

PROTOCOL INTERFACE MODULE (PIM)

Connect Solartron's Orbit[®] Network to the world's leading PLC protocols

EtherNet/IP[®]

PROFI[®]
NET

EtherCAT[®]

 **Modbus**

CC-Link



DESCRIPTION

Solartron Metrology's Protocol Interface Module (PIM) provides a simple way of interfacing the Orbit[®] Digital Measuring Network to most Programmable Logic Controllers (PLCs). A distinct PIM is created for each protocol, including:

- Ethernet/IP[™]
- ProfiNet[™]
- EtherCat[™]
- Modbus TCP
- CC Link[™]
 - *MODBUS RTU (RS485 Serial) can be interfaced using Solartron's standard MODIM Interface. (PSIM required)*

 **ODVA**[™]
CONFORMANT

The PIM includes the following features:

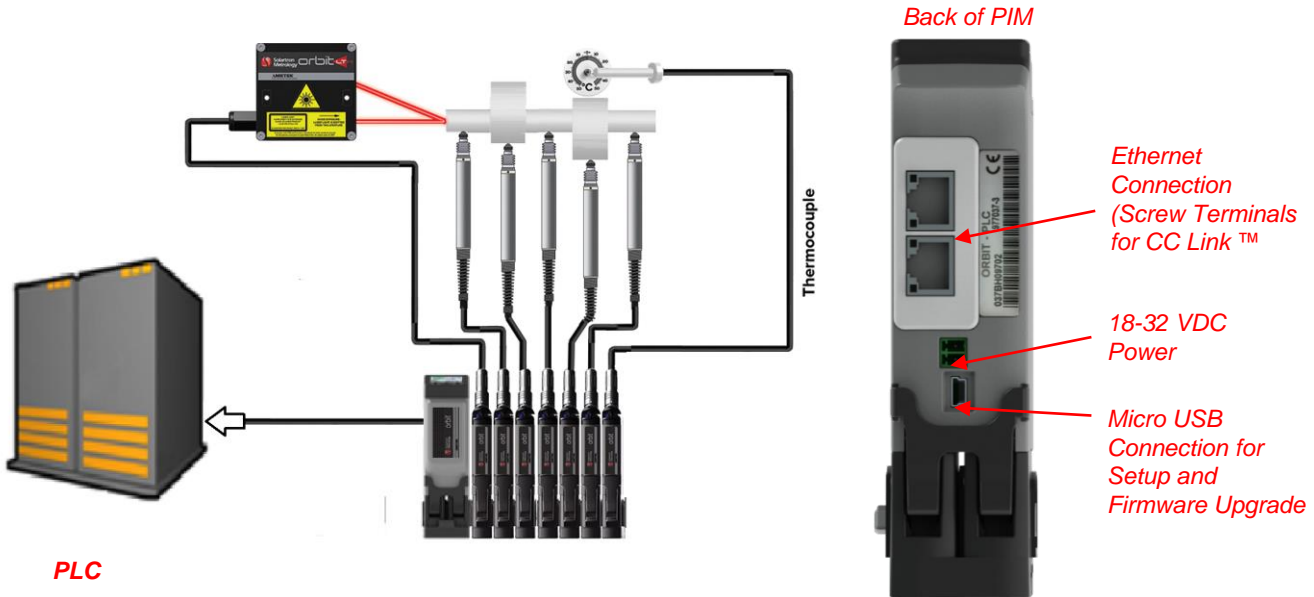
- Communicate with up to 150 Orbit modules with Explicit Messaging or 50 with Cyclic Messaging
- Power up to 10 Orbit modules (depending on type). *(A PSIM can be used when more than 10 is required)*
- Connect any Solartron Digital sensor including lasers
- Connect 3rd party sensors via the Analog Interface Module (AIM)
- Set up via free software interface



Precision. Quality. Reliability

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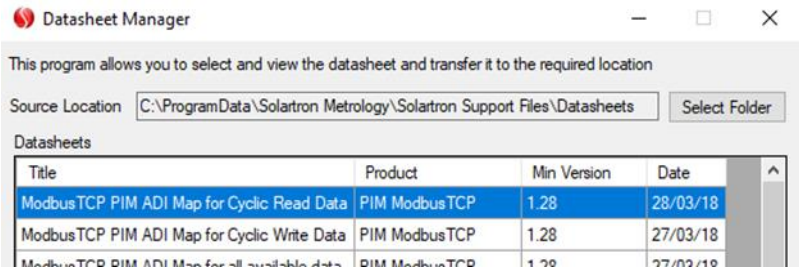
PIM PLC Interface to Orbit



General Protocol Specifications

| | |
|--------------------|---|
| <h2>Messaging</h2> | Explicit and Cyclic Messaging Supported |
| | 125 word read and write data length |

Datasheet manager comes with free software pack



EtherNet/IP

- One of the primary connectivity tools to different Rockwell Automation platforms, or any other PC's that support EtherNet/IP™
- Explicit Messaging aspect of the protocol has been implemented for reading and setting individual parameters,
- Cyclic messaging has been implemented to facilitate synchronised readings
- **Ethernet I/P Server Mode:** In server mode, the module accepts commands from one or more clients to read/write data stored in the modules internal registers

| | |
|------------------------|--------------------------|
| Connections | 6 explicit, 4 cyclic |
| CIP Services Supported | 0x4C CIP Data Table Read |

PIM PLC Interface to Orbit (cont.)



- One of the primary connectivity tools to different Siemens platforms or any other devices that support ProfiNet[®].
- The Explicit Messaging aspect of the protocol has been implemented for reading and setting individual parameters, cyclic messaging has been implemented to facilitate synchronised readings

EtherCAT

- EtherCAT is the open real-time Ethernet network originally developed by Beckhoff.
- The EtherCAT variant of the PIM provides both Explicit and Implicit data sets. However, they are all communicated through the same EtherCat backbone, there is a data latency reading the explicit non cyclic data.



- The **ModbusTCP** PIM variant provides communications between an Orbit[®] network of instruments and an ModbusTCP Master.
- The address ranges define the cyclic and implicit data sections with Input registers and output from 0 to being the cyclic data and holding registers from 4112
- The **ModbusRTU** Interface Module (MODIM) provides a simple interface for MODBUS RTU operating over RS485.
- Data transfer from Orbit is either individual readings of modules or synchronised readings of multiple modules
- Up to 115,000 Baud Rate
- Set up as standard Orbit module that must be powered by PSIM.

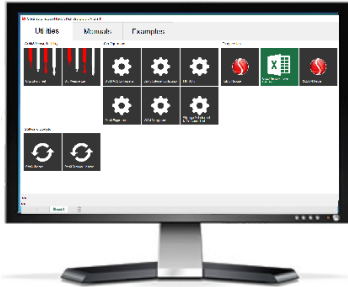


CC-Link

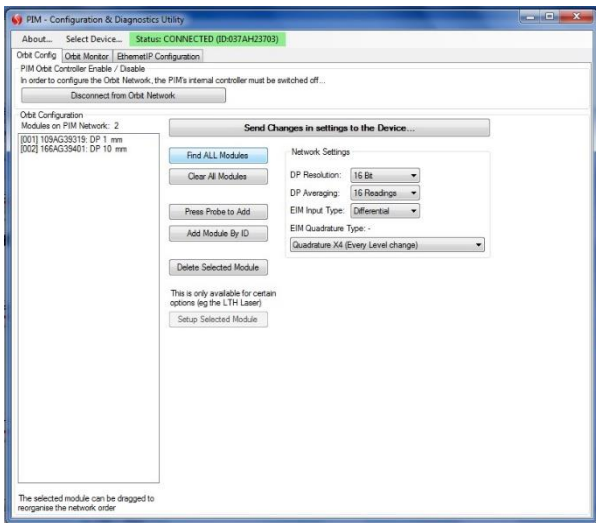
- CC-Link[™] is the main communication protocol for Mitsubishi PLCs.
- Status information (if supported) for each Orbit[®] module is mapped into the Remote Input (RX) area of the PIMs address space. The status code for each module is packed into 8-bits.
- Readings from each Orbit[®] module are mapped into the Remote Register (RWr) area of PIMs address space. The reading for each module is packed into two words (32-bits).

| Version | 1.10 | | | | 2.00 | | | | | | | | | | | | | | | |
|-------------------------|------|---|---|---|------|---|---|---|---|---|----|----|---|----|----|----|----|----|----|----|
| | 1 | | | | 1 | | | | 2 | | | | 3 | | | | 4 | | | |
| Cycles | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Stations | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Number of Orbit Modules | 2 | 4 | 6 | 8 | 2 | 4 | 6 | 8 | 4 | 8 | 12 | 16 | 8 | 16 | 24 | 32 | 16 | 32 | 48 | 64 |
| Module Status Available | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | x | ✓ | ✓ | ✓ | x | ✓ | ✓ | ✓ | x | ✓ | ✓ | ✓ |

Simple set up for a PIM



- Download Orbit Support Pack for Windows
- Stack Orbit Modules to PIM
- Plug PIM to Computer using MicroUSB to USB Cord (Included)
- Set up Orbit and Protocol Parameters

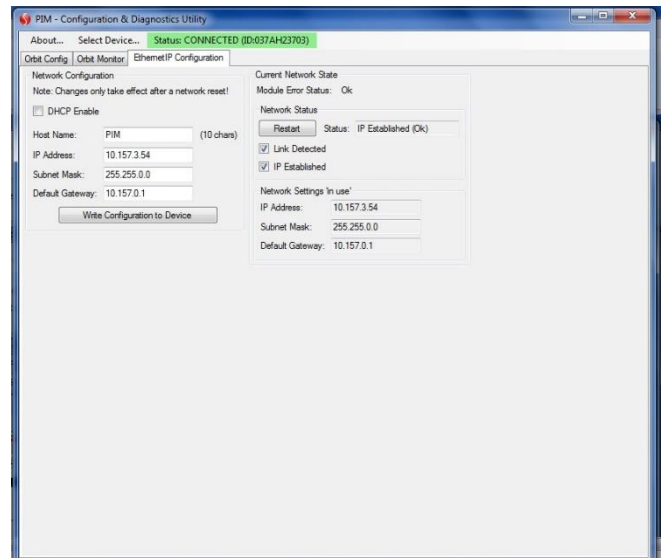


Configure Solartron Probes

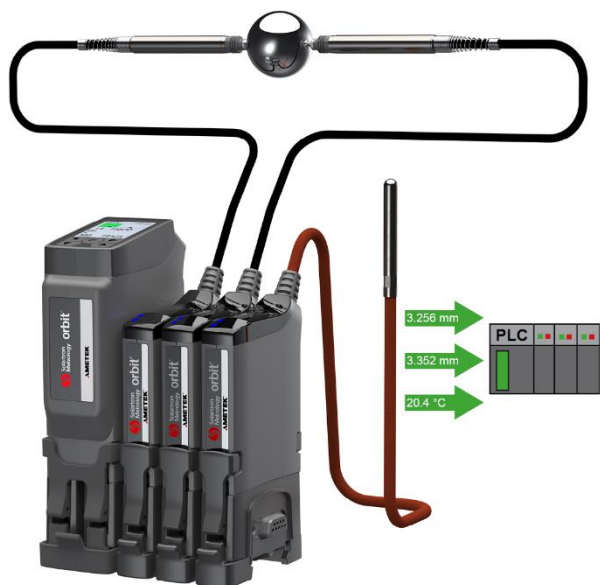
- ID all probes/sensors
- Set order of probes
- Set up EIM

Configure output to PLC

- Set **EtherNet/IP™**, **PROFINET®**, **EtherCat** and **CC Link™** settings such as DHCP enable, host name, IP address, subnet mask and default gateway.
- For PROFINET this can also be done through the standard PROFINET methods – TIA portal, Pronetta).
- The configuration application is also used to set Modbus settings such as baud rate, parity, Modbus address etc.



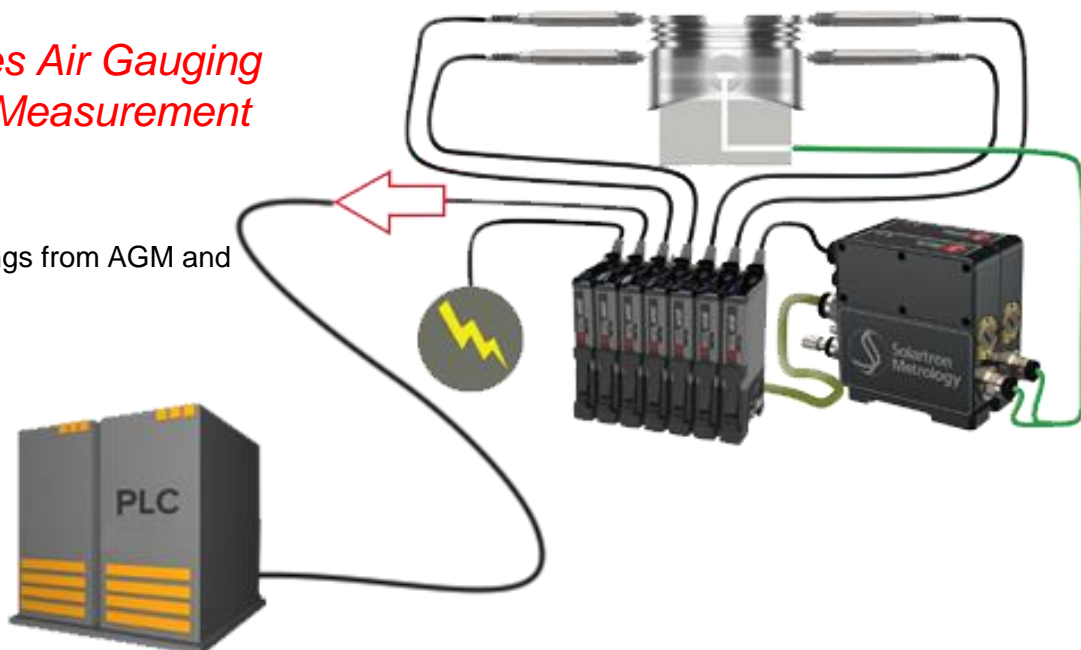
Sample Application



PIM being used with 2 digital probes to measure diameter and an AIM module to check ambient temperature

PIM Integrates Air Gauging and Contact Measurement into PLC

- PIM takes readings from AGM and probes



Technical Specification

| Product | Ethernet/IP | Profinet | EtherCAT | MODBUS TCP | CC LINK |
|--|---|----------|----------|------------|------------------|
| Environmental | | | | | |
| Sealing | IP43 | | | | |
| Storage Temperature (°C) | 0 to +60 | | | | |
| Operating Temperature (°C) | +5 to +60 | | | | |
| EMC Emissions | EN61000-6-3 | | | | |
| EMC Immunity | EN61000-6-2 | | | | |
| EMC Immunity | EN 61326-1:2013 | | | | |
| Shock | Do not subject to excessive shocks or loads | | | | |
| Material | | | | | |
| PIM | ABS, Nylon, Acrylic | | | | |
| Interface | | | | | |
| Protocol | Ethernet/IP | Profinet | EtherCAT | MODBUS TCP | CC LINK |
| Messaging Types | Explicit and Cyclic | | | | Cyclic |
| Connections | 4 cyclic, 6 explicit | | | | 1 |
| CIP Services Supported | 0x4C - CIP Data Table Read | N/A | N/A | N/A | N/A |
| Reading Rate (Readings per second) | see separate data in this data sheet | | | | |
| Power (input) | +18 to +32 VDC | | | | |
| No of Orbit Modules (powered) | Up to 10 depending on Modue type | | | | |
| No of Orbit Modules using additional Power Suppl | 150 Using Explicit Messaging | | | | Up to 64 modules |
| | 50 Using Cyclic Messaging | | | | N/A |
| Display | Colour LCD with acrylic sealed cover | | | | |
| Electrical Interface | Ethernet 2x RJ485 Connectors | | | | Screw Terminal |
| | Micro USB for Configuration | | | | |

Note 1: Explicit messaging can read the following: pmeasurement, status, max and min, from 150 sensors.

Note 2: Cyclic measurement can read measurement and status synchronised from 50 sensors.

Note 3: Only Ethernet/IP supports CIP Table

Reading Rates PIMS (not applicable to MODIM)

The PIM reads synchronised data from the Orbit Network. Reading rate is dependent on the number of Modules on the Orbit Network. For one module the PIM performs 318 sets of readings per second. As the number of modules increases the number of sets of readings reduces as shown in the table below.

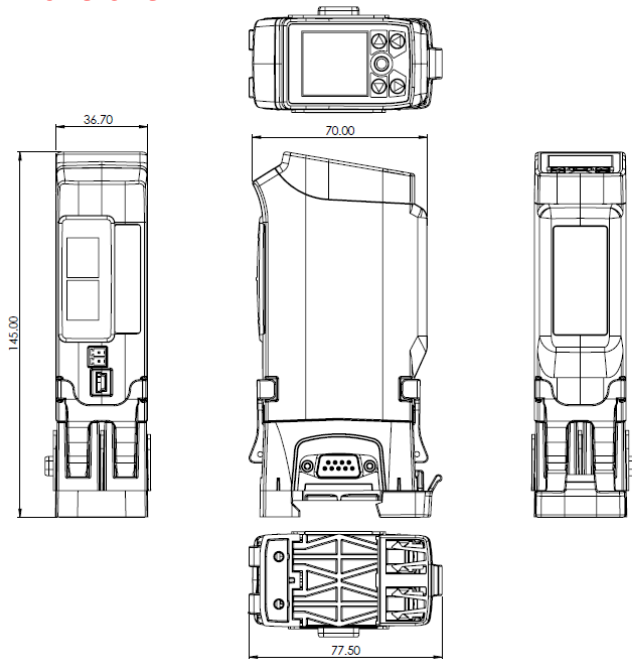
| Number of Modules | Reading Sets/Second | Total Modules Read/Second |
|-------------------|---------------------|---------------------------|
| 1 | 318 | 318 |
| 2 | 318 | 636 |
| 3 | 314 | 942 |
| 5 | 312 | 1560 |
| 10 | 208 | 2080 |
| 20 | 123 | 2460 |
| 30 | 90 | 2700 |
| 48 | 57 | 2736 |
| 64 | 41 | 2667 |

The Data rates will vary depending on the system and the numbers are indication only

Accessories

- +24V Power Block with Mains leads. Available with UK, EU and US plugs
- Spare T-con Mounts
- Spare Earthing/Mounting brackets

PIM Dimensions



Note: MODIM dimensions are the same as a Standard PIE module (see catalogue)

Note: CC Link™ PIM has screw terminals in place of Ethernet Ports

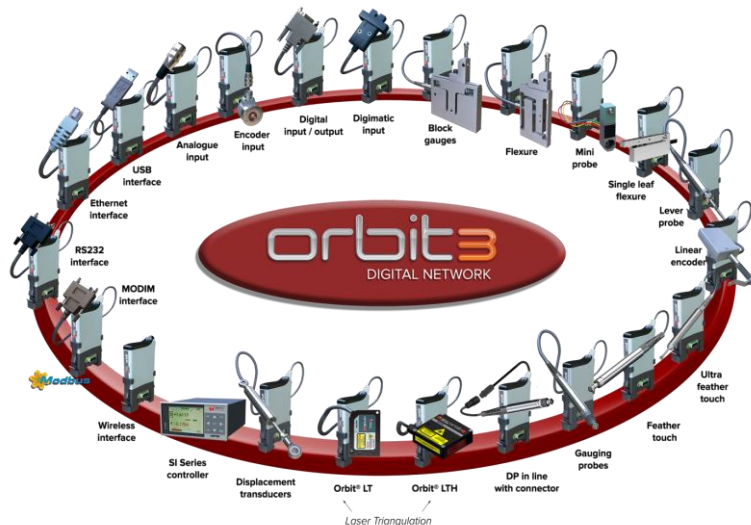


Orbit® 3 Digital Measurement System

The Solartron Orbit® 3 Digital Measurement System, in conjunction with Solartron’s wide range of transducers, provides a limitless set of measuring system solutions, with numerous different interfaces to computers and PLC’s, making Orbit® 3 completely flexible. Compatible products include both Contact and Non-Contact linear measuring transducers (gauging probes), specialist transducers and third party transducer interfaces.

FEATURES

- **Excellent metrology performance**, high **accuracy**, high resolution and excellent **repeatability**
- Excellent lifetime value – low maintenance costs due to the high reliability of mechanics and electronics
- Wide range of compatible transducers
- **Fast reading rates with high data integrity**
- Network up to 150 different transducers with one interface
- Communicate with any computer or PLC
- Range of Software drivers and tools for easy set up



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