SECTION 26 05 00.0050

COMMON WORK RESULTS FOR
ELECTRICAL – HEADBOLT
OUTLET INSTALLATION

11/14

PART 1 GENERAL

1.1 The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE Stds Dictionary	(2009) IEEE Standards Dictionary: Glossary of Terms & Definitions

INTERNATIONAL CODE COUNCIL (ICC)

ICC/ANSI A117.1	(2009) Accessible and Usable Buildings and Facilities

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI Z535.1	(2006; R 2011) American National Standard for Safety--Color Code
ANSI/NEMA OS 1	(2008; Amd 2010) Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
ANSI/NEMA OS 2	(2008; AMD 2010) Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports
NEMA 250	(2008) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA FB 1	(2012) Standard for Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable
NEMA KS 1	(2001; R 2006) Enclosed and Miscellaneous Distribution Equipment Switches (600 V Maximum)
NEMA PB 1	(2011) Panelboards
NEMA RN 1	(2005) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA TC 2	(2003) Standard for Electrical Polyvinyl Chloride (PVC) Conduit

NEMA TC 3	(2004) Standard for Polyvinyl Chloride (PVC) Fittings for Use With Rigid PVC Conduit and Tubing
NEMA VE 1	(2009) Standard for Metal Cable Tray Systems
NEMA WD 1	(1999; R 2005; R 2010) Standard for General Color Requirements for Wiring Devices
NEMA WD 6	(2012) Wiring Devices Dimensions Specifications

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014) National Electrical Code

1.2 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, are as defined in IEEE Stds Dictionary.

b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Material, Equipment, and Fixture Lists[; G]

SD-03 Product Data

Conduits and Raceways[; G]

Wire and Cable[; G]

Splices and Connectors[; G]

Receptacles[; G]

Outlets, Outlet Boxes [; G]

Circuit Breakers[; G]

Panelboards[; G]

SD-06 Test Reports

Continuity Test[; G]

Phase-Rotation Tests[; G]

Insulation Resistance Test[; G]

SD-07 Certificates

Certification[; G]

SD-08 Manufacturer's Instructions

Manufacturer's Instructions[; G]

1.4 QUALITY ASSURANCE

Submit certification required to install equipment components and system packages.

PART 2 PRODUCTS

2.1 Provide the standard cataloged materials and equipment of manufacturers regularly engaged in the manufacture of the products. For material, equipment, and fixture lists submittals, show manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site.

2.2 Each HBO bollard shall have and be controlled by an Intelligent Parking Lot Controller (IPLC) Model M210 or government approved substitute. See attached equipment specification for details and installation information.

2.3 Wire shall be AWG No. 12 copper 600-volt type XHHW stranded. Splices shall not be permitted between the servicing circuit breaker to the receptacle. Terminations at the receptacle shall be made using insulated forked connectors.

2.4 Each outlet cover will be aluminum or steel. (Plastic covers are subject to damage from cold temperatures and abuse from users)

2.5 New HBOs will be constructed with a 12 inch concrete cylinder around post and handholes behind each HBO. Composite handholes will be Carson

industries part # 1520-18 with a lid labeled “Electric” and will be installed flush with grade behind each HBO pole.

2.6 Provide circuit breaker type lighting and appliance branch circuit panelboards in accordance with NEMA PB 1. Panelboard shall be a 24 space, 150 Amp panel. Bolt circuit breakers to the bus. Plug-in circuit breakers are not acceptable. Provide copper buses of the rating indicated, with main lugs or main circuit breaker as indicated. Ensure panelboard enclosures are NEMA 250, Type 1, in accordance with NEMA PB 1. Provide enclosure fronts with latchable hinged doors.

PART 3 EXECUTION

3.1 Each HBO bollard shall consist of one receptacle for each parking space it is intended to service. Receptacles shall be NEMA 5-15R or NEMA 5-20R duplex receptacles unless otherwise approved.

3.2 Each receptacle shall be supplied by its own dedicated circuit and protected by a properly rated GFCI breaker. The tab that connects duplex receptacles shall be removed so that each receptacle operates independently.

3.3 New panels will be sized appropriately for new load and meet NEMA 3 requirements.

3.4 Finished height of each complete and usable HBO bollard shall be between 44”-48” and be of uniform height.

3.5 HBOs that have parking on both sides of the existing pole shall receive 2 each new IPLCs – 4 outlets, and HBOs that have parking on only one side shall receive 1 each new IPLC – 2-outlets.

3.6 All conduit will be bedded in sand. Trench will be backfilled with existing material if suitable for reuse or pit run gravel to 6 inches from surface. Topsoil and hydroseed to finish off the backfill and dress the area around excavation as needed.

Winter Just Got a Lot Better...

IPLC

Intelligent Parking Lot Controller

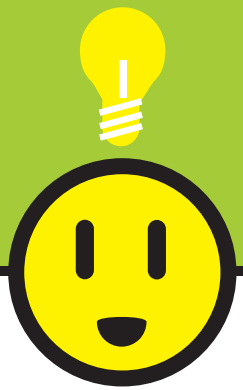
Developed and marketed by Vantera Incorporated

The Ultimate Energy and Cost-Saving Solution for Parking Lot Operators

Get plugged into...

- A flexible, affordable, easy-to-install product that can pay for itself in as little as one year
- 65 per cent power cost savings
- Award-winning technology
- Intelligent, computer-controlled power outlets that can be individually programmed and deliver data on their use
- User-friendly technology that warns of problems with outlets or block heater circuits
- A durable low-maintenance product
- An environmentally responsible product
- Proven satisfaction

Introducing the Intelligent Parking Lot Controller



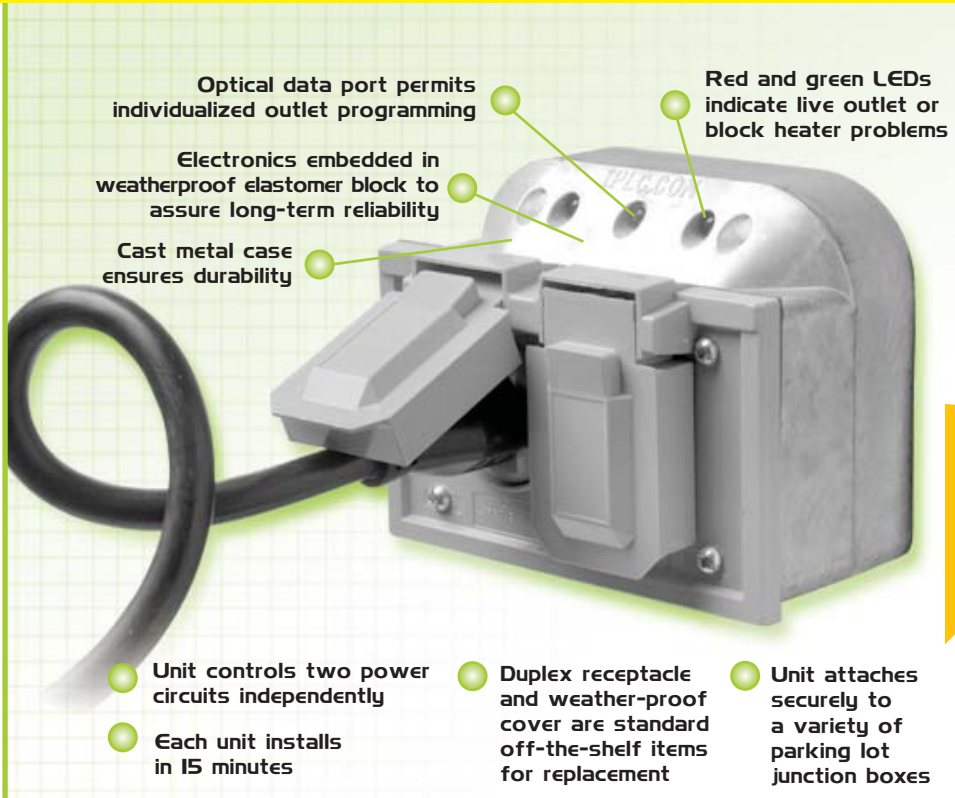
The Intelligent Parking Lot Controller (IPLC) is a smart power receptacle that can replace any existing parking stall power outlet. It incorporates a micro-processor, temperature sensors, and red and green LED lights to tell users the status of the system. It measures temperature and wind chill, and is factory programmed to automatically regulate the optimum power flow to ensure strong starts at any temperature. This intelligent operation reduces electrical consumption and costs by up to 65 percent, or a full 30 percent more than competing systems.

IPLCs are user friendly, too. The LEDs tell users if there's power at the plug, and if their block heater is shorted or has a break in the circuit. Each IPLC handles two circuits and each outlet can be individually programmed to prevent use of in-car heaters, or to meet the special needs of diesel engines or emergency vehicles. And, each receptacle stores connection data that can be captured to assess use patterns.

Red and green LEDs instantly tell users the status of the power outlet and their equipment, including: a live outlet, a functioning block heater, an open circuit in their block heater, a circuit overload from an in-car heater or a short circuit in the block heater.

Save 65% in Parking Lot Power Use and Costs with the Intelligent Parking Lot Controller

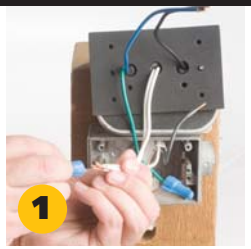
About 4.8 million Canadian vehicles need their engines warmed each winter. Any parking lot operator providing block-heater outlets knows to expect high power costs from November through March, regardless of how warm or cold the winter is. Many drivers automatically plug in, even on warm days when little or no engine heat is needed to assure a start. This results in wasted power and needless expense.

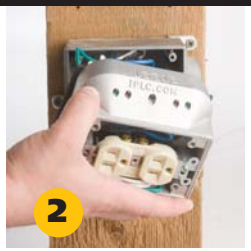


Short-circuited or dead block heaters often lead irate drivers to claim receptacles are malfunctioning or breakers are tripped. NOT with the IPLC! The IPLC prevents these costly service calls, just to reset a breaker or confirm the circuit is working and the driver's block heater is faulty.

Suitable for Any Parking Lot Situation with Fast, Easy Installation

The IPLC is ideal for multi-residential, commercial, industrial, and institutional parking lots, small or large. It has been designed and tested to retrofit the wide range of outlet box configurations found in most parking lots – FS-Box, surface or concrete embedded, steel beam or post.





Fast, Easy Installation

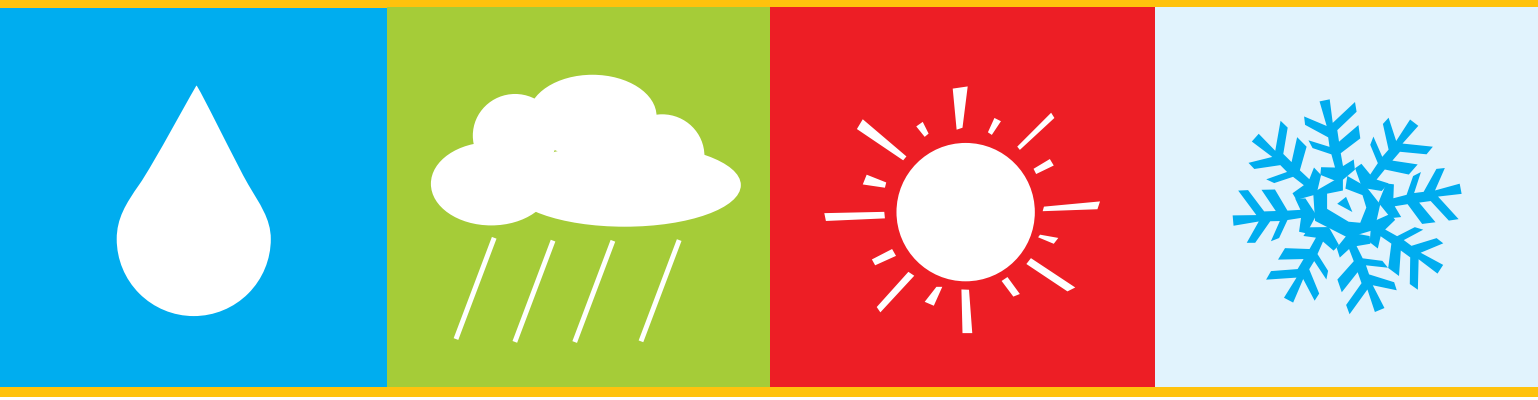
Installation of each IPLC unit is estimated to take 15 minutes or less. Just remove the existing duplex receptacle, connect IPLC's colour coded wiring and attach the weatherproof unit to the existing junction box with screws supplied.

How the IPLC Works

IPLC's microprocessor measures both temperature and windchill and is factory programmed to deliver no power above –5° C. It infinitely varies power delivery from 10 percent on-time at –5° C to 100 percent on-time at –25° C and colder. This configuration delivers 65 percent in power savings, but circuits can be individually adjusted to change this schedule. Once the IPLC device first detects a functioning block heater, it cuts power for the first two hours, recognizing how long it will take a hot engine to cool to a temperature requiring block-heater-support.

IPLC circuits can also be programmed to accept a maximum load to prevent the use of in-car heaters, and will warn drivers of an overload so they can disconnect their in-car heater. The IPLC reduces tripped breakers because it cuts power directly at the outlet. It continually monitors the circuit, restoring power when a detected short or overload problem is removed.

A Durable and Weatherproof Solution



Each IPLC is housed in a weatherproof, durable cast-metal case. The electronic components are embedded in a moulded flexible elastomer block designed to expand and contract with changing temperatures to be entirely waterproof and airtight. (It's the same material used to seal aircraft electronics.)

The case mounts with a neoprene gasket to existing weatherproof junction boxes with up to six screws to ensure a rugged, long-lasting installation. Since it was first introduced 10 years ago, the IPLC has proven to be very dependable, with a 99.8 percent reliability rate.

As with conventional block heater outlets, the only parts subject to user wear and tear are the hinged face-plate and the plug-in receptacle. Both are inexpensive, easy-to-replace, off-the-shelf items available at any electrical parts outlet or home improvement centre.

IPLC Liked by Users

Vehicle operators like the IPLC since they always know if there's power at the outlet and get a free block heater diagnosis every time they plug in. Fewer complaints are testimony to user satisfaction.

Natural Resources Canada Award Winner

The IPLC won Natural Resources Canada's 2000-2002 Energy Management Technology Award from the Office of Energy Efficiency.

In addition, the IPLC won the Arctic Energy Alliance's 2003 Energy Action Award in Yellowknife.

Helps Canada Meet its Kyoto Commitments

IPLC can be an easy and important part of helping Canada meet its Kyoto commitments to CO_2 reduction. Each kilowatt-hour of power saved reduces CO_2 emissions by one kilogram across the integrated continental power grid that includes carbon-emitting generators. Multiply that by the number of vehicles you serve and the total number of kilowatt hours you save. If your organization is selling carbon credits, your IPLC savings may be eligible.

In addition, since block heater power is part of a vehicle's total energy use, each kilowatt-hour used is equal to the vehicle driving four extra kilometres in terms of CO_2 emissions. Each kilowatt the IPLC saves, is like saving a four-kilometre drive and a kilogram of CO_2.

More Flexibility and Less Costly than Centralized Control Systems

Consider the advantages of the IPLC system over centralized parking lot control systems:

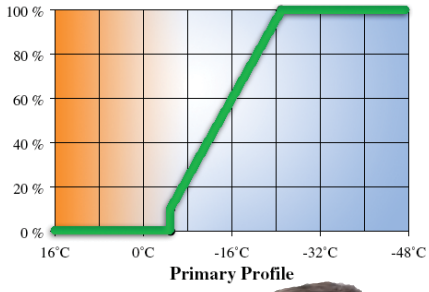
- The IPLC is cost effective for parking lots having from one to over 1,000 stalls whereas centralized controls are not practical or cost effective for small parking lots.
- The IPLC works with any existing power distribution situation, whereas centralized controls require complex wiring, rewiring, or site planning that can be costly for both equipment and labour.
- The IPLC system provides flexibility to phase in equipment on a stall-by-stall basis over time as budgets permit, whereas centralized controls require budgeting for and converting entire parking lots at the same time.
- Because IPLCs are installed on a stall-by-stall basis, the number of parking lots managed is not a consideration. Separate centralized controls are needed for each parking lot where organizations operate more than one lot or distribution panel.

- IPLCs allow for individual programming of each circuit to meet differing user needs, whereas centralized controls provide the same program to all stalls.
- In IPLC-equipped parking lots, potential problems are confined to individual circuits and alert parkers to problems, whereas malfunctioning centralized controls affect many or all outlets in the lot, without automatically alerting parkers.
- IPLCs provide feedback to tell each vehicle operator if their outlet and block heater are working properly, whereas centralized controls do not.
- IPLCs deliver up to 65 percent in energy and cost savings whereas centralized controls typically deliver a maximum of 50 percent in savings.

Factory Pre-programmed Schedule

Primary Profile	
Temperature	Percent ON
> -5.0 °C	0.00 %
-5.0 °C	9.77 %
< = -25.0 °C	100.00 %

LOAD LIMIT: 1800 W (15 Amps)
INTIAL POWER DELAY = 2.05 hours



"The IPLC is the most advanced, flexible and cost effective parking lot power management device on the market today."
– Dr. Glenn Rosendahl, Ph.D., P.Eng., President, Vantera Incorporated

The IPLC Data-Mate Puts You in Control

The optional IPLC Data-Mate is a companion handheld device designed to transfer information between IPLC units and your Windows-based computer. When connected to your computer, proprietary software allows you to change factory settings as well as customize individual or all of your IPLC outlets (operating times, load limits, temperature response profiles) and to collect data on how the units are being used. The Data-Mate conveniently links to each IPLC using an optical link on the front of the unit. This allows you to easily transfer performance instructions from your computer, and at the same time capture use data from the units to transfer to your computer. It comes complete with software, a computer interface cable and battery.

THREE YEAR 3 WARRANTY PROTECTION

Protected by a three-year warranty

Each IPLC is protected by a three-year replacement warranty against manufacturing defects. Nine years of use in some of the harshest environments in North America are proving the IPLC to be robust and reliable.

"It's like finding money in our parking lots."

– *Ron Penner, Vice President Operations*
Globe General Agencies, Winnipeg

Helps Counter Rising Electricity Costs

Electricity prices range from 4¢ to 12¢ per kilowatt hour in Alberta, Saskatchewan, Manitoba and Ontario, which have experienced significant increases in recent years due to deregulation and higher trends in overall energy costs. While you can't directly control the prices, installing IPLCs let you intelligently control power consumption without sacrificing performance, which translates into significantly reduced costs, by up to 65 percent.

Check With Your Local Electric Utility for Rebates

Some electric utilities may provide you with a partial rebate on the purchase price of IPLC units as an incentive to encourage conservation. Check with your utility for availability.

IPLC

Intelligent Parking Lot Controller

Developed and marketed by Vantera Incorporated

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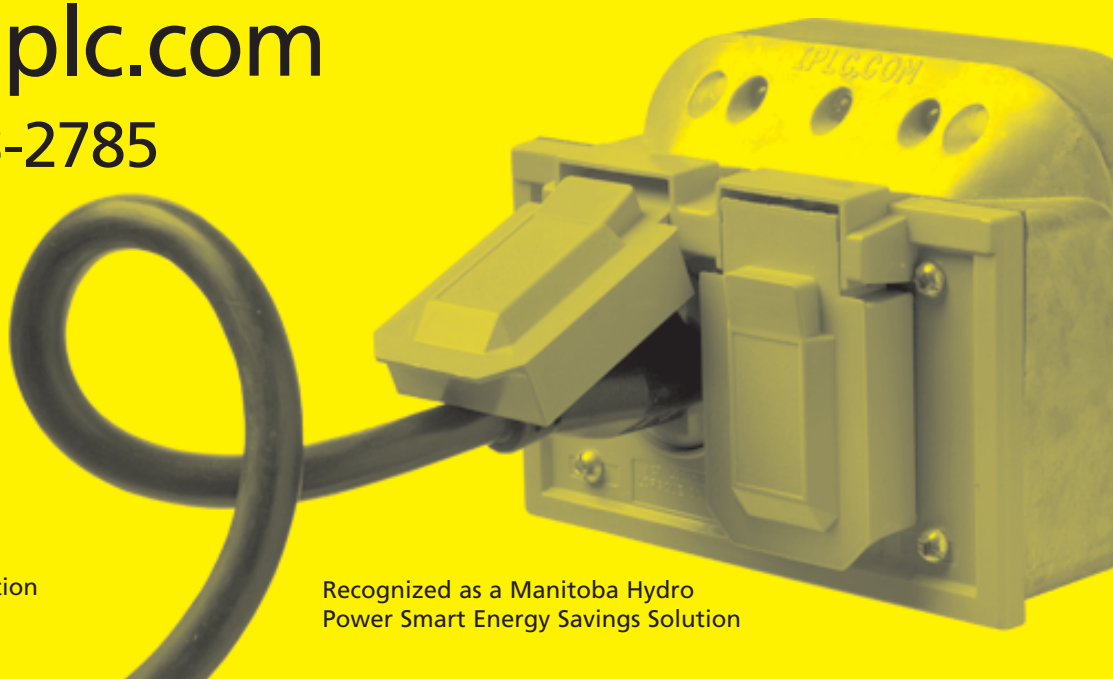
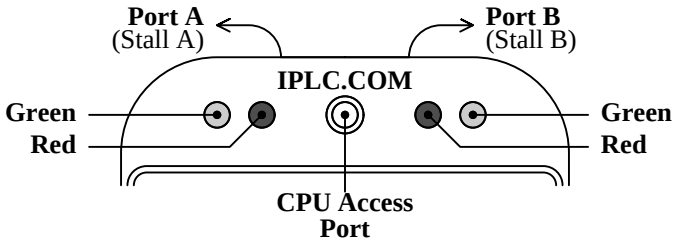


A Made-in-Canada Solution

Recognized as a Manitoba Hydro
Power Smart Energy Savings Solution



IPLC M210 Diagnostic Lights

Each stall or port has two associated lights, one green the other red. These lights reflect the status of the IPLC and the condition of any attached loads, such as block heaters, battery blankets, interior heaters, etc. The various light combinations and status is shown in the table below.

Stall Lights		Load Attached	Load Status Discription
Green	Red		
Flashing Slowly	OFF	NO	Power is Available. Ready to accept User load.
Flashing Slowly	OFF	YES	User Equipment has an open circuit condition.
ON	OFF	YES	All is OK! Load is Accepted.
Flashing Quickly	OFF	YES	Load is too small. Loads MUST BE Atleast 1/4 Amp.
OFF	ON	YES	Load is OVER Maximum Load Limit. Unplug - reduce load - retry.
OFF	Flashing Slowly	YES	Load has a Ground Fault! Possible Shock Hazard!
OFF	Flashing Quickly	YES	Load is Greater Than 20 Amps! Possible Short Ciruit!
OFF	OFF	N/A	Power is NOT Available. Call Service Personel.

IPLC M210 Diagnostic Lights & Load Status Table

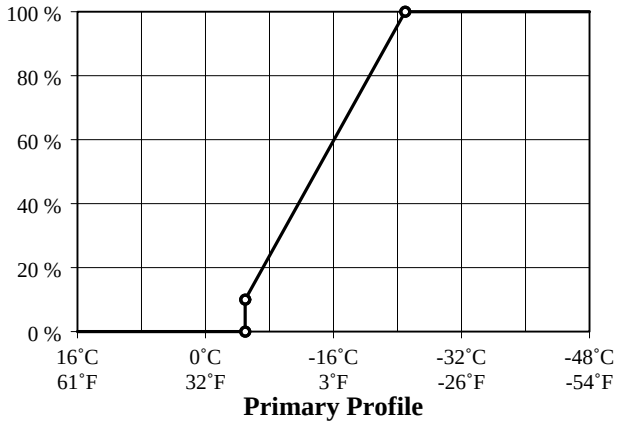
Package Contents:

One IPLC M210 dual circuit controller, pre-wired industrial outlet, seals, mounting hardware/instructions, and commissioning procedures. The IPLC comes pre-programmed with a standard schedule averaging 65% in savings (see program profile below) with a load limit of 15 Amps and a two hour initial power delay. Note: A cover is required and not included.

Factory Pre-Programmed Schedule

Primary Profile	
Temperature	**Percent ON**
> -5.0˚C [23˚F]	0.00 %
-5.0˚C [23˚F]	9.77 %
<= -25.0˚C [-13˚F]	100.00 %

LOAD LIMIT: 1800 W (15 Amps)
INTIAL POWER DELAY = 2.05 hours



Primary Profile

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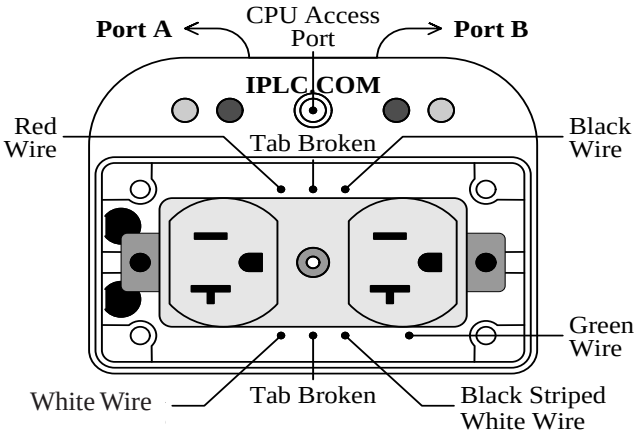
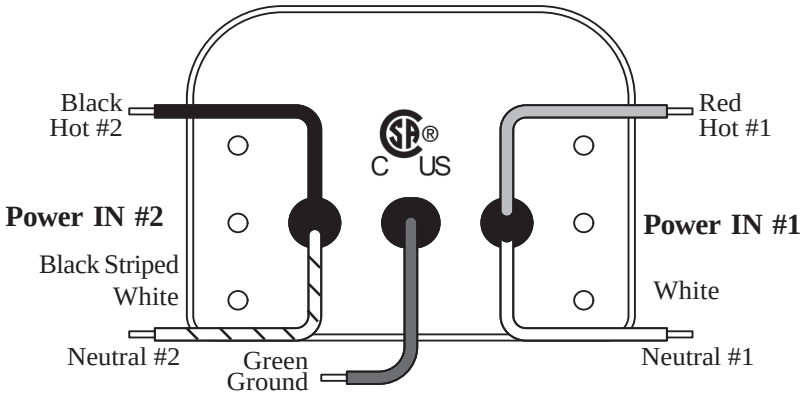
Intelligent Parking Lot Controller (IPLC) M210TN Wiring and Commissioning Procedure



IPLC M210TN Wiring Diagram (Front View)



IPLC M210TN Wiring Diagram (Back View)

Electrical & Wiring Specifications: Dual 125 VAC, AC supply, 20 Amps rms, 60 Hz circuit operation, resistive loads only. 240 VAC single phase split circuit with neutral, 208 VAC Line-to-Line 3 phase with neutral. *please refer to IPLC M210 wiring diagram BACK VIEW (shown above) and table (shown below).

Configuration	Wiring	Notes
Dual Stall/ Dual Circuit	Red to Hot #1 Black to Hot #2	
Dual Stall/ Single Circuit	Red & Black Together to Hot #1	Connect Red and Black together with available Hot. Set load limit to 900 Watts using IPLC Data-Mate.
Single Stall ONLY Port A will be available for use.	**Option #1** Red & Black Together to Hot #1	Connect Red and Black together with available Hot. Configure for Single Stall operation using IPLC Data-Mate (recommended method). Port B will always have a red light.
	Option #2 Red to Hot #1 Black & Neutrals to Neutral	IPLC Data-Mate NOT available: Connect Red with available Hot. Connect Black with Neutral. Port B will have no lights, recommend capping off.
If the Neutral is split the device will have one white Neutral and one Black/white striped Neutral. Ensure each Neutral is connected with it's associated Hot's Neutral terminal (Neutral #1 & #2 shown above). If only one Neutral is provided wire Neutral #1 & #2 with this available Neutral. **COMMON WIRING:** Whites - Neutral Green - Ground		

IMPORTANT NOTE: THE LINE HOTS MUST BE CONNECTED TO THE DEVICE HOTS (HOT #1 & #2 shown above). Take special care to ensure the wire connectors make tight wire connections! If available wiring is corroded, it is recommended to trim wire and then connect. The IPLC M210 is a flush mount style which does not require any access to the back of the unit. This makes the M210 suitable for almost ALL parking post or concrete embedded electrical box installations.

Commissioning Procedure: IMPORTANT!: Connect the IPLC as described above, reset breakers, the units should flash "Green" after ~4 seconds, using an **OUTLET CIRCUIT TESTER** test each half of the outlet to ENSURE THAT THE POWER IS WIRED PROPERLY to the device. **EXTREME SHOCK HAZARD CAN RESULT IF** Neutral and Hot wires are reversed. The Outlet Circuit Tester should verify that the hot, neutral and ground are properly connected. To complete the commissioning procedure, assert a test load which does not violate the preprogrammed load limits (a standard interior heating load with selectable wattage is suitable). The outlets "Green" light will be lit solid and power will be delivered to this load if all is well. A solid "Red" light will indicate the applied load is too large. Remember to assert the load for each outlet and only a short connection period is required to verify proper operation. If the "Green" lights do not flash after ~10 seconds (and you are sure power is applied to both circuits) this indicates a poor wiring connection. Turn off power, reaffirm the wiring connections and repeat. For GFCI protection devices, the IPLC **"Power In" MUST BE** wired to the **GFCI device's LOAD terminals**.

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