exposure of a pH 7 salt fog at 35 °C.	4 cycle of 24 h exposure of a pH 7 salt fog at 35 °C.
Damp Heat Cycling	IEC 60068-2 30:2005 Category Db variant 2.	5 cycles of 8 h of temperature variation between 2 °C and 60 °C.	5 cycles of 8 h of temperature variation between 2 °C and 30 °C.
Humidity	MIL-STD-810G Test method 50.	6 cycles of 8 h of 95% humidity non-condensing from -40 to 65 °C.	6 cycles of 8 h of 90% humidity non-condensing from 0 to 30 °C.

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DESCRIP-TION	TEST STANDARD	CAP LAMP 2.0 (L3Z) HEAD PIECE AND BATTERY PACK	RACK & CRADLE
Altitude	MIL-STD-810G Custom test procedure Over pressure.	5 cycles of rapid pressure in-crease from 100 to 150 kPa (5 km depth).	N/A
Thermal Shock	SAE J1455:2017.	50 cycles of rapid transition from -20 to 60 °C.	N/A
Temperature Variation	SAE J1455:2017.	3 to 5 °C per minute. -20 to 60 °C.	N/A
Operating Temperature	MIL-STD-810G Test method 502.7 and 501.7.	-20 to 50 °C, 24 h.	10 to 27 °C.
Storage Temperature	MIL-STD-810G Test method 502.7 and 501.7	-20 to 50 °C.	-20 to 70 °C.
Operation Cycles	Custom test procedure based on ASTM 1597.	10,000 cycles of buttons pressed. 10,000 cycles of helmet clip rotation.	10,000 cycles of lamp insertion in cradle.
Cord Slatting	MSHA 30 CFR ASTP 2217 Miners cap lamp cord slatting test.	100,000 cycles of 90 Platting per minute at 50°, weighed down by battery pack.	N/A
Cord Bending	SANS 1438 6.6.2 Resistance to alternating bend test.	10,000 cycles of 60 bending per minute at 180°, weighed down by 500 g.	N/A
Cord Tensile Force	SANS 1438 6.5 Cord breaking strength.	Breaking strength above 265 N, with elongation below 10%.	N/A
Cord Anchora ge Force	SANS 1438 7.8 (headpiece) and 8.1.5 (belt-pack).	60 s of pulling at 150 N with less than 6 mm of movement.	N/A
Tensile Force at Headpiece	Cable anchorage from head-piece custom test.	500 cycles of pulling at 133 N with unit powered.	N/A
Tensile Force at Battery Pack	Cable anchorage from battery pack custom test.	500 cycles of pulling at 133 N with unit powered.	N/A

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5 CHARGING RACK FOR CAP LAMP 2.0

NTX-NPD-R4Z
Complete rack including cradles to charge. 48x cap lamps model 2.0

NTX-NPD-TYPE X
Regional Power Plug (to be ordered separately per rack).
NTX-PWR-CRD-B: Type B: USA, Canada, Mexico.
NTX-PWR-CRD-I: Type I: Australia, New Zealand, Argentina.
NTX-PWR-CRD-L: Type L: Chile.
NTX-PWR-CRD-N: Type N: Brazil.

https://en.wikipedia.org/wiki/Mains_electricity_by_country.

Features

- 4 stackable modular sections for easy installation
- Replaceable and upgradeable cradles
- Individual locks to secure lamps.

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Specifications

- Dimensions: 1514 mm Wide x 1835 mm High x 228 mm Deep
- International power input: 90-264 VAC 50-60 Hz @ 1570 watts maximum
- Output 12 VDC @ 5 Amps max per charging cradle
- Total weight 176 kg:
  - Base section 22.8 kg
  - Charger section 36.3 kg (ea)
  - Top section 8 kg.

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6 DISTRIBUTION KIOSK

Distribution kiosk for Newtrax cap lamps are used for user identification, association, and asset management.

NTX-PTR-200-ETH-xx-y

Optional kiosk for Cap Lamp 2.0 to enable dynamic assignment of workers for personal data recording and device maintenance, with passive RFID tag user authentication via a rugged display.

Where -xx is the Power version:

- AC Powered with AC & PoE
- DC Powered with DC & PoE.

Where -y is the region AC power plug:

- Y= B, I, G or C with AC plug type:

https://en.wikipedia.org/wiki/Mains_electricity_by_country.

Communications: Ethernet (RJ45) (to Optimine® MDP server)

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7 COMPLIANCE

Legend

Description	Legend
An exemption from the local regulatory authority is required for MineHop® or Mine-Prox®.	○

Cap Lamp 2.0 (NTX-NPD-L3Z)

Description	CA	US	ZA	BR	CD	ML	PE	CL	MX
ICES-003	●								
RSS-210	●								
RSS-220									
FCC PART 15 B		●					●	●	
FCC PART 15 C		●					●	●	
SANS 61000-6-4			●						
SANS 61000-4-2			●						
SANS 301489-1			●						
SANS 302208			○						
SANS 301511									
IEC 61000-6-4				●					●
IEC 61000-4-2				●					●
IEC 301489-1				●					●
IEC 302028				●					●
IEC 301511									
CERT. ANATEL				●					
NOM-019-SCFI-1998									●
CERT.IFT									●
EN 61000-6-4					●	●			
EN 61000-4-2					●	●			
EN 301489-1					●	●			

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Description	CA	US	ZA	BR	CD	ML	PE	CL	MX
EN 302208					○	○			
EN 301511									
EMC DIRECTIVE 2014/30/EU					●	●			
RED DIRECTIVE 2014/53/EU					●	●			

Charging Rack for Cap Lamp 2.0 (NTX-NPD-R4Z)

Description	CA	US	ZA	BR	CD	ML	PE	CL	MX
ICES-003	●								
RSS-210									
RSS-220									
FCCPART 15 B		●					●	●	
FCCPART 15 C									
SANS 61000-6-4			●						●
SANS 61000-4-2			●						●
SANS 301489-1									
SANS 302208									
SANS 301511									
IEC 61000-6-4				●					●
IEC 61000-4-2				●					●
IEC 301489-1									
IEC 302028									
IEC 301511									
CERT. ANATEL				●					
NOM-019-SCFI-1998									●
CERT. IFT									●
EN 61000-6-4					●	●			
EN 61000-4-2					●	●			
EN 301489-1									
EN 302208									
EN 301511									

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Description	CA	US	ZA	BR	CD	ML	PE	CL	MX
EMC DIRECTIVE 2014/30/EU					●	●			
SAFETY CB SCHEME	●	●	●	●	●	●		●	●
CSA C22.2 NO. 62368	●								
UL 62368		●							
SANS 62368			●						
IEC 62368, CB				●					
CERT. INMETRO				●					
EN 62368, CB					●	●			

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