



### Widget series industrial virtual-link serial to serial via fiber modem

#### Features

- ✓ **LC single-mode fiber** port (up to 40km)
- ✓ **VIRTUAL LINK** pass-through – no configuration required
- ✓ **USB** serial port (diagnostics and programming)
- ✓ **RS-232** serial port (full 9 pin DB9 DTE)
- ✓ **RS-422/485** port
- ✓ **Concurrent** multiple serial port usage
- ✓ **P8X32A** advanced 32bit multicore processor
- ✓ **Firmware** field or remote upgradable
- ✓ **LAN** Ethernet port (option) TCP/IP,UDP,HTTP,FTP,TELNET
- ✓ **SD** memory card slot (option)
- ✓ Vertical **DIN rail** mounting standard
- ✓ **Top local - Bottom remote** cabling format



#### Overview

Based upon the latest Cescom WIDGET series the CE0960 is configured as a fiber to serial modem that is designed to operate back to back with another CE0960 to extend serial communications ports over long distances. Part of the advantage of the Widget series is the highly flexible nature of the hardware based around a multicore processor which emulates normal hardware interfaces in software thus permitting the kind of customization that would not be possible due to hardware limitations.

In operation the serial port traffic from both the RS232 and RS422/485 ports are concurrently packetized and biphas modulated for transmission over the fiber-optic medium capable of spanning intervals of up to 40km. The serial ports are virtualized so that they appear as if a hard-wired cable were used so no configuration is necessary for speeds up to 115.2K baud.

Access to diagnostics and setups are via a built-in USB port (or Ethernet option) using a terminal emulation program built into most operating systems such as Hyperterm in Windows.

#### Applications

- RS232/422/485 extender
- Roadway systems communications
- Local controller over fiber network.

#### Options

- +LAN 10/100base-T Ethernet
- +SDM SD memory card (FAT16 logging etc)
- +RTC Real-time clock
- +DFM 4MB onboard Dataflash



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#### Specifications

<b>Supply Voltage</b>	10...28VDC
<b>Current</b>	200ma@12V, 85ma@24V typical
<b>Physical</b>	78mm x 70mm x 15mm (WLH)
<b>Weight</b>	220g
<b>Case</b>	1mm Steel, gold passivated zinc
<b>Environment</b>	0°C to +70°C operating
<b>Standards</b>	IEC 1010; AS/NZS 3548 EMI/EMC; C Tick compliant N400
<b>CPU</b>	P8X32A 8x32-bit CPU, 48kB RAM, 32kB ROM, 32kB EEPROM

#### Ports

<b>RS232</b>	0 – 115.2K baud, all formats supported, DB9
<b>RS422/485</b>	0 – 115.2K baud, all formats supported, multidrop. 110 – 2M baud via system configuration, multidrop
<b>USB</b>	USB 2.0, FTDI USB UART slave, Standard B connection
<b>LAN (option)</b>	10/100Base-T RJ45, TCP, UDP, TELNET
<b>FIBER</b>	1300nm Class 1 single-mode LC (40km using L1.1 fiber)
<b>PS/2</b>	Keyboard/mouse or serial bus expansion modules

#### CONNECTIONS

	RS-232		DB9 DTE
1	DCD	In	
2	RXD	In	Receive Data
3	TXD	Out	Transmit Data
4	DTR	Out	Data Terminal Ready
5	GND		
6	DSR	In	Data Set Ready
7	RTS	Out	RTS output
8	CTS	In	CTS output
9	RI	In	

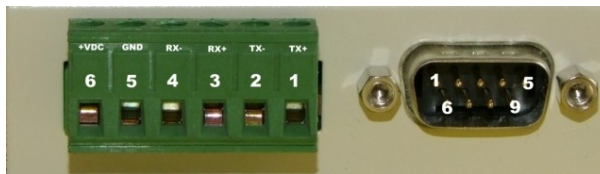
	RS485		RS422
1	RS485 A	IO	RX+
2	RS485 B	IO	RX-
3	RS485 A	IO	TX+
4	RS485 B	IO	TX-
5	GND		GND
6	+VDC	In	+VDC

	PS/2		Minidin6
1	DAT	IO	PS/2 DATA I/O
2	SDA	IO	I2C DATA
3	GND		
4	+5V	O	
5	CLK	O	PS/2 CLOCK
6	SCL	IO	I2C CLOCK

#### INDICATORS

<b>RS232</b>	
<b>ERROR</b>	No DTR from host
<b>DATA</b>	Data activity from host
<b>LINK</b>	Data present in last 10 secs
<b>FIBER</b>	
<b>ERROR</b>	No signal from fiber
<b>DATA</b>	Data activity from fiber
<b>LINK</b>	Data present in last 10 secs

#### Serial Port Connectors





# CesCom

 **N400**  
ACA approved



## CE0960 Fiber Serial Modem

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#### OPERATION

##### CPU

Conventional CPUs are interrupt driven single cores with general-purpose peripheral circuits. The Widget is different in that it uses the [Parallax Propeller](#) chip which is comprised of eight 20MIP 32-bit CPUs integrated onto a single chip. These CPUs called “cogs” are designed to emulate hardware peripherals in software in a deterministic real-time manner as well as general processing. There is no master CPU, all cogs are absolutely identical and can access any I/O. As all I/O is general-purpose so the ports may be retasked to suit application-specific requirements.

Software is stored in serial EEPROM and loaded into the CPU upon reset much like a FPGA. Rather than implementing overly-specialized hardware peripherals the Propeller utilizes the cogs not only as application software processors but also as on-demand peripherals configured through software object.

##### FIBER

The fiber optic interface features a propriety encoding and modulation scheme suitable for serial communications over fiber links so requires a matching FSM at both ends. The RS-232 DTE\* port signals are transmitted as a virtual link so that all signals are reflected over the link as if it were a hard-wired cable. This also makes configuration unnecessary as any combination of baud rates, formats, handshaking may be used and conveyed just as a cable would carry all these signals without configuration. Due to this virtualization it is also quite possible to transmit up to three serial signals using the RXD-TXD, CTS-RTS, and DSR-DTR lines if so desired along with the RS422/485 signals.

The received signal is filtered and stripped of any errors that may occur and any persistent errors or loss of signal is indicated on the front panel Error LED.

##### INDICATORS

The operation of the front panel mounted indicators is designed to enable an operator to quickly ascertain correct operation of the device. During periods of inactivity the error and link indicators will flick on briefly on a one second basis to indicate a ready and waiting condition but also to mark the indicators and their condition. The data indicator only lights up during the time that data is actually present (though stretched to 50ms) but the link indicator stays lit for up to ten seconds from the detection of the last data character. During normal operation with the devices polled at least every 10 seconds then the link led should be lit with the data led flashing accordingly while the the error led is fully off.

\*Note: DTE connections at both ends preclude the replication of all the signals as in DTE<->DCE.

##### RS232

This port supports the three primary signal combinations standard on a DB9 DTE. They are RXD+TXD, CTS+RTS, DSR+DTR. The other input signals are also implemented in hardware but are not used in most systems.

##### RS485/422

The RS485 can communicate at speeds up to 2Mbps/sec or more, the format of which is totally under software control through serial port emulation by an element or more of the array processor. By selecting RS422 mode both RS485 ports appear as a single full-duplex RS422 port. Various protocols are supported and further protocols can be implemented as required. This port is supported by the virtual link for speeds up to 115.2K baud but for higher speeds it is necessary to configure the unit via the USB port.

##### USB

A standard type B connection makes connection to USB host devices such as PCs possible. The USB port appears as a communications class device and is assigned a COMPORT by most PC operating systems (I.e COMxx in Windows, ttyUSBx in Linux). By default the port is set at 115200,8,N,1 and is used for diagnostics and configuration as well as loading new firmware. On startup the following information will be displayed on a terminal:

```
HARDWARE: CE0972 WIDGET
FIRMWARE: FIBER SERIAL MODEM
V1.1 100224-1200
```

##### PS/2

PS/2 interfaces include keyboards and mice as well as other HIDs common to PCs. The port totally under software control and in combination with the I2C bus signals also on the connector it is possible to run I2C or SPI devices straight from these ports as well as a variety of other devices.

##### POWER

In standalone mode power is supplied via the same 6-pin screw terminal connector as the RS422 port. This power is polarity protected and switch-mode regulated on-board. The input is designed for a nominal +12V or +24V supply but the voltage\* can range from +10V to +28V. An on-board protection resistor protects against over-current faults.

\*Note: Operating this unit at a lower voltage than recommended will cause the switch-mode regulator to draw more current possibly tripping the protection resistor.