

Specifications and Suggestions for SixTRAK IPm Controller Applications

It is the intent of this document to provide specifications and suggested requirements for SIXNET Industrial control modules arranged for process control, SCADA and DCS applications. As applications vary widely, it is suggested that only the specific parts of the document be included in the final specification. Logic for specific specifications has been included as an aid. These too may be deleted as necessary.

This specification will act to provide:

- Quality and assurances of the specified equipment
- Insure the performance of the system with redundancy to ensure data capture
- Provide a truly open system- one that is compatible with interchangeable open commercial products
- Run on LINUX open-sourced software- to added additional features or want to add a web server or other useful features
- Insurance that the specified system is future expandable, supported and easily maintained
- Provide greatest overall system value to the customer

System Hardware Manufacturer

It is the intent of this specification to arrange the manufacturer's standard equipment modules into a complete, function able control system. System redundancy features shall be designed into the selected modules to facilitate data capture. All control components as much as possible shall be the design of one manufacturer, who has been engaged in the design, and manufacturer of like components for 25 years and who can document thousands of installations. Any component not manufactured by the indicated control manufacturer shall be listed as an exception with bid with the model, name of manufacturing company, and their address listed to be considered. Selected for this project's design and implementation is the equipment and controls manufactured by SIXNET Box 767, Clifton Park, NY 12065. (phone) +1 518- 877-5173. (fax) +1 518-877-8346. www.sixnetio.com. Other companies seeking to bid their equipment offering shall seek pre-approval from the engineer in a timely manner.

General Hardware Specification

It is the intent of the specification that the equipment supplied be modular in design. It shall be highly flexible & arranged as is indicated on the drawings to suite the requirements for this project. The components shall meet the follow criteria:

- The equipment must operate within the temperature range of -40 to +70 degree Centigrade. The storage temperature range must be rated at -40 to +85 degrees Centigrade. Humidity (non-condensing) shall be rated at 5 to 95%.
- The SixTRAK Controller must be able to act as a PLC, RTU and as a data logger to log data within the one controller. The unit shall act to control data and commutations through out the control architecture. The SIXNET SixTRAK Controller shall:

- Have an accurate time of day clock for time stamping & scheduling periodic reporting. The clock must be able to operate through power outages.
- Have a true 32-bit CPU running at 50 MHz or higher, with a full 32-bit data bus to facilitate high data throughput and fast program execution.
- Have a minimum of 16 Megabytes of Flash memory for firmware and application program storage.
- Have a minimum of 16 Megabytes of fast dynamic memory, accessed on a true 32-bit data bus for efficient program execution.
- Have a minimum of (512K, 1 Megabyte, or 2 Megabytes) of data logging memory. This memory shall be retained through out power outages for a minimum of 30 days.
- Have a non-volatile memory for a minimum of 8000 variables that shall be maintained through unplanned and instantaneously occurring power outages.
- Have the ability to log data based on time or event.
- Have a minimum Mean Time between Failure (MTBF) of at least 190,000 hours.

The unit specified shall be SIXNET SixTRAK Controller model **ST-IPM-6350**, **ST-IPM-2350**, or **ST-IPM-1350**.

Power Supply

The Power Supply units supplied shall be the manufacturer's standard. They shall be arranged within the control architecture as is indicated on the drawings. A provision shall be made the SIXNET SixTRAK controller to be connected to two independent yet redundant supplies. These two inputs shall be of different voltages. One supply can be a battery, the other main powered. The design of the controller is such that the higher voltage source is utilized. (This is important because the most common circumstance is primary power set at 24 VDC and backup from a 12-volt battery. The Main power will prevail with the battery taking over only when necessary.)

- The control modules must accept DC power over a minimum range of 10 to 30 VDC
- A power LED shall be supplied for each input source
- The power supply must be compliant with IEC 92-504 (power supply failure and variation).

I/O Capabilities

All I/O modules shall be the Manufacturer's Standard Design with a wide choice of models of modules allowing system interfacing of discrete I/O, analog I/Os and/or high speed counters. The SixTRAK controller and system shall support up to 1000 local, 1000 remote (RS 485) and 10,000 Ethernet networked channels per system controller. The I/O system shall:

- Have analog inputs with 16 bit resolution and factory calibration to better than 0.025%.
- Have an isolated analog input module that can accept: 4-20mA, voltage inputs, and thermocouples on any channel. These shall be configurable through Windows software.
- Be configured through the manufacturer's Windows utility program. Start-up of I/O scanning shall not require a program to be written.
- Be able to be removed and replaced while the system is powered up. Only the module removed will go off line, not the entire string of attached modules. Replacing the module shall not require reconfiguration or re-calibration.

Communications

The SIXNET SixTRAK Controller Shall:

- Have a minimum of two RS 232 ports, one RS 485 port , and five RJ45 Ethernet ports,10/100 Base T(x) auto detecting Ethernet ports capable of full duplex operation, configured into two independent networks.
- Have two serial ports capable of rates up to 115,000 baud to facilitate High-speed data transfers.
- Have the RS 485 port protected against over voltage to a minimum of 24 VDC.
- Support the Modbus RTU and ASCII protocols as both master and slave.
- Allow Peer-to-Peer I/O transfers from multiple remote system stations on any communication port.
- Support any serial modem, including: phone, radio, microwave, satellite, and short-haul.
- Be true multitasking and support communications out all ports simultaneously.
- Have the ability to add additional I/O drivers to support third party equipment. These drivers may be written in C language using the manufacturer's compiler supplied with the project.
- Be able to be configured both locally and remotely while the unit is operating.
- Have a default protocol that must be open (published) and available at no charge.
- Have com ports configurable by the manufactured standard configuration software included. There shall be no requirement to write code to communicate out a serial port, to perform data logging or I/O Transfers.

Programming

The SIXNET SixTRAK controller shall:

- Have programming software, Windows based, and suitable for running in Windows 95, 98, NT, 2000, Millennium, and XP. This programming Language must be certified by the PLC Open Committee for all five languages supported by the IEC 1131-3 standard (these being Sequential Function Chart, Ladder Diagram, Structured Text, Instruction List, and Function Block Diagram).This software shall available from a major commercial software provider with documented evidence that it will run on RTUs and control devices from a minimum of 50 suppliers.
- Have all five languages supplied as a package.
- Be capable of running a minimum of two programs simultaneously to meet application needs, redundancy or special timing needs.
- Have software with a built in program simulator.
- Have the tag database for the Windows SCADA, created from the controller's tag database by direct export. This tag database shall only need to be configured once at the I/O device and then have it shared to the SixTRAK Controller and to the Human Machine Interface.
- Have the project configuration retrievable and archived in the controller in an editable form for future read back.

The control program and the controller shall support both long integers and floating registers. It must be able to trigger I/O transfers to other RTUs or other control devices. The control program must be able to trigger data logging in the SixTRAK unit.

Open Source Software

- The operating system in the controller must be a commercially available operating system that accepts upgrades and can be enhanced with commercially available third party add-on software such as I/O drivers and application software packages. There must be a minimum of 100,000 installations of this operating system. It must have a proven track record for a minimum of five years. Proprietary operating systems are not acceptable.

-And/or-

- The Operating System must be embedded LINUX. The implementation of the LINUX in the SixTRAK controller shall be standard LINUX configuration so that there is expectation that third party software add-ons will have an expectation of compatibility.
- The operating system must be transparent to the control system designer and maintenance personnel. It shall be possible to configure the SixTRAK controller, program applications and even upgrade the operating system to a later version, in the field, without any knowledge of the operating system or computer languages.
- The controls manufacturer shall warrantee support for the firmware in the SixTRAK controller and all associated software tools for ten years.
- The controller shall be supplied with open source application development tools, including a library to interface to the Controller's I/O register, clock, serial communications and hardware functions.
- It shall be possible to run user programs written in either C or C++ languages. User programs must run concurrently with all standard SixTRAK Controller function and capabilities including the IEC-61131-3 applications.

Compliance Certifications

The SIXNET SixTRAK Controller as well as the SIXNET supplied control modules and devices provided shall be compliant with the following:

- Electrical Safety:
 - UL508
 - CSA C22.2/14
 - EN61010-1 (IEC1010-1)
 - IEC 950: 1950
 - AS/NZS3260-1993
 - All European Community (CE) electrical safety directives
- Flammability- constructed of materials with a UL 94v flammability rating
- EMI Emissions
 - FCC part 15, ICES-003 Class A, En55022
 - AS/NZS3548-1995 EMI emission standards
 - All European Community (CE) EMC immunity directives
- EMC Immunity
 - EN50082-1 (IEC801-2, 3, 4) Emcee immunity Standards
 - All European Community (CE) directives
- Surge Withstand- IEEE-472 (ANSI C37.90) surge withstand standard
- Vibration: IEC68-2-6Vvibration Standard

- Hazardous Locations
 - Class 1, Div. 2 Group A, B, C, and D Hazardous locations
 - UL 1604
 - CSA C 22.2/213-M1987
 - Cenelec EN50021 (EEx nA II T4) for zone 2 locations
- Marine/ Offshore Locations- Det Norske Veritas (DNV) No. 2.4

Redundancy

The purpose of this control system shall be data capture, retention and utilization. The control systems design from the top down shall take into consideration this purpose. If warranted multiple PCs running a duplicate HMI package for redundant acquisition shall be provided. Each unit shall act to independently back up data from the field sources. The field hardware, the RTUs and/or Controllers shall have standard redundancy features built in. Wrap around data logging in non-volatile memory shall be standard. This provision allows for data recovery if the computers systems fail. The duplicate porting in the specified hardware shall facilitate a requirement for redundancy in the field wiring architecture. Where practical duplicate field RTUs/ Controllers shall be implemented and interconnected. SIXNET Ethernet switches can augment this, Ethernet to Fiber converters, and/or Dual Ethernet I/O Gateway.

Conclusion

These specifications will act to provide the customer the necessary data he is seeking. We at SIXNET thank you for your consideration and your specification. We trust your project will be a success. If this project exceeds yours and your client's expectations, we would be pleased to write it up in our applications. If for any reason you need our assistance, please call us.