Southern African Large Telescope
High-Resolution Spectrograph

SALT HRS

3220AD0033 Electronics Specifications

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Issue History

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3250AD0033 elect spec	GG	1.0	3 March 2005	Insert spec sheets
	PLC	1.1	8 March 2005	Update
	PLC	1.2	16 March 2005	Final edit

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1 Scope

This document contains the specification sheets for COTS systems described in the electronics design and control document (3250AE0029) for the operation of the SALT HRS instrument.

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I Pulnix TM-300 CCD camera

TOTAL Turnkey SOLUTIONS Leaders in Data Acquisition Scientific Imaging and Machine Vision

IMAGING PRODUCTS

PULNiX

TM-300 1/2" High

The PULNiX TM-200/TM-300 cameras offer a high resolution interline transfer 1/2" CCD imager in a very tiny package. Designed to meet a variety of application requirements, this camera has many standard and optional features at a very affordable price. It is available in both EIA (TM-200) and CCIR (TM-300) formats. The most commonly needed adjustments-manual gain, gamma, AGC, and field/frame selection-are easily accessible on the rear camera panel. Electronic shuttering is another standard feature. Eight shutter speeds, ranging from 1/60 sec. to 1/10,000 sec., can be selected externally using the rotary dial on the rear panel. The miniature size of the TM-200/TM-300 Series cameras eliminates the need for a remote imager camera in all but the most confined spaces. These cameras fit easily, both physically and functionally, into all types of machine vision, automated inspection, and related applications. Other uses include remotely piloted vehicles, miniature inspection devices, surveillance, microscopes and medical equipment.

Ask us About the TM-200/TM300 ?

Specifications

TM-200 (EIA), TM-300 (CCIR)

Imager	1/2" Interline transfer CCD, HAD type
Pixel	768 (H) x 494 (V), 752 (H) x 582 (V)
Cell size	8.4 µm x 9.8 µm, 8.6 µm x 8.3 µm
Scanning	525 lines EIA, 625 lines CCIR
Sync	Internal/External auto switch, fH=15.734 KHz ±5%, fV=59.94 Hz±5%
TV resolution	570 (H) x 350 (V), 560 (H) x 420 (V)
S/N ratio	50 db min. AGC off
Min. illumination	0.5 lux (F=1.4)
Video output	1.0 Vp-p composite video, 75 ohm
AGC	ON/OFF back panel switch
Gamma	1 or 0.45 back panel switch
Lens mount	C-mount
Power req.	190 mA. 11-15V
Operating temp.	-10° C to +50° C
Vibration & shock	Vibration 7G Shock 70G
Size (W x H x L)	45.8mm x 39.4mm x 66.3mm
Weight	157g (5.6 oz.)
Power cable	12P-02
Power supply	K25-12V, DC-12N, PD-128, P-15-1
Functional options	3-1, 3-2, 7-2, 21, 25

II National Instruments PCI-1407 image acquisition card: single channel monochrome

NI 1407

- 1 video input for standard monochrome cameras (RS-170 or CCIR VGA)
- Synchronization for multiple camera acquisition
- Partial image acquisition - Onboard programmable ROI - Onboard pixel decimation
- Programmable gain and offset
- Pixel jitter less than 2 ns
- 256-byte LUT
- 1 external trigger/digital I/O line
- Scatter-gather DMA controller

Driver Software

- NI-IMAQ for Windows2000/NT/Me/9x

Application Software

- NI LabVIEW
- NI Measurement Studio - NI LabWindows/CVI - Visual Basic - Visual C++
- NI Vision Development Module - IMAQ Vision - IMAQ Vision Builder

Hardware

PCI Interface

The PCI bus is the electrical interface for both the PCI-1407 and the PXI-1407. The PCI interface, implemented with a National Instruments MITE ASIC, can transfer data at a maximum rate of 132 Mbytes/s in master mode to maximize the use of the available PCI.

562 National Instruments • Tel: (800) 433-3488 • Fax: (512) 683-9300 • info@ni.com • ni.com

Overview

The NI 1407 Series is ideal for machine vision and scientific imaging end users and OEM developers who are looking to reduce costs. The NI 1407 Series consists of image acquisition plug-in devices with a single high-accuracy monochrome video input, external triggering capabilities, and easy-to-use image acquisition driver software. The NI 1407 Series advanced features include partial image scanning, programmable gain and offset, and onboard decimation and LUT processing.

For easy configuration of both RS-170 and CCIR monochrome cameras, the NI 1407 Series includes NI-IMAQ image acquisition driver software and the National Instruments Measurement & Automation Explorer configuration utility. With NI-IMAQ, you can quickly and easily start your application without having to program at the register level.

Quick and Easy Camera Configuration

Easily configure standard video capture with the Measurement & Automation Explorer delivered with NI-IMAQ. This utility is an interactive configuration tool for setting the camera type (RS-170 or CCIR VGA), programmable ROI, decimation, gain, and offset.

Applications

The low-cost, high-accuracy NI 1407 Series is ideal for both industrial and scientific environments. The NI 1407 Series is a high-performance, versatile solution for a wide range of vision applications, such as assembly-line product inspection and biological cell growth monitoring. An NI 1407 Series board can generate 8, 16, and 32-bit memory read and write cycles (both single and multiple). The interface logic ensures that the NI 1407 meets the loading, driving, and timing requirements of the PCI specification.

Scatter-Gather DMA Controller

With the NI 1407 Series, there is no need to lock down large, continuous blocks of memory. NI 1407 devices have an onboard DMA controller capable of transferring data from the PCI bus to the onboard FIFO buffer. The controller performs scatter-gather DMA, which means the DMA controller can reconfigure on the fly and perform continuous image transfers to either contiguous or fragmented buffers.

Genlock and Synchronization Circuitry

The genlock and synchronization circuitry receives the incoming video signal and generates PCLK, HSYNC, and VSYNC signals for use by the acquisition and control circuitry. Use the genlock feature to synchronize multiple cameras and multiple 1407 devices for simultaneous image acquisition.

8-Bit A/D and LUT

An 8-bit flash A/D converter performs the image digitization. The result of the digitized image passes to a 256 by 8 RAM LUT. You can configure the LUT to implement simple imaging operations, such as gamma correction, contrast enhancement, data inversion, or any nonlinear transfer function. An NI 1407 has programmable gain and offset circuitry for optimizing the input signal range.

Specification

Typical for 25 °C unless otherwise noted.

Available Formats

RS-170/NTSC	30 frames/s interlaced
CCIR-601/PAL	25 frames/s interlaced
VGA	60 frames/s, noninterlaced

Video Input

Quantity	1 monochrome
Video 0	Single-ended (BNC)
Input impedance	75 ~
Input impedance	75 ~ , 1 M~ (jumper selectable)
Bandwidth	Typical 20 MHz (-3dB)
Input full-scale range	2 Vpp maximum

A/D Conversion

Gray levels	256 (8 bits)
DNL	±1 LSB maximum
RMS noise	< 0.5 LSB rms
SNR	Typical 48 dB

External Synchronization and Trigger Signals

Signals

Trigger sense	TTL
Trigger polarity	Programmable (rising or falling)
CSYNCIN sense	Selectable (TTL)
CSYNCIN level	Programmable (rising or falling)
Minimum detectable pulse width	20 ns
VIH (TTL)	2 V
VIL (TTL)	0.8 V

I/O Connector

The three BNC connectors provide connections to the video source, the external digital I/O line/trigger, and CSYNC external lines.

III Hamamatsu & Spellman

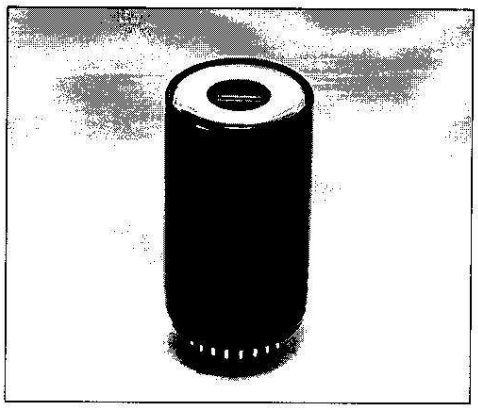
HAMAMATSU

PHOTOMULTIPLIER TUBE R943-02

GaAs (Cs) Photocathode, Wide Spectral Response, 51 mm (2") Diameter Head-on Type for Photon Counting, Low Dark Counts, Excellent P.H.D.

FEATURES

- Wide Spectral Response ..... 160 nm to 930 nm
- High Quantum Efficiency in Near IR ... 14 % at 632.8 nm
- Fast Rise Time ..... 3.0 ns at 1500 V
- Excellent Single Photoelectron Pulse Height Distribution ..... Peak to Valley Ratio 2.3 (at -20 °C)
- Low Dark Counts ..... 20 s^{-1} Typ. (at -20 °C)



APPLICATIONS

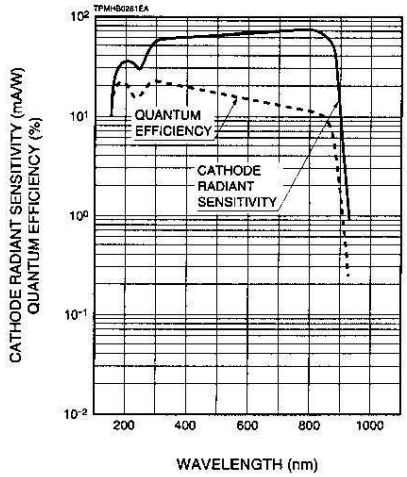
- Raman Spectroscopy
- Fluorescent Spectroscopy
- Astrophysical Measurement
- Laser Detection

Hamamatsu R943-02 is a 51 mm (2") diameter head-on type photomultiplier tube having GaAs (Cs) photocathode and synthetic silica window. The combination of the GaAs photocathode and the synthetic silica window allows high sensitivity over a wide spectral range from UV to IR (160 nm to 930 nm).
The R943-02 is selected for photon counting and features low dark counts and excellent pulse height distribution (PHD) of single photoelectrons.

GENERAL

Parameter	Description / Value	Unit
Spectral Response	160 to 930	nm
Wavelength of Maximum Response	300 to 850	nm
Photocathode		
Material	GaAs(Cs)	—
Minimum Effective Area	10 × 10	mm
Mode	Opaque	—
Window Material	Synthetic silica glass	—
Dynode		
Secondary Emitting Surface	Cu-BeO	—
Structure	Linear focused	—
Number of Stages	10	—
Direct Interelectrode Capacitances		
Anode to Last Dynode	Approx. 2.7	pF
Anode to All Other Electrodes	Approx. 5.0	pF
Base	21-pin glass base	—
Suitable Socket	E678-21C (supplied) E678-21D (sold separately)	—
Weight	93	g
Operating Ambient Temperature [A]	-30 to +50	°C
Storage Temperature	-80 to +50	°C

Figure 1: Typical Spectral Response



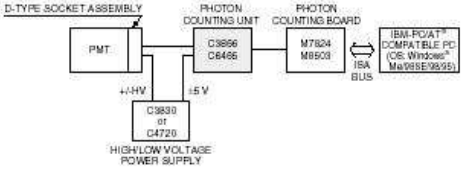
HAMAMATSU

PHOTON COUNTING UNITS
C3866, C6465

Photon counting units are designed to convert single photoelectron pulses from a photomultiplier tube into 5 V digital signals by use of the built-in amplifier and discriminator circuits. Photon counting with a high S/N ratio can be performed by simply connecting a counter to the output of the photon counting unit.
The C3866 uses a high-speed electronic circuit that allows measurement with an excellent output linearity up to 10^7 s^{-1}. The C3866 also has a prescaler (division by 10) eliminating the need for a high-speed counter.
The C6465 provides an output linearity up to 10^6 s^{-1} and an output pulse width of 30 ns, making it suitable for use with a general-purpose counter.

Left: C3866, Right: C6465

COMBINATION EXAMPLE



SPECIFICATIONS

Parameter		C3866	C6465
Input Impedance		50 Ω	50 Ω
Discrimination Level (Converted Into Input)		-0.5 mV to -16 mV	-2.2 mV to -31 mV
Gain Requierd in PMT (Recommendation)		3×10^6	5×10^6
Prescaler		+1, +10 Ⓐ	—Ⓑ
Maximum Count Rate (Random Pulse: -10 % deviation)	+1	4×10^6 s^{-1} (Typ.)	1×10^6 s^{-1} (Typ.) Ⓑ
	+10	1×10^7 s^{-1} (Typ.)	
Pulse Pair Resolution	+1	25 ns	60 ns Ⓑ
	+10	10 ns	
Output Pulse Ⓒ		TTL Compatible positive logic (C-MOS 5 V)	TTL Positive logic
Output Pulse Width	+1	10 ns	30 ns Ⓑ
	+10	Depending on count rate	
Supply Voltage		+5.2 V ± 0.2 V, 150 mA -5.2 V ± 0.2 V, 300 mA	+5 V ±0.2 V, 60 mA -5 V ±0.2 V, 120 mA
Connectors	Input	BNC	BNC
	Output	BNC	BNC
	Remote	BNC	—
	Power Supply	HIROSE SR30-10R-4S Ⓓ	DIN (6 PIN) Ⓔ
Operating Temperature		0 °C to +40 °C	0 °C to +40 °C
Storage Temperature		-15 °C to +60 °C	-15 °C to +60 °C
Size (W × H × D)		88 mm × 32 mm × 170 mm	60 mm × 43.2 mm × 105 mm
Weight		Approx. 320 g	Approx. 250 g

NOTE: Ⓐ: Selectable by the switch or remote control.
Ⓑ: C6465 does not have a prescaler.
Ⓒ: Output stage C3866: ADVANCED C-MOS (National Semiconductor 74AC153), C6465: ADVANCED C-MOS (TOSHIBA TC74ACT04)
Ⓓ: Fitting plug (HIROSE SR30-10PQ-4P) with cable is supplied with C3866 (1 m)
Ⓔ: Fitting plug with cable is supplied with C6465 (1.5 m)

HAMAMATSU

WIDE BANDWIDTH AMPLIFIER C6438

C6438 is a wide bandwidth, DC to 50 MHz, amplifier. While providing the photomultiplier tube output current directly to C6438 input connector, it provides the voltage output signal in the conversion coefficient of 10 mV/10 µA. It can be used as a wide bandwidth amplifier not only for a photomultiplier tube but also for other detectors, or simply as a wide bandwidth amplifier.

FEATURES

- **Wide Bandwidth: DC to 50 MHz**
- **Rise Time: 7 ns Typ.**
- **Gain: 20 dB ± 3 dB (Approx. 10 Times)**
- **Non-Inverting Output**
- **Compact · Light weight**

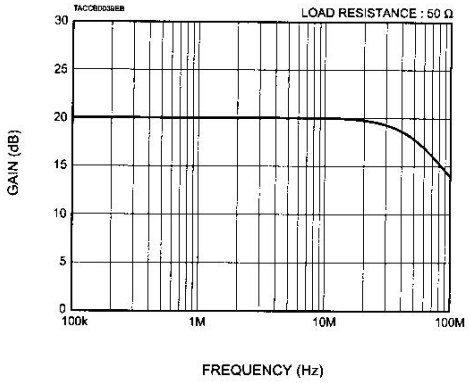
MAXIMUM RATINGS (Absolute Maximum Values)

Parameter	Description/Value
Input Voltage	± 6 V dc
Operating Temperature	0 °C to +40 °C
Storage Temperature	-10 °C to +60 °C

SPECIFICATIONS

Parameter		Description/Value
Gain (Frequency: DC to 50 MHz, Load Resistance: 50 Ω)		20 dB ± 3 dB (Approx. 10 times)
Frequency Bandwidth (-3 dB)		DC to 50 MHz
Rise Time		7 ns Typ.
Input Polarity		Positive/Negative
Amplifying Method		Non-inverting Output
Input/Output Impedance		50 Ω
Maximum Output Voltage	Load Resistance: 1 MΩ	2.0 V Min.
	Load Resistance: 50 Ω	1.0 V Min.
Output Offset Voltage (Load Resistance: 50 Ω)		0.5 mV Typ.
Output Noise Voltage (Load Resistance: 50 Ω)		0.5 mV rms Max. (at 50 MHz)
Output Offset Drift (0 °C to +40 °C)		0.06 mV/°C
Input Voltage/Current		±5 V dc/±20 mA Typ.
Weight		160 g

Figure 1: Gain vs. Frequency Characteristic



Thermoelectric Coolers

High Performance Thermoelectric Coolers C4877, C4878 Series

Left: C4877 Power Supply
Right: C4877 Cooled PMT Housing

The C4877 series and C4878 series are thermoelectric coolers constructed with enhanced electrostatic and magnetic shielding (C4877 Series). This minimizes the influence of external noise on the photomultiplier tube and thus significantly improves photometric accuracy. These coolers offer user-friendly functions such as easy temperature control and pilot lamp blanking. The C4877 series is designed for use with 51 mm (2") or 38 mm (1-1/2") diameter head-on photomultiplier tubes, and the C4878 series for MCP-PMTs.

Features

- Thermoelectric cooling using Peltier elements
- About -30 °C cooling temperature (with +20 °C cooling water)
- Evacuated, double-pane window with heater for frost prevention
- Built-in electrostatic and magnetic shielding (C4877 Series)
- Water shut-off protection to guard the Peltier elements
- Stable operation due to a regulated power supply

Specifications

[Cooled PMT Housing]

Parameter		Value/Description
Cooling		Thermoelectric cooling using Peltier elements
Heat Exchange Medium		Water
Amount of Cooling Water		1 L/min to 3 L/min
Cooling Temperature (with cooling water at +20 °C)		Approx. -30 °C
Temperature Controllable Range (with cooling water at +20 °C)		-30 °C to 0 °C (continuously adjustable)
Cooling Time		Approx. 120 min
Optical Window Material		Evacuated double-pane fused silica window with heater
Applicable PMTs (Optional)	C4877 Series	28 mm (1-1/8") Dia. and 38 mm (1-1/2") Dia. and 51 mm (2") Dia. Head-on
	C4878 Series	MCP-PMT (R3809U-50 Series)
Applicable Socket Assembly or PMT Holder (Optional)	C4877 Series	E2762 Series Ⓐ
	C4878 Series	E3059-500 (R3809U-50 Series)
Operating Ambient Temperature Ⓑ		0 °C to +40 °C
Storage Temperature Ⓑ		0 °C to +40 °C
Weight		C4877 5.8 kg / C4878 5.5 kg

NOTE: Ⓑ No condensation

[Power Supply]

Parameter		Value/Description
AC Input Voltage	C4877, C4878	100 V ± 10 V (50 Hz/60 Hz)
	C4877-01, C4878-01	120 V ± 12 V (50 Hz/60 Hz)
	C4877-02, C4878-02	230 V ± 23 V (50 Hz/60 Hz)
Power Consumption		270 V·A
Output Voltage		28 V
Output Current		4.3 A
Protection Circuit		Functions against cooling water suspension and over current/short circuit
Operating Ambient Temperature Ⓑ		0 °C to +40 °C
Storage Temperature Ⓑ		0 °C to +40 °C
Weight		8.5 kg

NOTE: Ⓑ No condensation

[Components and Accessories]

●Cooled PMT Housing (Including an input window) ●Power Supply ●Light Shield Cap
●Spare Fuse ●Water Hose Clamps ●Connection Cable (1.5 m) ●AC Line Cable (2 m)

To operate C4877 and C4878, water hoses with an inner diameter of 15 mm are required.

NOTE: Ⓐ

E2762 Series	PMT
E2762-502	R1767, R980, R1387, R2066
E2762-506	R943-02, R3310-02
E2762-509	R464, R585, R649
E2762-510	R329-02, R331-05, R2257
E2762-511	R316-02, R374, R2228, R5929, R6249
E2762-513	R375, R669

All 6 models E2762 series listed here are SHV high voltage input and BNC current output type.

102

MP 10W HIGH STABILITY POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- *ARC AND SHORT-CIRCUIT PROTECTION*
- *LOW OUTPUT RIPPLE - 0.001% P-P*
- *LOCAL AND REMOTE VOLTAGE PROGRAMMING*
- *10V REFERENCE OUTPUT FOR EXTERNAL CONTROL*
- *HIGH STABILITY 0.001% LINE AND LOAD REGULATION*
- *MODELS UP TO 40KV OUTPUT*
- *CE MARK FOR EMC DIRECTIVE*
- *OEM CUSTOMIZATION AVAILABLE.*

The MP Series has been designed as high performance dc to dc converters with output voltages up to 40kV.

Each module provides well regulated, low ripple and high stability high voltage in a highly versatile compact design, combining linear and switched mode techniques to minimize internal dissipation and generated EMI/RFI interference. The higher voltage modules are vacuum encapsulated to ensure corona free operation.

Specialist cell manufacture of the MP Series ensures prompt delivery.

TYPICAL APPLICATIONS

Photomultiplier Tubes
Scintillators
Electron Guns
Ion Guns
Nuclear Instruments
Electrostatic lenses
Spectroscopy
Microchannel Plates

OPTIONS

F	Flange Mounting
P	Positive Output Polarity
N	Negative Output Polarity
LL	Optional Lead Length

SPECIFICATIONS

Input Voltage:
+24Vdc±2V. Other input voltages available on special order.

Input Current:
Less than 1A at full output.

Output Voltage:
Continuously adjustable over entire output range. Available in either positive or negative output polarity. See table for voltage ranges.

Output Voltage Control: Controlled by either:
1) Internal ten-turn potentiometer
2) External potentiometer 5k to 100k (set internal pot to max.)
3) Remote differential voltage programming (0 to +10V gives 0 to full output).
Accuracy 0.1%.

Remote Control:
Remote programming Common Mode Range: -5VDC to +15VDC

Line Regulation:
0.001% for input change of 1V.

Load Regulation:
0.001% for 100µA to full load change (at maximum voltage).

Temperature Coefficient:
Better than 25ppm/°C.

Stability:
<0.007%/hr at constant operating conditions after 1 hour warm-up.

Output Voltage and Current Monitors:
Voltage: 0 to +10V represents zero to full output ±1%.
Current: 0 to +10V represents zero to full output ±2%.

Temperature:
Operating: 0°C to +50°C.
Storage: -35°C to +85°C.

Connectors:
Input: 10 pin connector (mating connector supplied).
Output: Output voltage 1-20kV: 500mm screened cable URM76
Output voltage 30kV: 500mm screened cable RG59
Output voltage 40kV: 500mm silicone rubber cable.

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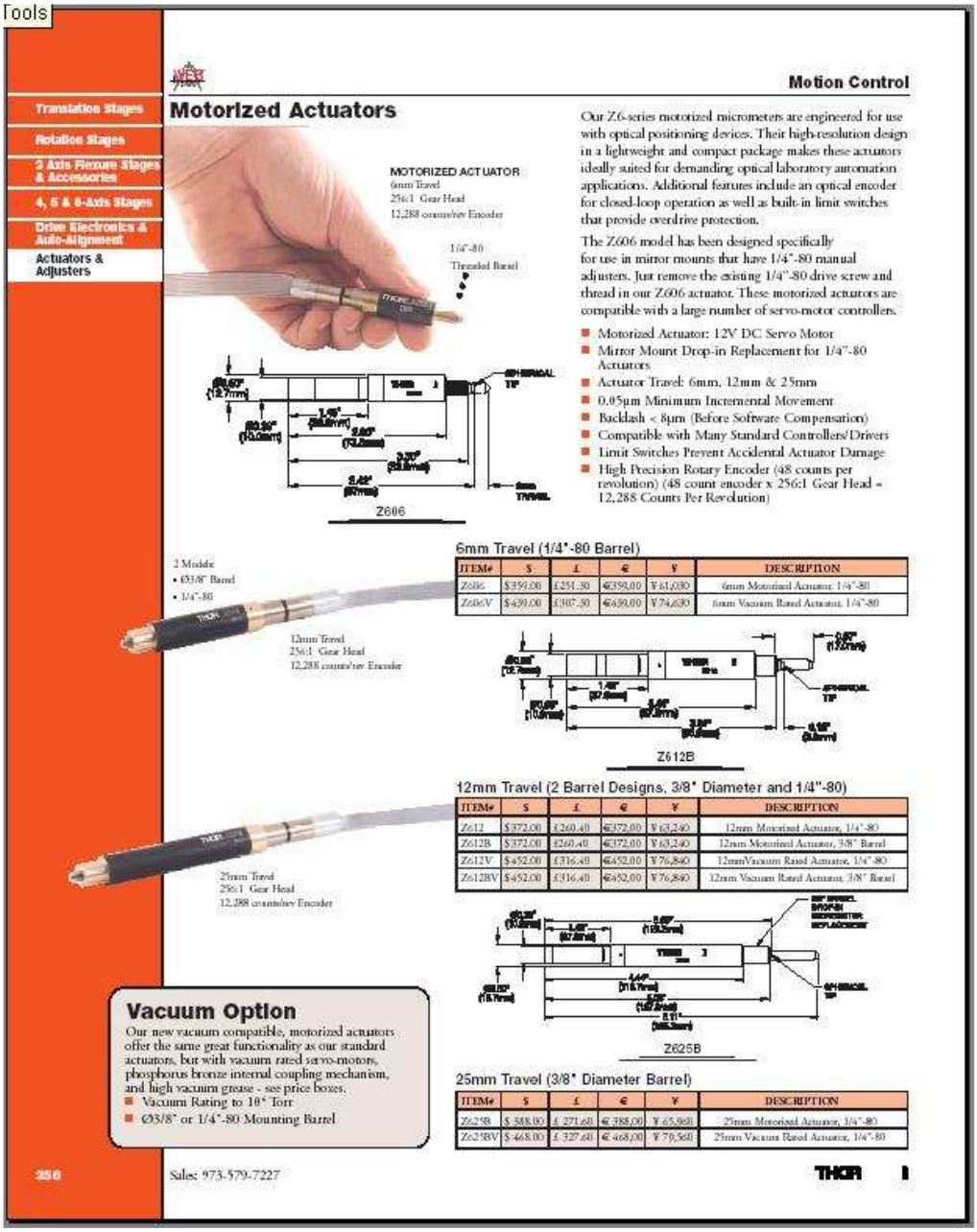
128005-001 REV.B

IV Thorlabs Z625BV motorized actuator



Tools

Translation Stages
Rotation Stages
2 Axis Flexure Stages & Accessories
4, 5 & 6-Axis Stages
Drive Electronics & Auto-Alignment
Actuators & Adjusters

Motion Control

Motorized Actuators

MOTORIZED ACTUATOR
6mm Travel
256:1 Gear Head
12,288 counts/rev Encoder

1/4"-80 Threaded Barrel

Z606

Our Z6-series motorized micrometers are engineered for use with optical positioning devices. Their high-resolution design in a lightweight and compact package makes these actuators ideally suited for demanding optical laboratory automation applications. Additional features include an optical encoder for closed-loop operation as well as built-in limit switches that provide overdrive protection.

The Z606 model has been designed specifically for use in mirror mounts that have 1/4"-80 manual adjusters. Just remove the existing 1/4"-80 drive screw and thread in our Z606 actuator. These motorized actuators are compatible with a large number of servo-motor controllers.

- Motorized Actuator: 12V DC Servo Motor
- Mirror Mount Drop-in Replacement for 1/4"-80 Actuators
- Actuator Travel: 6mm, 12mm & 25mm
- 0.05µm Minimum Incremental Movement
- Backlash < 8µm (Before Software Compensation)
- Compatible with Many Standard Controllers/Drivers
- Limit Switches Prevent Accidental Actuator Damage
- High Precision Rotary Encoder (48 counts per revolution) (48 count encoder x 256:1 Gear Head = 12,288 Counts Per Revolution)

2 Models
• Ø3/8" Barrel
• 1/4"-80

12mm Travel
256:1 Gear Head
12,288 counts/rev Encoder

Z612B

25mm Travel
256:1 Gear Head
12,288 counts/rev Encoder

Z625B

6mm Travel (1/4"-80 Barrel)

ITEM#	$	£	€	¥	DESCRIPTION
Z606	$359.00	£251.30	€359.00	¥ 61,030	6mm Motorized Actuator, 1/4"-80
Z606V	$439.00	£307.30	€439.00	¥ 74,630	6mm Vacuum Rated Actuator, 1/4"-80

12mm Travel (2 Barrel Designs, 3/8" Diameter and 1/4"-80)

ITEM#	$	£	€	¥	DESCRIPTION
Z612	$372.00	£260.40	€372.00	¥ 63,240	12mm Motorized Actuator, 1/4"-80
Z612B	$372.00	£260.40	€372.00	¥ 63,240	12mm Motorized Actuator, 3/8" Barrel
Z612V	$452.00	£316.40	€452.00	¥ 76,840	12mmVacuum Rated Actuator, 1/4"-80
Z612BV	$452.00	£316.40	€452.00	¥ 76,840	12mm Vacuum Rated Actuator, 3/8" Barrel

25mm Travel (3/8" Diameter Barrel)

ITEM#	$	£	€	¥	DESCRIPTION
Z625B	$ 388.00	£ 271.60	€ 388.00	¥ 65,960	25mm Motorized Actuator, 1/4"-80
Z625BV	$ 468.00	£ 327.60	€ 468.00	¥ 79,560	25mm Vacuum Rated Actuator, 1/4"-80

Vacuum Option

Our new vacuum compatible, motorized actuators offer the same great functionality as our standard actuators, but with vacuum rated servo-motors, phosphorus bronze internal coupling mechanism, and high vacuum grease - see price boxes.

- Vacuum Rating to 10⁻⁶ Torr
- Ø3/8" or 1/4"-80 Mounting Barrel

256

Sales: 973-579-7227

THOR

V Empire Magnetics VC-U17-X

Empire Magnetics Inc.

Vacuum Stepper Motors
Standard Grade - VS
Frame Sizes

Stepper Motors

Ordinary motors cannot operate for long at pressures lower than 10^{-4} Torr. **Empire Magnetics** vacuum rated motors are constructed to allow extended operation at pressures as low as 10^{-7} Torr without a sacrifice in motor performance.

Some vacuum applications cannot tolerate contamination by motor outgassing products. To accommodate a range of motor cleanness requirements, **Empire Magnetics** provides three grades of vacuum rated stepping motors in the full range of environmental motor sizes.

Frame size selection:

Motors are typically made in groups or families, the families are identified by the outer diameter or size of the square, these references are called frame sizes. In the American system, a 23 frame is a nominal 2.3 inches in diameter. For motors less than one inch in diameter, the reference is typically known as a size. Herein is a list of the frame sizes offered by Empire Magnetics Inc. and some of the characteristics of the group that will allow you to select from them.

Frame Size 5: Nominal outer dimension of 0.5 inches, these motors are very low power, suitable only for instrumentation applications. Torque range of .25 to .5 oz-in. Cylindrical shaped motor.

Frame Size 11: Nominal outer dimension of 1.1 inches, these motors are very low power, suitable primarily for instrumentation applications. Torque range of .5 to 2.5 oz-in. Cylindrical shaped motor with square front flange.

Frame Size 15: Nominal outer dimension of 1.5 inches, these motors are low power, typically used for instrumentation applications. Torque range of 5 to 10 oz-in. Cylindrical shaped motor.

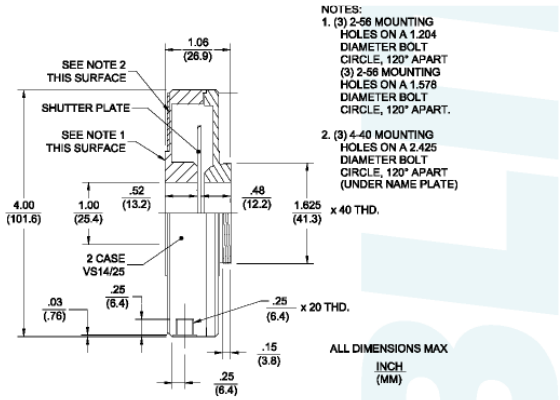
Frame Size 17: Nominal outer dimension of 1.7 inches, these motors are relatively low power useful for a wide range of industrial applications. Torque range of 13 to 26 oz-in. Cylindrical shaped motor laminations, with square end flanges front and rear. Since this motor does not have a housing, it is not available in all environments.

Frame Size 23: Nominal outer dimension of 2.3 inches. Extremely popular size useful for a wide range of industrial applications. Torque range of 60 to 150 oz-in. Cylindrical shaped motor with square front flange.

Frame Size 34: Nominal outer dimension of 3.4 inches. Power range of 80- 240 watts, useful for a wide range of applications. Torque range of 150 to 450 oz-in. Cylindrical shaped motor with square front flange.

Frame Size 42: Nominal outer dimension of 4.2 inches. Power range of 240-700 watts, relatively high power in the stepper motor range. Torque range of 400 to 1600 oz-in. Cylindrical shaped motor with square front flange.

VI Fast shutters Uniblitx VS25



The UNIBLITZ® VS14 and VS25 shutter series have been designed to give accurate, repeatable exposures for a wide variety of applications. They have been successfully field tested in microscopy, video imaging, PMT protection, and photographic applications worldwide.
Available with either 14mm or 25mm apertures, these shutters are offered in either cased or uncased configurations. The uncased shutter allows a high degree of flexibility when mounting the unit in situations inaccessible to most shutters due to spatial limitations. The cased version of this series is very popular due to the protection the black anodized aluminum housing provides the precision shutter mechanism. To further enhance the adaptability of this series, we offer several customized mounts and mounting systems for popular microscopes and video imaging applications. For those applications where the shutter will be used to switch a mercury arc lamp, we strongly recommend the "R1" enhancement. This modification will allow the shutter to operate under the intense heat produced by mercury lamps. Additional information can be found in the specific data sheet entitled "MICROSCOPE & VIDEO MOUNTING SYSTEMS."

FEATURES

- Two aperture sizes available
  - 14mm diameter - Model VS14
  - 25mm diameter - Model VS25
- Laser energy ratings up to 10W/mm^2
- Exposure repetition rates from DC - 40Hz
- Solid state synchronization available
- Cased and uncased versions available

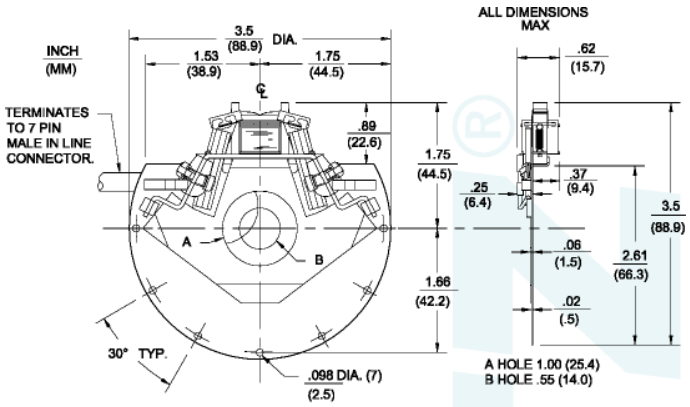
HOW TO ORDER

VS14/VS25 Series Shutters Part Numbering System

For additional Timing and Operational information, see "Shutter Products-General Specification Sheet." See VS14/VS25 shutter outline drawings shown on page 2 of this specification sheet.

#2 UNCASED STYLE

(Figure 1) The VS14/25 uncased style is the basic configuration of this series and is best suited for OEM applications. Mounting can be accomplished through seven 2.5mm holes around the unit's outer perimeter. The unit terminates to a 7-pin male in-line connector through a six-inch cable assembly.

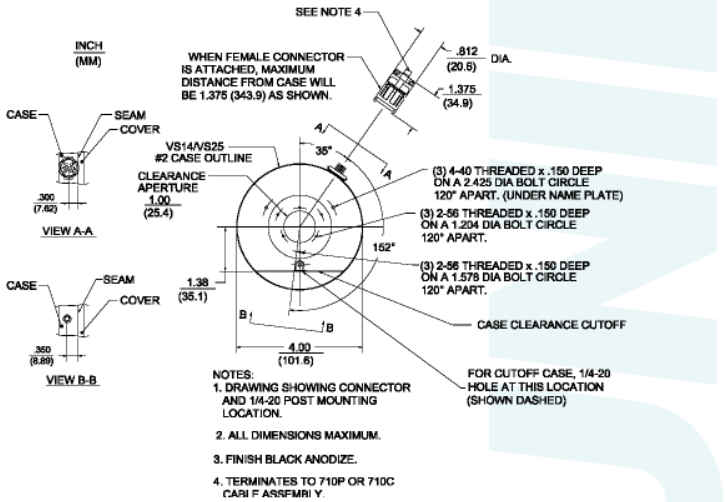


#2 CASED STYLE

(Figure 2) The VS14/25 #2 case style allows a number of mounting configurations. A 1/4-20 threaded hole is provided for post mounting. The 1.625in x 40TPI external thread, rear side, and the six 2-56 threaded holes, front side (Figure 3), can be interfaced directly into your application or fitted with variety of specific mounting options. See "MICROSCOPE & VIDEO MOUNTING SYSTEMS" data sheets for additional information. The unit terminates with a 7-pin male connector.

CASE/CONNECTOR LAYOUT

(Figure 3) This drawing illustrates 7-pin connector and 1/4-20 threaded hole layout for the VS14/25 series #2 case style.



Due to our ongoing product development program, Vincent Associates reserves the right to discontinue or change specifications or designs or any products at any time, without incurring any obligations. Teflon is a registered trademark of E.I. DuPont. U.S. Pat No. 3,427,576; 3,595,553; 3,967,293. Drawings shown for illustrative purposes only. Updated 12/2002

VII MKS baratron model 722A-100 pressure sensor

VACUUM GAUGES

Diaphragm Vacuum Sensors

Diaphragm Vacuum Sensors are highly accurate, gas-species-independent gauges for critical process control and research applications. All sensors offered below have a 15-pin, D-type connector with a signal ouput of 0-10 VDC full scale.

Capacitance Diaphragm Vacuum Sensors

MODEL 722 A

ALSO AVAILABLE WITH VCR-8 FEMALE, OR VCR-4 FEMALE, OR MINI CFF, OR KF-16 AT $65.00 ADDITIONAL

MKS Baratron® Model 722 A

NON-HEATED 0.5% Accuracy, 0°- 50°C Temperature Range

MODEL 722 A (NON-HEATED)

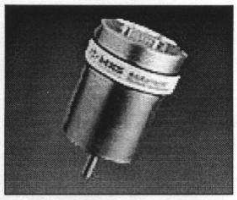
DUNIWAY PART #	FULL SCALE RANGES	FITTING	STATUS	PRICE
722A-1	1 torr	1/2" tube	stocked	$895.00
722A-10	10 torr	1/2" tube	stocked	795.00
722A-100	100 torr	1/2" tube	stocked	795.00
722A-1000	1000 torr	1/2" tube	stocked	795.00

GAUGES

MKS Baratron® Model 627 B

HEATED to 45°C 0.15% Accuracy, 15°- 40°C Temperature Range

MODEL 627 B



ALSO AVAILABLE WITH VCR-8 FEMALE OR MINI CFF & KF-16 AT $65.00 ADDITIONAL

MODEL 627 B (HEATED)

DUNIWAY PART #	FULL SCALE RANGES	FITTING	STATUS	PRICE
627B-002	20 mtorr	1/2" tube	special ordered	$1,800.00
627B-005	50 mtorr	1/2" tube	special ordered	$1,600.00
627B-01	100 mtorr	1/2" tube	stocked	$1,500.00
627B-1	1 torr	1/2" tube	special ordered	$1,500.00
627B-2	2 torr	1/2" tube	special ordered	$1,500.00
627B-10	10 torr	1/2" tube	special ordered	$1,500.00
627B-20	20 torr	1/2" tube	special ordered	$1,500.00
627B-100	100 torr	1/2" tube	special ordered	$1,500.00
627B-1000	1000 torr	1/2" tube	special ordered	$1,500.00

Piezo Diaphragm Vacuum Sensor

Terranova® Model 808

Silicon Diaphragm Vacuum Sensor

The Terranova Model 808 Silicon Diaphragm Vacuum Sensor provides a low cost alternative for gas-species-independent pressure measurement in the range from 0.5 torr to 1000 torr.

- *Small Size: (1.5"W x 2.2" L x 2.0"H)*
- *Gas-Species Independent*
- *Low Cost*
- *Compatible with CDG Controllers*
- *Vacuum Surfaces Inert*

- *Full-Scale Pressure: 1000 torr*
- *Accuracy: 2%*
- *Output Voltage: 0-10 VDC*
- *Vacuum Connection 1/.8 NPT*
- *Electrical Connector: D-15 Male*

Part #: 808-1000-NPT
Price: $250.00

(Also available with other vacuum connections. Inquire for price and delivery)

808-1000-NPT

www.duniway.com

VG11

VIII ACCU-GLASS PRODUCTS vacuum feed-throughs

Subminiature-D Feedthroughs and Accessories Page 1 of 2

ACCU-GLASS PRODUCTS, INC

700 Arroyo Ave. * San Fernando, CA. 91340

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- Linear & Rotary

VACUUM WIRING
- Accessories
- Single Conductor
- Multi-Conductor
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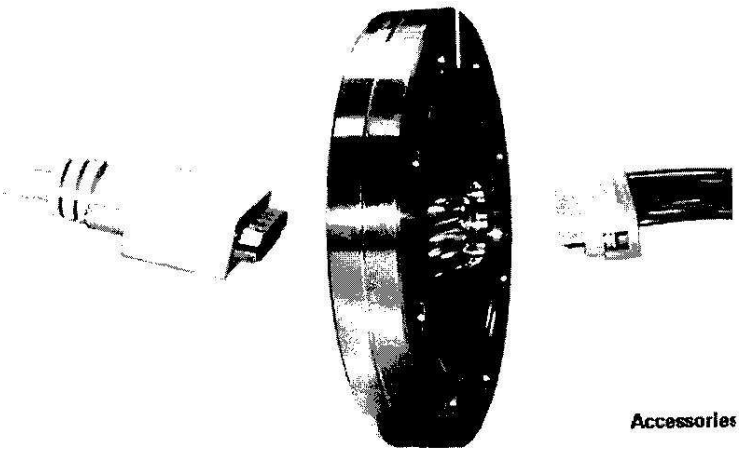
- Thermocouple
- Fiber Optic

INDEX
- Part #

Subminiature-D Feedthroughs and Accessories:

Air-Service | Feedthrough Flanges | In-Vacuum



Accessories

Accesso

Click on desired category

9 PIN US $ 295
15 PIN US $ 350
25 PIN US $ 375

IX Data Loggers

HOBO U10 Temp and RH USB Data Logger — Page 1 of 2

onset **HOBO® U10 Data Loggers**

ADD TO APPENDIX

10-Bit Temp/RH with Direct USB Interface

Onset's new HOBO U10 loggers are small, economical loggers that record temperature or temperature and relative humidity (RH) in indoor environments. La memory capacity (52K readings) allows for long-term deployments, and data read is fast and easy via direct USB interface using HOBOware™ (Windows) software.

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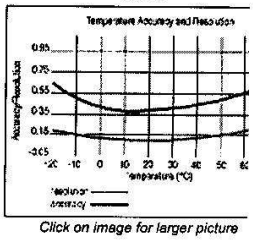
Printable Version

	U10-001	U10-003
	$55	$69
Required Software	Temp	Temp/RH

Family Features

- User-selectable sampling intervals: 1 second to 12 hours
- Programmable Start time/date or push-button start
- Battery level indication at launch
- Battery level can be recorded as separate channel
- Numerous event types (button push/release, host PC connection, low battery) stored to data file asynchronously during logging
- Hinged case snaps open for easy battery replacement
- Large memory for long-term deployments
- NIST-traceable temperature accuracy certification available
- Logger size 6.0 x 4.7 x 1.9 cm (2.4 x 1.9 x 0.8")/ Weight: 28 grams (0.9 oz)
- Patented technology (U.S. patent 6,826,664)

Plot A



Click on image for larger picture

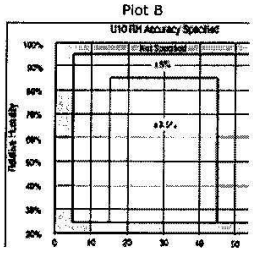
Temperature

- Range: -20° to 70°C (-4° to 158°F)
- Accuracy: ±0.4°C @ 25°C (±0.7° @ 77°F) (See Plot a)
- Resolution: 0.1°C @ 25°C (0.2° @ 77°F) (See Plot a)
- Response time in airflow of 1 m/s (2.2mph): 10 minutes, typical to 90%
- Optional NIST temperature certification

Relative Humidity

- Range: 25% to 95% RH over the range 5° to 55°C (41° to 131°F)
- Accuracy: ±3.5% from 25% to 85% over the range 15° to 45°C (59° to 113°F) (See Plot b); ±5% from 25% to 95% over the range 5° to 55°C (41° to 131°F) (See Plot b)
- Resolution: 0.07% @ 25°C (77°F) and @ 30% RH
- Response time in airflow of 1 m/s (2.2mph): 6 minutes, typical to 90%
- Operating Range: -20° to 70°C (-4° to 158°F); 0

Plot B



X Flat Field lamps

Edmund Optics - Dolan-Jenner DC-950 DC-Regulated Fiber Optic Illuminator Page 1 of 2

Edmund Industrial Optics

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home : online catalog : illumination : quartz halogen illuminators : Dolan-Jenner DC-950 DC-Regulated Fiber Optic Illuminat

Dolan-Jenner DC-950 DC-Regulated Fiber Optic Illumi

[Specification Table | Related Products | Helpful Literature | Product Matrix | Technical Images]

- DC-Regulated Power Supply Less Than 0.5%
- Low Output Power Ripple Less Than 0.4%
- Remote Intensity Control from 0-5V DC Analog
- 200 to 10,000 Hours Lamp Life

The DC-950 is a DC-regulated upgrade to the PL-800. In addition, with 250VAC input, it is an upgrade to the PL-900 (no longer available). In ad 100% intensity control and heat absorbing filter, the basic model feature variation in the power output as compared to typical 2% variance in non- regulated illuminators. An optional iris and filter mount package (include and #55-219) allows control of the color temperature and the inclusion of diameter filter to the PL-900 illuminator setup. Built-in remote interface intensity control of output power via 0-5VDC analog input or an 8 bit Digital control accomplished via either the Digital-to-Analog Converter (RS-232 Control Package w/Software (#57-783). Stock Numbers #55-2 include standard Euro and UK plugs.

Specification Table

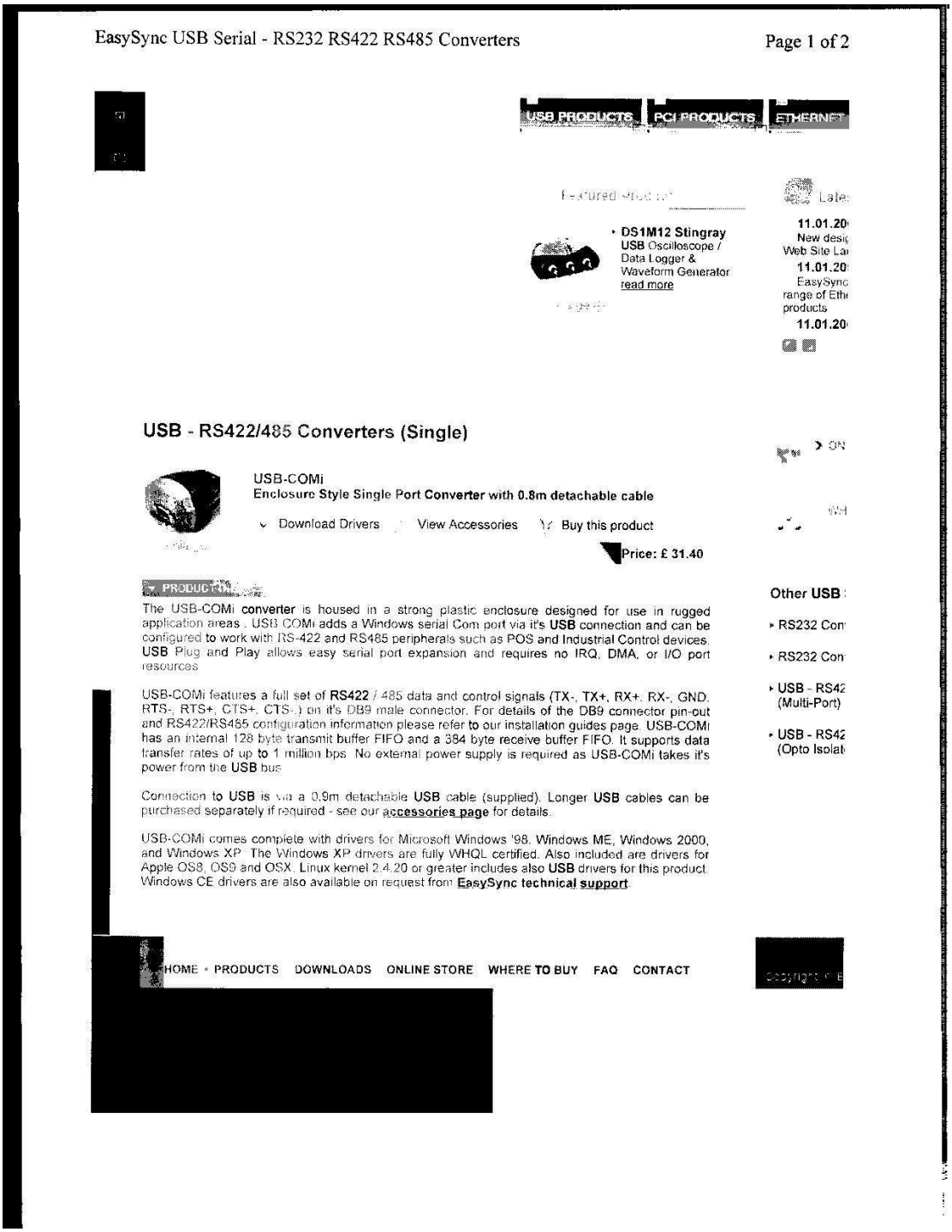
Variable Light Control	Solid State 0% to 100%
Lamp Type	150W EKE Quartz Halogen
Lamp Life	200 to 10,000 hrs.
Lamp Output	21V, 400,000 footcandles at fiber optic insertion plane
Color Temperature	3250K at maximum intensity
Input Voltage to Lamp	
Regulation	±0.5% or better
Output Ripple	0.4% or better
Remote Intensity Control	0-5V DC analog or optional 8-bit digital (via #55-232)
Construction	Aluminum
Operating Temperature	5°C to 40°C
Operating Humidity	0% to 80% non-condensing
Dimensions	7.25" W x 4.50" H x 9.50" L
Weight	11.5 lbs.

Products

[Quotation Request]

Description	Stock Number	Price *	
• FO ILLUM DC-950 115V	NT55-216	$495.00	in
• FO ILLUM DC-950 230V CE	NT55-217	$495.00	in
• FO ILLUM DC-950 IRIS 115V	NT55-218	$565.00	in
• FO ILLUM DC-950 IRIS 230V CE	NT55-219	$565.00	in
• D-TO-A CONVERTER FOR DC-950	NT55-232	$50.00	in

XI USB to 422 Convertors



EasySync USB Serial - RS232 RS422 RS485 Converters Page 1 of 2

USB PRODUCTS | PCI PRODUCTS | ETHERNET

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USB - RS422/485 Converters (Single)

USB-COMi
Enclosure Style Single Port Converter with 0.8m detachable cable

Download Drivers | View Accessories | Buy this product

Price: £ 31.40

The USB-COMi converter is housed in a strong plastic enclosure designed for use in rugged application areas. USB-COMi adds a Windows serial Com port via it's USB connection and can be configured to work with RS-422 and RS485 peripherals such as POS and Industrial Control devices. USB Plug and Play allows easy serial port expansion and requires no IRQ, DMA, or I/O port resources

USB-COMi features a full set of RS422 / 485 data and control signals (TX-, TX+, RX+, RX-, GND, RTS-, RTS+, CTS+, CTS-) on it's DB9 male connector. For details of the DB9 connector pin-out and RS422/RS485 configuration information please refer to our installation guides page. USB-COMi has an internal 128 byte transmit buffer FIFO and a 384 byte receive buffer FIFO. It supports data transfer rates of up to 1 million bps. No external power supply is required as USB-COMi takes it's power from the USB bus

Connection to USB is via a 0.9m detachable USB cable (supplied). Longer USB cables can be purchased separately if required - see our accessories page for details.

USB-COMi comes complete with drivers for Microsoft Windows '98, Windows ME, Windows 2000, and Windows XP. The Windows XP drivers are fully WHQL certified. Also included are drivers for Apple OS8, OS9 and OSX. Linux kernel 2.4.20 or greater includes also USB drivers for this product. Windows CE drivers are also available on request from EasySync technical support.

Other USB
- RS232 Con
- RS232 Con
- USB - RS42 (Multi-Port)
- USB - RS42 (Opto Isolat

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