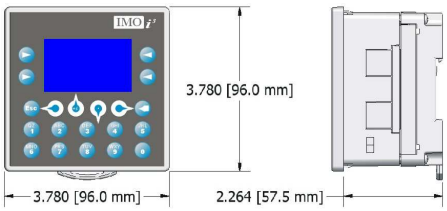
i^3 User Start-up Guide

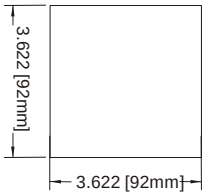
Getting Started:

1. Connect the 24VDC power as shown on the connector below.
2. Install i^3 Configurator onto your PC.
3. Connect serial programming cable into port MJ1 port.
4. If using a USB to serial convertor (PC501), please check in Window Device Manager which com port has been assigned. Then enter menu Tools->Editor Options-> Communications port->Configure, and set accordingly.
5. Press the up and down arrows simultaneously on the front of the unit and check Network ID. Then press the target sign in the Configurator and make the Target ID match that of the i^3

WARNING: Please ensure power is ON and i^3 is in Idle mode before inserting SanDisk™ MicroSD.



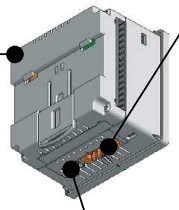
Panel Cut out



i 3 A 1 2 X /	128x64 Display, 14 programmable keys
1 0	12 Digital Inputs (4 HSC)
D	4 Analogue Inputs (10-bit)
0	0 Analogue Outputs (12 bit)
3	6 Relay Outputs
- S C H	2 Serial Ports, 1 CAN port, iCAN Protocol
A	CANopen Protocol
F	MicroSD Card

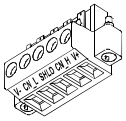
Back cover screws. Remove the 4 screws and back plate to access the Internal jumpers.

WARNING: Do not Over-tighten screws.

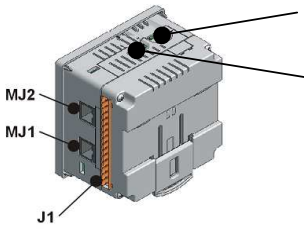


CAN Connector

1 – V+
2 – CN_H
3 – SHIELD
4 – CN_L
5 – V-



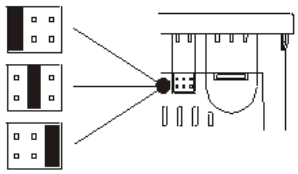
WARNING: After installing CANopen firmware, part number suffix becomes SC**A**F. See CANopen Application Note for more details.



MicroSD Card slot on SCH**F** Models only.

External Jumper Configuration.

As seen when looking at the top of the i^3 unit



Power Connector

Power Up:
Connect to Earth Ground.
Apply 10 - 30 VDC.
Screen lights up.

1 - Positive
2 - Negative
3 - Ground

Serial Ports
MJ1 / MJ2

MJ1 Serial Port Pin Assignments

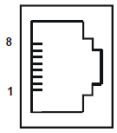
Pin	Signal	Signal Description	Direction
8	TD[1]	RS-232 Transmit Data	Out
7	RD[1]	RS-232 Receive Data	In
6	0V	Ground	-
5	+5	+5 VDC 60mA max	Out
4	RTS[1]	RS-232 Request to Send	In
3	CTS[1]	RS-232 Clear to Send	Out
2	RX/TX−	Receive/Transmit Negative	In/Out
1	RX/TX+	RS-485 Receive/Transmit Positive	In/Out

MJ2 Serial Port Pin Assignments

Pin	Signal	Signal Description	Direction
8	TD[1]	RS-232 Transmit Data	Out
7	RD[1]	RS-232 Receive Data	In
6	0V	Ground	-
5	+5	+5 VDC 60mA max	Out
4	TX-	RS-485 Transmit Negative	In
3	TX+	RS-485 Transmit Positive	Out
2	RX−	RS-485 Receive Negative	In
1	RX+	RS-485 Receive Positive	In

[1]Signals are labeled for connection to a DTE device
* +5 on i^3 H/W Rev E and later

MJ2 RS485 Connection Examples:



MJ2 - Full Duplex Mode

Pin	MJ2 Pins Signal	MJ2 Pins Direction
8	-	-
7	-	-
6	0V	Ground
5	-	-
4	TX-	OUT
3	TX+	OUT
2	RX-	IN
1	RX+	IN

MJ2 - Half Duplex Mode

Pin	MJ2 Pins Signal	MJ2 Pins Direction
8	-	-
7	-	-
6	0V	Ground
5	-	-
4	-	-
3	-	-
2	TX-/RX-	IN/OUT
1	TX+/RX+	IN/OUT

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

WARNING: **EXPLOSION HAZARD** – Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
AVERTISSEMENT - RISQUE D'EXPLOSION - AVANT DE DECONNECTOR L'EQUIPMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX.

WARNING: To avoid the risk of electric shock or burns, always connect the safety (or 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 the voltage measurement inputs. 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.

WARNING: EXPLOSION HAZARD – Substitution of components may impair suitability for Class I, Division 2
AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIAL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE 1, DIVISION 2

WARNING: **EXPLOSION HAZARD** - BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS
AVERTISSEMENT - RISQUE D'EXPLOSION - AFIN D'EVITER TOUT RISQUE D'EXPLOSION, S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX AVANT DE CHANGER LA BATTERIE

WARNING: Battery May Explode If Mistreated. Do Not Recharge, Disassemble or Dispose Of In Fire

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.

I/O Register Map

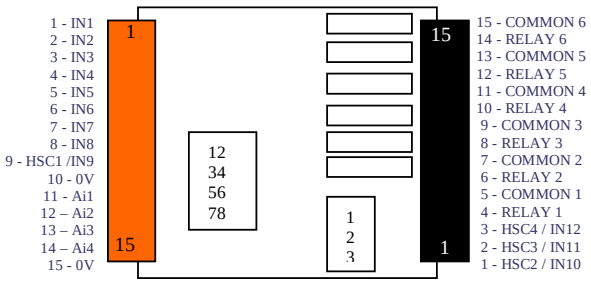
Registers	Description
%I1 to %I24	Digital Inputs
%I32	Output Fault
%I25 to %I31	Reserved
%Q1 to %Q16	Digital outputs
%Q17	Clear HSC1 accumulator to 0
%Q18	Totalizer: Clear HSC2 Quadrature 1-2: Accumulator 1 Reset to max – 1
%Q19	Clear HSC3 Accumulator to 0
%Q20	Totalizer: Clear HSC4 Quadrature 3-4: Accumulator 3 Reset to max – 1
%Q21 to %Q32	Reserved
%AI1 to %AI4	Analogue inputs
%AI5, %AI6	HSC1 Accumulator
%AI7, %AI8	HSC2 Accumulator
%AI9, %AI10	HSC3 Accumulator
%AI11, %AI12	HSC4 Accumulator
%AQ1, %AQ2	PWM1 Duty Cycle
%AQ3, %AQ4	PWM2 Duty Cycle
%AQ5, %AQ6	PWM Prescale
%AQ7, %AQ8	PWM Period
%AQ9 to %AQ14	Analogue outputs

Note: Not all i3 units contain the I/O listed in this table.

Wiring Specifications

- For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG (0.8 mm^2) or larger.
- For shielded Analogue I/O wiring, use the following wire type or equivalent: Belden 8441, 18 AWG (0.8 mm^2) or larger.
- For CAN wiring, use the following wire type or equivalent: Belden 3084, 24 AWG (0.2 mm^2) or larger.

Analogue I/O and Digital I/O



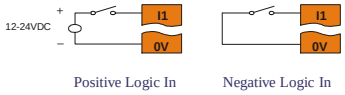
Internal Jumper Configuration

I/O Jumper settings are located internally. Remove the 4 screws on the back and lift casing off to access. **Only access when power is removed from the *i*^{3}**. Care must be taken to avoid over tightening the case screws.

Digital Input

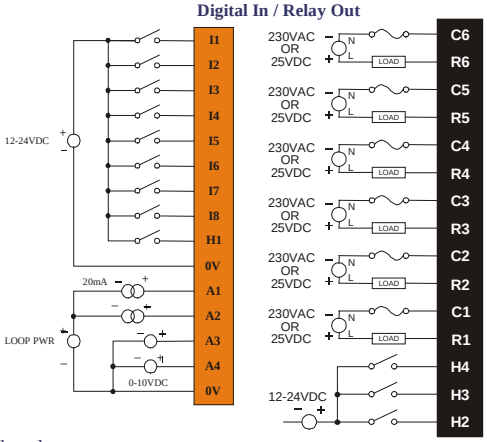
Positive Logic vs. Negative Logic Wiring

The ***i*^{3}** can be wired for Positive Logic inputs or Negative Logic inputs depending on the position of JP1.



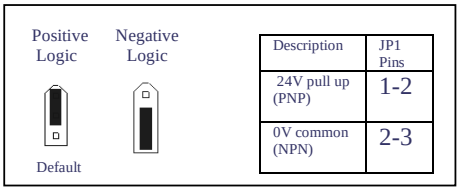
Wiring Example: Positive Logic

Digital In / Relay Out

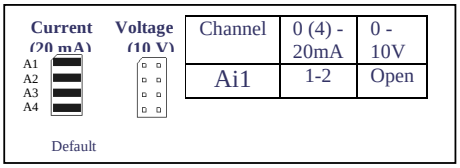


WARNING: Do not short loop power source directly to analogue inputs, more than 35mA load can damage input circuit.

Registers	PWM	HSC	Stepper
%AQ1	PWM1 Duty Cycle (32 bit)	HSC1 Preset Value	Start Frequency
%AQ2			Run Frequency
%AQ3	PWM2 Duty Cycle (32 bit)	HSC2 Preset Value	Accel Count (32 bit)
%AQ4			
%AQ5	PWM Prescale (32 bit)		Run Count (32 bit)
%AQ6			
%AQ7	PWM Period (32 bit)		Decel Count (32 bit)
%AQ8			
%Q1			Run
%I30			Ready/Done
%I31			Error

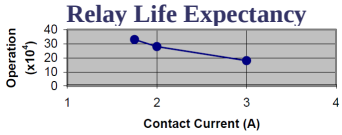


Description	JP1 Pins
24V pull up (PNP)	1-2
0V common (NPN)	2-3

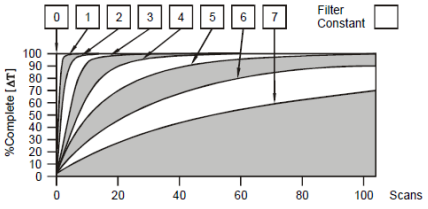


Channel	0 (4) - 20mA	0 - 10V
Ai1	1-2	Open

Relay Life Expectancy

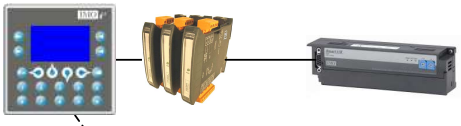


Analogue Filtering



Expansion I/O Modules

All ***i*^{3}** controllers can have extra analogue and digital I/O added by connecting expansion modules to either MJ1 or MJ2 ports.



iCAN based expansion I/O is also available on special request. Please inquire at IMO technical support. automation@imopc.com

Basic Options

Input - 4 Channel RTD (0-2000ohm, 0-500ohm, PT100, Ni100, PT1000, Ni1000)	iOS / M 4 I P X - D1
Input - 8 Channel DC Current (-20mA to +20mA)	iOS / M 8 I C X - D1
Input - 8 Channel DC Voltage (-10V to +10V)	iOS / M 8 I V X - D1
Input - 8 Channel Thermocouple (J, K, R, S, B, E, T, N, -/+ 50mV, -/+100mV)	iOS / M 8 I T X - D1
Output - 4 Channel DC Voltage / Current (0-20mA, 0-10V)	iOS / M 4 O X A - D1
16 Digital Input, 16 Transistor output (0.1A / Channel, 2A / Common)	GSL - D T 4 A
16 Relay Output (2A / Channel, 5A / Common)	GSL - R Y 2 A
32 Digital Input	GSL - D 2 4 A

Note: Other I/O configurations and Fieldbus options are available. Please inquire at IMO. automation@imopc.com

For further information on Remote I/O please consult the Remote I/O datasheet, and the i3 Remote I/O tutorial in the downloads section of the IMO website. www.imopc.com/manuals

Technical Specifications

Digital DC Inputs

Inputs per Module	12 including 4 configurable HSC inputs	
Commons per Module	1	
Input Voltage Range	12 VDC / 24 VDC	
Absolute Max. Voltage	35 VDC Max.	
Input Impedance	10 kW	
Input Current	Positive Logic	Negative Logic
Upper Threshold	0.8 mA	-1.6 mA
Lower Threshold	0.3 mA	-2.1 mA
Max Upper Threshold	8 VDC	
Min Lower Threshold	3 VDC	
OFF to ON Response	1 ms	
ON to OFF Response	1 ms	
HSC Max. Switching Rate	10 kHz Totalizer/Pulse, Edges 5 kHz Frequency/Pulse, Width 2.5 kHz Quadrature	

Digital Relay Outputs

Outputs per Module	6 relay
Commons per Module	6
Max. Output Current per Relay	3 A at 250 VAC, resistive
Max. Total Output Current	5 A continuous
Max. Output Voltage	275 VAC , 30 VDC
Max. Switched Power	1250 VA, 150 W
Contact Isolation to i3 ground	1000 VAC
Max. Voltage Drop at Rated Current	0.5 V
Expected Life **(See Derating section for chart.)**	No load: 5,000,000 Rated load: 100,000
Max. Switching Rate	300 CPM at no load 20 CPM at rated load
Type	Mechanical Contact
Response Time	One update per ladder scan plus 10 ms

Analogue Inputs Medium Resolution

Number of Channels	4	
Input Ranges	0 - 10 VDC 0 – 20 mA 4 – 20 mA	
Safe input voltage range	-0.5 V to +12V	
Input Impedance **(Clamped @ -0.5 VDC to 12 VDC)**	Current Mode: 100 W	Voltage Mode: 500 k W
Nominal Resolution	10 Bits	
%AI full scale	32,000 counts	
Max. Over-Current	35 mA	
Conversion Speed	All channels converted once per ladder scan	
Max. Error at 25°C **(excluding zero)** ***can be made tighter (~0.25%) by adjusting the digital filter setting to 3.**	4-20 mA 1.00% 0-20 mA 1.00% 0-10 VDC 1.50%*	
Additional error for temperatures other than 25°C	TBD	
Filtering	160 Hz hash (noise) filter 1-128 scan digital running average filter	

General Specifications

Required Power **(Steady State)**	130 mA @ 24 VDC
Required Power (Inrush)	30 A for 1 ms @ 24 VDC – DC Switched
Primary Power Range	10 – 30 VDC
Relative Humidity	5 to 95% Non-condensing
Clock Accuracy	+/- 35 ppm maximum at 25° C (+/- 1.53 Minutes per Month)
Operating Temperature	-10°C to +60°C
Terminal Type	Screw Type, 5 mm Removable
Weight	12 oz. (340.19 g)
CE **UL**	Approved

IMO Precision Controls Ltd
1000 North Circular Rd, Staples Corner, London. NW2 7JP
Tel: +44 (0) 208 452 6444,
Fax: +44 (0) 208 450 2274,
Web: www.imopc.com

For further technical information and a full specification, please consult the Hardware Manual

Small Extras:

RS232 Serial Programming Cable
For programming any i^3 Model.

PART No: i3PC45

IP65 RJ45 Panel-Mounted Socket
Bring either MJ1 or MJ2 ports to the outside world by installing this into a 22.5mm cut-out.

PART No: i3PAD

USB to RS232 Convertor
For PCs without a serial Com Port. Add one with this device.

PART No: PC501

Communication:

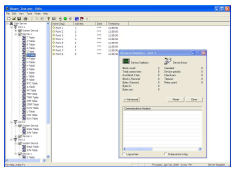
Ethernet Expansion card
Link an i^3 to an Ethernet network. Program monitor and debug remotely, or run i^3 as a Modbus TCP server.

PART No: i^3-E

GSM Modem Expansion Card
Send and Receive SMS messages via the i^3, dial-up connection over GSM data link for remote programming, debugging etc. Or, use a GPRS always-on data connection ideal for programming, debugging, monitoring and connection to a SCADA package for constant data logging and remote control.

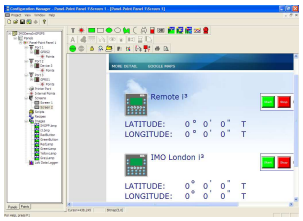
PART No: i^3-M

ODIN OPC SERVER (With LOKI data-logger)
With no tag limit and 30+ Protocols to choose from (including IMO products, Mitsubishi, Allen Bradley, Siemens), ODIN can be used with LOKI to log data either to an Excel spreadsheet or an Access database.



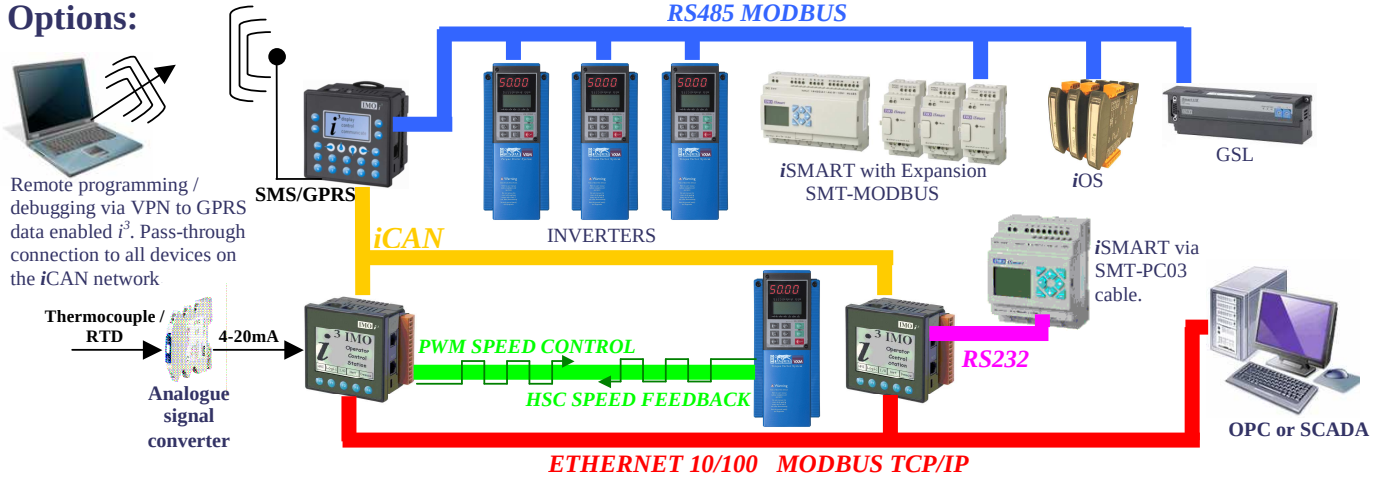
PART No: IMO-OPC-SERVER

Panel Point SCADA*lite*
With no tag limit and 30+ Protocols to choose from (including IMO products, Mitsubishi, Allen Bradley, Siemens), a powerful graphical editor, and a VB-based scripting language, Panel-Point allows a PC to become the central data hub of an application.



PART No: PANELPOINT (Developer)
PART No: PANELPOINTRT (Runtime)

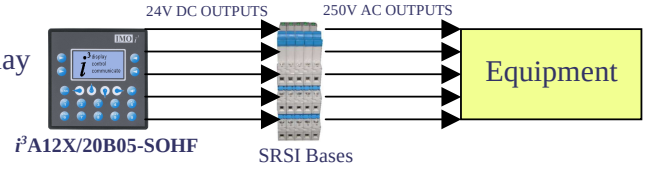
Options:



Miscellaneous:

DIN rail mounted SRSI Base and ETS Relay
Use the Transistor outputs of the i^3 to operate the relay coils to switch up to 6A @ 250VAC.

Part Numbers: SRSI-24AC/DC, ETS-1AN-SL-24VDC

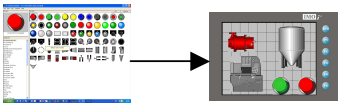


i^3A12X/20B05-SOHF

SRSI Bases & ETS Relays

i^3 Configurator with Symbol Library
Obtain a copy of the i^3 Software with a library of colour buttons, pipes, vessels, motors, pumps, fans etc. To enhance the look and feel of applications on the i^3C.

Part Numbers: IMO-CD-SUITE



Custom screen overlays
Ask at IMO for custom overlays. Overlays are tooled to a customer's design.

GPS Receiver
Locate your i^3 Controller anywhere in the world by connecting this device to MJ2 of a unit equipped with a GPRS enabled modem.

Part Number: i^3-GPS