ER815-OEM C4D Detector

User Manual v1.1 May 2019

Contents

Introduction

The ER815-OEM provides a version of the ER815 for OEM applications. It provides essentially the same functionality as the ER815 in a smaller and less expensive format and with added flexibility to meet potential OEM requirements:

1. Second analog input channel to record data from a second detector, for example a UV detector, or an eDAQ isoPod

2. RS232 serial port

3. Direct headstage connection

4. Lower cost

5. Smaller size

This document describes the various functions of the system and highlights those functions that are optional.

Physical Arrangement

System Components

Size: 100mm x 160mm x 25mm
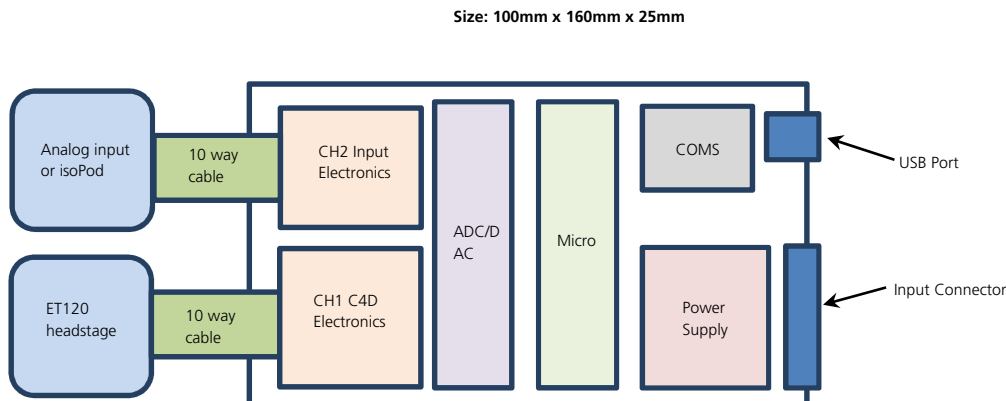
System Description

This section describes the ER815-OEM system with reference to the system components diagram above. The operation of the following components will be described:

- Comms channels
- Headstage
- Channel 1 C4D Electronics
- Channel 2 Input Electronics
- ADC/DAC
- Micro and Firmware
- Power Supply
- Input/output connectors

COMMs Channels

The ER815-OEM system is provided with two means to communicate with an external system:

- RS232C Hardware Serial interface- used with external data system with serial comms ports.
- USB port (J6) configured as a virtual serial interface - used with a Windows based PC.

An external RS232C compatible device can be used to control the ER815-OEM. It is the customer's responsibility to provide this resource. The simplest approach is to use a terminal emulator program such as Tera Term.

The following serial port settings are used by the ER815-OEM system:

- Port settings: installed by Windows or hardware port.
- Baud Rate: 115200
- Data: 8 bit
- Parity: none
- Stop: 1 bit
- Flow Control: none

ET120 and Other Headstage

The system interfaces to the C4D Headstages via a 10 way flat cable or a DB9 adapter cable.

Channel 1 C4D Electronics

This provides adjustable frequency and amplitude excitation to the C4D headstage. The resulting headstage signal is filtered and amplified before conversion to digital data. This element duplicates the existing EA025 headstage module used by the ER825.

Channel 2 Input

This provides an interface to an external analog input from another detector or an eDAQ isoPod.

ADC/DAC

This provides the data acquisition and control components required by the C4D electronics.

Micro and Firmware

Signal conditioning system firmware is stored in the ER815-OEM Micro-processor and provides the means to control the device and to sample data. The micro-processor also provides all necessary communications and control functions.

There are two versions of firmware available, running either a serial protocol, or an application protocol using PowerChrom or Chart software. The user can switch between firmwares using the ER8x5 Converter and Updater application.

- ES018 Serial protocol which support a serial based control and acquisition.
- ES017 Application protocol which supports PowerChrom and Chart software.

Power Supply

The system accepts an external nominal 12 volt/10 watt DC (9 - 16 volt range) supply and generates all internal power levels required. Connect Power GND to J8-PIN 1 and +12V to J8-PIN 2. Take care not to reverse these two connections.

A number of internal supplies are generated using a combination of DC to DC converters and low noise linear regulators which generate the following:

- AN5V   Analog negative 5 volts
- AP5V   Analog positive 5 volts
- VCC-3V   Microprocess or 3 volt power
- P5V   Logic 5 volt power
- AN15V   Analog negative 15 volts
- AP15V   Analog positive 15 volts

The system automatically comes online when power is applied.

Input / Output Connectors

The connector functions are described in this section.

View from Top side (Scale 1:1)
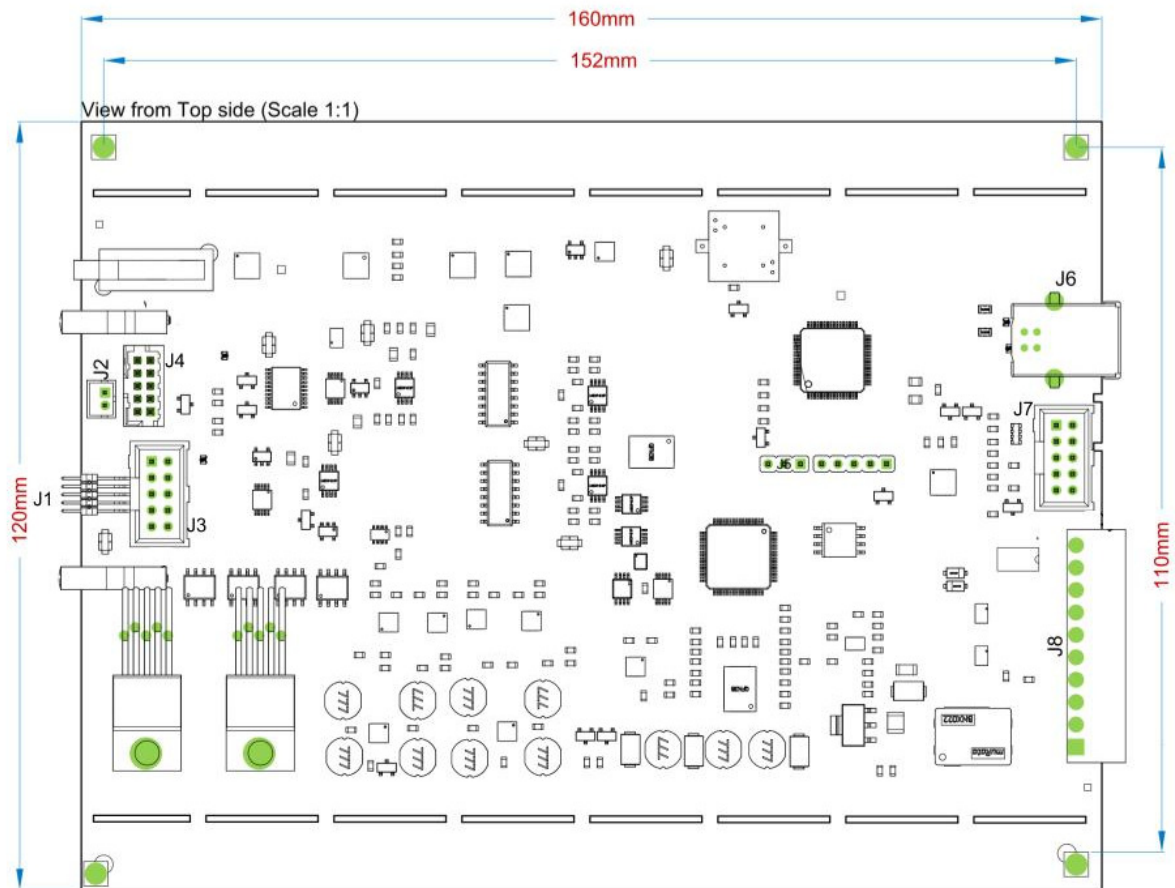
USB Port (J6)

USB port provides direct connection to a PC.

Input/Output Connector (J8)

Eurostyle 3.5mm terminal block – 10 way connector pins provides access to input DC power, analog output, trigger and RS232C serial comms.
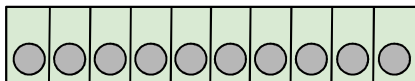
PIN #	SCHEMATIC LABEL	DESCRIPTION
1	IDv-Common	Power common
2	IDv-VP	Input power 12 volts nominal
3	IDv-PMC	External power on/off. Momentary contact closure ONLY
4	ANAVOUT 1 POS	Headstage analog output.

5	ANAVOUT NEG	Analog ground
6	ANAVOUT 2 POS	Conditioned analog output for channel 2
7	TRIG	Trigger input
8	COM	Logic common
9	TXD-232	RS232C transmit data
10	RXD-232	RS232C receive data

Trigger Input (J8-7): A trigger input, generated by the third-party instrument, is used to start an ER815-OEM run. TTL active low-level signal. This requires a special trigger cable.

Analog Output: An analog output in the range 0 to +5 volts, corresponding to the output of the detector headstage, is provided on the J8 terminal block. The output can either be raw analog output as generated by the headstage (pin 4), or a scaled output as generated by the internal DAC.

Power (J8-3): Note: The IDv-PMC signal requires a contact closure to allow remote power supply on/off control. Do not connect any voltage to this pin. It could damage the CPU. To operate, apply a momentary contact closure.

USB Connector J6 (USB Type B - 4 Way)

This provides access to a USB serial control port. If the unit is connected to the RS232 port on J8, the USB port will be disabled.

Headstage Connector J3 (0.1 in pitch 10 Way 5 x 2)

The C4D headstage can be connected to either connector J3 or J1. The J3 connector provides access to a C4D headstage via a flat cable and DB9 connector.
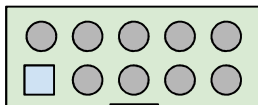
PIN #	SCHEMATIC LABEL	DESCRIPTION
1	SDA	I2C data to headstage
2	SCL	I2C clock to headstage
3	N5V	Negative 5V
4	SGND	Analog Ground
5	P5V	Positive 5V
6	EXOUTN	Excitation positive out
7	FPGAIN	Headstage gain select
8	KSIG	K Signal
9	EXOUTP	Excitation negative out
10	Not connected	LED grounded internally

Headstage Connector J1 (SAMTEC FTSH -10 hWay Flat cable)

This provides access to an alternative direct connection to a C4D headstage via a FTSH flat cable.
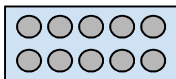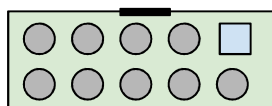
PIN #	SCHEMATIC LABEL	DESCRIPTION
1	SDA	I2C data to headstage
2	SCL	I2C clock to headstage
7	N5V	Negative 5V
5	SGND	Analog Ground
8	P5V	Positive 5V
9	EXOUTN	Excitation positive out
3	FPGAIN	Headstage gain select
6	KSIG	K Signal
10	EXOUTP	Excitation negative out
4	LED	LED common

Channel 2 Analog Input Connectors J4 and J2 (Mill -5 x 2 x2 mm - 10 Way)

The J4 connector provides access to a GP differential input or an eDAQ isoPod (e-corder isoPod EPxxx). This can be used to connect another detector or sensor to CH2. An alternative analog input connection can be via J2 (2 x 0.1 inch) connector. Pin 1 = Analog IN, Pin 2 = COM.

CH2 can accept the output from a direct external analog input in the range 0-5 volts.

PIN #	SCHEMATIC LABEL	DESCRIPTION
1	POD-NEG in	General Purpose analog DIFF. Negative input
2	Signal Input-Common	Signal Common
3	POD-POS in	General Purpose analog DIFF or SE Positive input
4	Signal Input-Common	Signal Common
5	5V NEG	Input power negative 5V
6	SDA	Logic SDA
7	SGND	Signal Common
8	SCL	Logic SOLAR CELL
9	5V POS	Input power positive 5V
10	GND	Logic Common

I2C Bus Port Connector J4 (Milligrid 5 x 2 x 2 mm - 10 Way) NOT NORMALLY FITTED

This port is not normally fitted. It provides an I2C connection to an e-corder. In this mode, the ER815-OEM operates as a front-end amplifier to an e-corder. It also provides an alternative trigger input on pin 1.

LED Indicators

Five LED indicators are provided to signal internal conditions.
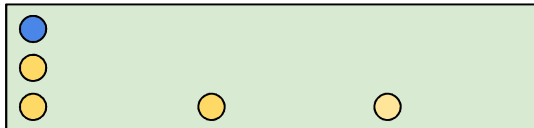
Specifications

General

Input channels	CH 1 C4D detector input
	CH 2 Auxiliary analog input from a second detector or eDAQ isoPod
ADC	2 differential channels, 24 bit resolution
ADC output rate	Max 1000 samples per second per channel
ADC range FS	±5 V
ADC offset	< 100 µV
Output Channels	CH 1 Delta K output. +/-5.000mV FS. Other ranges available to suit application
	CH 2 Auxiliary output. +/-10 volt FS. Other ranges available to suit application
USB	USB 2 with virtual serial channel implemented. Scalable output range with Cal command
I²C	Standard I²C DB 9 connector for connection to an e-corder.
Serial Port	Optional internal RS232C implemented
Displays	Power LED. Blue = Power ON.
	Status LED. Green = On-line. Amber = sampling.
	CH 1/ CH 2 LED: Steady = Connected. Blinking = Over Range
Power requirements	12 V nominal DC (+9 V to +26V range @ 10 W)
Dimensions	160 x 120 x 160mm (2.6 x 7.9 x 9.8 inches)
Weight	120g
Operating temperature range	0 – 45˚C

Channel 1 C4D Detector

Input Connector	J1 and J3
Output Driver Single Ended	20 V Peak to peak sine wave (100% range) 10 mA max.
Output Driver Differential	40 V Peak to peak effective (100% range) 10 mA max.
Excitation Frequency	10 kHz to 2000 kHz
Adjustable excitation range	5% to 100% 0f Full scale
PGA Amplifier	Programmable Gain amplifier. x1, x10, x100, software selectable
Input range	±5 V
Offset range	±5 V
Drift RTI	2 µV + (6/Gain) µV/°C
Noise	<5 µV RMS measured with 50 Ohm input at Gain = 100 and 10 Hz filter
Frequency response	0 to 1000 Hz
Filters	Selectable: No filter (1000 Hz) , 10 Hz and 1 Hz Low pass 3 pole Bessel

Channel 2 External Analog Input

PGA Amplifier	Programmable Gain amplifier. x1, x10, x100, software selectable
Input mode	Single ended or differential – software selectable
Input range	±10 V
Offset range	±10 V
Drift RTI	2 µV + (6/Gain) µV/°C
Noise	<5 µV RMS measured with 50 Ohm input at Gain = 100 and 10 Hz filter
Frequency response	0 to 1000 Hz
Filters	Selectable: No filter (1000 Hz) , 10 Hz and 1 Hz Low pass 3 pole Bessel