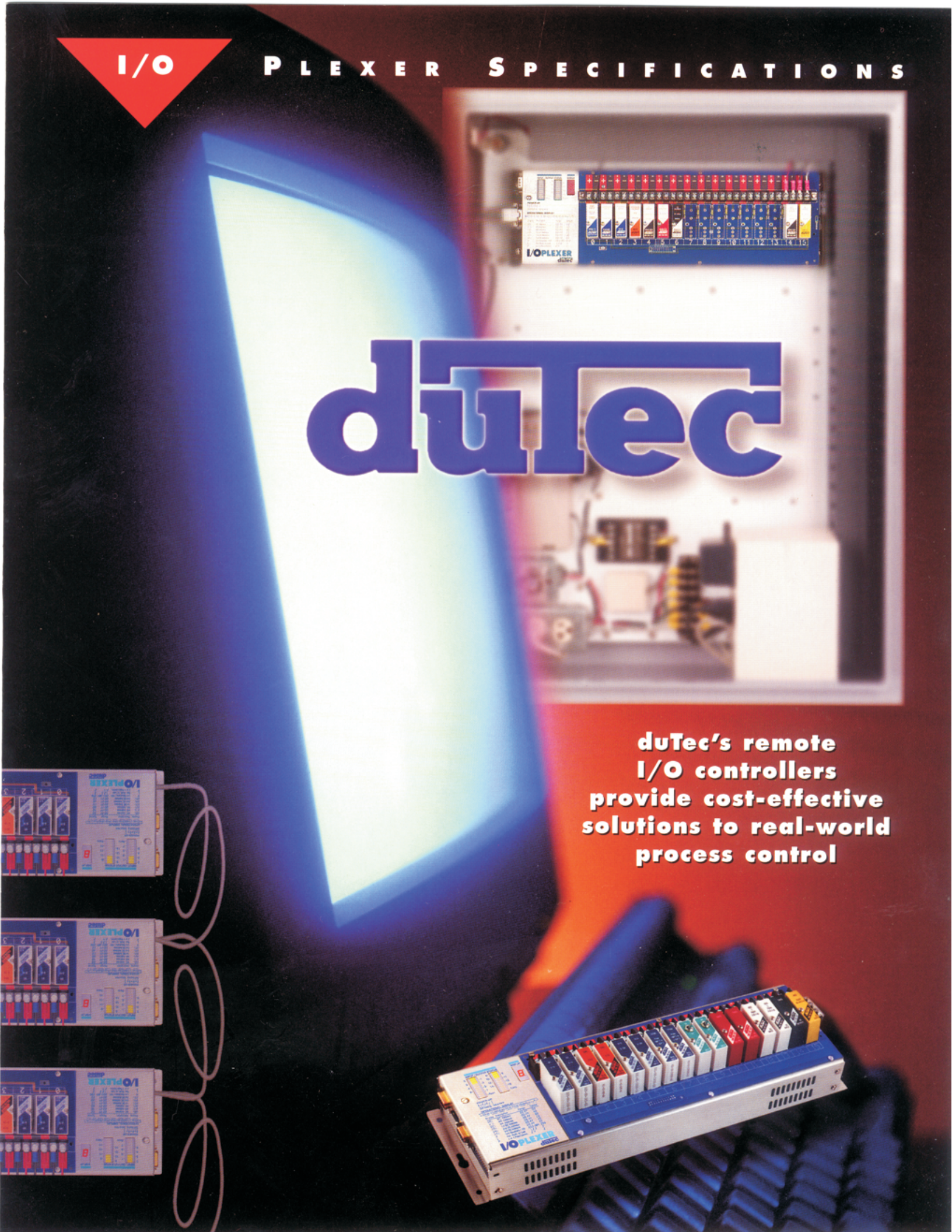
I/O

# PLEXER SPECIFICATIONS




# duTec

**duTec's remote I/O controllers provide cost-effective solutions to real-world process control**

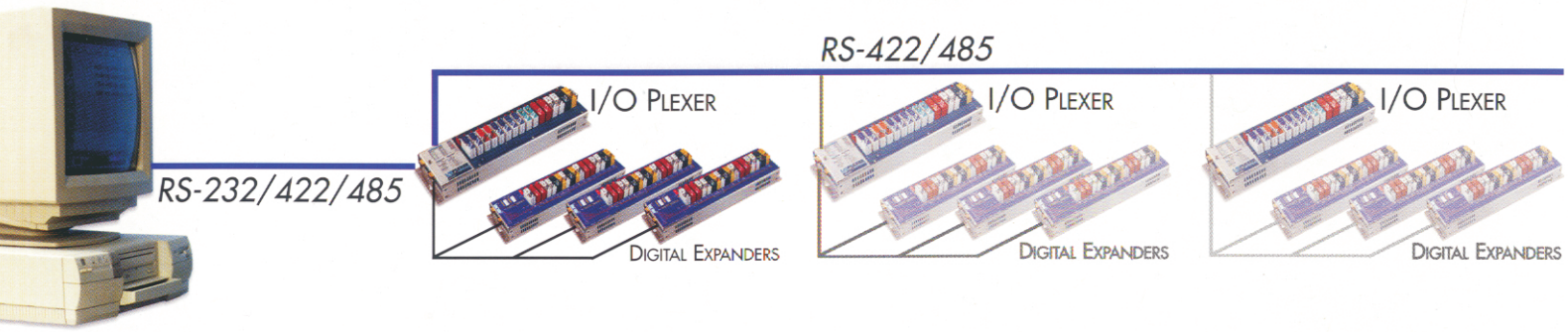
**Real-world process control requires reliable analog and digital I/O. duTec's responsive technical support minimizes the hassle and cost of system design, trouble shooting, and successful operation.**

**The I/O PLEXER is a complete, industrial-grade, remote I/O controller which can operate under the control of a host computer via a serial communications link, or in a StandAlone mode, with or without supervision.**

By locating I/O PLEXERS near the process, the serial link eliminates the expense of lengthy, noise-prone analog sensor and actuator field wiring. Because the I/O PLEXER supports any mix of a large variety of analog and digital I/O signals, the requirements of virtually any process can be accommodated. Omni-Isolated I/O modules provide 1,500 volts of isolation protection between each I/O Line, host computer and power supplies.

Omni-isolated I/O, and the ability to mix and match individual analog or digital signals* from virtually any sensor or actuator reduces system design, installation and trouble-shooting costs, as well as simplifying future maintenance and system expansion. I/O PLEXERS, complete with a built-in wide range power supply, are shipped ready to connect to your sensors, actuators, communications and power. A single I/O PLEXER can handle any mix of 16 analog or digital I/O points.
With expanders, the number of digital I/O Points can be increased by up to 48. An I/O PLEXER network can serve a mix of over 1,000 analog and digital I/O lines.

The host computer uses RS-232 or RS-422/ 485 to communicate with I/O PLEXERS spaced up to 4,000 feet apart. Using telephone or radio modems, the distance is virtually unlimited.




## Remote Operation

There are numerous third party HMI/MMI/SCADA software packages that have I/O PLEXER drivers for polling sensor data. Most have extensive graphics displaying the process, only a few have the capability to transmit control commands to actuators. The open architecture communication protocol instructions are readily available for those writing their own proprietary software.

duTec's universal DDE driver can be used with all Windows® DDE compliant software packages. This includes most HMI/ MMI/ SCADA packages as well as Visual BASIC®, spread sheets such as Excel® and numerous other programs. In addition to working with polling software packages, the duTecDDE™ driver allows a remote I/O PLEXER to initiate a scan when it detects user specified events. This Speak-on-Event (SOE) capability materially reduces the need for host initiated scans and communications circuit traffic and in large networks reduces the time to detect problems.
While the duTecDDE™ driver has minimal graphics, it has a screen for the user to monitor and control the state or values of all analog and digital I/O points. It is particularly useful during system troubleshooting as it makes it possible to verify that the hardware is operating correctly before the application software is exercised.

* See duTec's I/O module data sheet for complete specifications

## Standalone Operation

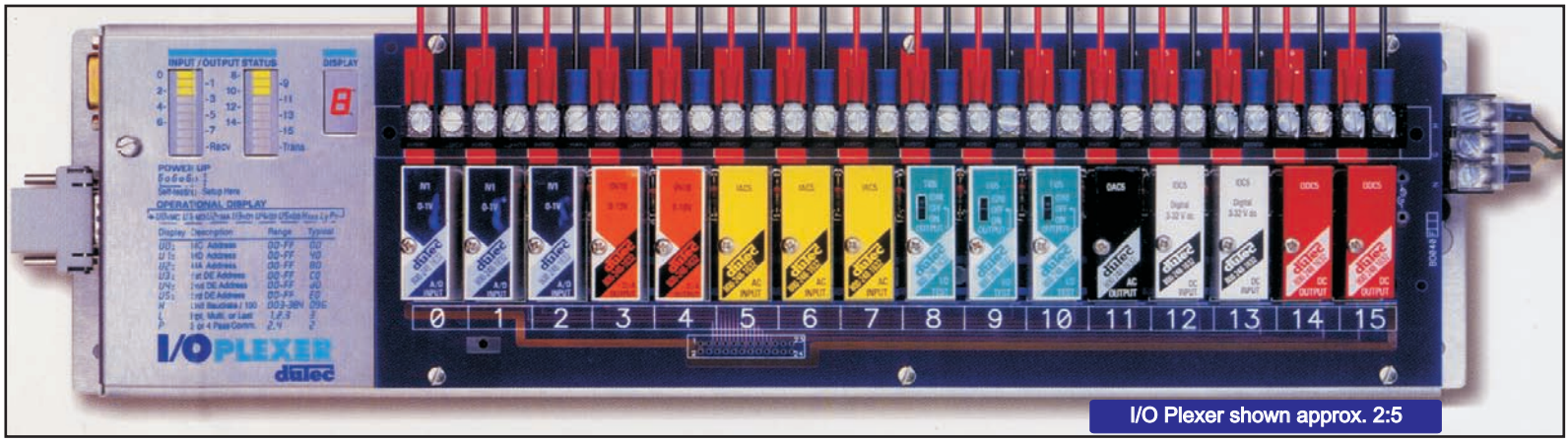
Built-in LCF's (Local Control Functions) allow an I/O PLEXER to perform control operations with or without host supervision. LCF's include logic gates, analog compare and math, dead-band and PID control, and ladder logic. Because analog and digital modules are available on the same I/O Plexer, LCF's can perform closed-loop control operations.

LCF's not only provide for faster, more predictable real-time response, but they allow and I/O PLEXER to assume control in the event of communications or host computer failure. The process continues to operate safely.

The I/O PLEXER can also be programmed to override an operator command which would result in an unsafe condition.

LCF's often eliminate the need for more expensive auxiliary hardware. Because LCF's can perform simple control tasks, the host computer needs to transmit fewer instructions, thus allowing both the computer and the network to serve higher-priority tasks. After LCF configurations are developed using duTec's Windows LCF program generator, they are downloaded and stored in the I/O Plexer's EEPROM.

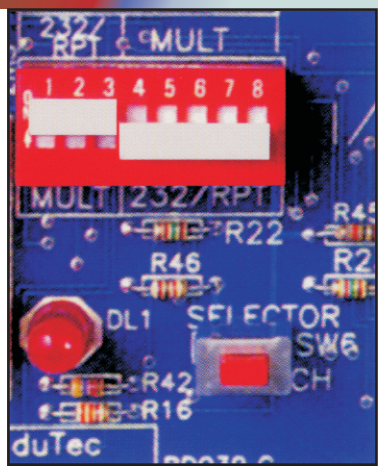
LCF's have virtual analog input and output modules which provide the means for the host to send and receive data without using an actual module position. The transfer of PID setpoint values to a remote I/O Plexer is a common use for virtual analog modules.



I/O Plexer shown approx. 2:5

## Setup

No jumpers are needed to configure an I/O PLEXER communication network address or baud rate. Instead, they are selected during initial setup via a single pushbutton, or remotely via the RS-232 port. Configuration is saved in EEPROM and is continually displayed to make it easy to verify the settings.




## Trouble Shooting

Receive and transmit indicators provide a means for verifying the communications circuit operation.

The use of only ASCII printable characters in the communications protocol provides a means of observing what is actually being transmitted and received.

With the included magic program disk, individual I/O points can be operated making it possible to verify wiring, sensor and actuator operation before the application software is started.

In addition, duTec's readily available technical support helps to ensure worry-free installation, operation, and product satisfaction.

Several utility programs, DDE and LCF demonstration software are available from our web site, **www.dutec.net**

## Data Integrity

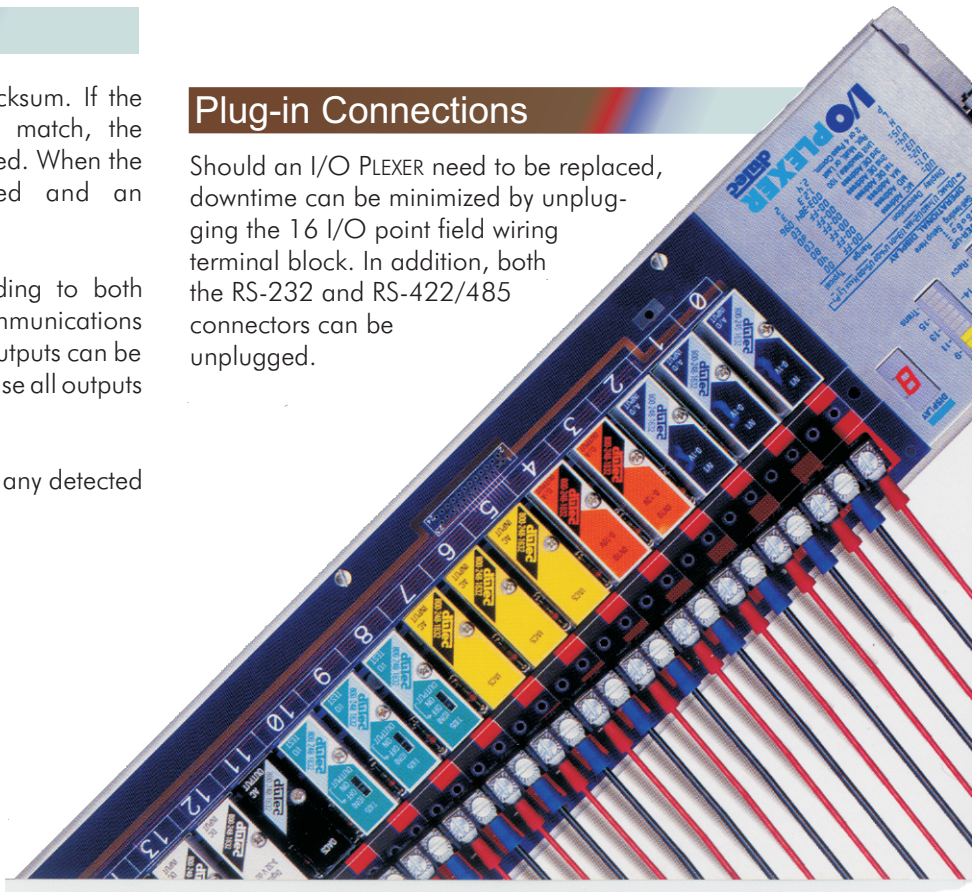
Each command issued by the host includes a checksum. If the checksum calculated at the remote unit fails to match, the command is ignored and an error message is returned. When the checksum matches, the command is executed and an acknowledgment is returned.

Built-in watchdog timers ensure safety by responding to both communications or hardware failures. If the communications watchdog time-out occurs, both analog and digital outputs can be programmed to specific values. Hardware failures cause all outputs to be returned to an OFF state.

Built-in diagnostics test system operates and displays any detected faults each time the I/O PLEXER is powered up.

## Plug-in Connections

Should an I/O PLEXER need to be replaced, downtime can be minimized by unplugging the 16 I/O point field wiring terminal block. In addition, both the RS-232 and RS-422/485 connectors can be unplugged.




INNOVATIVE I/O SINCE 1977 duTec

# I/O PLEXER SPECIFICATIONS

## Operational Functions

### Analog Inputs (12 bit resolution)

- Signal levels
  - 10mSec/point
- Linearized temperature
  - Thermocouples & RTDs
- Frequency
  - Up to 10KHz
- Sample & Hold
  - max and mins
- Calculate averages
  - 65,535 samples max
- Detect Out-of-Range
  - high or low

### Analog Outputs

- Set levels
  - 10mSec/16 points
- Generate waveforms
  - Periods: 100mSec-10.9min
  - Square Waves
  - Sawtooths
  - Triangular
  - Ramps

### Digital Inputs

- Read input state
- Count pulses
  - 65,535 max @ 500Hz
- Pulse duration
  - Single or multiple pulses
  - 10mSec resolution
- Frequency
  - 500Hz max
- Contact de-bounce
  - 255mSec max
- Edge detection
  - 1mSec acquisition time

### Digital Outputs

- Set output state
- One-shot pulses
  - Duration 655Sec max
- Pulse trains
  - 1-65,535 pulses
- Square waves
  - Continuous
  - Periods: 2mSec- 5Sec
- Delay ON / Delay OFF
  - Periods: 10mSec - 655Sec

## Local Control Functions

**AND/NAND**
2-input AND, NAND
3-input AND, NAND
4-input AND, NAND

**OR/NOR**
2-input OR, NOR
3-input OR, NOR
4-input OR, NOR
2-input XOR, XNOR

**Analog Compare**
A < B A <=B
A > B A =>B
A = B A <>B

**Analog Math**
A + B Avg A and B
A - B Max of A or B
Min of A or B

**Latch**
Digital latch
D-Flip Flop
Analog sample & hold
Analog gate

**State Machine**
Truth table
Alternate High Low

**Controllers**
Deadband
Multiband
PID

**Ladder Logic**
Ladder

**Miscellaneous**
Time proportional/ PWM
Constants

## Communications

| Link: | Host to first I/O Plexer | | Network | Local RS-232 |
|---|---|---|---|---|
| Standard | RS-232 | RS-422/485 | RS-422/485 | RS-232 |
| Type | DCE | Multidrop or Repeater | Multidrop or Repeater | DTE |
| Range Host to first IOP | 50' | 4,000 ' | | 50' |
| Multidrop | | | 4,000 ' Total | |
| Repeater | | | 4,000 ' unit-to-unit | |
| Handshake | None or RTS/ CTS | None | None | None or RTS/ CTS |
| Data Format | 10 bit ASCII -1 start, 1 stop, 8 data, no parity | | | |
| Data Integrity | Message checksum or message checksum plus 4-pass mode | | | |
| Baud Rate | 300 - 600 - 1200 - 2400 - 4800 - 9600 - 19,200 - 38,400 | | | |
| Wiring | 3 wire, 5 wire with RTS/CTS | Dual twisted pair + ground 18-30 AWG solid or stranded | | 3 wire, 5 wire with RTS/CTS |
| Connections | DB9F | 10-position terminal block | | DB9M |

## Scanning Rate

Communication baud rate and the mix of analog and digital I/O modules determines the speed with which an I/O PLEXER can provide data to a host computer. The table below summarizes maximum performance of a random mix of 16 modules when operating at a baud rate of 38,400.

| | |
|---|---|
| Digital only I/O modules | 1,600 points/ Sec |
| Analog only I/O modules | 640 points/ Sec |
| Analog and Digital I/O modules | 500 points/ Sec |

The host operating system and application program limit the rate at which the host can request data. These delays are often more significant than the baud rate.

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## Physical

| | |
|---|---|
| Power (standard): | 90-264 Vac, 47 -440Hz, 30 watts 3.0 A fuse; |
| Power (optional): | 9-18, 18-36, or 36-72 Vdc 25 watts each |
| Operating Temp: | 0-60°C |
| Package: | 4 pounds, stainless steel |
| Humidity: | 95% non-condensing |
| Envelope: | 17.25" L x 5" W x 3.5 H (overall) |

## Reliability & Warranty

Before shipment, every I/O PLEXER is burned in for 24 hours at 70°C while networked. Each I/O module is temperature cycled for 24 hours over a range from 0°C to 60°C. All duTec products are warranted to be free of defects in material or workmanship for 24 months from date of shipment. DuTec will repair or replace unabused components at no charge within the warranty period.