Canvas 4 - Model 4

24 DC In, 16 DC Out, 2 – 12-bit Analog In

MAN1369_00_EN_CV4_Mod4

Part Numbers: HE-CV-035C-04

User Manual and Add-Ons

Find the documents via the Documentation Search.

Part #	Description
MAN1364	Canvas 4 User Manual
HE-BAT013	CR2032 Lithium Battery
HE-XCK	Programming Cables
HE-XDAC	2 channel Analog Output I/O option kit, selectable 0-10V, +/-10V, 4-20mA.
HE-XDAC107	4 channel Analog Output I/O option kit, selectable 0-10V, +/-10V, 4-20mA.
HE-XKIT	Blank I/O Board
HE200MJ2TRM	Adapter, RJ45 (8P8C) male to 8-position terminal strip.
HE-FBD001	Ferrite core for filtering out electrical noise.

Backup Battery

The Canvas 4 uses a Renata CR2032 lithium battery to run the Real Time Clock. The battery life is 7-10 years.

For more information, see **MAN1364**.

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TECHNICAL SPECIFICATIONS

General Specifications

Required Power (Inrush)	2A for < 1ms @ 24VDC, DC switched
Heater Option* (add a -22 to model #)	Add 250mA with heater* (24VDC)
Primary Power Range	10 - 30VDC; 10 - 24VDC (with heater option*)
Maximum Current	500mA, Class 2; 750mA, Class 2 (with heater option*)
Relative Humidity	5 to 95%, Non-Condensing
Clock Accuracy	± 20 ppm maximum at 25°C (± 1 min/month)
Relative Humidity	5 to 95%, Non-Condensing
Clock Accuracy	± 20 ppm maximum at 25°C (± 1 min/month)
Real Time Clock	Battery Backed, Rechargeable Lithium
Operating Temperature	-10°C to +60°C; -40°C to +60°C (with heater option*)
Storage Temperature	-20°C to +60°C
Weight	12 oz/340g (without I/O)
Altitude	Up to 2000m
Pollution Degree	Degree 2 Rating
Certifications (UL/CE)	North America or Europe
Enclosure Type	1, 3R, 4, 4X, 12, 12K & 13

Backlight

HE-CV-035C-00 (Model 0)	Typical Power Backlight at 100%	239mA @ 10V (2.39W); 106mA @24VDC (2.54W)
	Power Backlight at 50%	81mA @ 24VDC (1.94W)
	Power Backlight Off	79mA @ 24VDC (1.90W)
HE-CV-035C-02 (Model 2)	Typical Power Backlight at 100%	351mA @ 10VDC (3.51W); 163mA @ 24VDC (3.912W)
	Power Backlight at 50%	138mA @ 24VDC (3.31W)
	Power Backlight Off	136mA @24VDC (3.26W)
HE-CV-035C-03 (Model 3)	Typical Power Backlight at 100%	248mA @10VDC (2.48W); 158mA @24VDC (3.792W)
	Power Backlight at 50%	133mA @24VDC (3.19W)
	Power Backlight Off	131mA @24VDC (3.14W)
HE-CV-035C-04 (Model 4)	Typical Power Backlight at 100%	257mA @10VDC (2.57W); 174mA @24VDC (4.176W)
	Power Backlight at 50%	149mA @ 24VDC (3.58W)
	Power Backlight Off	147mA@24VDC (3.53W)
HE-CV-035C-05 (Model 5)	Typical Power Backlight at 100%	423mA@10VDC(4.23W); 224mA @24VDC (5.376W)
	Power Backlight at 50%	199mA @24VDC (4.78W)
	Power Backlight Off	197mA@24VDC (4.73W)
HE-CV-035C-06 (Model 6)	Typical Power Backlight at 100%	407mA @ 10VDC (4.07W); 192mA @24 VDC (4.608W)
	Power Backlight at 50%	167mA @24VDC (4.01W)
	Power Backlight Off	165mA @ 24VDC (3.96W)

Control and Logic

Control Language Support	Register-Based Advanced Ladder Logic; Variable-Based Advanced Ladder; IEC 61131-3 Languages
Logic Program Size	2MB, maximum
Scan Rate	0.02 ms/kB
Digital Inputs	2048
Digital Outputs	2048
Analog Inputs	512
Analog Outputs	512
General Purpose Registers	50,000 (words) Retentive 16,384 (bits) Retentive 16,384 (bits) Non-retentive

User Interface

Display Type	3.5” TFT Color
Screen Brightness	640cd/m² (nits)
Resolution	QVGA (320 x 240)
Color	16-bit (65,535)
User-Program. Screens	1023 max pages; 1023 objects per page
Backlight	LED - 50,000 hour life
Brightness Control	0-100% via System Register %SR57
Number of Keys	5

Connectivity

Serial Ports	1 RS-232 and 1 RS-485 on singular Modular Jack
USB mini-B	USB 2.0 (480Mbps) Programming & Data Access
USB A (500mA max)	USB 2.0 (480Mbps) for USB flash drives (2TB)
CAN Port Isolated 1kV	Remote I/O, Peer-to-peer Comms, Cscape
CAN Protocols	CsCAN, CANopen, DeviceNet, J1939
Ethernet	10/100 Mb (Auto-MDX)
Ethernet Protocols	TCP/IP, Modbus TCP, FTP, SMTP, EGD, ICMP, ASCII
Remote I/O	OCS-I/O
Removable Memory	microSD, SDHC, SDXC (in FAT32 format), support for 32GB maximum. Application Updates, Datalogging

USB Webcams

USB Webcams supported should support the UVC (USB Video class) protocol for the OCS to be able to display video. Most USB based video devices support this today. Special feature such as zoom and high definition are not supported by the OCS.

CONTROLLER OVERVIEW

Overview of OCS

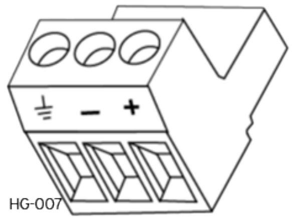
1. Touchscreen
2. Function Keys
3. High Capacity microSD Slot
4. DIP Switches
5. USB Mini-B Port
6. Wide-Range DC Power
7. CAN Port
8. Ethernet LAN Port
9. USB A Port
10. RS-232/RS-485 Serial Port

NOTE: See "Precautions" on page 19 about USB and grounding.

HG-745

Power Wiring

NOTE: The Primary Power Range is 10VDC to 30VDC.



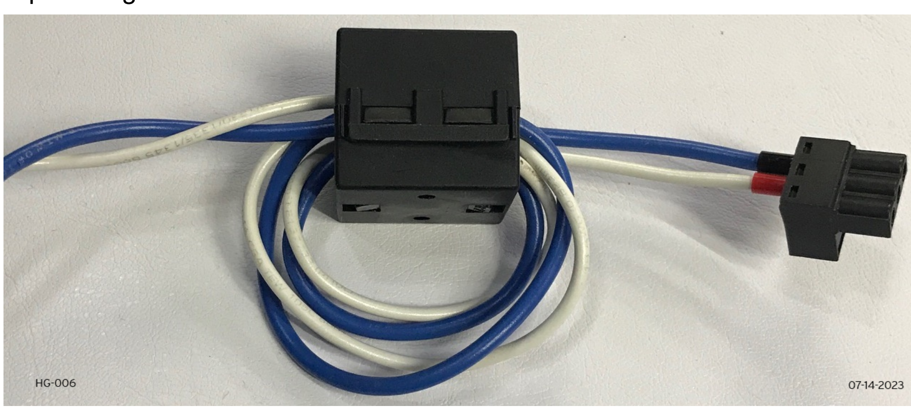
Primary Power Port Pins		
PIN	**Signal**	**Description**
1	Ground	Frame Ground
2	DC-	Input Power Supply Ground
3	DC+	Input Power Supply Voltage

DC Input/Frame

- Solid/Stranded Wire: 12-24 AWG (2.5-0.2mm²)
- Strip length: 0.28" (7mm)
- Torque, Terminal Hold-Down Screws: 4.5 – 7 in•lbs (0.50 – 0.78 N•m)
- DC- is internally connected to I/O V-, but is isolated from CAN V-. A Class 2 power supply must be used.

Power UP

1. **OPTION**: Attach ferrite core with a minimum of two turns of the DC+ and DC- signals from the DC supply that is powering the controllers.



2. Connect to earth ground.
3. Apply recommended power.

MODEL 4 SPECIFICATIONS

Digital DC Input

Inputs per Module	24 Including 4 Configurable HSC Inputs	
Commons per Module	1	
Input Voltage Range	12VDC/24VDC	
Absolute Maximum Voltage	30VDC Max.	
Input Impedance	10kΩ	
Input Current	Positive Logic	Negative Logic
Upper Threshold Lower Threshold	0.8mA 0.3mA	-1.6mA -2.1mA
Maximum Upper Threshold	8VDC	
Minimum Lower Threshold	3VDC	
OFF to ON Response	1ms	
ON to OFF Response	1ms	
High Speed Counter Maximum Frequency	1MHz (Quadrature Frequency 500kHz)	

Digital DC Outputs

Outputs per Module	16 Including 2 Configurable PWM Outputs
Commons per Module	1
Output Type	Sourcing/10kΩ Pull- Down
Output Frequency	10kHz (up to 500kHz when using the HE-XHSQ add-on module)
Absolute Maximum Voltage	28VDC
Output Protection	Short Circuit
Maximum Output Current/Point	0.5A
Maximum Total Current	4A Continuous
Maximum Output Supply Voltage	30VDC
Minimum Output Supply Voltage	10VDC
Maximum Voltage Drop at Rated Current	0.25VDC
Maximum Inrush Current	650mA per Channel
Minimum Load	None
OFF to ON Response	1ms
ON to OFF Response	1ms
Output Characteristics	Current Sourcing (Positive Logic)
Rise Time	50 - 115μs
Fall Time	8-20μs

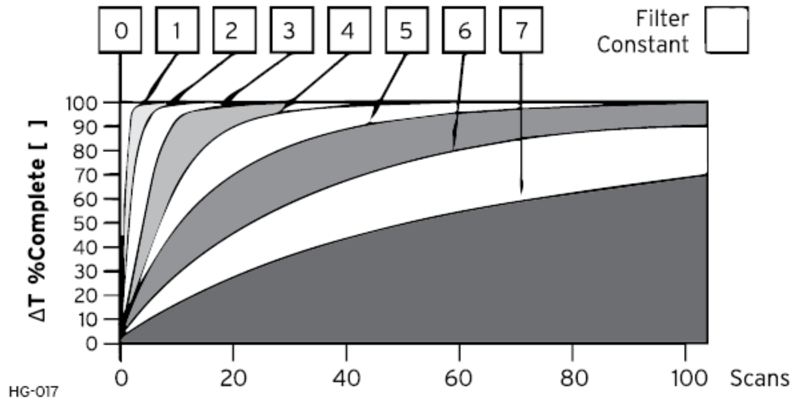
Analog Inputs

Number of Channels	2
Input Ranges	0 – 10VDC; 0 – 20mA; 4 – 20mA
Safe Input Range	-0.5V to +12V
Input Impedance (Clamped @ -0.5VDC to 12VDC)	Current Mode: 100Ω Voltage Mode: 500kΩ
Nominal Resolution	12 Bits
%AI full scale	10V, 20mA: 32,000 counts full scale
Maximum Over-Current	35mA
Conversion Speed	All channels converted once per ladder scan
Maximum Error @ 25°C (excluding zero)	4-20mA 1.00% 0-20mA 1.00% 0-10VDC 0.50%
Filtering	160Hz hash (noise) filter 1-128 scan digital running average filter

WIRING: INPUTS AND OUTPUTS

Analog Inputs Information

Raw input values for channels 1-4 are found in the registers as Integer- type data with a range from 0 – 32000. Analog inputs may be filtered digitally with the Filter Constant found in the Cscape Hardware Configuration for Analog Inputs. Valid filter values are 0-7 and act according to the following chart:

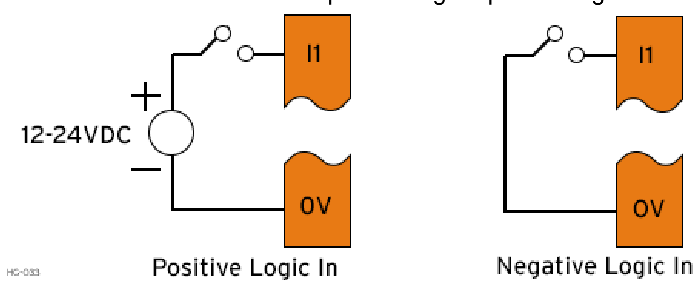


Data Values	
Input Mode:	Data Format, 12-bit INT:
0-20mA, 4-20mA	0-32000
0-10V	0-32000

Digital Inputs Information

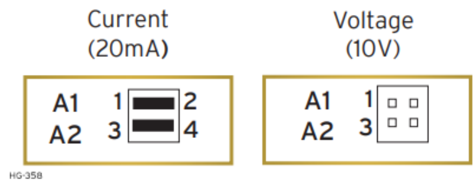
Positive Logic vs. Negative Logic

The OCS can be wired for positive logic inputs or negative



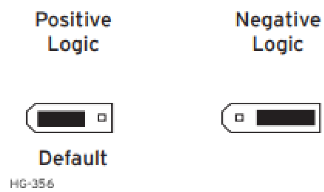
Digital inputs may be wired in either a Positive Logic or Negative Logic fashion as shown. The setting in the Cscape Hardware Configuration for the Digital Inputs must match the wiring used in order for the correct input states to be registered. When used as a normal input and not for high speed functions, the state of the input is reflected in registers %I1 – %I12.

Jumper Settings for Model 4

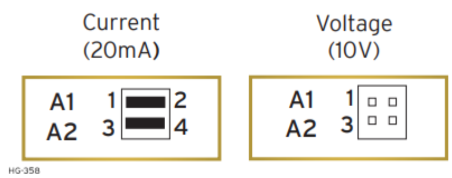


Location of I/O jumpers (JP1 & JP3) and wiring connectors (J1, J2, J3 & J4) with back cover removed.

JP1 Digital DC Inputs



JP3 Analog In



NOTE: The Cscape Module Configuration must match the selected I/O (JP) jumper settings.

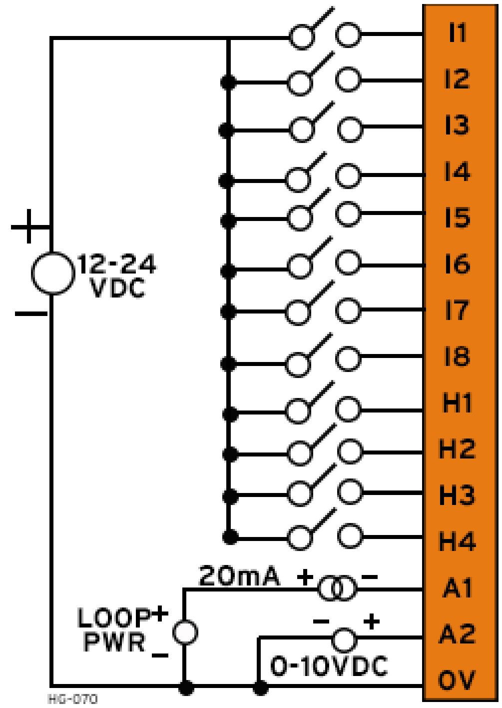
NOTE: When using JP3 (A1-A2), each channel can be independently configured.

Screw Torque for Reattaching Back Cover After I/O Jumper Update

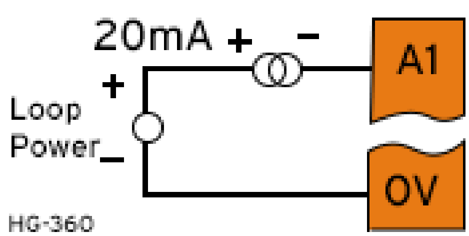
XLE/XLT, XL4/XL4 Prime, EXL6/XL6 Prime, Canvas 4	3.0 - 4.0 in•lbs (0.34 - 0.45 N•m)
EXLW/ XLW Prime, XL7/XL7 Prime, EXL10/XL10 Prime, Canvas 7, Canvas 7D, Canvas 10D	3.0 - 3.5 in•lbs (0.34 - 0.40 N•m)

J1 (Orange) Wiring - Digital In/Analog In

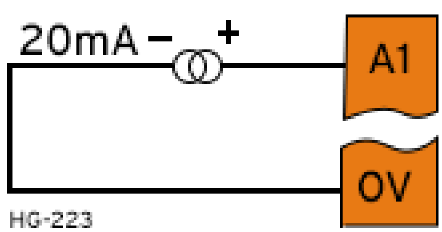
Pin	Signal Name
I1 (%I1)	Digital In 1
I2 (%I2)	Digital In 2
I3 (%I3)	Digital In 3
I4 (%I4)	Digital In 4
I5 (%I5)	Digital In 5
I6 (%I6)	Digital In 6
I7 (%I7)	Digital In 7
I8 (%I8)	Digital In 8
H1 (%I9)	HSC1/Digital In. 9
H2 (%I10)	HSC1/Digital In. 10
H3 (%I11)	HSC1/Digital In. 11
H4 (%I12)	HSC1/Digital In. 12
A1 (%AI1)	Analog In 1
A2 (%AI2)	Analog In 2
OV	Common



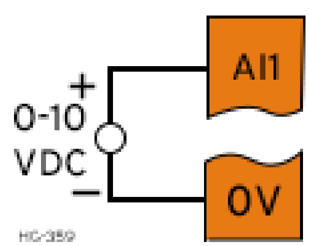
20mA Analog In - Not Self-Powered



20mA Analog In - Self-Powered

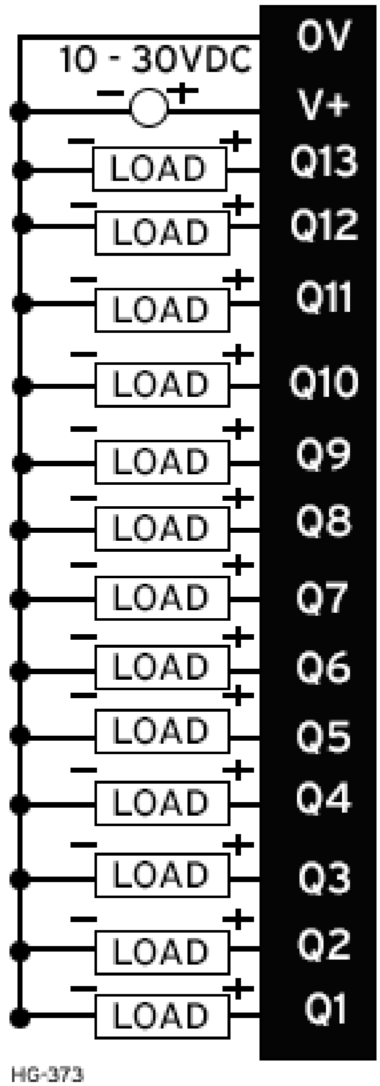


0-10VDC IN



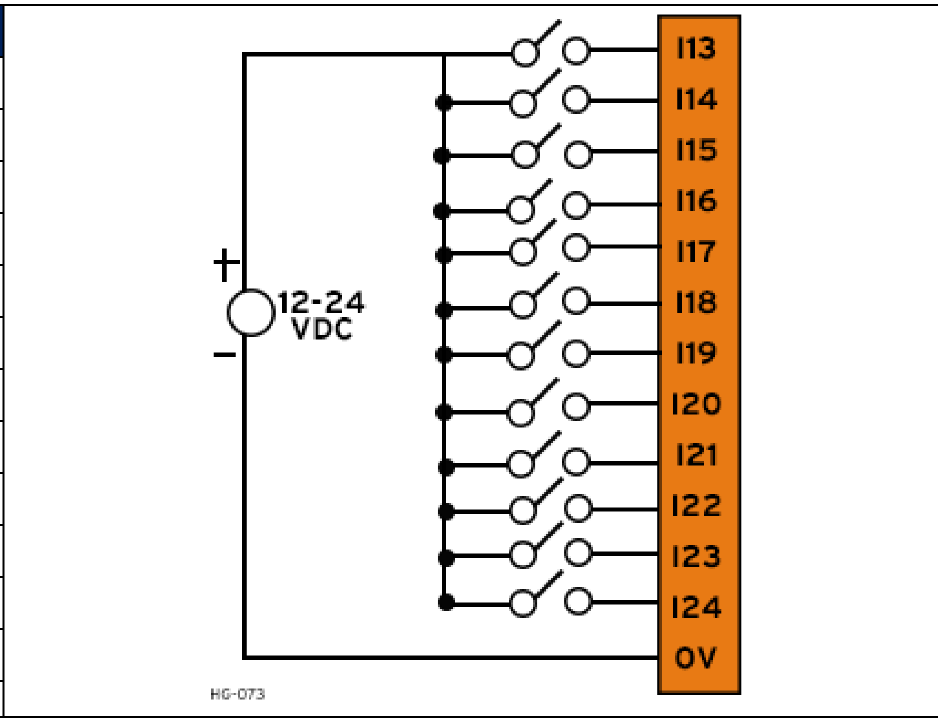
J2 (Black) Wiring - Digital Out

Pin	Signal Name
0V	Common
V+	V+
Q13 (%Q13)	Digital Out 13
Q12 (%Q12)	Digital Out 12
Q11 (%Q11)	Digital Out 11
Q10 (%Q10)	Digital Out 10
Q9 (%Q9)	Digital Out 9
Q8 (%Q8)	Digital Out 8
Q7 (%Q7)	Digital Out 7
Q6 (%Q6)	Digital Out 6
Q5 (%Q5)	Digital Out 5
Q4 (%Q4)	Digital Out 4
Q3 (%Q3)	Digital Out 3
Q2 (%Q2)	Digital Out/PWM2
Q1 (%Q1)	Digital Out/PWM1



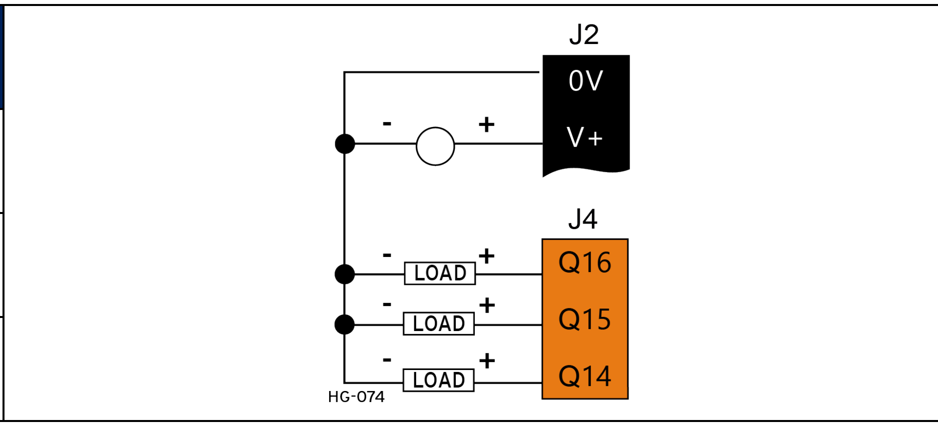
J3 (Orange) Wiring - Digital In/Positive Logic

Pin	Signal Name
I13 (%I13)	Digital In13
I14 (%I14)	Digital In14
I15 (%I15)	Digital In15
I16 (%I16)	Digital In16
I17 (%I17)	Digital In17
I18 (%I18)	Digital In 18
I19 (%I19)	Digital In 19
I20 (%I20)	Digital In 20
I21 (%I21)	Digital In 21
I22 (%I22)	Digital In 22
I23 (%I23)	Digital In 23
I24 (%I24)	Digital In 24
0V	Common



J4 (Orange) Wiring - Digital Out/Positive Logic

Pin	Signal Name
Q16 (%Q16)	Digital Out 16
Q15 (%Q15)	Digital Out 15
Q14 (%Q14)	Digital Out 14



NOTE: J2 must also be connected. Strip Length: 0.28" (7mm).

Wiring Details

Solid/Stranded Wire: 12-24 AWG (2.5-0.2mm²).
Strip Length: 0.28" (7mm).
Torque, Terminal Hold-Down Screws: 4.5 – 7 in•lbs (0.50 – 0.78 N•m).

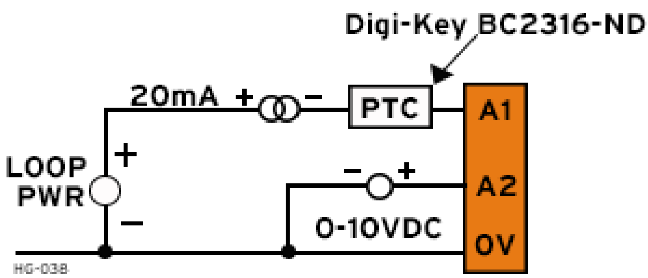
Built-In I/O

The I/O is mapped into OCS Register space, in three separate areas: Digital/Analog I/O, High-Speed Counter I/O, and High-speed Output I/O. Digital/Analog I/O location is fixed starting at 1, but the high-speed counter and high-speed output references may be mapped to any open register location .

Digital and Analog I/O Functions	
Digital Inputs	%I1-24
Reserved	%I25-31
ESCP Alarm	%I32
Digital Outputs	%Q1-16
Reserved	%Q17-24
Analog Inputs	%AI1-2
Reserved	%AI3-12
Analog Outputs	n/a
Reserved	%AQ1-8

Analog Input Transient-Voltage-Suppression Diode Failure

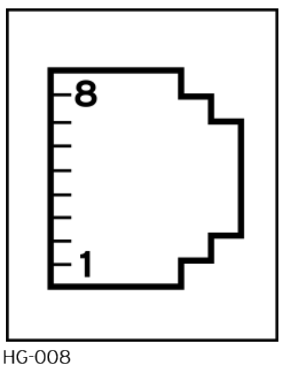
A common cause of Analog Input Transient-Voltage-Suppression Diode Failure on Analog Inputs Model 2, 3, 4 & 5: If a 4- 20mA circuit is initially wired with loop power, but without a load, the analog input could see 24VDC. This is higher than the rating of the Transient-Voltage-Suppression Diode. This can be solved by NOT connecting loop power prior to load connection, or by installing a low-cost PTC in series between the load and analog input.



COMMUNICATIONS

Serial Communication

MJ1/2 Serial Ports



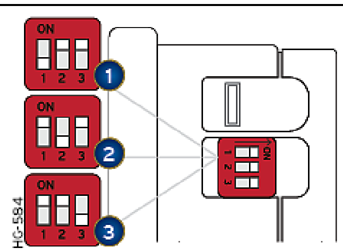
2 Serial Ports on 1 Module Jack (8 position)

MJ1: RS-232 w/Full Handshaking
MJ2: RS-485 Half-Duplex

	MJ1 Pins		MJ2 Pins	
PIN	**SIGNAL**	**DIRECTION**	**SIGNAL**	**DIRECTION**
8	TXD	OUT	--	--
7	RXD	IN	--	--
6	0V	COMMON	0V	COMMON
5	+5V @ 60mA	OUT	+5V @ 60mA	OUT
4	RTS	OUT	--	--
3	CTS	IN	--	--
2	--	--	RX-/TX-	IN/OUT
1	--	--	RX+/TX+	IN/OUT

NOTE: Attach optional ferrite core with a minimum of two turns of serial cable.

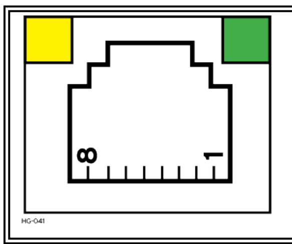
DIP Switches



DIP Switches			
SWITCH	**NAME**	**FUNCTION**	**DEFAULT**
1	MJ3 RS-485 Termination	ON = Terminated	OFF
2	Spare	Always OFF	OFF
3	Factory Use	Always OFF	OFF

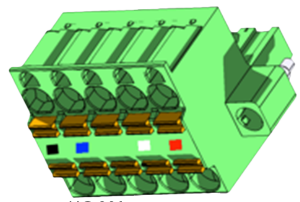
The DIP switches are used to provide a built-in termination to the MJ2 port if needed. The termination for these ports should only be used if this device is located at either end of the multidrop/daisy-chained RS-485 network.

Ethernet



Green LED indicates link - when illuminated, data communication is available.
Yellow LED indicates activity - when flashing, data is in transmission.

CAN Communications

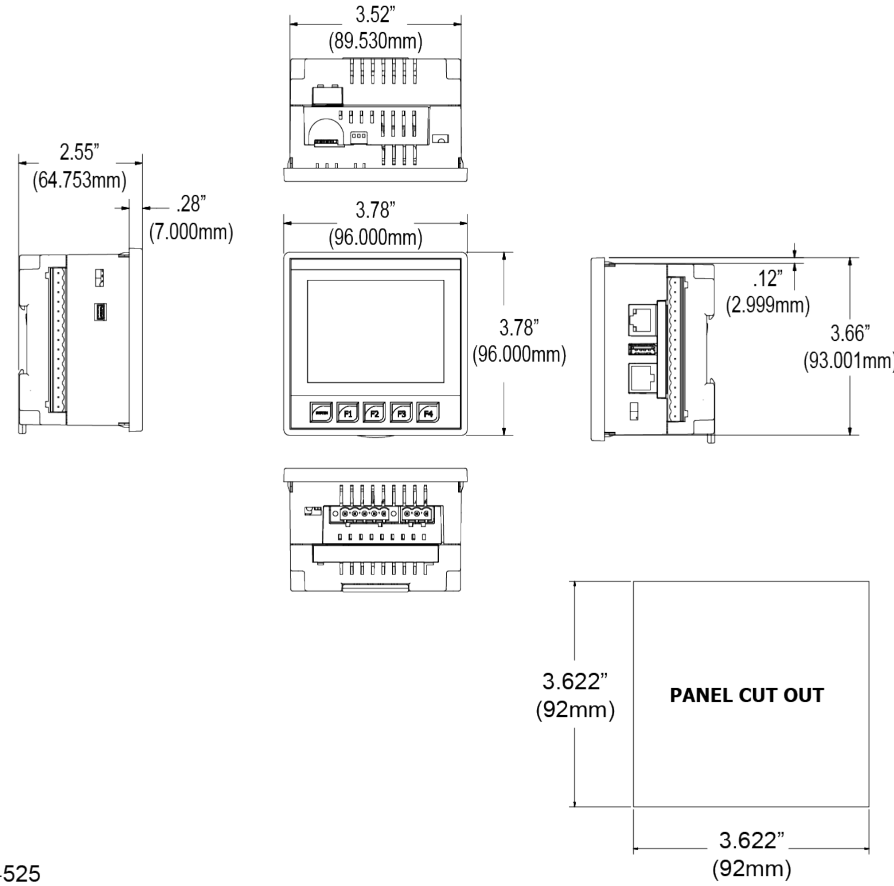

HG-001

CAN Network & Power Port Pin Assignment		
Pin	**Signal**	**Signal Description**
1	V-	CAN Ground – Black
2	CN_L	CAN Data Low – Blue
3	SHLD	Shield Ground – None
4	CN_H	CAN Data High – White
5	V+ (NC)	No Connect – Red

- **Solid/Stranded Wire**: 12-24 AWG (2.5-0.2mm²).
- **Strip Length**: 0.28” (7mm).
- Locking spring-clamp, two-terminators per conductor.
- **Torque, Terminal Hold-Down Screws**: 4.5 – 7 in•lbs (0.50 – 0.78 N•m).
- V+ pin is not internally connected, the SHLD pin is connected to Earth ground via a 1MΩ resistor and 10 nF capacitor.

DIMENSIONS & INSTALLATION

Canvas 4 Dimensions



HG-525

* ± 0.1mm cutout tolerance

Installation Information

- The Canvas 4 utilizes a clip installation method to ensure a robust and watertight seal to the enclosure. Please follow the steps below for the proper installation and operation of the unit.
- This equipment is suitable for Class I, Division 2, Groups A, B, C and D or non-hazardous locations only.
- Digital outputs shall be supplied from the same source as the operator control station.
- Jumpers on connector JP1 shall not be removed or replaced while the circuit is live unless the area is known to be free of ignitable concentrations of flammable gases or vapors.
- The USB ports are for operational maintenance only. Do not leave permanently connected unless area is known to be non-hazardous.

Installation Procedure

1. Carefully locate an appropriate place to mount the OCS. Be sure to leave enough room at the top of the unit for insertion and removal of the microSD™ card.
2. Carefully cut the host panel per the diagram, creating a 92mm x 92mm ±0.1mm opening into which the OCS may be installed. If the opening is too large, water may leak into the enclosure, potentially damaging the unit. If the opening is too small, the OCS may not fit through the hole without damage.
3. Remove any burrs and or sharp edges and ensure the panel is not warped in the cutting process.
4. Remove all Removable Terminals from the OCS. Insert the OCSthrough the panel cutout (from the front). The gasket must be between the host panel and the OCS.
5. Install and tighten the four mounting clips (provided in the box) until the gasket forms a tight seal.

   NOTE: Max torque is 0.8 to 1.13 N•m (7 to 10 in•lbs).

6. Reinstall the I/O Removable Terminal Blocks. Connect communications cables to the serial port, USB ports, Ethernet port, and CAN port as required.

SAFETY & MAINTENANCE

Warnings

1. To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.
2. To reduce the risk of fire, electrical shock, or physical injury, it is strongly recommended to fuse the voltage measurement inputs. Be sure to locate fuses as close to the source as possible.
3. Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.
4. In the event of repeated failure, do **NOT** replace the fuse again as repeated failure indicates a defective condition that will **NOT** clear by replacing the fuse.
5. Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment.
6. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.
7. **WARNING:** Battery may explode if mistreated. Do not recharge, disassemble, or dispose of in fire.
8. **WARNING:** EXPLOSION HAZARD- Batteries must only be changed in an area known to be non-hazardous.
9. **WARNING:** Do not disconnect while circuit is live unless area is know to be non-hazardous.

FCC Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Precautions

All applicable codes and standards need to be followed in the installation of this product. Adhere to the following safety precautions whenever any type of connection is made to the module:

1. Connect the safety (earth) ground on the power connector first before making any other connections.
2. When connecting to the electric circuits or pulse-initiating equipment, open their related breakers.
3. Do NOT make connection to live power lines.
4. Make connections to the module first; then connect to the circuit to be monitored.
5. Route power wires in a safe manner in accordance with good practice and local codes.
6. Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.
7. Ensure hands, shoes, and floor are dry before making any connection to a power line.
8. Make sure the unit is turned OFF before making connections to terminals.
9. Make sure all circuits are de-energized before making connections.
10. Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.
11. Use copper conductors in field wiring only, 60/75˚C.

12. Use caution when connecting controllers to PCs via serial or USB. PCs, especially laptops, may use “floating power supplies” that are ungrounded. This could cause a damaging voltage potential between the laptop and controller. Ensure the controller and laptop are grounded for maximum protection. Consider using a USB isolator due to voltage potential differences as a preventative measure.

Technical Support

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