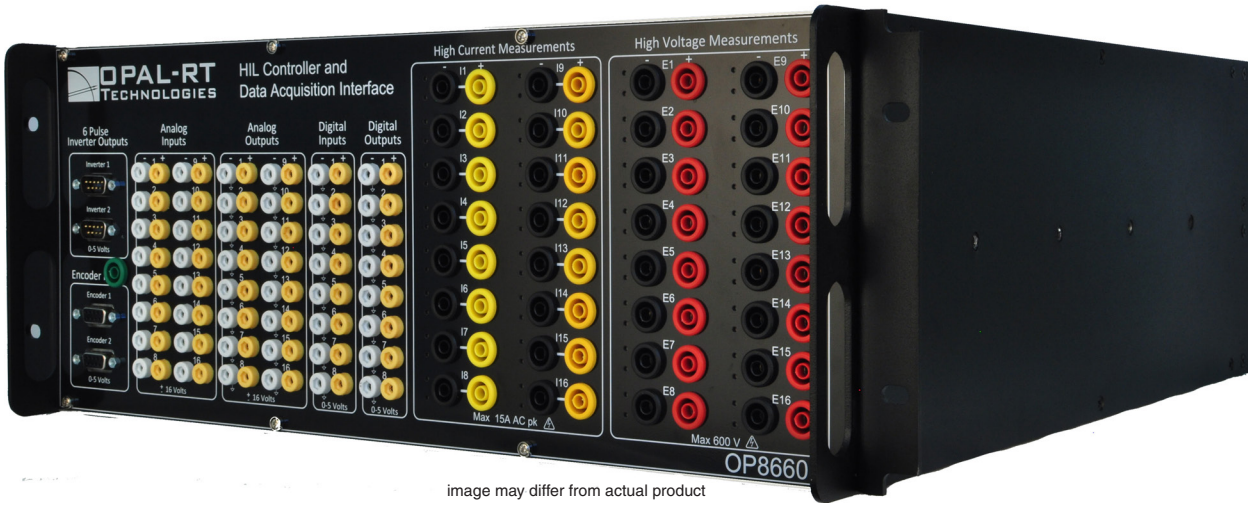

image may differ from actual product

OP8660 HIL Controller User Guide

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www.opal-rt.com

SYMBOL DEFINITIONS

The following table lists the symbols used in this document to denote certain conditions:

Symbol	Definition
	ATTENTION: Identifies information that requires special consideration
	TIP: Identifies advice or hints for the user, often in terms of performing a task
	REFERENCE _ INTERNAL: Identifies an additional source of information within the bookset.
CAUTION	Indicates a situation which, if not avoided, may result in equipment or work (data) on the system being damaged or lost, or may result in the inability to properly operate the process.
	Indicates a situation where users must observe precautions for handling electrostatic sensitive devices.
	CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.
	WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death.

CONTENTS

OP8660 HIL CONTROLLER

RECEIVING AND VERIFICATION

When you receive your shipment, we strongly recommend that you verify the contents of the package(s). After carefully opening the package, remove the equipment and components. Make sure that all the items described below are actually in the box and are undamaged.

STANDARD HARDWARE

The OP8660 HIL Controller includes the following basic hardware:

Item	QTY	Description	Part Number
OP8660 connection box			N/A
Encoder cables	2	DB9 cables for connecting OP8660 to encoder	113-0475
Inverter cables	2	DB9 cables for connecting OP8660 to inverter	113-0466
Encoder cables	1	DB9 to DB9 for connecting OP8660 to LabVolt kit	000-0113-0668
Inverter cables	1	DB9 to DB9 cables for connecting OP8660 to LabVolt kit	000-0113-0698
Lead 4MM 30 YELLOW SAF	14	Banana patch cord	211-0302-0009
Lead 4MM 60 RED SAF	5	Banana patch cord for current probe banana jacks	211-0302-0010
Lead 4MM 90 BLUE SAF	19	Banana patch cord for input/output monitoring	211-0302-0008
2mm Socket to PIn Plug		Banana Patch Cord White	213-0100-0112
2mm Socket to PIn Plug		Banana Patch Cord Yellow	213-0100-0113
Communication Converter	1	Device used to convert RS-232 cable to RS-485	213-0100-0056
Dynamo cable	1	Cable to connect dynamometer to simulator	113-0480
Documentation		Test Report User Documentation CD	N/A

OPAL-RT strongly recommends the use of anti-static wrist straps whenever handling any electronic device provided by OPAL-RT. Damage resulting from electrostatic charges will not be covered by the manufacturers warranty.

INTRODUCTION

The OP8660 is an HIL Controller and data acquisition interface designed to be used with the complete OP5600 simulation system to provide a supplementary signal conditioning. Its core contains four (4) OP5511 high current and high voltage input conditioning modules, which allow conversion of current and voltage to ±10V voltage signals.

It is designed to be used either as a desktop (or shelf top) or as a more traditional rack mount. and uses standard connectors (DB37, DB9 and banana jack) without the need for input/output adaptors and allows quick connections for monitoring.

The rear of the chassis provides the DB37 connectors that link the OP8660 to the OP5600 simulator, while the front provides connectors (banana jack or DB9) for connecting client-side applications such as inverters, encoders, monitoring and measuring devices.

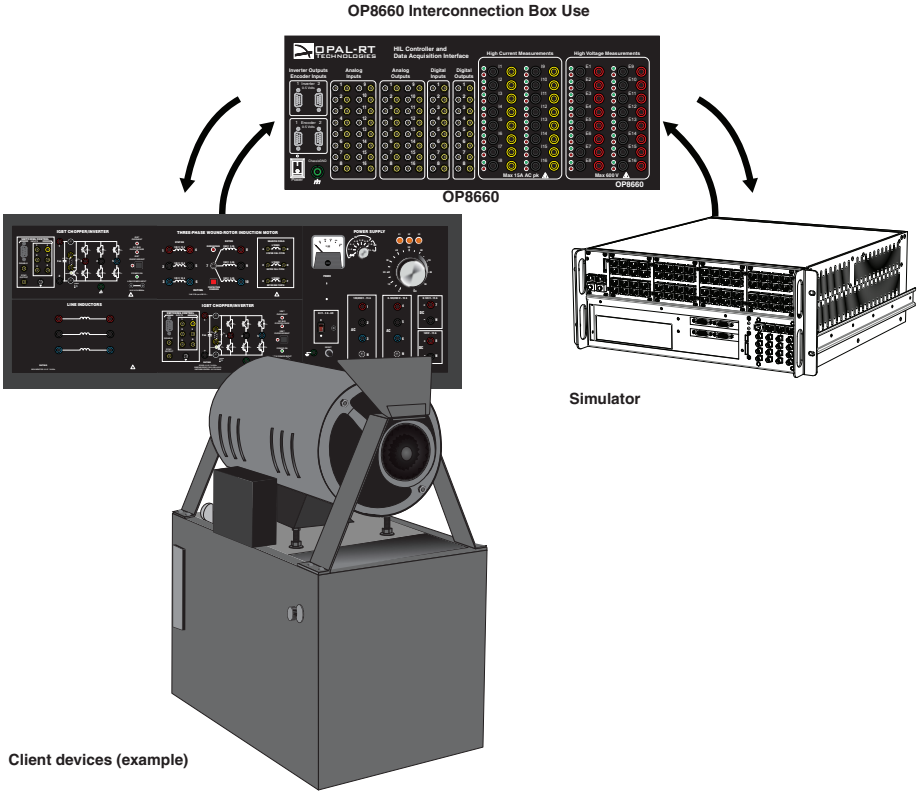


Figure 1: Interconnection box use illustration

By installing the HIL Controller as a link between the unit under test (ECU, motor controller, etc.) and the simulator, you can insert a fault at any point in the test to assess how the unit reacts to the fault.

FEATURES

- DB9 inverter and encoder connectors.
- Banana jack high current and high voltage measurement connectors.
- Banana jack analog input (+/-16V) monitoring connectors
- Banana jack analog output (+/-16V) interface connectors
- Banana jack digital input (0-30V) monitoring connectors
- Banana jack digital output (0-5V) interface connectors
- DB37 connectors for quick connections to the OP5600 HILbox (all DB37 use common pin assignments).

OP8660 FRONT INTERFACE

The interfaces provided on the OP8660 are either banana jacks or DB9. Depending on the simulator and I/Os avaible, some of these connectors may be inactive.

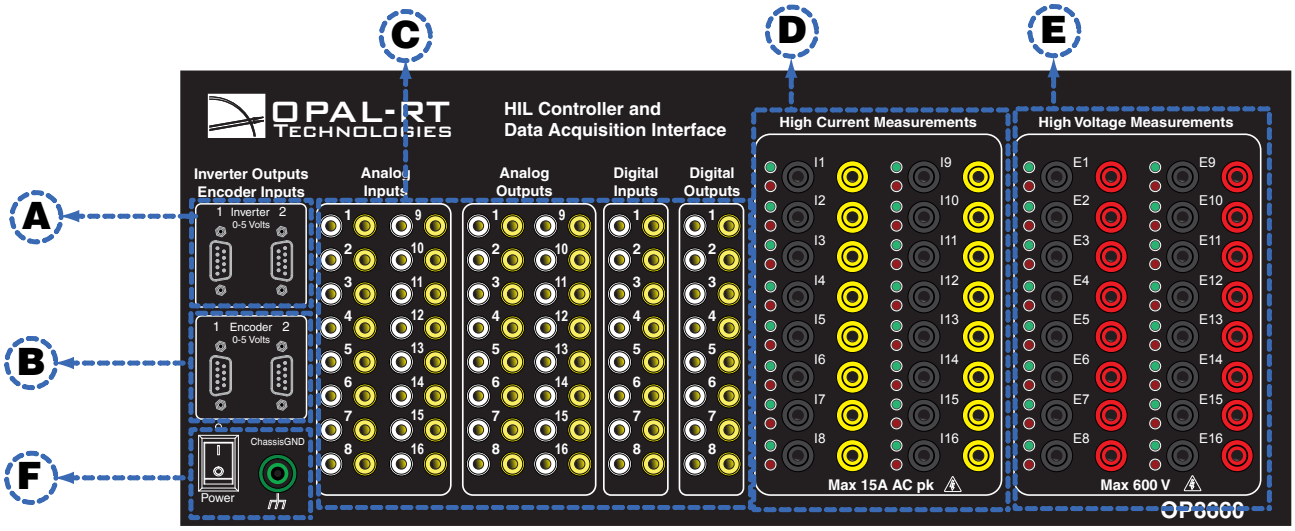


Figure 2: OP8660 front connector panels

A. 6 Pulse Inverter Output DB9 connector used to send control pulses to the motor.
B. Encoder Input connector used to read motor speed and position using differential ABZ encoder signals.
C. Analog and digital input/output monitoring connectors for each channel (16 analog or 8 digital).
D. High current probe connectors (maximum 15 A AC), with red and green LEDs to indicate channel activity.
E. High voltage probe connectors (maximum 600 V), with red and green LEDs to indicate channel activity.
F. Power switch and ground connector.

OP8660 REAR INTERFACE

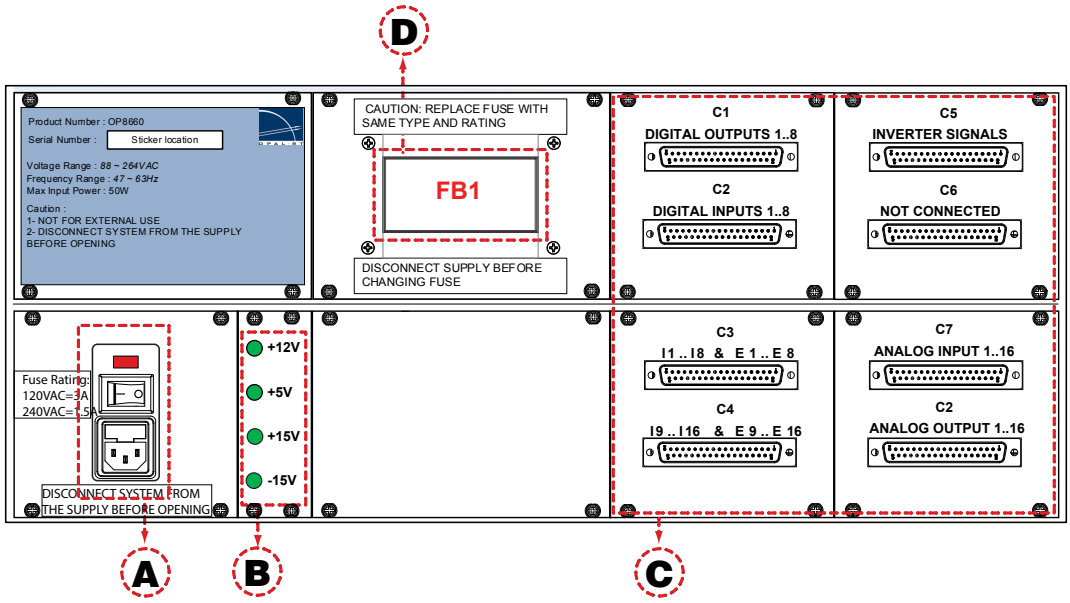


Figure 3: OP8660 rear connector panels

A. Power connection port and switch

B. Main LEDs

LED Label	Description
+12V	indicates DC-DC power supply status. On shows that there is a 12V internally generated voltage.
+5V	indicates inverter power supply. On shows that there is a 5V supply to the inverter
+15V	Current & High Voltage probe power supply. On = Power on
-15V	Current & High Voltage probe power supply. On = Power on

C. DB37F I/O connectors C1 to C8 (see “Pin Assignments” for details).

D. Fusebox.

LABVOLT CABLING INSTRUCTIONS

This diagram shows basic cabling for the OP8660. Actual connections may vary depending on your system.

Hardware Setup - with LabVolt System

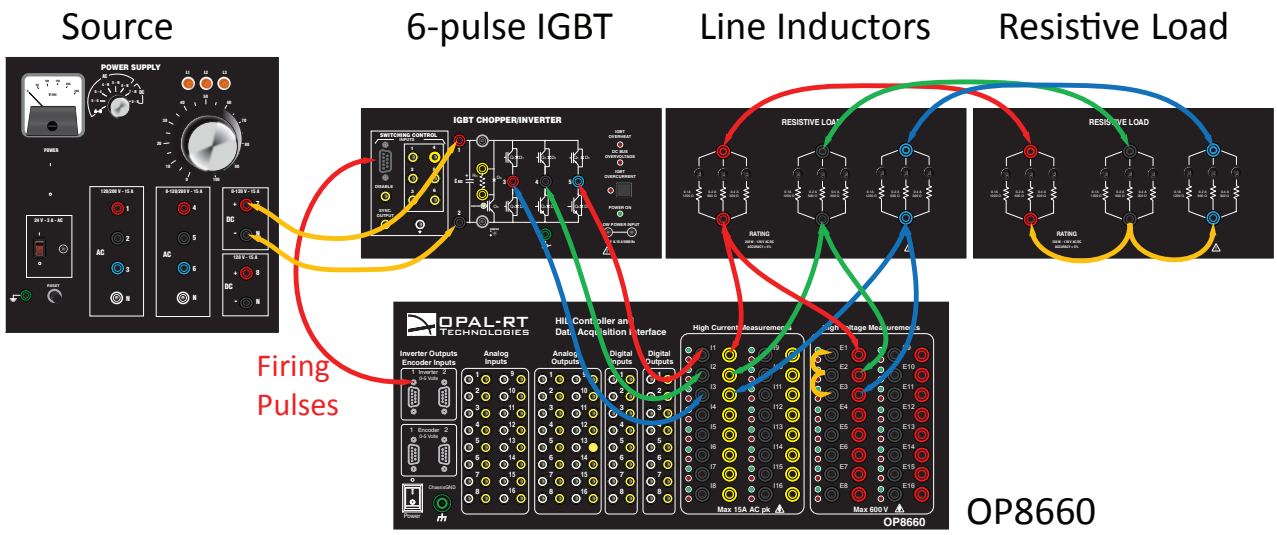


Figure 4: Cabling diagram

GENERAL CABLING INSTRUCTIONS

The following diagram and table illustrate the general cabling instructions for an OP8660 that is connected to thirtd party devices.

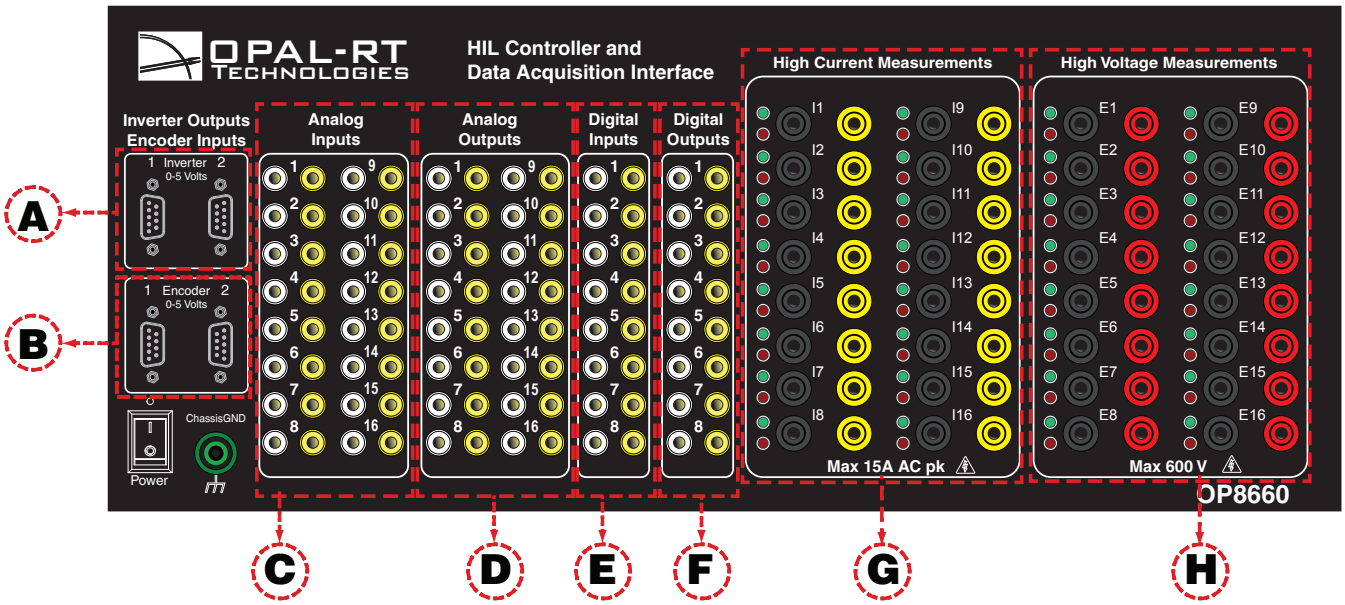


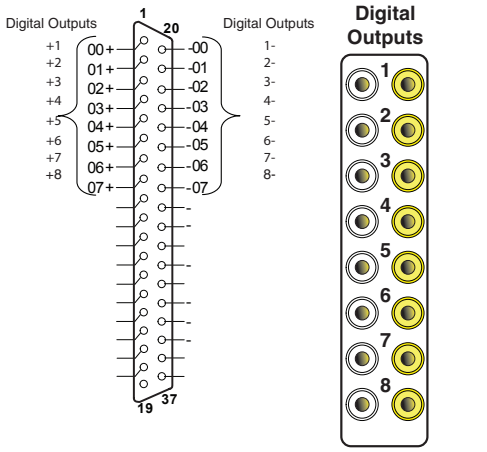
Figure 5: OP8660 connectors

	Connectors	Connector Type	Instructions
A	Inverter 1 and 2 (digital out)	DB9	Use the DB9 cable provided (113-0466) to connect the OP8660 to an ***IGBT drive*** or other device that accepts 0-5 digital pulses
B	Encoder 1 and 2 (differential digital in)	DB9	Use the DB9 cable provided (113-0668) to connect the OP8660 to a ***quadrature encoder*** (Max +/15V)
C	Analog inputs	Mini banana jack (2mm)	Use the cables provided (213-0100-0112, white and 213-0100-0113, yellow) to connect to an ***analog*** device.
D	Analog Outputs	Mini banana jack (2mm)	Use the cables provided (213-0100-0112, white and 213-0100-0113, yellow) to connect to an ***analog*** device.
E	Digital Inputs	Mini banana jack (2mm)	Use the cables provided (213-0100-0112, white and 213-0100-0113, yellow) to connect to a ***digital*** device.
F	Digital Outputs	Mini banana jack (2mm)	Use the cables provided (213-0100-0112, white and 213-0100-0113, yellow) to connect to a ***digital*** device.
G	High Current Measurements	Banana jack (4mm)	Use the cables provided (211-0302-0009, yellow and 211-0302-0008, blue) to read the current on the channel (serial connection)
H	High Voltage Measurements	Banana jack (4mm)	Use the cables provided (211-0302-0009, yellow and 211-0302-0008, blue) to read the voltage on the channel (parallel connection)

PIN ASSIGNMENTS

Note that the 5V Vuser is always provided internally by the OP8660.

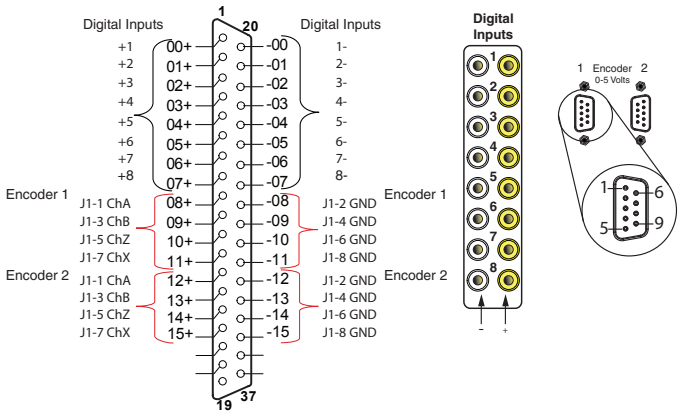
CONNECTOR C1



DB37F (rear) OP8660 (front)

Simulator Signal	DB37F (rear)	OP8660 (front)	Simulator Signal	DB37F (rear)	OP8660 (front)
+DOUT00	1	Digital Outputs 1+	Vuser_RTN	20	Digital Outputs 1-
+DOUT01	2	Digital Outputs 2+	Vuser_RTN	21	Digital Outputs 2-
+DOUT02	3	Digital Outputs 3+	Vuser_RTN	22	Digital Outputs 3-
+DOUT03	4	Digital Outputs 4+	Vuser_RTN	23	Digital Outputs 4-
+DOUT04	5	Digital Outputs 5+	Vuser_RTN	24	Digital Outputs 5-
+DOUT05	6	Digital Outputs 6+	Vuser_RTN	25	Digital Outputs 6-
+DOUT06	7	Digital Outputs 7+	Vuser_RTN	26	Digital Outputs 7-
+DOUT07	8	Digital Outputs 8+	Vuser_RTN	27	Digital Outputs 8-
N/C	9	N/C	N/C	28	N/C
N/C	10	N/C	N/C	29	N/C
N/C	11	N/C	N/C	30	N/C
N/C	12	N/C	N/C	31	N/C
N/C	13	N/C	N/C	32	N/C
N/C	14	N/C	N/C	33	N/C
N/C	15	N/C	N/C	34	N/C
N/C	16	N/C	N/C	35	N/C
N/C	17	N/C	N/C	36	N/C
Digital VRef	18	N/C	Digital VRef_RTN	37	N/C
N/C	19	N/C	N/C		N/C

CONNECTOR C2



DB37F (rear) OP8660 (front DB9F)

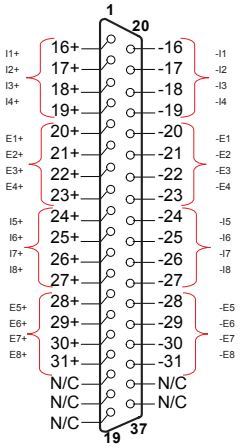
Encoder input: differential digital +/15V from an encoder captor
Encoder output = single ended to simulator Din board

Simulator Signal	DB37F	OP8660 (front)	Simulator Signal	DB37F	OP8660 (front)
+DIN00	1	Digital Inputs 1+	Vuser_RTN	20	Digital Inputs 1-
+DIN01	2	Digital Inputs 2+	Vuser_RTN	21	Digital Inputs 2-
+DIN02	3	Digital Inputs 3+	Vuser_RTN	22	Digital Inputs 3-
+DIN03	4	Digital Inputs 4+	Vuser_RTN	23	Digital Inputs 4-
+DIN04	5	Digital Inputs 5+	Vuser_RTN	24	Digital Inputs 5-
+DIN05	6	Digital Inputs 6+	Vuser_RTN	25	Digital Inputs 6-
+DIN06	7	Digital Inputs 7+	Vuser_RTN	26	Digital Inputs 7-
+DIN07	8	Digital Inputs 8+	Vuser_RTN	27	Digital Inputs 8-
+DIN08	9	Encoder 1 Ch-A	Vuser_RTN	28	GND
+DIN09	10	Encoder 1 Ch-B	Vuser_RTN	29	GND
+DIN10	11	Encoder 1 Ch-Z	Vuser_RTN	30	GND
+DIN11	12	Encoder 1 Ch-X	Vuser_RTN	31	GND
+DIN12	13	Encoder 2 Ch-A	Vuser_RTN	32	GND
+DIN13	14	Encoder 2 Ch-B	Vuser_RTN	33	GND
+DIN14	15	Encoder 2 Ch-Z	Vuser_RTN	34	GND
+DIN15	16	Encoder 2 Ch-X	Vuser_RTN	35	GND
N/C	17	N/C	N/C	36	N/C
N/C	18	N/C	N/C	37	N/C

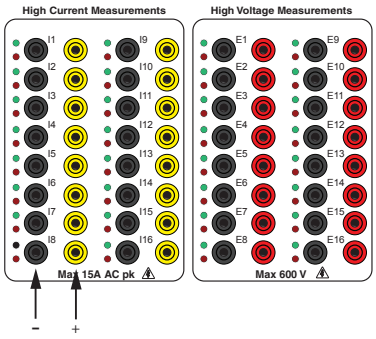
DB9

DB9F	OP8660 (front)	DB9F	OP8660 (front)
1	GND	6	Channel A-
2	Channel X+	7	Channel B-
3	Channel A+	8	Channel Z-
4	Channel B+	9	Channel X-
5	Channel Z+		

CONNECTOR C3



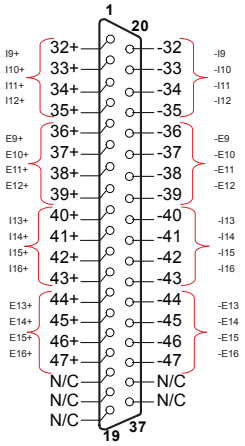
DB37F (rear)



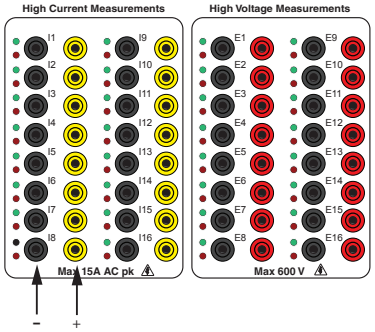
OP8660 (front)

Simulator Signal	DB37F (rear)	OP8660 (front)	Simulator Signal	DB37F (rear)	OP8660 (front)
AIN +CH16	1	I1 +	AIN -CH16	20	I1-
AIN +CH17	2	I2 +	AIN -CH17	21	I2-
AIN +CH18	3	I3 +	AIN -CH18	22	I3-
AIN +CH19	4	I4 +	AIN -CH19	23	I4-
AIN +CH20	5	E1 +	AIN -CH20	24	E1 -
AIN +CH21	6	E2 +	AIN -CH21	25	E2 -
AIN +CH22	7	E3 +	AIN -CH22	26	E3 -
AIN +CH23	8	E4 +	AIN -CH23	27	E4 -
AIN +CH24	9	I5 +	AIN -CH24	28	I5 -
AIN +CH25	10	I6 +	AIN -CH25	29	I6 -
AIN +CH26	11	I7 +	AIN -CH26	30	I7 -
AIN +CH27	12	I8 +	AIN -CH27	31	I8 -
AIN +CH28	13	E5 +	AIN -CH28	32	E5 -
AIN +CH29	14	E6 +	AIN -CH29	33	E6 -
AIN +CH30	15	E7 +	AIN -CH30	34	E7 -
AIN +CH31	16	E8 +	AIN -CH31	35	E8 -
N/C	17	N/C	N/C	36	N/C
N/C	18	N/C	N/C	37	N/C
N/C	19	N/C	N/C		N/C

CONNECTOR C4



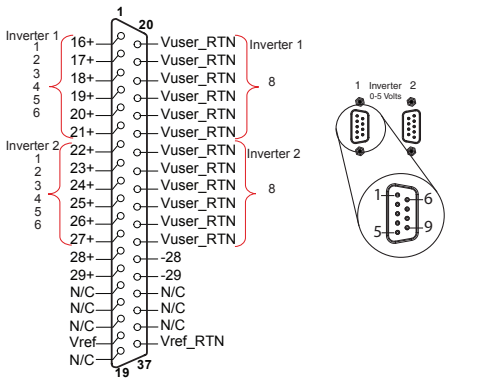
DB37F (rear)



OP8660 (front)

Simulator Signal	DB37F (rear)	OP8660 (front)	Simulator Signal	DB37F (rear)	OP8660 (front)
AIN +CH32	1	I9 +	AIN -CH32	20	I9-
AIN +CH33	2	I10+	AIN -CH33	21	I10-
AIN +CH34	3	I11+	AIN -CH34	22	I11-
AIN +CH35	4	I12+	AIN -CH35	23	I12-
AIN +CH36	5	E9+	AIN -CH36	24	E9-
AIN +CH37	6	E10+	AIN -CH37	25	E10-
AIN +CH38	7	E11+	AIN -CH38	26	E11-
AIN +CH39	8	E12+	AIN -CH39	27	E12-
AIN +CH40	9	I13+	AIN -CH40	28	I13-
AIN +CH41	10	I14+	AIN -CH41	29	I14-
AIN +CH42	11	I15+	AIN -CH42	30	I15-
AIN +CH43	12	I16+	AIN -CH43	31	I16-
AIN +CH44	13	E13+	AIN -CH44	32	E13-
AIN +CH45	14	E14+	AIN -CH45	33	E14-
AIN +CH46	15	E15+	AIN -CH46	34	E15-
AIN +CH47	16	E16+	AIN -CH47	35	E16-
N/C	17	N/C	N/C	36	N/C
N/C	18	N/C	N/C	37	N/C
N/C	19	N/C	N/C		

CONNECTOR C5

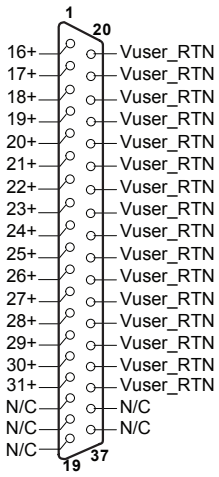


DB37F (rear) OP8660 (front DB9M)

Inverter Input: simulator Dout 0-5V
Inverter Output = client side 0-5V digital , 50mA Sink/Source

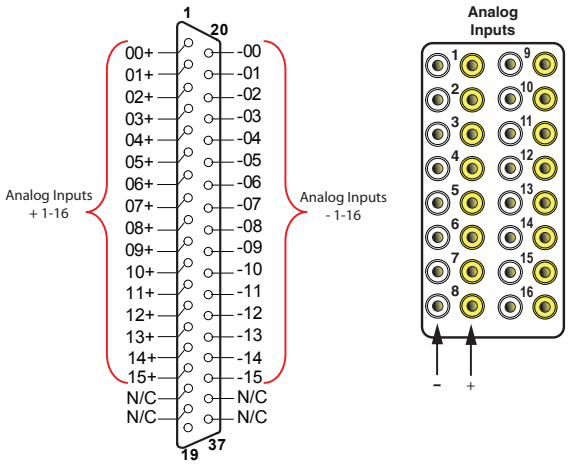
Simulator Signal	DB37F (rear)	OP8660 (front)	Simulator Signal	DB37F (rear)	OP8660 (front)
+DOUT16	1	Inverter 1 DB9M – 1	Vuser_RTN	20	Inverter 1 DB9M – 8
+DOUT17	2	Inverter 1 DB9M – 2	Vuser_RTN	21	Inverter 1 DB9M – 8
+DOUT18	3	Inverter 1 DB9M – 3	Vuser_RTN	22	Inverter 1 DB9M – 8
+DOUT19	4	Inverter 1 DB9M – 4	Vuser_RTN	23	Inverter 1 DB9M – 8
+DOUT20	5	Inverter 1 DB9M – 5	Vuser_RTN	24	Inverter 1 DB9M – 8
+DOUT21	6	Inverter 1 DB9M – 6	Vuser_RTN	25	Inverter 1 DB9M – 8
+DOUT22	7	Inverter 2 DB9M – 1	Vuser_RTN	26	Inverter 2 DB9M – 8
+DOUT23	8	Inverter 2 DB9M – 2	Vuser_RTN	27	Inverter 2 DB9M – 8
+DOUT24	9	Inverter 2 DB9M – 3	Vuser_RTN	28	Inverter 2 DB9M – 8
+DOUT25	10	Inverter 2 DB9M – 4	Vuser_RTN	29	Inverter 2 DB9M – 8
+DOUT26	11	Inverter 2 DB9M – 5	Vuser_RTN	30	Inverter 2 DB9M – 8
+DOUT27	12	Inverter 2 DB9M – 6	Vuser_RTN	31	Inverter 2 DB9M – 8
+DOUT28	13	N/C	N/C	32	N/C
+DOUT29	14	N/C	N/C	33	N/C
N/C	15	N/C	N/C	34	N/C
N/C	16	N/C	N/C	35	N/C
N/C	17	N/C	N/C	36	N/C
Vref	18	N/C	Vuser_RTN	37	N/C
N/C	19	N/C	N/C		N/C

CONNECTOR C6



Simulator Signal	DB37F (rear)	OP8660 (front)	Simulator Signal	DB37F (rear)	OP8660 (front)
DIN +CH16	1	N/C	Vuser_RTN	20	N/C
DIN +CH17	2	N/C	Vuser_RTN	21	N/C
DIN +CH18	3	N/C	Vuser_RTN	22	N/C
DIN +CH19	4	N/C	Vuser_RTN	23	N/C
DIN +CH20	5	N/C	Vuser_RTN	24	N/C
DIN +CH21	6	N/C	Vuser_RTN	25	N/C
DIN +CH22	7	N/C	Vuser_RTN	26	N/C
DIN +CH23	8	N/C	Vuser_RTN	27	N/C
DIN +CH24	9	N/C	Vuser_RTN	28	N/C
DIN +CH25	10	N/C	Vuser_RTN	29	N/C
DIN +CH26	11	N/C	Vuser_RTN	30	N/C
DIN +CH27	12	N/C	Vuser_RTN	31	N/C
DIN +CH28	13	N/C	Vuser_RTN	32	N/C
DIN +CH29	14	N/C	Vuser_RTN	33	N/C
DIN +CH30	15	N/C	Vuser_RTN	34	N/C
DIN +CH31	16	N/C	Vuser_RTN	35	N/C
N/C	17	N/C	N/C	36	N/C
N/C	18	N/C	Digital VRef_RTN	37	N/C
Digital VRef_RTN	19	N/C			

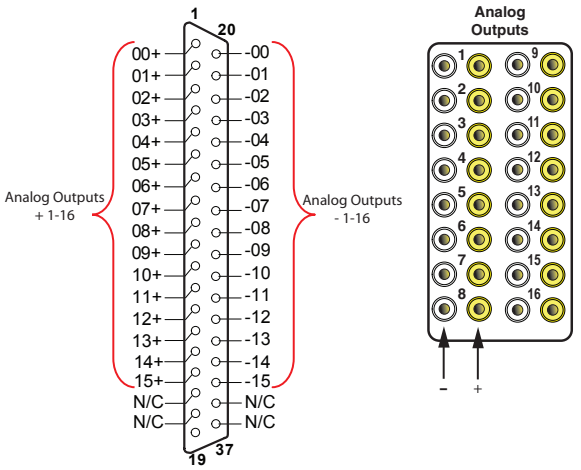
CONNECTOR C7



DB37F (rear) OP8660 (front)

Simulator Signal	DB37F (rear)	OP8660 (front)	Simulator Signal	DB37F (rear)	OP8660 (front)
+AIN00	1	Analog Inputs 1+	-AIN00	20	Analog Inputs 1-
+AIN01	2	Analog Inputs 2+	-AIN01	21	Analog Inputs 2-
+AIN02	3	Analog Inputs 3+	-AIN02	22	Analog Inputs 3-
+AIN03	4	Analog Inputs 4+	-AIN03	23	Analog Inputs 4-
+AIN04	5	Analog Inputs 5+	-AIN04	24	Analog Inputs 5-
+AIN05	6	Analog Inputs 6+	-AIN05	25	Analog Inputs 6-
+AIN06	7	Analog Inputs 7+	-AIN06	26	Analog Inputs 7-
+AIN07	8	Analog Inputs 8+	-AIN07	27	Analog Inputs 8-
+AIN08	9	Analog Inputs 9+	-AIN08	28	Analog Inputs 9-
+AIN09	10	Analog Inputs 10+	-AIN09	29	Analog Inputs 10-
+AIN10	11	Analog Inputs 11+	-AIN10	30	Analog Inputs 11-
+AIN11	12	Analog Inputs 12+	-AIN11	31	Analog Inputs 12-
+AIN12	13	Analog Inputs 13+	-AIN12	32	Analog Inputs 13-
+AIN13	14	Analog Inputs 14+	-AIN13	33	Analog Inputs 14-
+AIN14	15	Analog Inputs 15+	-AIN14	34	Analog Inputs 15-
+AIN15	16	Analog Inputs 16+	-AIN15	35	Analog Inputs 16-
N/C	17	N/C	N/C	36	N/C
N/C	18	N/C	N/C	37	N/C
N/C	19	N/C	N/C		N/C

CONNECTOR C8



DB37F (rear) OP8660 (front)

Simulator Signal	DB37F rear)	OP8660 (front)	Simulator Signal	DB37F (rear)	OP8660 (front)
+AOUT00	1	Analog Outputs 1+	-AOUT00	20	Analog Outputs 1-
+AOUT01	2	Analog Outputs 2+	-AOUT01	21	Analog Outputs 2-
+AOUT02	3	Analog Outputs 3+	-AOUT02	22	Analog Outputs 3-
+AOUT03	4	Analog Outputs 4+	-AOUT03	23	Analog Outputs 4-
+AOUT04	5	Analog Outputs 5+	-AOUT04	24	Analog Outputs 5-
+AOUT05	6	Analog Outputs 6+	-AOUT05	25	Analog Outputs 6-
+AOUT06	7	Analog Outputs 7+	-AOUT06	26	Analog Outputs 7-
+AOUT07	8	Analog Outputs 8+	-AOUT07	27	Analog Outputs 8-
+AOUT08	9	Analog Outputs 9+	-AOUT08	28	Analog Outputs 9-
+AOUT09	10	Analog Outputs 10+	-AOUT09	29	Analog Outputs 10-
+AOUT10	11	Analog Outputs 11+	-AOUT10	30	Analog Outputs 11-
+AOUT11	12	Analog Outputs 12+	-AOUT11	31	Analog Outputs 12-
+AOUT12	13	Analog Outputs 13+	-AOUT12	32	Analog Outputs 13-
+AOUT13	14	Analog Outputs 14+	-AOUT13	33	Analog Outputs 14-
+AOUT14	15	Analog Outputs 15+	-AOUT14	34	Analog Outputs 15-
+AOUT15	16	Analog Outputs 16+	-AOUT15	35	Analog Outputs 16-
N/C	17	N/C	N/C	36	N/C
N/C	18	N/C	N/C	37	N/C
N/C	19	N/C	N/C		N/C

GENERAL SPECIFICATIONS

Product name	OP8660 **HIL Controller**
Part number	N/A
Form factor	4 U
Dimensions	13.33 x 48.26 x 30.8cm HxWxD (5.25” x 19” x 12.125”)
I/O connector	DB37F, DB9, banana jacks
Operating temperature	10 to 40 ºC (50 to 104ºF)
Storage temperature	-55 to 85ºC (-67 to 185ºF)
Relative humidity	10 to 90%, non condensing
Maximum altitude	2,000 m (6562 ft.)

SENSOR SPECIFICATIONS

Current Sensor

These are the specifications that apply to the High Current Measurement connectors on the front of the OP8660.

Input range:	15 A (factory default)
Signal output range:	± 10 Volts
Isolation:	Galvanic, 2.5 Kv
Bandwidth:	DC to 100 kHz
Linearity:	< 0.2%
Rise time:	< 2 Microseconds
Power supplies:	±15 Volts

Voltage Sensor

These are the specifications that apply to the High Voltage Measurement connectors on the front of the OP8660.

Input range:	Up to 600 volts
Signal output range:	± 10 Volts
Common mode:	Greater than 200 volts after the resistive divider
Bandwidth:	DC to 100 kHz
Linearity:	< 0.2 % Rise time: < 2 microseconds
Power supplies:	±15 Volts

LIMITED WARRANTY

LIMITED WARRANTY

OPAL-RT Technologies Inc. warrants to the original purchaser and/or ultimate customer (“Purchaser”) of OPAL-RT products (“Product”) that if any part thereof proves to be defective in material or workmanship within one (1) year, such defective part will be repaired or replaced, free of charge, at OPAL-RT Technologies’ discretion, if shipped prepaid to OPAL-RT Technologies Inc. at 1751 Richardson, suite 2525, Montreal, Quebec, Canada, H3K 3G6, in a package equal to or in the original container. The Product will be returned freight prepaid and repaired or replaced if it is determined by OPAL-RT Technologies Inc. that the part failed due to defective materials or workmanship. Otherwise, the fees will be charged to the client (see article “warranty limitation and exclusion”). The repair or replacement of any such defective part shall be OPAL-RT Technologies’ sole and exclusive responsibility and liability under this limited warranty.

Purchaser must request an RMA number before shipping any Product for repair:

1. Access the OPAL-RT website (www.opal-rt.com/support/ return-merchandise-authorization-rma-request), click on support and select Return Merchandise (RMA).
2. Fill out the online form and submit. You will receive a notification with a thread-ID that will be used for further exchange with support.
3. OPAL-RT’s Support department will evaluate the return and either issue an RMA number via email using the same thread-ID.
   - If the Product is returned for repair more than 12 months after purchase, the Purchaser is responsible for the cost of repair. OPAL-RT will assess the repair and prepare a quote. The RMA number will be sent with the quote.
4. Only when the Purchaser receives the RMA number, may they ship the Product, prepaid, to OPAL-RT.

RETURN POLICY

The following fees will apply when customers return products for credit:

A full credit, less a 15% fee and less return fee will only be issued if the product is in perfect working condition and if the product is returned within 1 month following the shipping date. If repairs are required on the returned product, the cost of these repairs will be deducted from the credit to be issued.

No credits will be issued beyond the one month period.

EXCLUSIONS

If third party products are part of the Product, OPAL-RT will honor the original manufacturer’s warranty.

This limited warranty does not cover consumable items, such as batteries, or items subject to wear or periodic replacement, including lamps, fuses or filter elements.

WARRANTY LIMITATION AND EXCLUSION

OPAL-RT Technologies will have no further obligation under this limited warranty. All warranty obligations of OPAL-RT Technologies are void if the Product has been subject to abuse, misuse, negligence, or accident or if the Purchaser fails to perform any of the duties set forth in this limited warranty or if the Product has not been operated in accordance with instructions, or if the Product serial number has been removed or altered.

DISCLAIMER OF UNSTATED WARRANTIES

The warranty printed above is the only warranty applicable to this purchase. All other warranties, express or implied, including, but not limited to, the implied warranties of merchantability or fitness for a particular purpose are hereby disclaimed.

LIMITATION OF LIABILITY

It is understood and agreed that OPAL-RT Technologies' liability, whether in contract, in tort, under any warranty, in negligence or otherwise shall not exceed the amount of the purchase price paid by the purchaser for the product and under no circumstances shall OPAL-RT Technologies be liable for special, indirect, or consequential damages. The price stated for the product is a consideration limiting OPAL-RT Technologies' liability. No action, regardless of form, arising out of the transactions under this warranty may be brought by the purchaser more than one year after the cause of actions has occurred.

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Note:

While every effort has been made to ensure accuracy in this publication, no responsibility can be accepted for errors or omissions. Data may change, as well as legislation, and you are strongly advised to obtain copies of the most recently issued regulations, standards, and guidelines.
This publication is not intended to form the basis of a contract.

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