tondo
ENLIGHTENING CONNECTIVITY

Solutions Guide

Protect
Manage
Optimize

Winter 2026

ISO 9001:2015
ISO 27001:2013
ISO 27017:2015
ISO 27018:2019
ISO 22301:2019

www.tondo-iot.com

Smart Lighting Control

Edge IQ™ Streetlighting and Sensor Control Pages 5-8

Outdoor lighting infrastructure is the natural home for the Smart City network. Tondo's Edge IQ™ Smart Lighting controller is a fully-integrated lighting control, sensor controller, Bluetooth® outdoor network controller, and cellular communications gateway. Edge IQ™ connects to Tondo's Cloud IQ™ management platform to form a city-wide wireless platform for Smart City enablement.

Energy Analytics

Cabinet IQ™ Energy Analytics and Control Pages 9-15

Tondo's Cabinet IQ™ is an electricity service point analyzer, billing-grade TOU electricity meter, and multi-purpose analog/relay/digital control system. Cabinet IQ™ provides advanced diagnostics and fault detection for upstream utility service quality and downstream streetlighting circuits, and enables a wide range of control capabilities for analog switched and digital devices.

Smart Sensor Solutions

Sensor IQ: Smart City Sensors Pages 16-17

Tondo's Sensor IQ is a Smart City sensor platform that enables customers to choose a range of off-the-shelf or custom sensor solutions for a variety of use-cases. These include adaptive lighting control, monitoring roadway conditions, environmental and weather applications, traffic flow, air & water quality, and monitoring of critical infrastructure health.

Wire Theft Detection

Wire Theft IQ™ Copper Wire Theft Detection Pages 18-19

Tondo's Wire Theft IQ™ sensor accurately detects wire theft events in-progress, enabling cities, DOTs, and utilities to alert their security teams and law enforcement partners in time to apprehend thieves.

Ground & Sky Intelligence

MultiSense IQ™ Drone and Acoustic Event Detection Pages 20-21

Tondo's MultiSense IQ™ is a multi-purpose acoustic event detection system that detects the audio signature of a wide range of threats in the urban environment. MultiSense IQ™ uses advanced AI processing on-site without recording conversations or personally-identifying information to respect citizen privacy.

Cloud Management

Cloud IQ™: Unified Smart City Management Pages 22-25

Tondo's Cloud IQ™ provides a "single pane of glass" for controlling and monitoring the health and operations of all connected Smart City assets and data. Cloud IQ™'s Deep Learning AI supports analytics and automation for all controls and system data to simplify the complexity of managing Smart City devices and data.

Products and Services

ENLIGHTENING CONNECTIVITY

Competitive Comparison

Smart Lighting Competitive Comparison Page 26

Compare Tondo's solutions with those of other Smart Lighting and Smart City solutions on the market today. See the Tondo difference in simplicity, cybersecurity, performance, scalability, flexibility, and investment protection.

Tondo Services

Tondo Services Page 27

Tondo provides services for project management, custom solutions for our customers' Smart City use-cases, and customized analytics and reporting design. Tondo works with a variety of partners that include lighting systems integrators, design-build, lighting services, consulting firms, and lighting design consultancies.

About Tondo

About Tondo Page 28

The Tondo team boasts over 50 years of collective experience in the smart lighting and smart city domains, with deep expertise in integrating advanced technologies into urban infrastructure. Our background encompasses hardware and software engineering, project management, and systems integration, and building high-performance organizations.

Contact Tondo

Contact Tondo Page 29

Contact information for Tondo and our locations.

To receive detailed information on the configuration, installation, and use of Tondo's solutions, see the **Tondo User Guide** which is available on request from marketing@tondo-iot.com or from your Tondo representative.

Protect - Manage - Optimize

Tondo provides a fully-integrated AI-powered platform for protecting, managing, and optimizing outdoor infrastructure for Smart Cities.

1 **Edge IQ™** is the world's most advanced streetlighting controls solution, plugging into standard LED sockets on each fixture.

Edge IQ™ enables cities to transform from wasteful dusk-to-dawn lighting control to safer standards-based lighting for a 50% reduction in energy costs.

2 **Edge IQ™ Internal** provides all of the capabilities of the socketed Edge IQ™ controller, ready to install inside decorative or ornamental fixtures.

3 **Cabinet IQ™** energy management, sensor, and device control system provides advanced electricity analytics and electrical service diagnostics from the utility service point to the streetlight fixture.

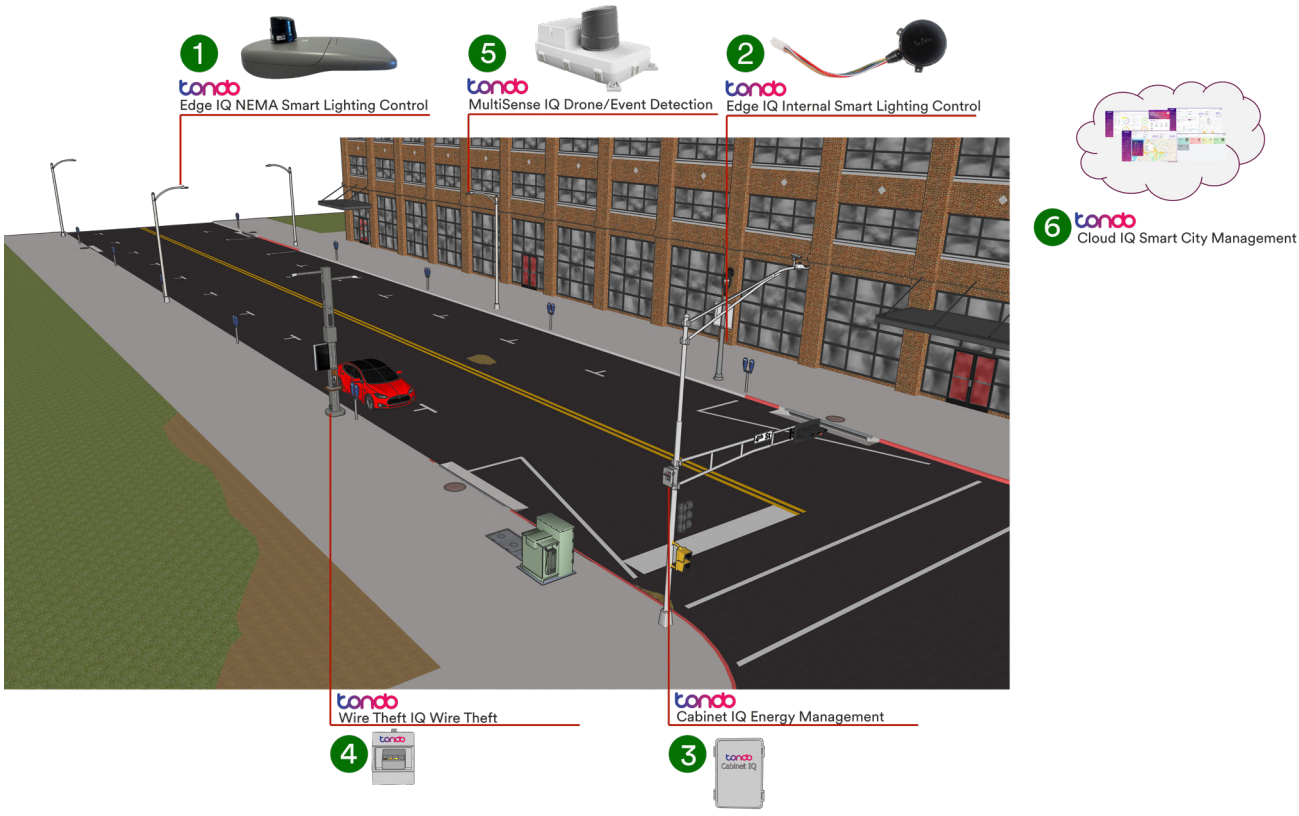
Cabinet IQ™ includes revenue-grade electricity metering, and digital and relay control for control and monitoring of critical infrastructure.

4 **Wire Theft IQ™** sensor detects copper wire thefts-in-progress from streetlight infrastructure that are plaguing our citiesr. Wire Theft IQ™ operates on energized and de-energized circuits and detects theft anywhere on the circuit, without false-positives caused by power outages or equipment failures.

5 **Multisense IQ™** monitors the ground and sky around critical infrastructure and public spaces for unauthorized activities and risks to public safety.

MultiSense IQ detects FAA-registered and unregistered drone activity, as well as gunshot, glass-breakage, panic and aggressive voices, cutting, grinding, loud impact, alarms, and excessive noise levels.

6 **Cloud IQ™** is a high-security, highly-scalable, Smart City decision and control platform. Cloud IQ™ provides a unified view of all connected controls and sensors, enabling safer and more efficient management of municipal environments and critical infrastructure operations



Smart Lighting Control

Edge IQ™ Smart Lighting Control

ENLIGHTENING CONNECTIVITY

All-in-One Control

Tondo's Edge IQ™ Smart Lighting controllers provide automated remote lighting control for on-fixture and on-pole roadway and area lighting that lowers energy use and operational costs. A single Edge IQ™ Smart Lighting Control can manage up to 16 fixtures in a high-mast cluster.

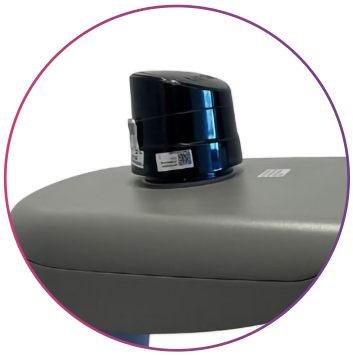
Each Edge IQ™ forms a secure, private cellular and Bluetooth Mesh® network for Smart City sensor, device control, and energy metering applications, with a connection back to Tondo's Cloud IQ™ central management system.

Tondo's Edge IQ™ works with Tondo's Cloud IQ™ to deliver consistent, standards-based lighting that saves 40% - 60% on your roadway lighting operating costs.

Edge IQ™ Features and Benefits

Socketed Lighting and Sensor Control

Edge IQ™ controllers install easily into existing LED light fixtures via NEMA and Zhaga sockets and internal fixture installation.



Lighting control is supported for 0-10V and DALI™ fixtures. Sensor connectivity is supported via Bluetooth Mesh® and DALI D4i™ wirelessly, via direct wire, or on fixtures with a DALI D4i compliant socket.

Dimming can be automated using Tondo's Deep Learning AI in the Cloud IQ™ CMS, ensuring delivery of safe lighting according to established standards and adjusts for city-specific practices and policies.

Patented Decorative/Ornamental Control

For cities who wish to preserve the aesthetics of their decorative or ornamental fixtures, Tondo's **new patented low-profile controller** *replaces* the space used by a NEMA socket inside a fixture, 1/2" above the fixture surface.

This makes Tondo's Edge IQ™ ideal for cities with significant historical districts or modern design aesthetics.

Internal Fixture Control

Tondo's Edge IQ™ controllers are also available for installation into available space within a decorative or ornamental fixture. Together with a small external antenna, **Tondo's Edge IQ™ Internal controller installs into unsocketed decorative or ornamental fixtures** to offer smart lighting control for all of your LED lighting assets.

Integrated Smart City Wireless Network

Each Edge IQ™ Smart Lighting Control contains a multi-protocol chip-set with active Bluetooth®. We chose Bluetooth® for its simplicity, reliability, low power requirements, long range capabilities up to 1.3km, and its open standard in use around the world.

Blazingly-Fast Cellular-to-Cloud Connectivity Included

Cellular connections enable information to flow to-and-from Tondo's Cloud IQ™ management system.

The Edge IQ™'s internal cellular gateway means there are no external network gateways to install or manage.

Tondo's new high-speed cellular technology provides blazing fast throughput for up to 10mbps - 10x or faster over most competitors!

Since Tondo's Cloud IQ™ includes multiple redundancy cellular data plans, there are no cellular data for the city to manage. This means fewer installed devices, faster project deployment, zero network management - and lower costs.

Bluetooth *and* Cellular Communications

Cellular is ultimately where the data has to go to get back to Tondo's Cloud IQ™ CMS.

By adding Bluetooth®, we create a low-cost, high performance, standards-based wireless network for connecting energy-efficient wireless sensors, meters, and other devices.

Dual Bluetooth® and high-speed LTE cellular provides cities with limitless scalability and reliability.

Critical Infrastructure-Grade Cybersecurity

Each Edge IQ™ Smart Lighting Control is a high-performance computing device protected by TWO cryptographic accelerator chips and a hardware security module.

This makes our Edge IQ™ Smart Lighting Control resistant to attacks that might otherwise compromise a human-managed certificate system.

Advanced Energy Measurement

The Edge IQ™ provides revenue-grade ANSI C12.1 ±0.5% accuracy and ANSI C136.50/C12.1 electricity metering for each fixture, with secure data logging utilities and cities can trust. Metered streetlighting rate plans can save as much as 30% of total streetlighting operating costs.

Product Specifications

Specifying Edge IQ™ is easy: Edge IQ™ comes fully configured with calibrated energy metering and ready to install.

Simply choose the model for socketed, internal fixture, internal pole, or external pole installation.

Models	
SC220-NS	ANSI/NEMA 136.41 socket
SC220-ZS	Zhaga Book 18 socket
SC220-IN	Internal fixture mounting

Lighting Control	
Driver Support	All LED drivers
Control Methods	Direct/Manual individual or group Automated individual or group • Fixed schedule • Astronomical clock • Daylight sensor override • AI-Adaptive Dimming
On-Off / Dimming	• Daylight sensor (NS ans ZS models only) • Scheduled autonomous • Direct remote control
Dimming	• ANSI C136.10 0-10V • DALI™/DALI 2™/D4i™
DALI™/DALI 2™/D4i™ Compatibility	Master capability, 50mA bus supply
Dimming Type	Linear or logarithmic
Fixtures per Controller	• Supports up to 16 fixtures per DALI bus from a single controller • Ideal for multi-fixture pole configurations
RTC Real Time Clock	• 72-hour battery backup option

Energy Management	

Compatibility	• ANSI C12.1 (NEMA)
	• ANSI C136.50 (NEMA)
	• DALI D4i (NEMA and Zhaga)
	  • DALI Part 251
	  • DALI Part 252
	  • DALI Part 253

Data Log Protection	Permanent non-volatile meter data registers
Metering Accuracy	ANSI C12.1 Class 0.5S Compliant Optional calibration for billing-grade applications

Communications	
Controller-to-Controller	Bluetooth® 5.3 LE
Sensor-to-Controller	Bluetooth® 5.3 LE
Smartphone-to-Controller	Bluetooth® 5.3 LE
Cellular Cloud Gateway Cellular Service Plans Included with Tondo Cloud IQ™ Subscription No External Gateways Required	• 1mbps up-link/down-link • Optional 10mbps down-link/ 5mbps up-link Includes multiple cellular network support with auto-failover for resilient network connectivity
Operating Bands	• GPRS/EGPRS 850/1900MHz • FDD LTE-M1 Band 2/4/5/12/13/25/26/66/85 • BLE 2400Mhz to 2483.5MHz
Location Services	• Bluetooth Beacon micro-positioning • GPS/GLONASS/BeiDou/ Galileo/QZSS (±3m accuracy)

Sensor Support	
Sensor Connectivity	• Bluetooth® 5.3 LE • Bluetooth® Mesh • 24V Digital I/O direct wire
Sensor Communication	• DALI D4i™ Part 351 • 24V Digital I/O
Internal Temperature Sensor	Internal, included
Ambient Daylight Sensor	Internal, included
Tilt and Vibration	Optional (Standard in North America)

Management and Field Configuration	
Central Management System	Tondo Cloud IQ™ CMS
Field Deployment and Configuration	• Plug-and-Twist auto-activation • Auto-configuration • Autonomous astronomical clock operation • Auto-locating via GPS Tondo Mobile-IQ App • Android compatible • Customizable asset management fields • Controller activation in-field • Out-of-band controller testing and configuration

Cybersecurity

Cryptographic Protection	• Fully automated key and certificate management • Hardware Root-of-Trust • Secure Over-the-Air updates • Secure Access Control List • Secure Firmware protection • Secure Boot
Key Generation	• Unique Root Key for each device • Automatic Root Key regeneration • Unique Session Keys • Secure cryptographic operations without exposing Root Key
Hardware Key Storage	• True HSM key storage • Root and session keys used in cryptographic operations not exposed in firmware

Physical and Environmental

Weight	SC220-NS - 245g SC220-ZS - 75g SC220-IN - 245g
Circumference	SC220-NS - 83.9mm SC220-ZS - 79.0mm SC220-IN -
Height	SC220-NS - 83.9mm SC220-ZS - 40.0mm SC220-IN -
Ambient Temperature	-40°C to +85°C
Ingress Protection	IP66 Class per IEC 60529
Fire	Flame resistant per UL94
Impact Resistance	IK07 per IEC 62262

Power

AC Input Voltage (NEMA)	Input Voltage Range: 100-480VAC, 50/60Hz, ± 10% Rated Load: 277VAC @ 10A / 2770VA
Input Voltage (Zhaga)	24VDC 80mA
AUX Output Voltage	24V DC, 2W
Power Consumption	< 1.5 watts @ 240V AC

Power

Transient Protection	• ANSI C136.2 Class B (10kV/5Ka) • IEC 62368-1:2018 Category II (2.5kV)
Relay	• NC (Standard)
Measurement	• AC Voltage (RMS, average) • Current (RMS, average) • Power (RMS, average) • Power frequency • Power factor • Controller power load • Lighting circuit power load
Max. Fixture Wattage	• NEMA: 1188W @ 120VAC maximum / 2742W @ 277VAC • Zhaga: no limit
DALI Bus Output	• 16VDC • 55mA rated current • 250mA max current
DALI Bus Protection	• Current-limited bus power supply with integrated series resistance and TVS surge suppression for automatic short-circuit recovery.

Compliance Summary

Electrical Safety	• UL/CSA 62368-1 (NEMA only) • CB Scheme per IECEE • ENEC (Zhaga only) • CE
Communications	• FCC (NEMA) • ISED (Zhaga) • PTCRB (NEMA)
Fire Resistance	UL94
Ingress	IP66 Class per IEC 60529
Impact	IK07 per IEC 62262
Electrical Transient/ Overvoltage Resistance	• ANSI C136.2 Class B (10kV/5Ka) • IEC 62368-1:2018 Category II (2.5kV)
Environmental	RoHS Restriction of Hazardous Substances

Warranty and Service

Standard	10 Year Device Replacement

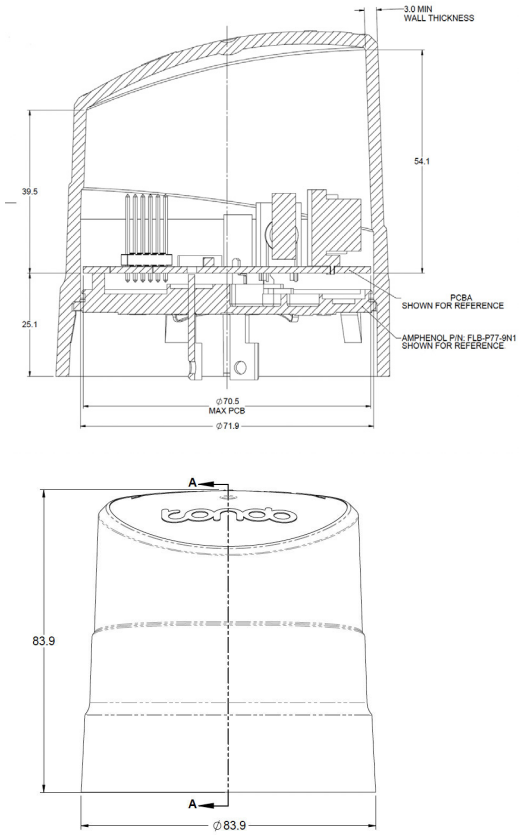
Compliance Summary

Lighting Control	• DALI™/DALI 2™ (Parts 101, 103) • DALI™ D4i (Part 351) • IFE-US (NEMA) • IFE-EU (Zhaga) • ANSI C136.10 0-10V (NEMA) • ANSI C136.41 7-Pin (NEMA) • Zhaga Book 18 (Zhaga)

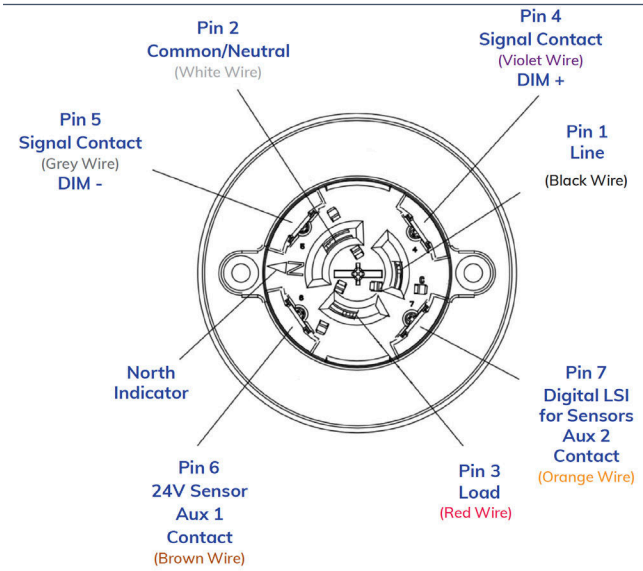
Energy Measurement	• ANSI C12.1 (NEMA)
	• ANSI C136.50 (NEMA)
	• DALI D4i (NEMA and Zhaga)
	  • DALI Part 251
	  • DALI Part 252
	  • DALI Part 253

Information Security	• ISO 27001 Information Systems • ISO 27017 Cloud Security • ISO 27018 PII Data Security
Quality Management	ISO 9001
Business Continuity	ISO 22301

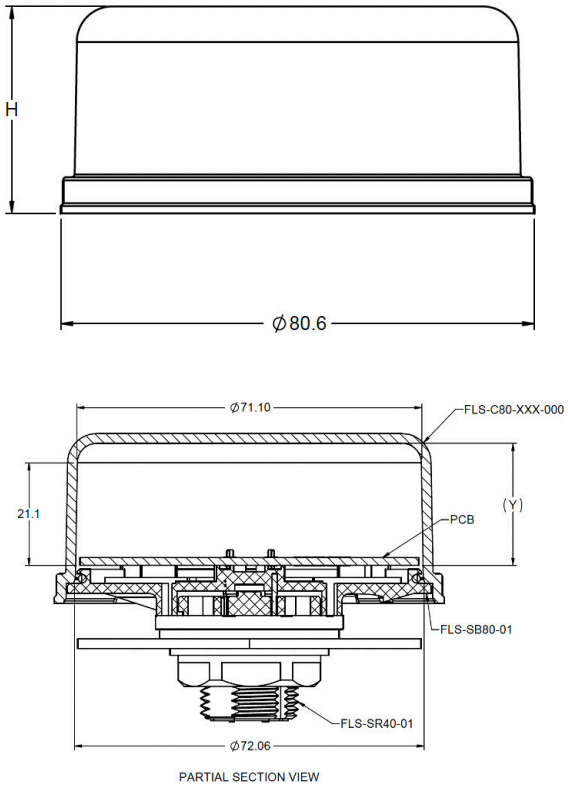
Dimensional Drawings - NEMA



Edge IQ™ NEMA Socket Pin Diagram



Dimensional Drawings - Zhaga



Energy Analytics

Cabinet IQ™ Energy Analytics

ENLIGHTENING CONNECTIVITY

Cabinet IQ™ Overview

Tondo's Cabinet IQ™ provides lighting and utility cabinet advanced energy quality monitoring, cabinet-based lighting control, revenue-grade smart electricity metering, and a wide range of relay, digital, and analog control.

Cabinet IQ™ is well-suited for a wide range of use-cases:

- Advanced electricity quality monitoring
- Billing-grade ANSI C12.20 0.5 Class electricity metering
- Digital and analog data acquisition and control
- Mechanical and solid-state relay control
- Cabinet-based lighting control
- Time-of-Use electricity metering and billing-grade reporting with secure data logging

Together with Tondo's Cloud IQ™ Central Management System, Cabinet IQ™ provides a complete controls, metering, and electricity management solution.

Cabinet IQ™ Features and Benefits

Advanced Energy Management

Cities require their electric utility distributor to provide a consistently dependable quality of electricity to power their critical infrastructure. Unfortunately, this is not always the case.

Tondo's Cabinet IQ™ solution can alert cities to problems with the quality of service on the secondary system side of their line transformers that service their streetlights and other electrified city assets. This allows cities to diagnose problems faster, and know whether to dispatch their maintenance team or report a problem to their utility partners.

Electricity Quality Monitoring and Analytics

Cabinet IQ™'s smart energy meter is a high-performance Class 0.5/0.5S accuracy revenue-grade, ANSI C12.20/IEC 62053-22 compliant energy monitoring and analysis system.

Together with Cabinet IQ™ can provide scheduling, energy management, and emergency control insights that include:

- Electricity theft
- Electrical wiring faults
- Secondary service failure
- Service breaker condition

The Cabinet IQ™'s Smart Energy Meter supports three-phase power metering, power quality analysis, and can be used for Time-of-Use residential, commercial, and industrial Smart Metering applications.

Cabinet IQ™'s energy management capabilities also include usage and demand, auditing and benchmarking, power limiting, load shedding, scheduling, and alerts to an array of anomalies, faults, and inefficiencies of monitored systems.

Sensor and Actuator Control

Cabinet IQ™ supports the full range of Tondo's Smart Sensor solutions that include:

- Vehicle lane monitoring, traffic counting
- Vehicle and license plate identification
- Pedestrian and cyclist traffic monitoring
- Ambient light level monitoring (lux)
- Roadway conditions (dry, rain, ice)
- Temperature, precipitation, wind, humidity, and UV
- Airborne particulates
- Noise levels
- Tank and vessel level monitoring
- Battery level monitoring
- Water flow (m3/s)
- Cabinet flood, fire (temp or ionization), or tampering

Based on the data Cabinet IQ™ collects, Tondo's Cloud IQ™ CMS deep machine-learning AI and analytics and data lake can provide cities with actionable intelligence, detecting patterns and anomalies in even the largest Smart City data sets.

Cabinet IQ™ x Edge IQ™: Working Together

Cabinet IQ™ is an ideal complement to Edge IQ™ controls.

When a lamp or driver goes bad, Edge IQ™ will tell you. However, when something goes wrong with the power from your utility service point, Cabinet IQ™ can provide enhanced insights by combining its data with the data captured by Edge IQ™.

Cloud IQ™'s Deep Learning AI uses the combined data to identify anomalies such as electricity theft, transformer theft, and wiring faults that cost cities enormous sums of money.

Cabinet IQ™ Energy Analytics

Group Lighting Control

Cabinet IQ™ is ideal for controlling lighting where socketed fixtures are not available, or where wireless connectivity may be impaired.

Tondo's Cloud IQ™ can store configuration and device operations profiles in Cabinet IQ™ and its standard 48-hour UPS can provide full operation in the event of loss of power.

Secure Encrypted Cellular Connection-to-Cloud

Each Cabinet IQ™ is connected to the Tondo Cloud IQ™ CMS using a private LTE cellular network.

Like the Edge IQ™, Cabinet IQ™'s cybersecurity encrypts data in-flight using a uniquely-generated encryption key and an encrypted LTE network. Secure authentication is provided via Cabinet IQ™'s on-board hardware-based cryptoprocessor. Firmware updates are delivered via secure over-the-air connections via Tondo's Cloud IQ™ CMS.

High-Speed Cellular Connection-to-Cloud

The Cabinet IQ™ includes a high-speed 4G LTE cellular network gateway with speeds up to **300mbps**.

With Cabinet IQ™'s built-in gigabit Ethernet switch and ability to mount on the pole or in a lighting or utility cabinet, cities can enable high-bandwidth applications using high definition video on the pole.

Cloud IQ™'s integrated gateway means there are fewer devices to manage, no cellular plans to manage, faster project delivery, lower network complexity, and lower costs.

Resilience and Data Retention

Cabinet IQ™ includes an uninterruptable power supply that can power the system for a minimum of 48 hours. This will ensure that in the event of a power outage, the Cabinet IQ™ will continue to monitor and control connected critical systems.

Energy usage data is retained for a minimum of 365 days in the event of power loss.

1. Three-Phase Mid-Certified TOU Smart Meter
2. 4 Digital Input + 2 Relay I/O Module
3. 180-550VAC 24VDC 10A Power Supply
4. UPS Controller
5. 2 x 7Ah Lead Acid Batteries - 48 hour operation
6. Cabinet IQ on Linux + 4G Cellular + Gigabit Ethernet

Cabinet IQ™ Energy Analytics

Product Specifications

Tondo provides Cabinet IQ™ as a fully-configured platform that automatically activates and connects to your Tondo Cloud IQ™ central management system.

Cabinet IQ™ comes pre-configured from Tondo, ready for installation on-pole or on-wall in its own IP67-rated cabinet.

Base Models

Cabinet IQ™-DIN	DIN TH35 Rail
Cabinet IQ™-POL	IP67 Cabinet Enclosure

Lighting Control Features

Lamp Control	Fixture, string and circuit control via relay output.
Scheduling	Astronomical clock Remote software control

Management and Field Configuration

Central Management System	Tondo Cloud IQ™ CMS
Scheduling Services	Dusk-to-Dawn AI-managed schedules Static scheduling Remote scheduling via CMS
Field Deployment	Tondo Cloud IQ™ CMS Tondo Mobile IQ™ App
Firmware Updates	Secure over-the-air

Measurement and I/O

Digital Sensor I/O	1 x 5VDC 4 x 48/125/250VDC
Relays/Contactors	2 x 250VAC / 30VDC / 5A
Solid-State Relay	0.15A/24VDC; 1 contact
Current Inputs (RMS)	1A secondary, 5A secondary, or 50A direct
I/O Communications	MODBUS RS-485 Serial
Ethernet	• Gigabit WAN x 1 • Gigabit Switch x 4

Cybersecurity

Device	Hardware security module • Root of trust • Automated key management • Secure over-the-air updates • Secure firmware • Secure boot
Cellular	Encrypted private cellular network via VPN tunneling

Network Connectivity

Sensor-to-Cabinet	• MODBUS RS-485 Serial • Dry Contact • Analog • USB

Gateway (Cloud Back-haul)	• LTE CAT-6
	  • up to 300Mb down-link
	  • up to 50Mbps up-link
	  • Dedicated cellular antenna
	  • Auto-switching dual SIM
	  • Secure private cellular network
	• Gigabit Ethernet
	  • Gigabit WAN x 1
	  • Gigabit Switch x 4

Internet Protocols	IPv4, IPv6, TCP, SSL, MQTT(S), HTTP(S), TLS, DNS, NTP
Location Services	GPS (±5m accuracy) Dedicated GPS/GNSS antenna
Network Status	On, off, fault, in-installation
Data Output	RS-485 serial port Tondo Cloud IQ™ CMS

Cabinet IQ™ Energy Management

Energy Monitoring & Metering	Energy Metering • MID-Certified Class 0.5S, 20mA-10A • Secure permanent meter log Monitoring (max/min/RMS/average): • AC Voltage • Current, Power, Power Frequency • Power Factor (phase, total) • Controller Power Load • Power Load • Voltage & current harmonic • Harmonic angles (40th order) • Phase-to-phase and phase-to-line voltage • Voltage and current THD, TDD and K-Factor • Measurement range 15-480/828V AC (L-N/L-L) • Measurement frequency range 25-400 Hz • Current & voltage imbalance • Active, reactive, & apparent energy metering

Power Supply

Line-In Power Supply Module	
Input Voltage	180-550VAC
Output Voltage	24VDC
Current Range	0-10A
Power	• 240W
Inrush Current	• 50A/530VAC
UPS Backup Module	
UPS Power Backup	• 2 x 12V (24V wired series) • 48-hour UPS backup
Input	• 2 inputs • 21-28V / 20A per input
Output	• 30V / 20A
Communications Module	
Power Consumption	9W maximum
Fault Tolerance	• Dual cellular SIM with automatic failover • Astronomical clock for scheduled operations • Time synchronization to cellular network • Real time clock • Data retention up to 290 days
Energy Metering and Monitoring Module	
Power Supply	• 57.7-277VAC • 48-290VDC
Input Impedance	1MΩ
Input Over-voltage	• 1000VAC continuous • 2000VAC 1 second
Nominal Voltage	400/690V AC (L-N/L-L)
Galvanic Isolation	4000V AC (L-G) for 1 min.
Rated Current Inputs	Choice of any of one options: • 5A CT connection • 1A CT connection • Direct up to 63A • Remote CT (40mA)
Output Rating	0.15A/24V AC/DC
Accuracy	0.5% Class
Digital I/O and Relay Module	
Galvanic Isolation	• 3000V AC 1 min between contacts and coil • 750V AC between open contacts
Output Rating	5A/250V AC; 5A/30V DC

Physical and Environmental

Communications Module	
Weight	455g
Height	44.2mm
Width	115mm
Depth	95.1mm
Mounting	DIN rail or wall-mount options
Operational Temperature	-40°C to +75°C
Ingress Protection	IP30 Class
Relative Humidity	10% to 90% non-condensing
Impact Resistance	IK07 per IEC62262
Energy Metering and Monitoring Module	
Weight	533g
Height	90mm
Width	125mm
Depth	75mm
Mounting	EN50022 DIN rail
Operational Temperature	-25°C to 60°C
Ingress Protection	IP20 Class
Digital I/O and Relay Module	
Height	95mm
Width	77mm
Depth	45mm
Mounting	Plug into EMM
Operational Temperature	-25°C to 60°C
Ingress Protection	IP20 Class

Certifications and Compliance

Communications Module	
Regulatory	• CE/RED • EAC • RoHS • WEEE
EMI	• Draft EN 301 489-1 V2.2.0 • Draft EN 301 489-19 V2.1.0 • Draft EN 301 489-52 V1.1.0
ESD	EN 61000-4-2:2009
RS	EN 61000-4-3:2006 + A1:2008 + A2:2010
EFT	EN 61000-4-4:2012
Surge	EN 61000-4-5:2014
CS	EN 61000-4-6:2014
DIP	EN 61000-4-11:2004

Product Specifications

Certifications and Compliance

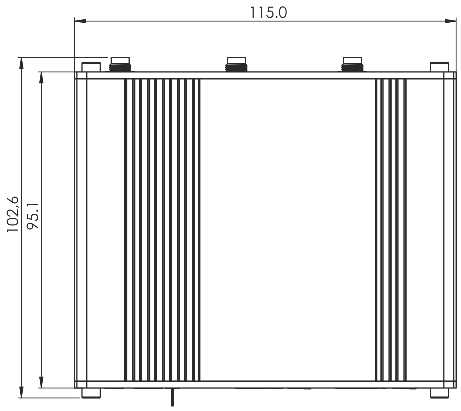
General	• CE • UL • CSA
RF	• EN 301 908-1 V11.1.1 • EN 301 908-2 V11.1.1 • EN 301 908-13 V11.1.2 • EN303 413 V1.1.1
Safety	• EC 62368-1:2014 • EN 62368-1:2014 + A11:2017 • EN 50665:2017 • EN 62311:2008
Energy Metering, Monitoring & I/O Module	
Safety	• UL/IEC 61010-1 • UL 916
EM Emissions	• EN55022: 2010 Class A (CISPR 22) • FCC p.15 Class A mandatory
Environmental	• WEEE • RoHS per 2011/65/EU & amendments • EN/IEC 60068-2-1:2007
Energy Immunity	• IEC61000-4-2 • IEC61000-4-3 • IEC61000-4-4 • IEC61000-4-5 • IEC61000-4-6 • IEC61000-4-8
Energy Metering Accuracy	• IEC 62052-11 • IEC 62053-22 0.5S Acccuracy Class • MID-Certified EN 50470-3 Class B or C (5A)
Electromagnetic/RF	• Draft EN 301 489-1 V2.2.0 • Draft EN 301 489-19 V2.1.0 • Draft EN 301 489-52 V1.1.0 • ESD: EN 61000-4-2:2009 • EFT: EN 61000-4-4:2012 • EN 301 908-1 V11.1.1 • EN 301 908-2 V11.1.1 • EN 301 908-13 V11.1.2 • EN303 413 V1.1.1
Surge	• EN 61000-4-5:2014 • CS: EN 61000-4-6:2014 • DIP: EN 61000-4-11:2004

Warranty and Service

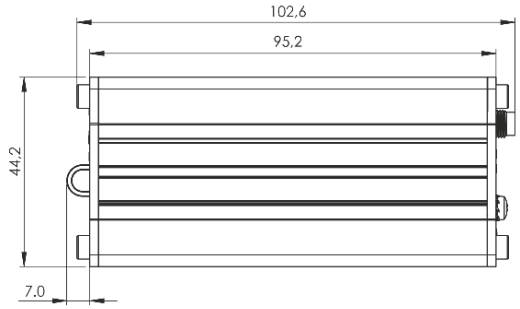
Standard	5 Year Component Replacement 10 Year Optional Term

Dimensional Drawings

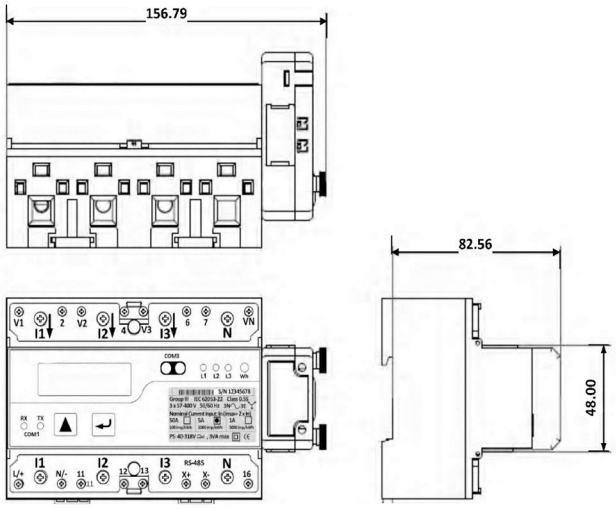
Communications Module - Top



Communications Module - Side

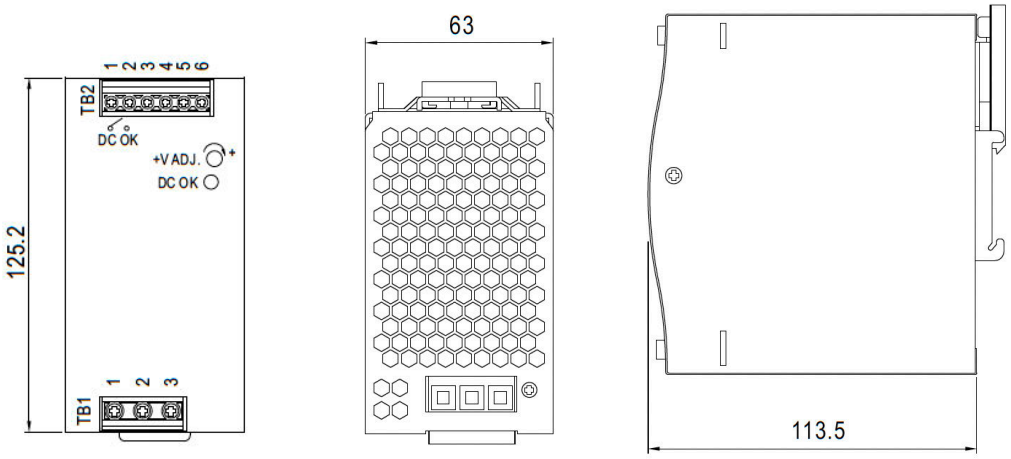


Energy Metering, Monitoring, & I/O Module - Top

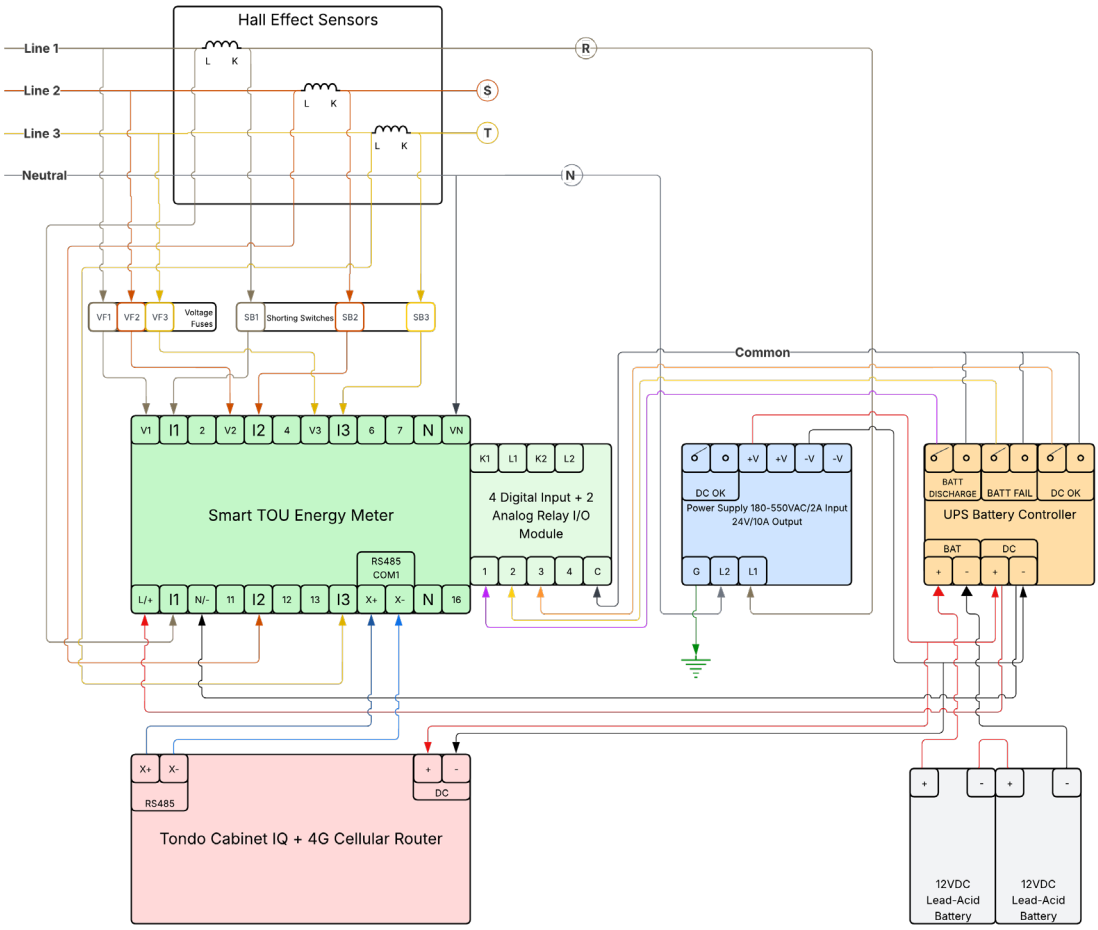


Dimensional Drawings

180-550VAC Line In Power Supply - North America Only

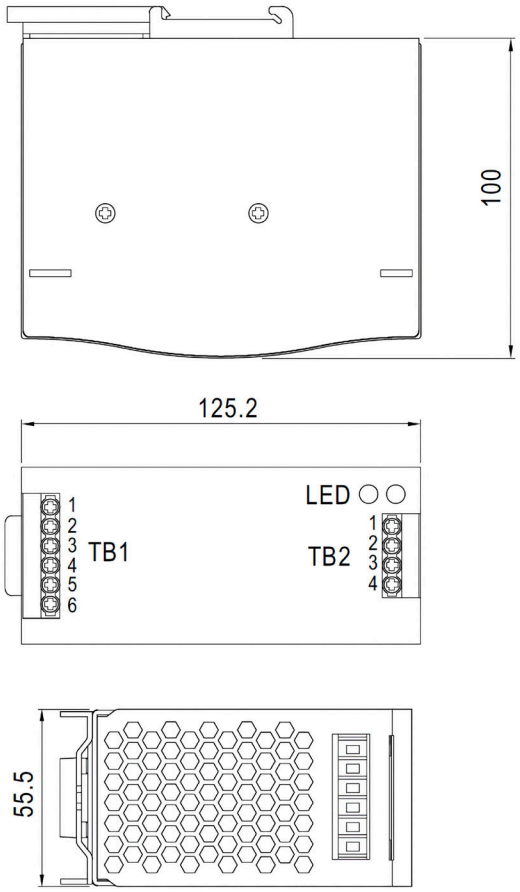


Cabinet IQ™ Wiring Diagram - United States

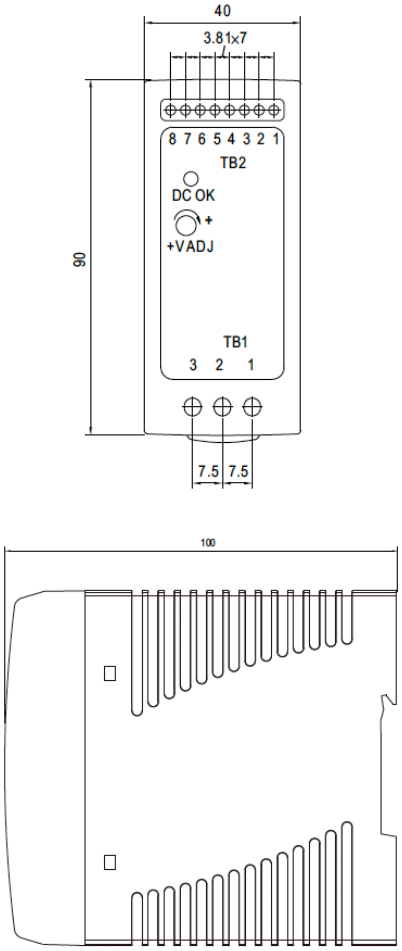


Dimensional Drawings

UPS Backup Module (North America Only)



220V Line In & UPS Backup Module (EU Only)



Smart Sensor Solutions

Tondo's Smart Sensor solutions support a limitless array of sensor solutions for nearly any use-case, both off-the-shelf and custom.

Using Tondo's universal IoT firmware platform, Smart Sensor solutions share a common set of functional capabilities, such as communications, calendaring, power management, and cybersecurity.

This enables Tondo to create and deliver tailored sensor solutions for our customers in only a few weeks.

Universal Sensor Platform

Tondo's Smart Sensor uses Tondo's universal IoT firmware platform to deliver Tondo's Smart City sensor solutions.

This firmware provides sensors with a common technology platform for communications services, location services, high-efficiency power management, on-device data storage, a rules engine, task scheduling, and a common integration layer.

Our approach enables us to quickly adapt nearly any existing sensors for deployment on the Tondo Smart City network. Some of the solutions include:

- Adaptive parking lot lighting
- Adaptive lighting for cyclist and pedestrian pathways
- Roadway and area flood sensing
- Vehicle traffic lane counting and identification
- Pedestrian and cyclist counting
- Weather monitoring
- Air quality monitoring
- Public emergency call button
- Public emergency lighting alerts
- Noise level monitoring
- Waste bin level sensing
- Wastewater monitoring
- Cabinet flood, fire, and tampering sensing
- Outdoor fire and smoke sensing
- Emergency shelter management

If you have a sensor or device control use-case, Tondo will make it happen.

Beyond Data... to *Decisions*

Tondo's advanced Deep Learning platform in the core of Cloud IQ™ transforms collected data into actionable alerts..

Tondo's flood control solution is one example: we don't just send an alert to a dashboard - we trigger traffic control systems to alert drivers to flash flood conditions that could cost lives.

For electricity theft, we trigger alerts and dispatch maintenance teams to re-mediate on-site, and saving one customer over $250,000 per year in energy costs.

At Tondo, our sensor and metering solutions go beyond just data collection to create operational efficiencies.

Motion IQ™: Presence and Adaptive Lighting

Motion IQ™ is an affordable motion detector that enables adaptive roadway and area lighting and maximizes lamp asset life.

Motion IQ™ also enables Tondo's deep learning AI to deliver adaptive lighting for roadway and area lighting according to ANSI/IES RP-8 best practices. This ensures cities are delivering safe, efficient lighting while reducing their energy usage by as much as 60%.

Motion IQ™ connects to fixtures via a Zhaga Type B socketed interface or on the pole using Tondo's Zhaga connector pole mounting option.

Adaptive Lighting Sensor

Motion IQ™ Sensor

ENLIGHTENING CONNECTIVITY

Product Description

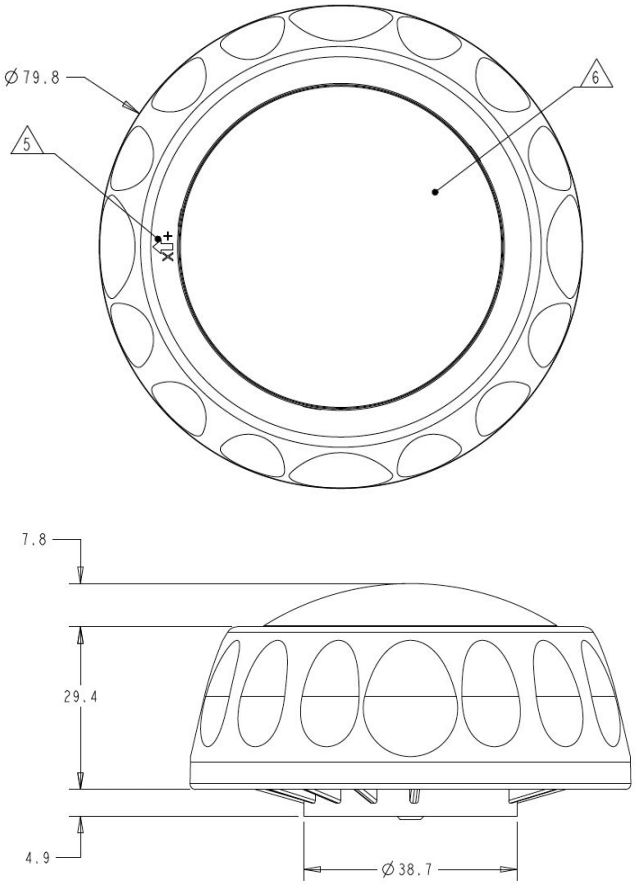
Tondo's Motion IQ™ works with Cloud IQ™'s Deep Learning AI to deliver safe lighting on-demand for roadways, parks, area lighting, pedestrian, and cyclist pathways.

Base Models	
Motion IQ™	Zhaga Book 18 Type B on fixture or pole

Features	
Detection Zone	30m x 6m @ 5m
Effective Height	Up to 12m
Detection	• Pedestrians, runners, cyclists, or vehicles • Counting accuracy suitable for tracking
Lighting Control	DALI D4i
Counting Sensitivity	Discrete pass through mask area
Luminance Sensitivity	Continuous calibration to filter reflected light
Connectivity	Zhaga Book 18 Type B Socket
Ingress	• IP66 • IK07
Operating Temperature	-40°C to 65°C
Detection Temperature	-40°C to 32°C
Height	42mm
Diameter	79.7mm
Case Materials	Dome: HDPE & Polycarbonate Base: PBT
Current	• 25mA on startup • 6-8mA average operating • Powered from DALI™ bus on Tondo Edge IQ™ Smart Lighting Control
Standards	• Zhaga Book 18 Editions 1, 2 and 3 • DiiA: Parts 351 • IEC 62386: Part 303, 101 and 103 • CE Marked • UL773 • IEC 61347-1 • IEC 61347-2-11
Vibration	5 to 500 Hz random levels at 4.9g per IEC 60512-6-4
Mechanical Shock	30g per IEC 60512-6-3

Features	
Impact	2 joules per IEC 62262
Thermal Shock	-40 and 70°C er EIA-364-32
Humidity	25 and 65°C at 90 to 100% RH IEC 60512-11-12
Dry Heat	70°C per IEC 60512-11-9
Conducted Emissions	CISRP 15 / EN 55015 • 84µV to 74µV quasi-peak • 64µV to 74µV average
Radiated Emissions	CISRP 15 / EN 55015 • 30µV/m@30MHz to 230MHz • 37µV/m@230MHz to 300MHz

Dimensional Drawings



Wire Theft IQ™ Sensor

Wire Theft IQ™: Copper Theft Detection

Tondo's Wire Theft IQ™ sensors are designed to detect copper wire theft-in-progress from energized or de-energized streetlight circuits.

Together with Tondo's Cloud IQ™ artificial intelligence engine, Wire Theft IQ™ detects the specific theft behaviors that indicate copper wire theft.

How It Works

Tondo's Wire Theft IQ™ system provides continuous, end-to-end monitoring of common four-wire roadway lighting circuits to detect copper theft at the moment a wire is cut, tampered with, or removed. The system uses a pair of compact battery backed-up sensor units installed at each end of a circuit.

Wire Theft IQ™ immediately detects loss of continuity, and sends an instant alert to Tondo's Cloud IQ™ management platform via the unit's integrated cellular modem.

Cities and utilities receive real-time, circuit-level notifications enabling law enforcement to respond quickly. Studies have shown that the presence of and response by law enforcement has the greatest impact on deterrence.

High Efficacy, High Trust Protection

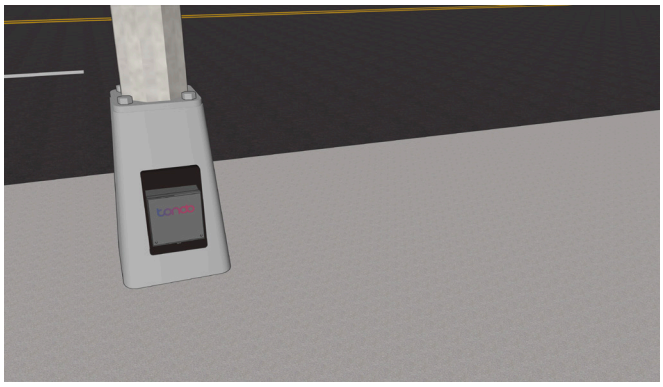
Each Wire Theft IQ™ sensor sends periodic "keepalive" signals over the monitored wires. As long as the conductor remains intact, the distant unit acknowledges the signal and the circuit is confirmed healthy.

When a thief cuts or removes wire anywhere along the line from cabinet to the last pole - the sensor signal path is broken.

Low Cost, Rapid ROI

Wire Theft IQ™ protects all wire in a circuit at a low annual cost per pole, and provides actionable, real-time intelligence for far less than passive locking mechanisms or replacement of copper wire with copper-clad steel or aluminum wire.

Tondo's Wire Theft IQ™ is fully cost-recovering for cities, DOTs and utilities experiencing theft incidents from their poles as low as 0.5% - 1.0%



Solutions that depend on light fixture controls cannot distinguish between a utility outage event or circuit wiring fault that causes fixture failure, creating false positives that erode trust in the system that requires trust for efficacy.

Installing Wire Theft IQ™

Wire Theft IQ™ is easy to install:

- Single technician, sidewalk installation
- No traffic control required
- Estimated 45 minutes per circuit installed
- Mobile field application enables collection of custom field asset information sent back to the cloud

Integrated Security and Law Enforcement

Thieves steal copper wire because today, the chances of getting caught are low.

Regulations requiring ID tracking for metals recyclers have a significant effect on the convenience of selling stolen wire, but are an insufficient deterrence by themselves.

Tondo's Wire Theft IQ™ is an ideal "upstream" complement to "downstream" metals recycling regulations.

Wire theft requires more time on-site versus other types of theft, making law enforcement response critical.

Wire Theft IQ™ provides law enforcement with actionable intelligence that increases arrest rates and deterrence.

Wire Theft Detection

Wire Theft IQ™ Sensor

ENLIGHTENING CONNECTIVITY

Product Specifications

Wire Theft IQ™ sensors operate independently of Tondo's roadway and area lighting controls, and are managed by Tondo's Cloud IQ™ central management platform.

One sensor is required for the first pole in the circuit, and one sensor is required for the termination at the last pole.

Part Numbers

SC400-NA	Sensor for circuit termination
SC400-AT	Optional external antenna

Electrical Specifications

Line Voltage	100 - 480VAC
Input Voltage	12VDC regulated
UPS Battery Backup	$LiFEPO_4$ 14 hour operation
Power Consumption	<1W continuous

Communications

Local Communications	Bluetooth® 6LE
Cloud Communications	Cellular 4G LTE CAT-M1 1mbps Optional CAT1 .bis 5/10mbps
Cellular Data	Unlimited multi-network cellular data plan included with Cloud IQ™ subscription
Control I/O	3 x GPIO for additional deterrence options • Access panel tampering • Emergency siren trigger • Flashing light beacon
Onboard Indicators	• Power • Battery Charge status • Cellular modem power • Network status

Detection

Monitoring	Closed-loop PLC
Alerts	• Cable cut • Optional access panel tampering
Operational Modes	• Energized circuit • De-energized circuit

Compliance Summary

Electrical Safety	• CB Scheme per IECEE • CE
Communications	• FCC • PTCRB
Fire Resistance	UL94
Ingress	IP20 Class per IEC 60529

Compliance Summary

Impact	IK07 per IEC 62262
Electrical Transient/ Overvoltage Resistance	• ANSI C136.2 Class B (10kV/5Ka) • IEC 62368-1:2018 Category II (2.5kV)
Environmental	RoHS Restriction of Hazardous Substances

Management and Field Configuration

Central Management	Tondo Cloud IQ™ CMS
Field Deployment and Configuration	• 4X DIN rail mount sensor • 1X DIN rail mount 12V power supply • Installed at pole base • Auto-configuration Tondo Mobile-IQ Field App • Android or iPhone compatible

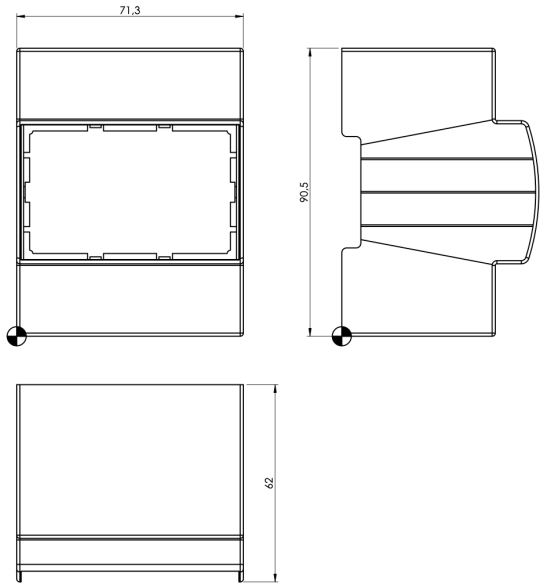
Physical and Environmental

Weight	600g with Battery
Dimensions	90.5mm x 71.3mm x 62mm
Ambient Temperature	-40°C to +85°C

Warranty and Service

Standard	5-Year Device Replacement
Optional	10-Year Replacement

Dimensional Drawings



MultiSense IQ™ Event Detection

Ground & Sky Intellligence

MultiSense IQ™: Privacy-Protecting Monitoring of Urban Ground and Sky

MultiSense IQ™ is Tondo's newest innovation in intelligent sensing—an advanced, streetlight-mounted drone and acoustic detection platform that brings real-time ground-and-sky situational awareness to public spaces and critical infrastructure.

Designed for installation on standard LED streetlights, MultiSense IQ™ captures, interprets, and classifies ground-and-sky events to help detect risks to public safety and critical infrastructure events as they happen.

MultiSense IQ's detection of FAA-registered drone Remote ID broadcasts also enable cities to verify licensing for commercial drone operators, supporting new licensing revenue streams in municipal airspace.

With an array of eight-microphones in 360° and embedded AI processing on each device, MultiSense IQ™ transforms detected sound and drone Remote ID information into actionable intelligence that protects citizen privacy without recording conversations or video surveillance.

Safeguarding critical infrastructure, monitoring public spaces and major outdoor events, MultiSense IQ™ equips cities and infrastructure operators with the ground-and-sky intelligence they need to respond proactively and effectively to adverse events.

Comprehensive Detection Capabilities

MultiSense IQ™ is engineered to recognize a wide range of sound-based events that matter to public safety, mobility management, and community well-being. Its detection library - enhanced through advanced machine learning models - provides accurate classification across diverse use cases.

Tondo currently has field-proven AI and digital signal processing for audio detection of::

- Licensed or unlicensed drones
- Glass breakage
- Gunshots
- Panic screams
- Aggression
- Grafitti spray
- Grinder, cutter, or drill
- Noise bylaw violations

MultiSense IQ™ is optimized for environments where sound-based insights help protect people and property.

Strengthening Awareness Where It Matters Most

Urban public spaces

Detection of disruptive events in plazas, parks, transit hubs, and entertainment districts.

Schools and campuses

Real-time acoustic awareness that supports student and staff safety, without the privacy tradeoffs of cameras.

Transit and transportation infrastructure

Event detection in stations, corridors, bus stops, and platforms, including violent confrontations, vandalism, or other audible anomalies.

Critical infrastructure and industrial sites

Detection of forced entry attempts, grinder, cutter, or drill activity, or other acoustic patterns associated with tampering or theft such as catalytic converter theft or break-and-enter.

Hospitals and medical facilities

Awareness of distress signals, aggression, or threats around high-stress public-facing environments.

Office buidings and public facilities

Support for detecting disturbances, aggression, or other events around commercial buildings and public facilities.

How It Works

MultiSense IQ™ uses a three-stage sensing and analytics pipeline designed for both speed and reliability.

Capture

A directional 8-microphone array continuously monitors the surrounding environment for sound signatures 360 degrees horizontal and vertical. Integrated WiFi is used for detection of FAA-registered drone Remote ID data that identifies the operator and their location.

Ground & Sky Intelligence

MultiSense IQ™ Event Detection

ENLIGHTENING CONNECTIVITY

Analyze

An embedded AI processor performs detection, screening for acoustic patterns that match known event types. Only anonymized metadata, not raw audio, is transmitted for further analysis by Tondo's Cloud IQ™ management system.

Classify and Correlate

Tondo's Cloud IQ™ management system evaluates detected events distinguishing between different types of sound and drone events, and correlating them across sensors when needed.

Notify and Act

Verified events by Cloud IQ™ can generate immediate alerts to command centers, public safety teams, or integrated systems, supporting real-time response and situational awareness.

Although MultiSense IQ™ does not capture video, alerts sent to Tondo's Cloud IQ™ management platform can send industry-standard ONVIF camera control commands to third-party camera platforms and orient cameras in the direction of a detected event. This provides faster-than-human response to events to confirm the need for a response.

Privacy & Security Designed for Public Trust

MultiSense IQ™ is engineered for operation in sensitive public environments while upholding strong privacy protections.

- No audio recordings are stored or transmitted
- No speech recognition or conversational analysis
- No biometric or personal data processing
- Acoustic data is converted into non-reversible metadata at the source
- System operations follow robust security and data governance practices

This makes MultiSense IQ™ suitable for deployment around schools, hospitals, civic centers, and other public locations where trust and compliance are essential.

Fast, Simple Deployment

MultiSense IQ™ is built for effortless installation and scalability.

- Mounts directly on streetlight poles < 2 minutes
- Powered through standard lighting infrastructure with 14-hour UPS battery backup during power outage
- Operates reliably under outdoor environmental conditions
- Uses energy-efficient cellular communication
- Managed remotely through the unified Cloud IQ™ platform

This minimizes installation costs and simplifies long-term operations.

Optimize From Alert to Coordinated Response

MultiSense IQ™ connects seamlessly with Cloud IQ™ and other information systems to support operational workflows.

- Real-time event alerts to command centers
- Automatic camera retargeting for visual verification
- Integration with dispatch, enforcement, and emergency response systems
- Event logging, timeline generation, and historical analysis

This ensures that every detected event becomes part of a coordinated, actionable process.

Enhancing Safety and Efficiency

MultiSense IQ™ enables cities and organizations to:

- Improve response times to critical events
- Support commercial drone licensing revenue streams for municipalities
- Reduce manual monitoring workloads
- Detect incidents not visible to cameras or human observers
- Enhance situational awareness in crowded or sensitive environments
- Support proactive intervention and risk mitigation
- Lower operational costs versus expanding camera systems

MultiSense IQ™ complements existing safety infrastructure and provides high-value coverage at scale.

MultiSense IQ™ Event Detection

Product Specifications

MultSense IQ™ sensors are mounted on any light fixture with a standard NEMA 7-Pin external socket, and are managed by Tondo's Cloud IQ™ central management platform.

No special tools or modifications for light fixtures or poles are necessary, and installation time < 2 minutes.

Part Numbers

SC500-NA	MultSense IQ™ Acoustic and Drone Sensor

Electrical Specifications

Line Voltage	100 - 480VAC
Input Voltage	12VDC regulated
UPS Battery Backup	$LiFEPO_4$ 14-hour operation Local event logging
Power Consumption	<1.5W continuous

Communications

Local Communications	Bluetooth® 5.4 LE
Cloud Communications	Cellular 4G LTE CAT-M1 1mbps Optional CAT1 .bis 5/10mbps Multi-network activation with auto-failover
Cellular Data	Unlimited multi-network cellular data plan included with Cloud IQ™ subscription
Remote ID Drone Detection	WiFi 5 802.11a/b/g/n/ac)
I/O	• USB-C for camera connection • I^2C • SPI • UART • IMU

Detection & Control

Monitoring	360° omnidirectional sensing via 8 external water-resistant microphones Remote ID for FAA-registered drones
Alerts and Data	• Location • Direction
Control	• ONVIV Camera Control • LED/Buzzer Alert

Cybersecurity

Device	Hardware security module • Root of trust • Automated key management • Secure over-the-air updates • Secure firmware • Secure boot
Cellular	Encrypted private cellular network via VPN tunneling
Cloud	• ISO 27001 Data Security • ISO 27017 Cloud Security • ISO 27108 Personal Information Security

Compliance Summary

Electrical Safety	• CB Scheme per IECEE • CE
Communications	• FCC • PTCRB
Fire Resistance	UL94
Ingress	IP65 Class per IEC 60529
Impact	IK07 per IEC 62262
Electrical Transient/ Overvoltage Resistance	• ANSI C136.2 Class B (10kV/5Ka) • IEC 62368-1:2018 Category II (2.5kV)
Environmental	RoHS Restriction of Hazardous Substances

Management and Field Configuration

Central Management System	Tondo Cloud IQ™ CMS
Field Deployment and Configuration	• ANSI C136.41 7-pin NEMA socket mount • Auto-configuration Tondo Mobile-IQ Field App • Android or iPhone compatible

Physical and Environmental

Weight	
Dimensions	
Operating Temperature	-20°C to +60°C

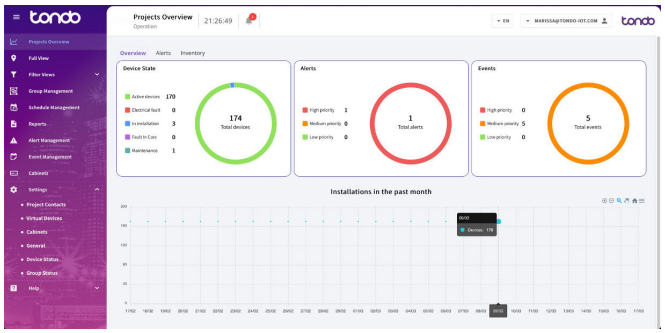
Warranty and Service

Standard	5-Year Device Replacement
Optional	10-Year Replacement

Cloud IQ™ Management Overview

Transforming Urban Environments with Cloud IQ™

Welcome to the forefront of Smart City evolution, where Tondo's Cloud IQ™ platform redefines how urban spaces harness the power of smart technology. Designed for directors of public works and those managing street and outdoor area lighting assets, Cloud IQ™ is your gateway to a safer, more efficient, and interconnected city.

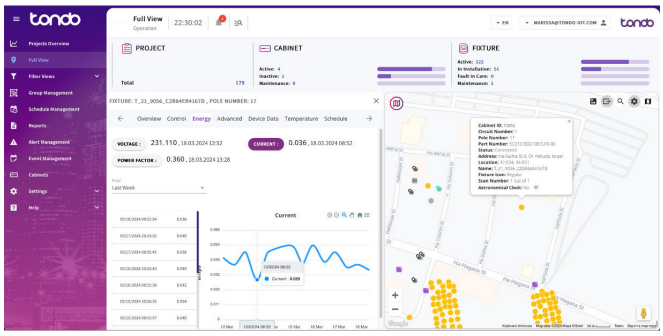


Advanced Roadway Lighting Control

Illuminate the path to efficiency with Cloud IQ™, delivering over a 55% improvement in streetlight operational efficiencies. Our platform ensures the delivery of safe, standards-compliant lighting exactly where and when it's needed, leveraging deep learning AI to simplify the complexities of urban lighting.

Connecting Critical Infrastructure

Bridge your city's foundational services - from water and sanitation to transportation and energy - with Cloud IQ™. Our platform enables comprehensive monitoring and management, driving operational efficiencies and reducing connectivity costs by more than 50%, all through a communication platform built on the backbone of our Smart Lighting solutions.

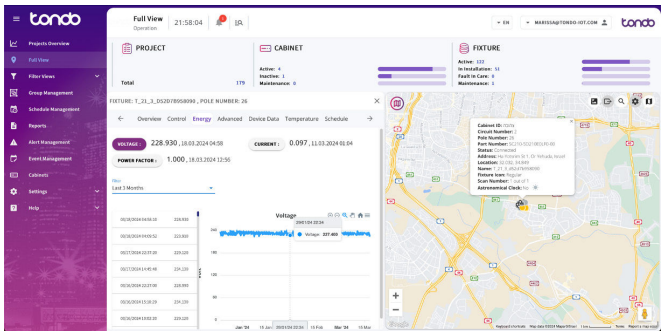


Transforming Data into Actionable Insights

Tondo's Cloud IQ™ does the data collection, analysis, and data management so you don't have to. Cloud IQ™'s robust Deep Learning AI and visualization technology transforms data into actionable insights, alerting teams to abnormal conditions and anomalies in real-time to console charts and dials, and critical events via SMS text messaging, email, or maintenance service applications used by the city or its contractors.

Advanced Energy Management

Take command of your city's energy narrative. Cloud IQ™, in tandem with Cabinet IQ™'s sophisticated electricity analysis, monitors the quality of electrical service, identifying potential infrastructural threats before they occur. This proactive approach extends to all energy systems, making Cloud IQ™ a unified solution for city-wide energy management.



Sensors, Smart Meters, and More

Cloud IQ™'s agnostic design seamlessly integrates a broad spectrum of devices, from sensors and smart meters to SCADA use-cases, all through our innovative Edge IQ™ Bluetooth Mesh network or direct fixture connections. Third-party systems are effortlessly incorporated, enhancing Cloud IQ™'s deep learning AI with a rich dataset for unparalleled insight generation.

Zero Network Management

Experience the simplicity of an "invisible" network with Cloud IQ™. We absorb the complexities of connectivity, ensuring all Edge IQ™ and Cabinet IQ™ devices communicate flawlessly, with no additional infrastructure or management required on your part. It's smart city technology, simplified.

AI Automation and Analytics

Empower your operations with AI-driven automation and analytics. Cloud IQ™ transforms vast urban data into actionable insights, optimizing city functions without overwhelming your teams. It's not just about data collection - it's about making that data work for you.

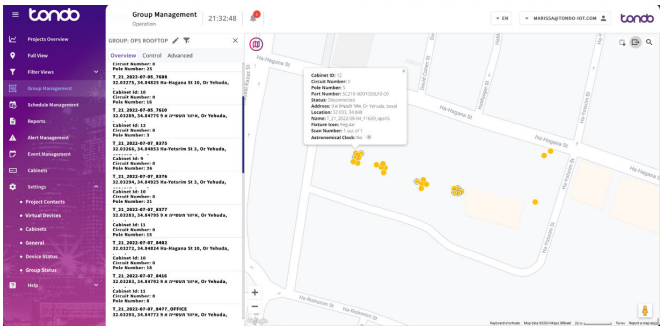
Simplifying Large Systems at Any Scale

Grow without boundaries. Cloud IQ™'s cloud-native infrastructure is designed to scale with your city, supporting the seamless addition of new technologies and devices. As your smart city expands, Cloud IQ™ grows with you, ensuring a sustainable, cost-effective future for urban management.

Tondo's User and Asset Group Management capabilities allow cities to group assets by type, location, and a variety of other attributes, and assign team members to specific asset types and geographies. This avoids team members from being overwhelmed with information outside their area of responsibility, greatly simplifying their work.

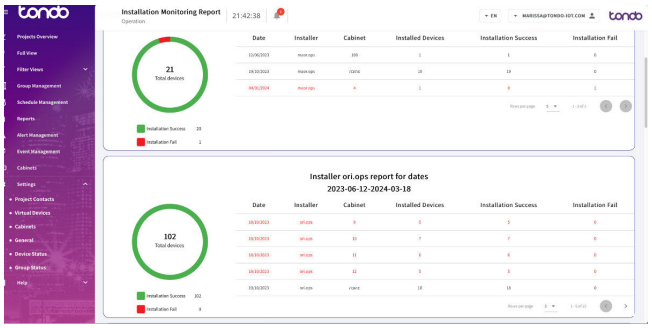
Simplifying Installation and Maintenance

All Tondo controllers are enabled with true plug-and-play activation. Socketed Edge IQ™ controls activate in less than a minute, significantly decreasing project timelines and costs.



Each controller is securely matched at the time of manufacture to a city's Cloud IQ™ platform with unique strong cryptographic keys to ensure only authorized devices can connect.

Whether it is a first-time project deployment or tracking maintenance activities, Tondo's Cloud IQ™ provides real-time tracking of installation activities for controllers and connected devices by city teams or contractors. This allows cities to track operational efficiencies and anomalies, and know whether projects are on-schedule or require further attention.



Tondo's Cloud IQ™ includes unlimited licenses for Mobile IQ, Tondo's field installation management app. Mobile IQ provides installers with confirmation of installation and operation in the field, and provides a secure testing application that can work at the top or the bottom of the pole.

Cloud IQ™ and Mobile IQ provide for unlimited custom asset fields to gather information on other field asset data such as the condition of the asset, the asset ID, or the area surrounding each asset, with any additional field notes.

Data can be fed back to city Open Data platforms like ArcGIS in real-time to support transparency initiatives, and automate the maintenance of city asset management data.

Unified Smart City Data

Say goodbye to data silos with Cloud IQ™'s advanced data lake architecture. Our platform collects and analyzes data from across your smart city ecosystem, offering a single, clear view of urban operations and unlocking new efficiencies across systems and use-cases.

Interoperability and Open Standards

Built on the bedrock of open source software and connectivity standards, Cloud IQ™ ensures your city remains agile and adaptable. With support for industry standards and an open REST API, we guarantee a future-proof foundation for your smart city initiatives.

Your Cloud or Ours

With Cloud IQ™, the choice is yours. Host our platform on your own cloud to keep data under your control, or let us manage it on AWS for seamless, secure service. Either way, Cloud IQ™ adapts to meet your city's specific data sovereignty needs.

Transform your city with Cloud IQ™ by Tondo Smart - where smart city innovation meets operational excellence. Together, let's light the way to a brighter, smarter future.

Cloud Management

Cloud IQ™ Management

ENLIGHTENING CONNECTIVITY

Product Specifications

Tondo's Cloud IQ™ Central Management System is the world's first Deep Learning platform for Smart City lighting, sensors, cameras, smart meters, and controls. Customers may deploy Cloud IQ™ on Tondo's secure cloud or the Customer's own private cloud.

Hosting and Language Support

Host Platforms	• Azure Cloud (Default) • AWS
Languages	Multilingual

Cloud Connectivity

Cellular	• Included with Cloud IQ™ • Supported on all major networks • Private encrypted network • No data cap

User Interfaces

Types Supported	• Desktop/Laptop Browser • Tablet Browser
Browsers Supported	• Google Chrome • Apple Safari • Microsoft Edge

Access Control

Users	• Single Sign On • Microsoft Azure Active Directory • Multi-Factor Authentication • User-based and Role-based • Administrator or read-only • Constrain by CMS function
Groups	• Custom groups • Configuration or read-only access • Constrain by CMS function

Controller, Sensor, and Device Support

Controllers	• Tondo Edge IQ™ • Tondo Cabinet IQ™
Sensors (Current)	Tondo Supplied • Unlimited use-cases
Cameras	Third Party Supplied • Public safety camera
Smart Meters	Third-Party Supplied • Smart electricity meter • Advanced electricity analytics
Actuators	Tondo Branded • Unlimited use-cases

Console Features

User Interface	• Full View Dashboard
	• Controller Dashboard
	• Cabinet Dashboard
	• Mobile Field App
	• Custom Thresholds
	• Google Map View
	• Visual Dials and Charts
	• Custom Filtering
	  • Geographic region
	  • Device type
	  • Device status
	  • Abnormal operation
	  • + more

Deep Learning AI	• AI-Adaptive[1] control • Abnormal operation • Predictive failure • Predictive lifecycle • Customizable use-cases • Over-the-Air Updates
Asset Data	• Custom fields • Automatic GPS Mapping • Manual override • Maintenance contract ID • Serial number • Asset tag • Manufacturer • Model • Lighting driver characteristics • Firmware version • IMSI cellular radio number • Connector type • Wiring gauge • Pole type • Pole condition • Manufacture date • Activation date • Installer reference • Rated lifecycle
Deployment Management	• Authorized device list • Project file attachments • Project contacts • Device installation reporting by installer, device, date, operating status, and location
System Notifications & Alerts	• Console • SMS text • Email
Lighting and Device Control	• Autonomous scheduled • Manual override control

Cloud IQ™ Management

Cloud Management

Console Features

Real Time Console View	• Fixture, cabinet, pole, sensor, meter, camera, switch
	• Branch circuit monitoring
	• Sensor data
	• Power factor
	• Wireless signal strength
	• Billing
	• Voltage and Current THD
	• 3-Phase demand monitor
	  • Voltage Max & THD
	  • Current Max & THD
	  • KW demand
	  • Demand Imbalance (V/I)
	  • V/I harmonics magnitude
	  • Angle

Reporting	• Electricity consumption • Asset inventory • Day-burner lighting • Abnormal operation • Device installation/removal • Device malfunction • Total operating hours • Time-of-use billing • Critical faults
Events and Alerts	• Custom thresholds • Device failure • Communication loss • Anomaly detection
Alert Communications	• CMS console • SMS text • WhatsApp • Webhooks • Email

Licensing

Cloud Host Options	• Microsoft Azure (Default) • AWS
Number of Users	Free Unlimited
Maximum Controllers	Unlimited; priced per controller
Maximum Sensors, Meters, & Devices	Unlimited; priced per device
Number of Cellular Networks	Supports two cellular plans: • One plan included • One additional available

Integrations

APIs	• RESTful • Any TALQ Compliant CMS
Notification Services	• Email • SMS • RESTful
Application Integrations	• Salesforce • Microsoft Dynamics CRM • Priority ERP

Cybersecurity

Data in Flight	• Encrypted • Private network back-haul
Data at Rest	Encrypted
Cloud Servers	• FIPS 140-2 Level 2 compliant key management
Controller-to-Cloud	Unique encryption keys on factory-provisioned controllers can connect to each customer's system. All others are rejected.
Controller-to-Sensor	• Cryptoprocessor and HSM-protected cryptographic operations • Authentication against secured Authorized Device List (ADL) in Tondo Cloud IQ™
Browser-to-Cloud	• Multi-Factor Authentication • Single Sign-On (SSO) • Role- and user-based security
Mobile App-to-Cloud	• Multi-Factor Authentication • Role- and user-based security

Competitive Comparison

Lighting Controls Comparison

ENLIGHTENING CONNECTIVITY

Smart Lighting Control Functionality Matrix														
Feature	**Tondo**	**Itron**	**Signify-Philips**	**Signify-Telensa**	**AcuityBrands - DTL**	**Current**	**Ubicquia**	**Dimonoff**	**Landis & Gyr**	**CIMCON**	**Synapse**	**Juganu JLED**	**Tvilight**	**Advantages**
AI-Adaptive Roadway Dimming	Yes	No	No	No	No	No	No	No	No	No	No	No	No	Up to 30% lower electricity use Standards-compliant lighting
Wife Theft Detection	Yes	No	No	No	No	No	No	No	No	No	No	No	No	Identify wire theft events
Electricity Theft Detection	Yes	No	No	No	No	No	No	No	No	No	No	No	No	Identify electricity theft events
Transformer Theft Detection	Yes	No	No	No	No	No	No	No	No	No	No	No	No	Identify transformer theft events
AI & Deep Learning	Yes	No	No	No	No	No	Third Party	No	No	No	No	No	No	Transforms data into valuable insights Simplified management
Cryptographic Hardware Security Module (HSM)	Yes	No	No	No	No	No	Yes	No	No	Yes	No	No	No	Cybersecurity suitable for connected critical infrastructure
Wireless Sensor Control	Yes	No	Motion Only	No	No	No	Wired Only	No	No	No	Yes	No	No	Smart City enablement
Data Lake & Real-Time Processing	Yes	Yes	No	No	No	No	Yes	No	No	No	No	No	No	Unified repository for Smart City data Scalability AI/Deep Learning across all solutions
Fully Managed Private Network	Yes	Additional Cost	No	No	No	No	No	No	Additional Cost	No	No	No	Yes	Reduce system complexity Reduce operating costs by up to 10%
Connected Devices on Network	Unlimited	Gateway Limited	Gateway Limited	Gateway Limited	Gateway Limited	CMS Limited	Unlimited	Gateway Limited	CMS & Gateway Limited	Gateway Limited	Gateway Limited	25 per CAP Gateway	Unlimited	Lower costs of growth Reduced system complexity
Cabinet Service Point Metering and Analytics	Yes	Third Party Option	Third Party Option	Third Party Option	No	No	No	No	No	No	No	No	Third Party Option	Measure and meter energy use and utility electrical service quality
On-Board Cellular	Yes	No	LLC7811 Only	No	No	No	Yes	No	No	No	No	No	Yes	Lower costs of deployment Lowers system complexity
Customer Cloud Hosting	Yes	No	Yes	Yes	No	No	No	Yes	No	No	No	No	No	Data sovereignty, privacy compliance
Decorative Fixture Installation	Yes	Yes	No	No	No	No	No	Yes	No	No	Yes	No	No	Preservation of decorative/ornamental fixture aesthetic
Cabinet Lighting Control	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	Yes	Manage grouped lighting on circuits from utility service point
Cellular Cloud Connectivity	1mbps or 10mbps Private	300kbps Private	1mbps Private	1mbps Private	Public Cellular Network	1mbps Private	1mbps or 10mbps Private	1mbps Private	200kbps Private	375kbps Private	1mbps Private	500kbps Private	1mbps Private	Scalability Security
Mesh Network	Bluetooth Mesh	Proprietary Mesh	Proprietary Mesh	No	No	Proprietary Mesh	No	Zigbee Mesh	No	Zigbee Mesh	Proprietary Mesh	Source Routing	No	Network resilience for cellular network dark spots and support for wireless sensors
Automatic Plug & Play Configuration	Yes	No	Yes	Yes	No	No	Yes	No	No	No	No	No	Yes	Automatic configuration and activation No pre-installation configuration No specialized installation skills Lower deployment costs by up to 50%
Astronomical Clock	Yes	No	Yes	Yes	No	No	Yes	No	No	Yes	Option	Yes	No	Savings of up to 10% over photocell controlled dusk-to-dawn
DALI D4i Sensor & Asset Management	Yes	No	Yes	No	No	Yes	Option	Yes	No	Yes	Yes	No	No	Lowers system complexity Lower cost of Smart City sensor solutions
Integrated Photocell	Yes	Yes	Yes	No	Yes	No	Yes	No	No	Yes	Yes	No	No	Ambient light detection for photometric adjustments
Tilt/Vibration Sensor	Yes	Option	Yes	Yes	No	Yes	Yes	Yes	No	Option	Option	No	No	Pole/down and damage detection
Cellular Data Included	Yes	Yes	Yes	Yes	Option	Yes	Yes	No	No	No	No	No	Yes	Lowers system complexity Lower cost of plan and management
Mobile Installer App	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Simplifies field installation
DALI-2 Lighting Control	Yes	Yes	Yes	Option	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Consistent lighting levels Advanced lighting management
Country of Manufacture	Israel USA Option	Ireland	Netherlands	United Kingdom	China	USA	Not Specified	Canada	Not Specified	India	China	Israel	Netherlands	Eligibility for IIJA/BABA projects
Rated Fixture Load	1188W@120VAC	1000W@120VAC	472W@120VAC	472W@120VAC	1000W@120VAC	1000W@120VAC	1200W@120VAC	840W@120VAC	718W@120VAC	990W@120VAC	600W@120VAC	Unknown	Not Listed	Ability to support a wide range of fixture load specifications
GPS	Yes	Option	Yes	Yes	Option	Option	Yes	Option	Yes	Yes	Yes	Yes	No	Asset Management
Cloud CMS	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Unified platform for all connected assets
Dual 0-10V and DALI Lighting Control	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Long-term investment protection True off/zero power state
Operating Voltage Range	90-480VAC	105-305VAC	105-305VAC	120-480VAC	105-480VAC	120-277VAC	90-480VAC	90-525VAC	120-277VAC	100-277VAC	110V-480VAC	105-305VAC	100-277VAC	Adapts to wide range of power conditions
Energy Meter Accuracy	ANSI 12.1 0.5S Accuracy Class Optional Factory Calibration	ANSI 12.1 0.5S Accuracy Class	ANSI 12.1 0.5S Accuracy Class	ANSI 12.1 0.5S Accuracy Class	ANSI 12.1 0.5S Accuracy Class	ANSI 12.1 0.5S Accuracy Class	ANSI 12.1 0.5S Accuracy Class	ANSI 12.1 0.5S Accuracy Class	No	ANSI 12.1 0.5S Accuracy Class	No	ANSI 12.1 0.5S Accuracy Class	ANSI 12.1 0.5S Accuracy Class	Accurate energy billing reconciliation Metered electricity rate plan eligibility Calibration required for billing-grade applications
Standard Warranty	5 Years	5 Years	5 Years	Not Specified	5 Years	5 Years	5 Years	5 Years	Not Specified	2 Years	5 Years	5 Years	5 Years	Lower lifecycle cost
Transient Protection	ANSI C136.2 Cat B (10kV/5kA)	ANSI C136.2 Cat C (20kV/10kA)	ANSI C136.2 Cat A (6kV/3kA)	ANSI C136.2 Cat B (10kV/5kA)	ANSI C136.2 Cat C (20kV/10kA)	ANSI C136.2 Cat B (10kV/5kA)	ANSI C136.2 Cat C (20kV/10kA)	ANSI C136.2 Cat A (6kV/3kA)	Not Specified	ANSI C136.2 Cat B (10kV/5kA)	ANSI C136.2 Cat A (6kV/3kA)	ANSI C136.2 Cat B (10kV/5kA)	Not Specified	Resistance to electrical anomalies Reduce non-warranty field replacements
Operating Temperature	-40°F to +158°F	-40°F to +149°F	-40°F to +158°F	-40°F to +158°F	-40°F to +158°F	-40°F to +158°F	-40°F to +158°F	-40°F to +158°F	-40°F to +140°F	-40°F to +158°F	-40°F to +158°F	-40°F to +122°F	-40°F to +158°F	Suitable for high ambient temperature conditions

Note: All reasonable efforts have been made to ensure the accuracy of the information in this table. However, Tondo does not warrant the information in the above table for accuracy, and provides it only as a guide for a prospective buyer to perform their own due-diligence independent of the information described in this table. Report any inaccuracies to marketing@tondo-iot.com

Tondo Services

Tondo provides a range of services to its partners and end-use customers that ensure the successful design, deployment, and outcomes for every project.

Tondo brings a wealth of experience from our successful delivery of dozens of projects, leveraging the knowledge from each engagement for the next.

Whether you are responsible for delivering a simple roadway controls project or fully-integrated lighting, sensor, camera, radar, and SCADA use-cases, Tondo can help you create a best-of-breed Smart City digital infrastructure.

Project Services

Project Design and Planning

Tondo can provide access to its most experienced team members that include project design review by our senior staff to ensure that every project plan is accurate and complete in scope.

We will work with our partners and end-use customers to factor in every possible variable and contingency, based on our decades of experience in delivering successful projects around the world.

Project Delivery

Tondo delivers its solutions through licensed lighting construction services firm partners and to cities, DOTs and utilities with their own maintenance teams.

Through its partners, Tondo provides expert project management resources, technical support, and guidance on best practices.

Both remote and on-site services are available as requested. Having experienced Tondo resources for your team will reduce the risk of project timeline or budget failure.

Project Financing

Your Affordable Smart City

Tondo can provide complete Smart Lighting solutions financed from the project's measured energy savings. Cites will gain an immediate benefit of improved standards-based lighting safety and a reduction in GHG footprint.

Tondo can also provide its solutions through energy services contracts, or through its Smart City as a Service solution that provides Smart Lighting plus an array of other Smart City solutions in a single monthly operating expense.

Development Services

Integration Services

For maximum operational efficiency, data automation is essential. Tondo provides standards-based integration interfaces to its Cloud IQ™ management platform.

Tondo's team has developed a wide variety of integrations to popular asset management, maintenance management, CRM, ERP, and business analytics platforms.

Wherever you want your Tondo data to go, Tondo's team can make it happen.

Tailored-to-Fit Smart City Enablement

Every city's vision is unique. Finding off-the-shelf solutions for every possible problem isn't always possible.

Tondo's culture can be summed up as, "Yes, we can."

Tondo's standards-based cloud software and firmware architectures enable us to cost-effectively tailor solutions to fit your requirements, while ensuring all devices remain supported as if they were off-the-shelf solutions.

If You Can't Find a Solution, Ask Us

Tondo's team is comprised of experts who have been in the Smart Lighting and Smart City enablement business from the very beginning. If you can't find a solution for your specific use-case, ask us.

If you need guidance to develop your project plan, reach out and we'll be happy to help you.

About Tondo

The Tondo Executive Team

Tondo Smart Ltd. was founded in 2016 and is based in Tel Aviv, Israel, with offices in Vancouver, Canada, and Seattle, USA. Tondo is a publicly-traded company on the Tel Aviv Stock Exchange (TASE: TNDO).

Tondo's solutions transform roadway and area lighting into a digital asset management platform that enables cities, parking management, and commercial property management firms to control, measure, and manage their critical infrastructure. Tondo helps deliver safety, improved operating efficiencies, and reduce the impact of urban growth on our planet.

Gilad Babchuk
CEO & President, North America

Gilad Babchuk is a 4x CEO and serial entrepreneur with 30 years of global experience establishing, developing, and running impact organizations.

Guy Saadi, CPA
Chief Executive Officer, Co-Founder

Guy Saadi is a digital communications expert, a graduate of Israel's 8200 Program, a former advisor to Israel's Prime Minister's Office, and the former Chief Financial Officer at a subsidiary of Dan Public Transportation.

Philip DesAutels, Ph.D.
Chief Product Officer

Dr. Philip DesAutels is an Internet of Things pioneer with IoT companies he helped found have been sold to Google and Verizon. Philip's experience includes Microsoft, The Linux Foundation, W3C and IBM

Micha Ben-Ezra
Chief Operating Officer, Co-Founder

Micha Ben Ezra is an expert in the field of outdoor and indoor lighting, electric utilities, and energy conservation programs, with over 30 years' in the wholesale electricity market.

Eliav Gnessin, M.Sc., BA Phys.
Chief Technology Officer, Co-Founder

Eliav Gnessin is a software and hardware design expert in mobile technologies, large-scale systems, embedded systems, Internet of Things (IoT), DevOps, Cloud software, Artificial Intelligence, and predictive algorithms.

Tali Kleinman, M.Soc
Vice President Sales & Marketing

Tali Kleinman is an expert in global-scale marketing and customer behavior. Served as Deputy CEO at Ipsos, one of the world's largest market research firms.

Marissa Wright, MBA
Chief Revenue Officer

Marissa Wright is a serial entrepreneur and angel investor with 40 years in technology marketing and sales leadership, and in 2002, co-founded Actenum Inc, an early AI software company.

Barak Ronen, CPA
Chief Financial Officer

Barak Ronen is a business planning and financial management expert. Barak is a former audit & compliance manager at PwC and Chief Financial Officer of Top Audio.

Locations

Head Office

Israel

Tondo Smart Ltd.
5 Hayotsrim St.
Or Yehuda - Tel Aviv
Israel 6022411

Canada

Tondo Smart Ltd.
Suite 1500 - 701 West Georgia St.
Vancouver, B.C.
V7Y 1G5

United States

Tondo Smart Ltd.
Suite 100 - 2815 Elliott Ave.
Seattle, WA 98121
Tel: (236) 259-2305 \

Contact us at sales@tondo-iot.com

Legal Disclaimer

The information contained in this technical product brochure (the “Brochure”) is provided for general informational purposes only. While we strive to ensure the accuracy, completeness, and timeliness of the information presented, we make no representations or warranties of any kind, express or implied, about the accuracy, suitability, reliability, availability, or completeness of the information, products, services, or related graphics contained in this Brochure for any purpose. Any reliance you place on such information is therefore strictly at your own risk.

Please note that this disclaimer does not limit or exclude any rights you may have under applicable laws that may not be lawfully limited or excluded.

Date of Revision: November 18th, 2025