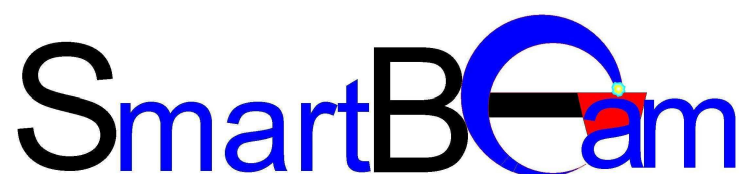


BeamTrek V3.0

Version 1.1 (September 2010)

- Hardware Manual -



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1. Overview

The BeamTrek controller offers an array of interfacing options to the system integrator. This includes many communication standards plus digital and analog inputs and outputs. Each section of the BeamTrek is insulated from each other using 3KV opto-couplers to the main controller. The function of each I/O may be changed if this is required in a custom installation. Please contact us for details, if you have a special requirement.

2. Panel Layout

The designation of each connector is available in the below picture.



Connector description:

- X120** : PLC Connection;
- X111** : PLC / Deposition Controller Input for Auto Emission Set-Point;
- X112** : Slave RS232 Serial port to connect the Controller to a PC / PLC;
- X113** : Master RS232 Serial port to connect the Controller to a slave equipment;
- X115** : Optical Link RX;
- X116** : Optical Link TX;
- X119** : USB Programming port for firmware updates (not recommended for permanent connection to a PLC / PC);
- X114** : Power Supply Interface;
- X118** : Gun Rotation Interface;
- X117** : Magnet Interface (X and Y);
- X101** : Mains input (220V only);
- X100** : Protective Earth Link (M5).

!!! Always install the protective earth link directly to a single common point on the vacuum chamber !!!

The RC connector is located on the front panel. Connect to the Remote Control using supplied shielded patch cable.

The USB and RS232_SLAVE ports can not be used simultaneously. There is no special configuration required to connect any of these to a PC or master PLC and there will be no damage to the unit if both connectors are used at the same time (actually neither of them will command the unit properly).

The X114 connector is designed to connect to Power Supplies from different manufacturers, including our BeamWell FPS (Filament Power Supply) and Warp HVPS (High Voltage Power Supply).

3. Magnet Connector

The part number is “NL4MD”. Consult Neutrik for a suitable plug if you wish to build a custom cable, instead of using the supplied 1-1 cord. An example is the NL4FX plug, supplied with our Magnet FT Cable:

Pin Number	Designation
1+	X Output +
1-	X Output -
2+	Y Output +
2-	Y Output -

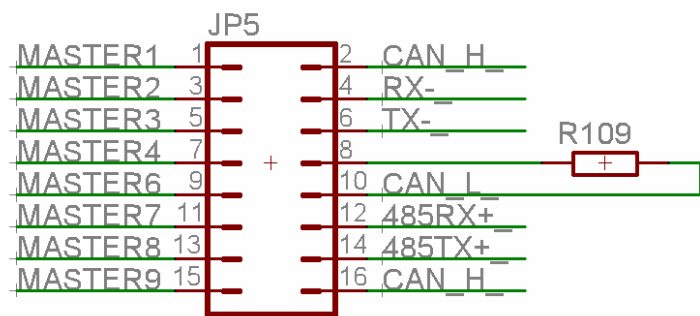
4. Communication

The BeamTrek offers slave RS232, USB, and CAN, as well as master RS232/422/485 (Profibus) interfacing. The slave USB and RS232 use separate connectors. The CAN and master RS232/422/485 (Profibus) are found on the X113 Master connector. The pin-out is available below:

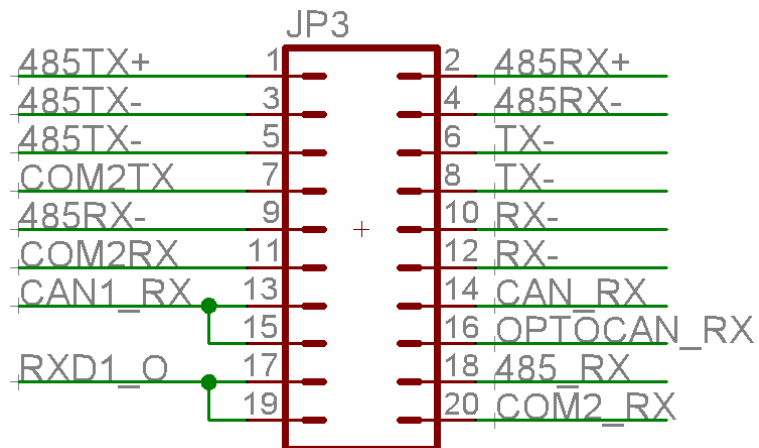
X112 (9SUBD – Socket)	Designation
2	TX Output
3	RX Input
5	GND (connected to PE)

X113 (9SUBD – Socket)	Designation
1	CAN-H
2	RX-
3	TX-
4	CAN-L after 120 Ohm
5	GND (connected to PE)
6	CAN-L
7	485RX+
8	485TX+
9	CAN-H

To use as terminated CAN short pins 1 and 4 and use CAN-H from pin 9 and CAN-L from pin 6.

<p>Only the required signals should be connected in JP5 to allow easy connection (for example to use a standard 1 to 1 cable to interface with a slave RS232 connect only pins 2,3 and 5):</p>	
--	--

To select between various configurations the JP3 Jumper is used:



Configuration for RS232 Master:

JP3									
1	2	3	4	5	6	7	8	9	10
-	-	-	ON	-	ON	-	-	-	ON

Configuration for RS422 Master:

JP3									
1	2	3	4	5	6	7	8	9	10
ON	ON	ON	-	ON	-	-	-	ON	-

Configuration for RS485/Profibus Master:

JP3									
1	2	3	4	5	6	7	8	9	10
-	-	ON	-	ON	-	-	-	ON	-

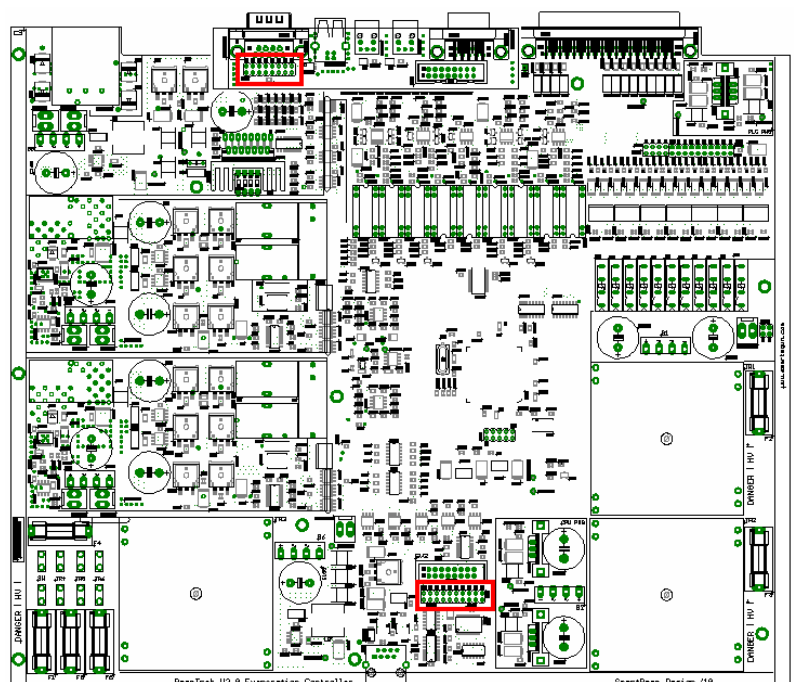
CAN Optical Link Selected

JP3	
7	8
-	ON

CAN Wired Link (X113)
 Selected:

JP3	
7	8
ON	-

To locate the jumpers on the board refer to the picture on the right :



5. OEM / PWS Interface

The detailed circuitry for the OEM input / output section is available below. The connector used is a standard D-SUB 25pin female:

Pin Number	Name	Designation
1	HVPS_RESET	HV PWS Reset Output Relay NO
2	HVPS_ON	HV PWS ON Output Relay NO
3	HVPS_OK	HV PWS OK Input to Optoisolator
4	FIL_OK	FPS Filament OK Input to Optoisolator
5	PLC+12V	Supply to use with the relay common
6	AOUT1	HV U Target Set Point Output (0-10V)
7	AIN3+	HV I Monitoring (0-10V) Positive Input
8	AIN4+	HV U Monitoring (0-10V) Positive Input
9	AOUT4	FPS I Target Output (0-10V)
10	AIN5+	FPS I Monitoring (0-10V) Positive Input
11	FPS_ON	FPS ON Output Relay NO
12	NC	-
13	NC	-
14	GND	Internally connected to PE
15	GND	Internally connected to PE
16	GND	Internally connected to PE
17	GND	Internally connected to PE
18	GND	Internally connected to PE
19	GND	Internally connected to PE
20	AIN3-	HV I Monitoring (0-10V) Negative Input
21	AIN4-	HV U Monitoring (0-10V) Negative Input
22	GND	Internally connected to PE
23	AIN5-	FPS I Monitoring (0-10V) Negative Input
24	OUT4	Relay Output 4 NO
25	OUT5	Relay Output 5 NO

To select the voltage connected to the common of the relays use jumper **JP4**.

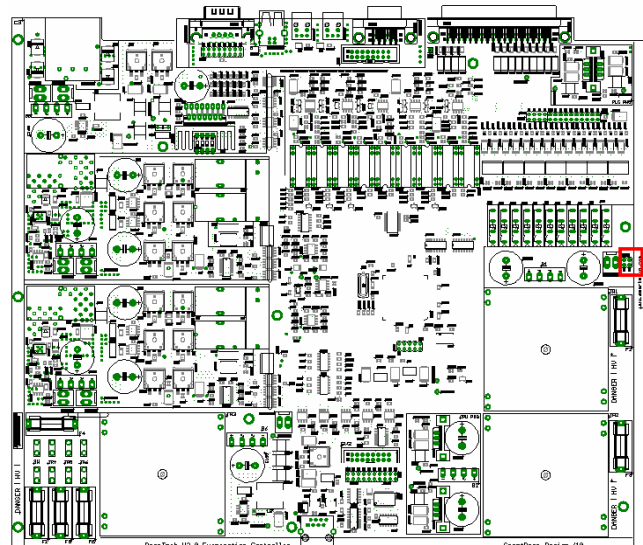
Outputs are 12V active:

JP4	
1	2
-	ON

Outputs are GND active:

JP4	
1	2
ON	-

To locate the JP4 on the board refer to the picture on the right :



Connecting to an “Warp” HVPS

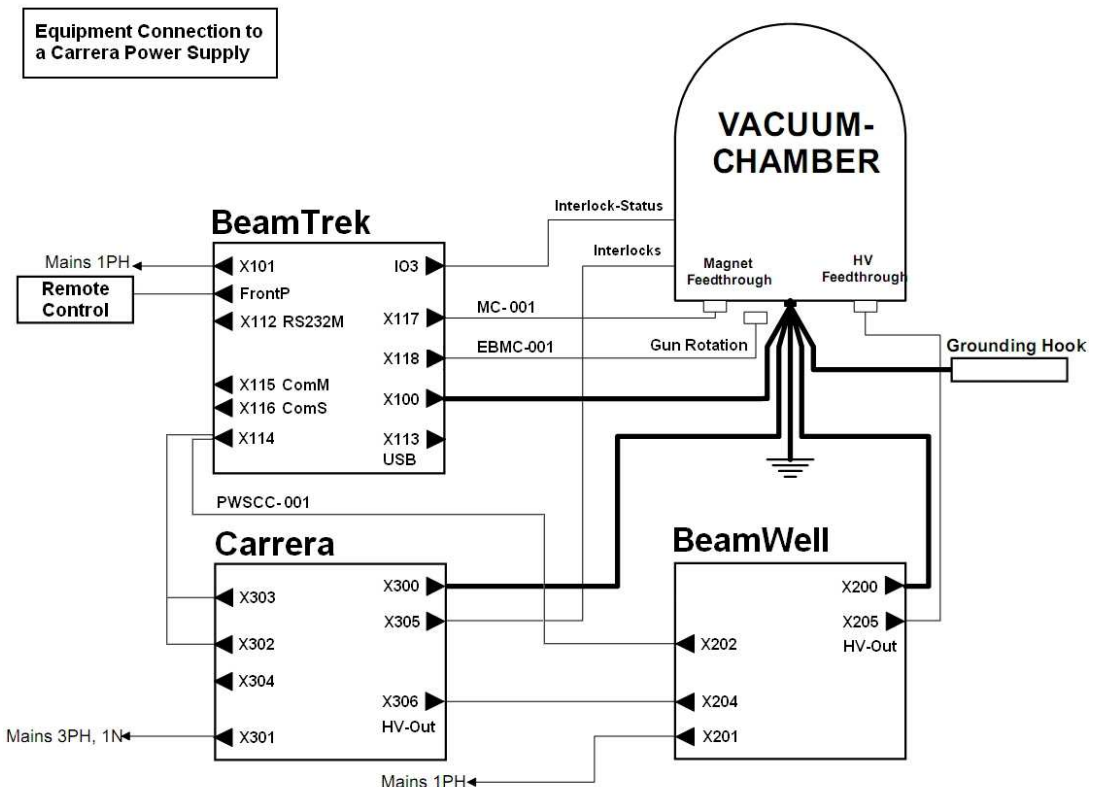
Simply uses a 1 to 1 Male to Male DB25 to DB25, standard cable. This connects between X114 and the Warp Power Supply which also includes a full DC output Filament Power Supply.

5.1. Connecting to a “Carrera” HVPS

Cable description (PN: “PWSCC- 003”):

BeamTrek DB25 Plug	FPS (Cable 1) DB25 Plug	Carrera (Cable 2)		Meaning
		DB9 Plug	DB15 Sock.	
1			3 - grey	HV RST
2			1 - yellow	HV On
6		1 - violet		HV Set Point
8		5 - green		HV Feed-Back
7		7 - blue		EM Feed-Back
18		8 - black		GND
16			2 - black	GND
17			4 - brown	GND
19	3 - blue			GND
11	25 - red			FIL On
4	7 - yellow			Filament OK
9	6 - green			EM Set Point
20+21+22	25 + 20			

Connection Diagram:



6. “PLC” I/O Interface

The PLC Interface groups the **X120** DB37 Female Connector, and the **X111**, BNC, Industry Standard, Auto Emission Input. These are easy to connect and disconnect from the rack, and offer an excellent and compact interface with all the signals in the same place.

The standard function of pins is:

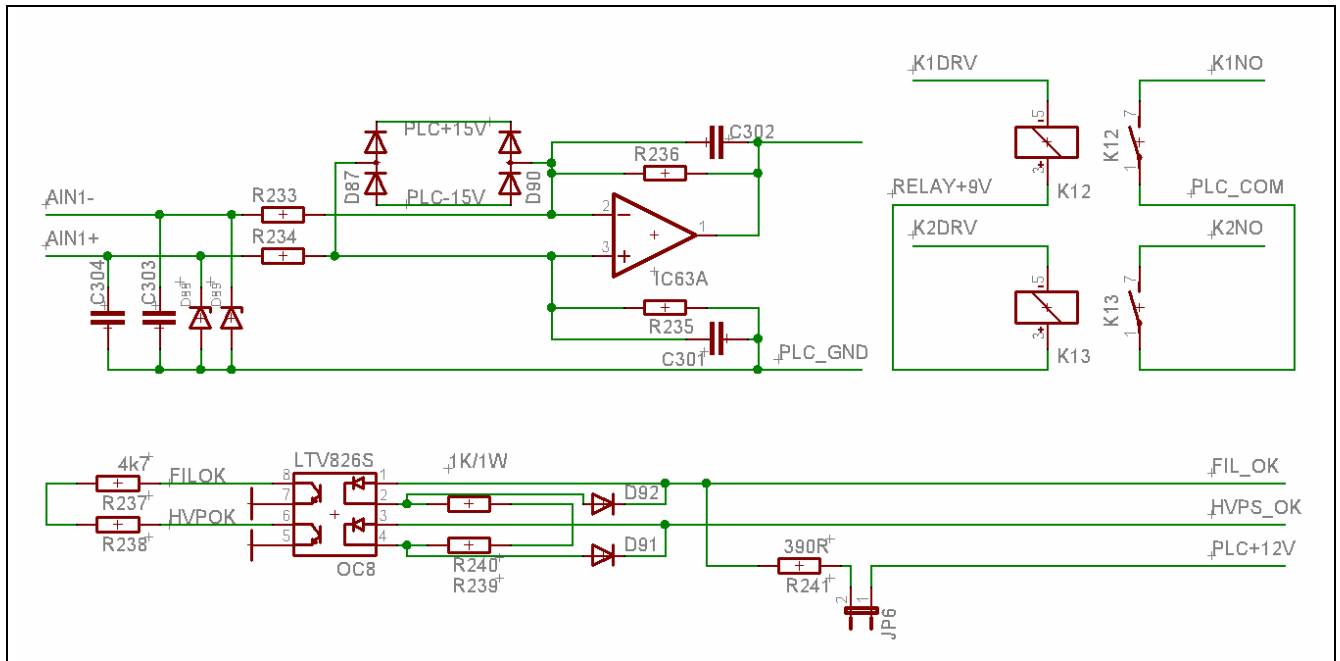
X120	Name	Designation (Yellow = Input, Grey = Output)
1	AIN2+	Filament Current Positive Input (0-10V)
2	AOUT2	HV Monitoring Analog Output (0-10V)
3	AOUT3	Emission Current Monitoring (0-10V)
4	RINT	Rotation Inter-Lock (5-24V) or OC with (JP2-1) installed
5	GINT	General Inter-Lock (determines when is HV On Allowed) – (5-24V) or OC with (JP2-2) installed
6	HVON	HV On request (5-24V) or OC with (JP1-10) installed
7	GUNON	Gun (Filament) On Request (5-24V) or OC with (JP1-9) installed
8	DATASET7	Dataset Bit 7 (5-24V) or OC drive with (JP1-8) installed
9	DATASET6	Dataset Bit 6 (5-24V) or OC drive with (JP1-7) installed
10	DATASET5	Dataset Bit 5 (5-24V) or OC drive with (JP1-6) installed
11	DATASET4	Dataset Bit 4 (5-24V) or OC drive with (JP1-5) installed
12	DATASET3	Dataset Bit 3 (5-24V) or OC drive with (JP1-4) installed
13	DATASET2	Dataset Bit 2 (5-24V) or OC drive with (JP1-3) installed
14	DATASET1	Dataset Bit 1 (5-24V) or OC drive with (JP1-2) installed
15	DATASET0	Dataset Bit 0 (5-24V) or OC drive with (JP1-1) installed
16	GND	Internally Connected to PE
17	GND	Internally Connected to PE
18	RELAY_COM	Relay Common to connect to GND, +12 or External PLC Supply
19	+12V	+12V Power Supply to use for the relay outputs if required
20	AIN2-	Filament Current Negative Input (0-10V)
21	FIL_MON	Filament Current Monitoring (0-10V)
22	GND	Internally Connected to PE
23	GND	Internally Connected to PE
24	GND	Internally Connected to PE
25	GND	Internally Connected to PE
26	GND	Internally Connected to PE
27	GND	Internally Connected to PE
28	GND	Internally Connected to PE
29	GND	Internally Connected to PE
30	GND	Internally Connected to PE
31	K1NO	When Closed :
32	K2NO	When Closed the Controller is Ready:
33	K3NO	When Closed :
34	K4NO	Pocket In Sight Bit 3
35	K5NO	Pocket In Sight Bit 2
36	K6NO	Pocket In Sight Bit 1
37	K7NO	Pocket In Sight Bit 0

The Controller offers also a Filament Current Analog Input for implementing custom procedures like Filament break in, and custom operation.

Both, the Auto Input and Filament Current Input, are easily configurable to support also a negative input voltage (-10V to 0V). This is accomplished by reversing the 2 wires, since the controller uses a fully differential measurement technique:

To fully understand the connection diagrams, a schematic example with each type of the available Inputs / Outputs is provided below:

Important : Never load the relays with more than 1 Amp Peak or Continuous Current !



Operation Example:

Dataset Selection Bits (Binary Mode BCD0)

X120 Pin Number	8	9	10	11	12	13	14	15
Meaning	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT 1	BIT 0
Dataset 1 Selected	0	0	0	0	0	0	0	0
Dataset 2 Selected	0	0	0	0	0	0	0	1
Dataset 3 Selected	0	0	0	0	0	0	1	0
Dataset 4 Selected	0	0	0	0	0	0	1	1
...	-	-	-	-	-	-	-	-
Dataset 64 Selected	0	0	1	1	1	1	1	1

Dataset Selection Bits (Binary Mode BCD1)

X120 Pin Number	8	9	10	11	12	13	14	15
Meaning	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT 1	BIT 0
No action	0	0	0	0	0	0	0	0
Dataset 1 Selected	0	0	0	0	0	0	0	1
Dataset 2 Selected	0	0	0	0	0	0	1	0
Dataset 3 Selected	0	0	0	0	0	0	1	1
...	-	-	-	-	-	-	-	-
Dataset 63 Selected	0	0	1	1	1	1	1	1

Dataset Selection Bits (Linear Mode)

X120 Pin Number	8	9	10	11	12	13	14	15
Meaning	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT 1	BIT 0
No action	0	0	0	0	0	0	0	0
Dataset 1 Selected	0	0	0	0	0	0	0	1
Dataset 2 Selected	0	0	0	0	0	0	1	0
Dataset 3 Selected	0	0	0	0	0	1	0	0
...	-	-	-	-	-	-	-	-
Dataset 7 Selected	0	1	0	0	0	0	0	0
Dataset 8 Selected	1	0	0	0	0	0	0	0

7. Standards and Directives

The BeamTrek® Evaporation Controller Conforms to the following EC Directives and safety standards:

1. Low Voltage Directive (73/23/EEC, 93/68/EEC):

- 1.1. SR EN ISO 12100-1 : Part 1 – Safety of Machinery; principles;
- 1.2. SR EN ISO 12100-2 : Part 2 – Safety of Machinery; principles;
- 1.3. SR EN 60204-1:2000 : Safety of Machinery; Electrical equipment of machinery;

2. EC Directive EMC (89/336/EEC, 91/263/EEC, 92/31/EEC, 93/68/EEC):

- 2.1. SR EN 61000-6-3:2003 : EMC Part 1;
- 2.2. SR EN 61000-6-1:2003 : EMC Part 1.

September 2010,
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