IEEE 1394 Interface System: Super High-Speed Field Bus for Servos and I/O, Based on IEEE 1394 FireWire

Overview

Soft Servo Systems offers a variety of PC-based CNC and general motion control (GMC) products. Each product is available with a choice of several servo and I/O communications hardware platforms, including the IEEE 1394 interface system.

The IEEE 1394 interface system is based on IEEE 1394 FireWire communications for high-performance, digital network IEEE 1394 servo drives. IEEE 1394 servo drives are proven, high-performing networked drives with fully automatic drive commissioning and all-digital configuration, setup and operation. These drives offer a power range from 600 to 15,000 watts, and users can mix and match servo technologies — DC brushless rotary, linear, DC brush-type or voice-coil motors — in the same system.

The IEEE 1394 platform features simple connections and cabling, superior diagnostics, elimination of all manual drive adjustments (no pots or jumpers to set), and control flexibility — all system parameters are configurable in the software package. Soft Servo’s IEEE 1394 platform provides an all-digital, minimal-hardware control architecture for next-generation motion control/CNC.

IEEE 1394 Network Features

- Scalable — up to 16 axes of servo control, with users connecting exactly the number of drives needed
- Data transfer rate of 200 Mbps
- 1 ms position feedback rate
- All-digital network eliminates digital to analog conversions between the PC and drive systems.
- Cost-effective, thin-wire, industry-standard FireWire cabling requires no maintenance
- Daisy-chainable servo drives offer distributed control and multiple nodes, with a total network length of up to 72 meters, allowing distance between the PC, machine and peripherals (maximum 10 m between any two servo drives)
- Simple wiring (a single cable) and only one interface card — no additional proprietary hardware components required
- Plug N Play IEEE 1394 networking allows for quick changes to the system
- Supports absolute and incremental encoders
- Third-party devices, such as vision systems, can communicate on the same network as the servo drives
- ServoWire Pro, an application suite of configuration, diagnostic and maintenance utilities that runs on the host PC, assists in the development and on-going support of IEEE 1394 interface systems

FireWire Communications Technology

FireWire, defined by the IEEE 1394 standard, is a high-speed, high-bandwidth digital-to-digital serial data bus protocol, supporting both asynchronous & isochronous data transfer. FireWire was designed for the multimedia needs of computer and consumer electronics (including audio, imaging, video and other streaming data), which mirror the requirements of servo drive applications: speed, networking and self-configuration (Plug N’ Play).
### IEEE 1394 Interface (OHCI)

OHCI (Open Host Controller Interface) standards created by leading software and hardware vendors (including Microsoft, Apple, Compaq, Intel, and Texas Instruments) assure that application and operating system software, including device drivers, work properly with any OHCI compliant hardware. IEEE 1394 interface systems have been tested with a variety of vendors’ OHCI compliant IEEE 1394 PCI cards plugged into a PCI slot in the host PC and providing the communications interface between the PC and the drives.

### I/O

IEEE 1394 drives provide software configurable drive I/O that can be used to support a variety of functions required by machines.

A modular, fieldbus independent I/O system from Wago can be added to the IEEE 1394 interface system. Each node is comprised of an IEEE 1394 fieldbus coupler, up to 64 connected fieldbus modules for any type of signal, and an end module.

An optional and affordable fiber-optic VersioBus I/O network can also be included as part of the IEEE 1394 interface system.

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### Parts Overview

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| N/A      | Standard IEEE 1394 adapter board (PCI) | - For insertion in a host PC PCI slot  
  - Must meet OHCI standards (see “IEEE 1394 Interface (OHCI)” below)  
  - Provides IEEE 1394 connector for the IEEE 1394 servo network | ![FP-95](image) |
| FP-80, FP-95 or FP-104 | VersioBus adapter boards (PCI, ISA or PC104) | - For insertion in a host PC (FP-80: ISA slot, FP-95: PCI slot, FP-104: PC104 stacking connector)  
  - Provides a connector for an optional VersioBus I/O network of IM-300s  
  - Provides 32 points of on-board general I/O  
  - Provides an encoder and digital I/O connector for a handwheel | ![FP-95](image) |
| IM-300   | 64-point general I/O module | - Provides built-in wire-entry screw terminals, LEDs and DIN rail mounting  
  - Up to 4 IM-300s can be daisy-chained for up to 256 points of additional I/O  
  - 32 optically isolated output points (N-Ch MOSFET), and 32 optically isolated input points | ![IM-300](image) |
| TB37BD   | 37-pin breakout box | - Provides screw terminal blocks for making connections between the VersioBus adapter board and local I/O  
  - 37-pin screw terminal module with a single terminal block for wire entry screw terminals | ![TB37BD](image) |
| HW-100   | handwheel | - A handheld manual pulse generator for manual jog operation of the machine or machine tool  
  - Emergency Stop button  
  - 5 axes available for single-axis control  
  - 4 multipliers: X1, X10, X100 or X1000 | ![HW-100](image) |
| VersioBus fiber-optic cable | For connecting VersioBus hardware components  
  - 4.5 meters per IM-300 is included — more cable can be ordered | ![VersioBus](image) |

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