SolarCube - Solar Tracker Controller

- Easy-to-configure Solar Tracker Controller
- 240 x 128 Monochrome LCD Display
- High Resolution Resistive Touch Screen
- MicroSD™ Data storage
- Real Time Clock
- 1 CAN Port, 2 RS-232 / RS-485
- IP65 (NEMA4X)
- 10 - 30 VDC Power Supply

Ordering Codes

Part Number	Description
SOLARCUBE-1AX	Configurable dual axes solar tracker controller
COMPASS-485-15M	3 axes digital compass

Technical Specifications

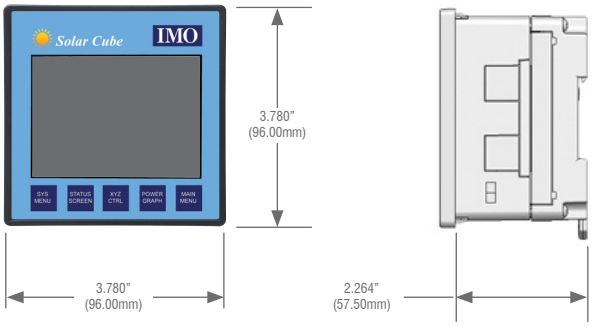
General Specifications	
Required Power (Steady State)	84mA @ 24VDC
Required Power (Inrush)	30A for 1ms @ 24VDC
Primary Voltage Range	10-30VDC
Relative Humidity	5 to 95% Non-Condensing
Clock Accuracy	+/-90 Seconds per month at 20°C
Operating Air Temperature	-10°C to +60°C
Storage Temperature	-20°C to +70°C
Weight	0.340kg
Approvals	cUL, UL, CE, FCC

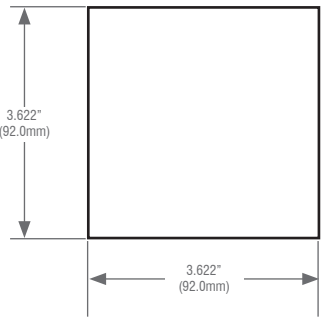
NOTE: Please refer to the Setup & Installation Manual on the www.imopc.com website for full details.

Display Specifications	
Display Type	Transreflective Touchscreen LCD (outdoor readable)
Resolution	160 x 128
Colour	Monochrome
Backlight	LED - 30,000 hour life
Touchscreen Life & Type	1 million touch+; Resistive Type
Screen Update Rate	User configurable within the scan time (perceived as instantaneous in many cases)

Connectivity	
Serial Ports	1 RS-232 or 1 RS-485 on first modular jack (MJ1) 1 RS-232 or 1 RS-485 on second modular jack (MJ2)
USB mini-B	USB 2.0 (480MHz) Programming & Data Access
CAN	Remote I/O, Peer-to-Peer Comms, i3 Configurator
Removable Memory	MicroSD™ (support for 32GB max) Application updates, Datalogging, more
Audio	Beeper (system/software controlled)

Dimensions & Panel Cutout





CUTOUT TOLERANCE TO MEET NEMA STANDARDS IS ±0.005" (0.1mm) Max. Panel Thickness is 5mm

NOTE: Depth including modem = 2.559" (65.0mm)

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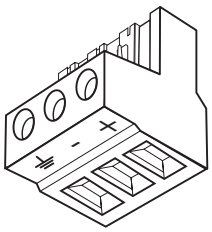
Ports & Connectors



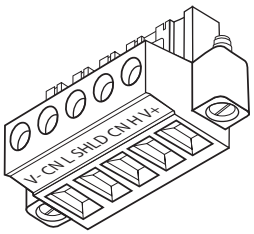
DC Input / Frame

Torque rating: 4.5-7 Lb-in (0.50-0.78Nm)

DC- is internally connected to I/O V-, but is isolated from CAN V-

A Class 2 power supply must be used

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

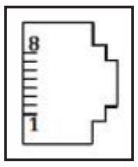


CAN

Mounting screw torque rating: 4.5 Lb-in (0.50Nm)

SHLD and V+ pins are not internally connected

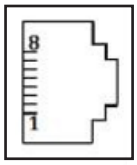
Primary Power Port Pins			
Pin	Signal	Description	Direction
1	V-	CAN Ground - Black	-
2	CN L	CAN Data Low - Blue	IN / OUT
3	SHLD	Shield Ground - None	-
4	CN H	CAN Data High - White	IN / OUT
5	V+ (NC)	No Connect - Red	-



MJ1 Independent Serial Ports

Two multiplexed serial ports on one modular jack (8posn)

PIN	MJ1 PINS	
	Signal	Direction
8	TXD RS-232	OUT
7	RXD RS-232	IN
6	0 V	Ground
5	+5V@60mA	OUT
4	RTS RS-232	OUT
3	CTS RS-232	IN
2	RX- / TX- RS-485	IN / OUT
1	RX+ / TX+ RS-485	IN / OUT



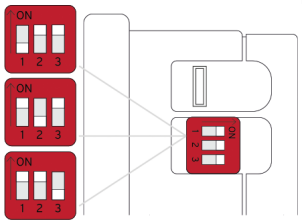
MJ2 Serial Port

Two multiplexed serial ports on one modular jack (8posn)

PIN	MJ2 PINS	
	Signal	Direction
8	TXD RS-232	OUT
7	RXD RS-232	IN
6	0 V	Ground
5	+5V@60mA	OUT
4	TX- RS-485	OUT
3	TX+ RS-485	OUT
2	RX- (RX- / TX-*) RS-485	IN or IN/OUT
1	RX+ (RX+ / TX+*) RS-485	IN or IN/OUT

* In half duplex mode

DIP Switches



Switch	Name	Function	Default
1	RS-485 Termination (MJ1)	ON = Terminated	OFF
2	RS-485 Termination (MJ2)	ON = Terminated	OFF
3	Factory Use	Always Off	OFF

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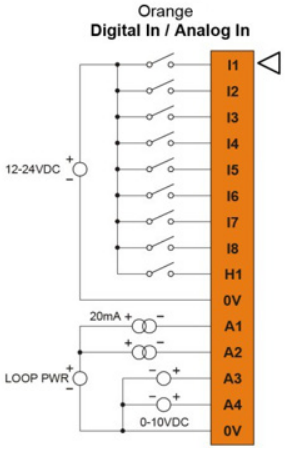
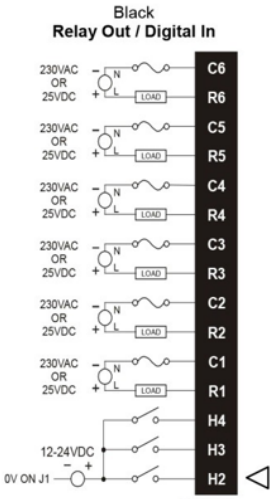
I/O Board Specifications

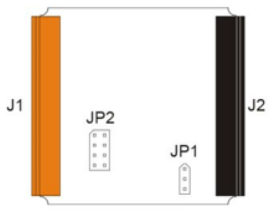
Digital DC Inputs		Digital Relay Outputs	
Inputs per Module	12 including 4 configurable HSC inputs	**Outputs per Module**	6 Relay
Commons per Module	1	**Commons per Module**	6
Input Voltage Range	10-30 VDC	**Max. Switching Current per Relay**	3A @ 250 VAC, Resistive
Absolute Max. Voltage	35 VDC Max	**Max. Total Output Current**	5A Continuous
Input Impedance	10 kΩ	**Max. Switching Voltage**	275 VAC, 30 VDC
Input Current **Upper Threshold** **Lower Threshold**	Positive Logic / Negative Logic 0.8mA / -1.6mA 0.3mA / -2.1mA	**Max. Switched Power**	1250 VAC, 150W
Max. Upper Threshold	8 VDC	**Contact Isolation to Ground**	1000 VAC
Max. Lower Threshold	3 VDC	**Max. Voltage Drop at Rated Current**	0.5V
OFF to ON Response	1 ms	**Expected Life (see below for detail)**	No Load: 5,000,000 200,000 at rated load
ON to OFF Response	1 ms	**Max. Switching Rate**	300 CPM at no load 20 CPM at rated load
HSC Max. Switching Rate	500kHz	**Type**	Mechanical Contact
		Response Time	One update per ladder scan plus 10ms
Analogue Inputs, Medium Resolution			
Number of Channels	4	**Input Ranges**	0-10 VDC, 0-20 mA, 4-20 mA
Safe Input Voltage Range	-0.5V to 12V	**Input Impedance (clamped @ -0.5VDC to 12VDC)**	Current Mode: 100 Ω / Voltage Mode: 500 kΩ
Nominal Resolution	12 Bits	**%AI Full Scale**	32,000
Max. Over Current	35 mA	**Conversion Speed**	Once per Ladder Scan
Max. Error at 25°C (excluding zero) **Adjusting filtering may tighten**	4-20 mA 1.00% of FS 0-20 mA 1.00% of FS 0-10 VDC 1.50% of FS	**Filtering**	160 Hz hash (noise) filter 1-128 scan digital running average filter

J1 (Orange)	Name
I1	IN1-Override Key
I2	IN2-Override1
I3	IN3-Override2
I4	IN4-Override3
I5	IN5-Override4
I6	IN6-EMG PB-UPS
I7	IN7-Limit SW UP
I8	IN8-Limit DOWN
H1	IN9-Limit LEFT
0V	Common
A1	Analogue IN1
A2	Analogue IN2
A3	Analogue IN3
A4	Analogue IN4
0V	Common



J2 (Black)	Name
C6	Relay 6 COM
R6	Relay 6 NO-Compass Power
C5	Relay 5 COM
R5	Relay 5 NO-Major Failure
C4	Relay 4 COM
R4	Relay 4 NO-RIGHT Output
C3	Relay 3 COM
R3	Relay 3 NO-LEFT Output
C2	Relay 2 COM
R2	Relay 2 NO-DOWN Output
C1	Relay 1 COM
R1	Relay 1 NO-UP Output
H4	IN12-Ice Alarm
H3	IN11-Wind Alarm
H2	IN10-Limit RIGHT

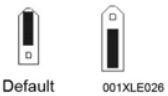




Location of I/O jumpers (**JP1 & JP2**) and wiring connectors (**J1 and J2**) with back cover removed.

Jumper Setting Details

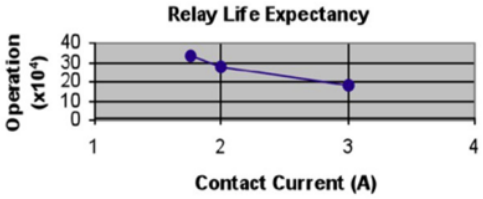
JP1 Digital DC In / HSC



JP2 Analog In (A1 – A4)

Note: The Module Setup configuration must match the selected I/O (JP) jumper settings

Note: When using JP2 (A1-A4), each channel can be independently configured.



"**WARNING**: EXPOSURE TO SOME CHEMICALS MAY DEGRADE THE SEALING PROPERTIES OF MATERIALS USED IN THE Tyco relay PCJ

Cover / case & base: Mitsubishi engineering Plastics Corp. 5010GN6-30 or 5010GN6-30 M8 (PBT)
Sealing Material: Kishimoto 4616-50K (I part epoxy resin)

It is recommended to periodically inspect the relay for any degradation of properties and replace if degradation is found

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Safety

WARNING: Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

WARNING: **EXPLOSION HAZARD** - BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS

This equipment is suitable for use in Class 1, Division 2, Groups A, B, C and D or Non-hazardous locations only.

FOR U.S. & CANADA ONLY
Power input and output (I/O) wiring must be in accordance with Class 1, Division 2 wiring methods of the National Electric Code, NFPA70 for installations in the U.S. or as specified in Section 18-1J2 of the Canadian Electric Code for installations within Canada and in accordance with the authority having jurisdiction.

WARNING: **EXPLOSION HAZARD** - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

WARNING: **EXPLOSION HAZARD** - Substitution of components may impair suitability for Class 1, Division 2.

Digital outputs shall be supplied from the same source as the SolarCube Controller.

WARNING: 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. 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.

WARNING: To avoid the risk of electric shock or burns, always connects the earth ground before making any other connections.

WARNING: To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse all Power Sources connected to the SolarCube controller. Be sure to locate fuses as close to the source as possible.

WARNING: Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.

WARNING: In the event of repeated failure, do not replace the fuse again as a repeated failure indicates a defective condition that will not clear by replacing the fuse.

Jumpers on connector JP1 and others 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 vapours.

Common Cause of Analogue Input Tranzorb Failure

If a 4-20mA circuit is initially wired with loop power, but without a load, the analogue Input could see 24VDC. This is higher than the rating of the tranzorb. 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 analogue input.