INTELLIGENT POWER UNIT (IPU)

ELECTRIC IPU FOR VEHICLE BARRIER CONTROL

PART I - GENERAL

1.1 WORK INCLUDED IN THIS SECTION

A. Furnish labor, materials, inspections, supervision, etc., necessary for the complete installation and operation of intelligent power unit(s) as shown on the plans and specified herein. Work includes furnishing all items and accessories required or necessary for the correct operation of the intelligent power unit(s) as shown on plans and/or specified herein.

1.2 QUALITY ASSURANCE

A. The Company shall specialize in manufacturing of the type of IPU specified, with a minimum ten (10) years' experience.

B. The installer shall have a minimum five (5) years installation experience of similar equipment.

1.3 SUBMITTALS

A. Submittals shall contain sufficient plans, elevations, sections, and schematics to clearly describe the apparatus. All conduit runs, controls and similar drawings shall be included.

B. Submittals shall include (but not necessarily limited to) the following:

1. Excavation, foundation dimensions and/or mounting locations, in addition to, requirements and specifications for mounting material and material grade.

2. All high/low voltage and signal conduit runs.

3. Electrical conduit and locations.

4. Details of electronic equipment, electrical equipment or any other apparatus deemed necessary by the Owner or Owners representative.

5. Finish details for apparatus color, appearance and orientation.

C. Installer shall provide two (2) copies of submittal packages.

D. Factory Testing

1. Upon completion, the IPU will be fully tested for proper operation by manufacturer prior to shipment. A nameplate with manufacturer's name, model number and serial number shall be located within the IPU.

2. All critical items shall be checked for accuracy against customer approved shop drawings.

1.4 INSPECTIONS

Procure all the necessary and usual inspections and certificates for all work to be installed. Deliver same to the Owner/Owners representative before final acceptance.

PART II – PRODUCTS

2.1 INTELLIGENT POWER UNIT (IPU)

A. Application

1. The IPU shall consist of an electrical controls cabinet capable of controlling electric vehicle barriers. The assembly shall contain all of the components necessary to open and close the vehicle barrier at normal and EFO speeds.

B. Features

1. The IPU shall be enclosed in a standard 36”x30”x12” NEMA 4 enclosure (other options available at customer request).

2. The IPU shall be capable of controlling an electric vehicle barrier using a variable frequency drive (VFD) or servo drive unit.

3. The IPU shall be capable of moving the electric vehicle barrier at normal speed and Emergency Fast Operation (EFO) speed.

4. The IPU cabinet shall be a standard NEMA 4 powder coated enclosure, NEMA 4X stainless steel available as an option.

C. Functional Specifications

1. Unit shall consist of a VFD or Servo Drive Unit capable of controlling an AC motor or an electric servo actuator. The electric control circuit shall include all necessary control logic, hardware, connections and power supplies to operate the barrier in a normal and EFO (Emergency Fast Operation) condition.

    a. The IPU shall operate the barrier by using an Allen Bradley VFD or Servo Drive Unit. The VFD or Servo Drive Unit shall be sized and capable of deploying the barrier during EFO operation.

    b. The actuator shall be equipped with a manual override in the event of primary power loss. The manual override shall be capable of deploying or retracting the barrier by use of a power drill and socket.

    c. Primary actuator shall be connected to the IPU with no more than two (2) liquid tight connectors, composed of power and signal connections.

2. Power System

    a. The servo drive shall operate on primary 208/240VAC single phase (L1,L2,N,G) 50/60 Hz power. The VFD shall operate on primary 208/240VAC single phase (L1,L2,N,G) 50/60 Hz or 208/460 three phase (L1,L2,L3,N,G) power.

    b. Incoming power shall be fused, all other branch circuits shall be circuit breaker protected.

    c. The IPU shall be completely solid state, no mechanical relays are permitted. Heaters, sump pumps and auxiliary device interface shall be solid state. Auxiliary device interface can be used for gate arms, slide/swing gates and other typical access point hardware. The PLC control circuit shall operate from the same primary power as the servo drive or VFD.

    d. Optional battery back-up system can provide 200-400 continuous cycles in event of primary power loss. Control of the barrier is through normal operating controls.

e. Barrier heat trace, if supplied, can be up to 5000 Watts on primary power circuit before changes to standard power are required.

3. Control Circuitry
   The following circuits and controls shall be furnished:

   a. A built-in Allen Bradley PLC controller, supporting Modbus, shall interface between the barrier control stations and the vehicle barrier. The PLC shall include all necessary inputs, outputs, timers and logic necessary for barrier operation. Relays or proprietary control boards shall not be acceptable. All outputs for traffic lights, barrier gate arms or other devices shall be solid-state.

   b. The PLC shall support up to 8 solid state outputs for barrier safety light segments, allowing it to run a safety pattern if desired, similar to a safety vehicle high frequency flashing.

   c. The PLC shall be designed to accept dry contact inputs from various types of devices.

   d. The PLC shall provide solid state outputs for 1, 2, or 3 24VDC LED traffic signals.

   e. The IPU shall include a local/maintenance console inside the unit cable of “Jog” open or close the barrier with indication, “Ops” normal operation of open and close commands with indication and “Maintenance” operation for setting the full open and closed positions of the barrier.

   f. Each PLC control circuit shall have time-based or event triggered data logging capability.

   g. The IPU control circuit shall be mounted in a general-purpose NEMA 4 metal enclosure. All device interconnect lines shall be run to terminal strips. An optional NEMA 4X stainless steel metal enclosure shall be available.

   h. Barrier Control station consoles shall operate on 24VDC control circuit. Barrier Control station consoles shall be of type push-button control or optional HMI touch screen. The communication between the PLC and HMI will be CIP protocol only.

   i. All Barrier Control station consoles shall contain an EFO (Emergency Fast Operation) button or command.

   j. A four port Ethernet switch shall be standard with a fiber switch available as optional equipment.

   k. Four (4) analog solid state proportional inputs shall be available for pedestrian and object detection.

   l. The IPU shall come standard with a 4 channel safety loop detector. The safety loop detector interface to PLC will be serial ASCII protocol, not hardwired.

   m. The IPU shall come standard for controlling a single barrier. Dual barrier operation is an available option.

   n. The IPU shall be built to UL508 standards and panel wiring shall be UL508 color coded for industrial control hardware.

   o. The communication between the PLC and the VFD or Servo Drive unit shall be CIP protocol only.

   p. All terminal blocks are to be labeled with computer printed plastic labels and are to reference the proper rung numbers in the control prints.

   q. All wires to be marked with printed shrink-tube type wire labels and are to be cross-referenced to the rung numbers on the supplied control prints.

r. The IPU shall come standard with an internal GFCI 120V laptop outlet.

2.2 ACCESSORY DEVICES

(Any or all of the following may be specified)

A. Traffic Control Arms - An electrically operated traffic arm signal gate can be supplied to alert vehicle drivers of the barrier position. The gate operate shall interface with the barrier at the control panel. The control panel shall control the gate based on the customer approved Sequence of Operation. The traffic arm shall correspond to the lane width and striped with reflective striped (Red LED safety lights are optional).

B. Traffic Control Lights – Red, Yellow, or Green 8 inch (or 12 inch) stand-alone LED traffic control lights can be supplied to alert vehicle drivers of the barrier position. The flashing Yellow or Green light shall indicate that the barrier is in the fully down position. All other positions shall cause the Red light to illuminate. The traffic control light operating voltage is 24 VDC and can come in 2 or 3 light arrays.

C. Battery Back-up System – When commercial power is not available the Battery Back-up System automatically transfers power from the batteries to operate up to 2 barriers at a time. The Battery Back-up System will allow 200-400 continuous cycles of the barrier before recharging is required.

D. Cold Weather Package – IPU and Barrier Heat System - Barrier design allows the barrier to lift or lower through snow build up. The Heat Grid System in barrier vault shall melt snow and ice, allowing the gravity or sump pump drains to remove the water. A heater unit and system thermostat is located at the IPU. NOTE: Heat Trace in drainage pipes is NOT included.

E. Hot Weather Package - The Hot Weather Package includes an Air Conditioning unit and system thermostat to be located at the IPU.

F. Corrosive Resistant Enclosures. Stainless steel, aluminum, or fiberglass enclosures are available for harsh environments. Depending on size these may be special order items with a long lead time.

G. Pedestrian presence sensors available.

H. OS/WW- Overspeed and Wrong Way Detection available.

I. Tailgating System- Available with this unit.

2.3 QUALITY ASSURANCE

A. Factory Testing

1. Upon completion, the IPU system will be fully tested for proper operation by manufacturer prior to shipment. A nameplate with manufacturer's name, model number, and serial number shall be located within the IPU enclosure.

2. All critical dimensions shall be checked for accuracy against customer approved shop drawings.

3. Warranty: The IPU control system shall carry a 1 year manufacturers warranty.

2.6 PROCUREMENT SOURCE

The IPU system shall be manufactured by **TOTAL AUTOMATION GROUP INC. (205-329-5208), 61 Industrial Center Rd Trafford, AL 35172. (Contact: JT Rose jtrose@totalautomationgroup.com)**

PART III – EXECUTION

3.1 INSTALLATION

A. Installation shall be performed according to the manufacturer's instructions. Verify all component locations with contract drawings and shop drawings.

B. Any disagreement between the Plans, Specifications, and Ordinances, must be called to same before signing of the shop drawings. After the shop drawings have been signed, the Contractor is responsible for having all work meet requirements of the governing ordinances.