

i³C Lite Intelligent Control Station



Technical Datasheet

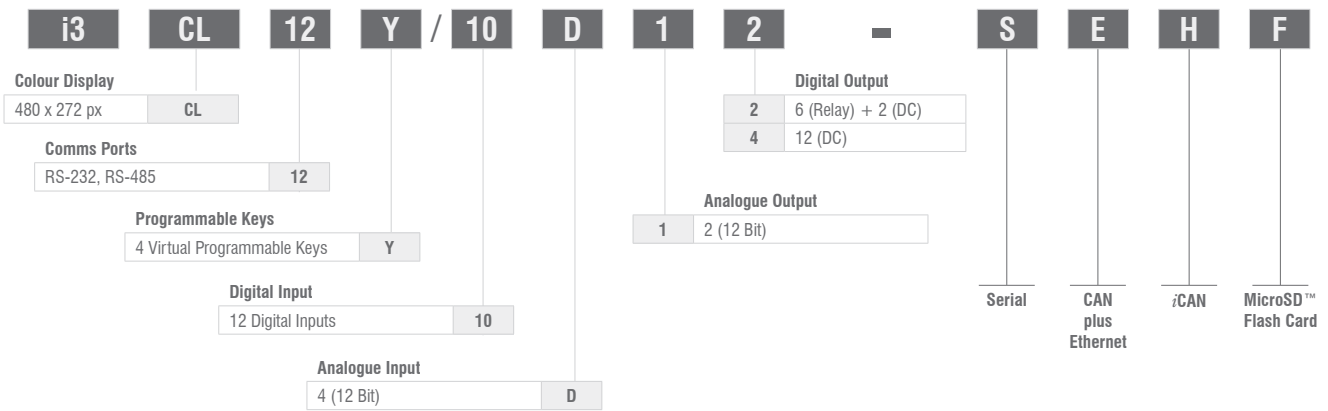
Key Features

- 480 x 272 colour LCD display
- MicroSD™ data storage
- Real time clock
- 1 CAN Port, 1 RS-232, 1 RS-485
- IP65 (NEMA 4X)
- USB port for programming
- Free configuration software
- 1 x Ethernet port



Options & Ordering Codes

Standard Options	DI	DO	AI	A0
i3CL12Y/10D12-SEHF	12	6 Relay + 2	4	2
i3CL12Y/10D14-SEHF	12	12	4	2



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Technical Specifications

General Specifications

Required Power (Steady State)	140mA @ 24VDC
Primary Voltage Range	24VDC ± 20%
Inrush Current	30A for <1ms
Relative Humidity	5 to 95% Non-Condensing
Clock Accuracy	+/-90 seconds per month at 20°C
Operating Temperature	-10°C to +60°C
Storage Temperature	-20°C to +70°C
Weight	0.360kg

Display Specifications

Display Type	4.3" Colour LCD
Resolution	480 x 272 Pixels
Keys	4 Virtual Slide Keys (touch)
Screen Memory	256kB
User-Programmable Screens	250 (max. 30 objects per screen)
Backlight	LED - 20,000 hours to reach 50% brightness
Screen Update Rate	User configurable within the scan time (perceived as instantaneous in many cases)

Control & Logic Specifications

Control Language Support	Advanced Ladder Logic, Full IEC 61131-3
Logic Program Size & Logic Scan Rate	256kB Maximum, 1.2ms/kB
I/O Support	Digital Inputs - 1024
	Digital Outputs - 1024
	Analogue Inputs - 256
	Analogue Outputs - 256
General Purpose Registers	5,000 (words) Retentive 1,024 (bits) Retentive 1,024 (bits) Non-retentive
Non-Retentive Memory	128kB

Connectivity

Serial Ports	1 RS-232, 1 RS-485
USB mini-B	USB 2.0 (480MHz) Programming & Data Access
CAN	CAN 2.0; Remote I/O, Peer-to-Peer Comms, i3 Configurator
Ethernet	ICMP Ping, EGD (Peer), iCAN TCP Server, Modbus TCP Slave, Ethernet / IP Server, FTP Server, ASCII over TCP/IP Server
Remote I/O	Modbus RTU, Modbus TCP, iCAN; IOS, Smart I/O, iSmart
Removable Memory	MicroSD™ (support for 32GB max) Application updates, Datalogging, more

I/O Specifications

Digital DC Inputs

Inputs per Module	12 including 4 configurable HSC inputs	
Commons per Module	1	
Input Voltage Range	24 VDC	
Absolute Max. Voltage	35 VDC Max	
Input Impedance	10 kΩ	
Input Current	Positive Logic	Negative Logic
Upper Threshold	0.8mA	-1.6mA
Lower Threshold	0.3mA	-2.1mA
Max. Upper Threshold	8 VDC	
Max. Lower Threshold	3 VDC	
OFF to ON Response	0.1 ms	
ON to OFF Response	0.1 ms	
HSC Max. Switching Rate	10kHz - Totalize 2.5kHz - Quadrature 5kHz - Per Frequency	
Modes Supported	Totalizer, quadrature, pulse measurement, frequency measurement, set point controlled outputs	

Digital Relay Outputs

Outputs per Module	6 Relay
Commons per Module	6
Max. Switching Current per Relay	3A @ 60 VAC, Resistive 3A @ 30 VDC, Resistive
Max. Total Output Current	5A Continuous
Max. Switching Voltage	60 VAC, 30 VDC
Max. Switched Power	150W
Contact Isolation to Ground	1000 VAC
Max. Voltage Drop at Rated Current	0.5V
Expected Life (see below for detail)	No Load: 5,000,000 100,000 at rated load
Max. Switching Rate	300 CPM at no load 20 CPM at rated load
Type	Mechanical Contact
Response Time	One update per ladder scan plus 10ms

Digital DC Outputs - Sinking PWM

Outputs per Module	2 PWM or HSC Out
Commons per Module	1
Type	Sinking w/optional 10kΩ pull-up
Absolute Max. Voltage	28VDC
Output Protection	Short Circuit
Max. Output per Point: Sinking	500mA
Max. Voltage Drop at Rated Current	0.25VDC
Max. Inrush	650mA
OFF to ON Time	20μs
ON to OFF Time	10μs
PWM Out	65kHz
Rise Time	2.4μs @ 24V
Fall Time	7.5μs @ 24V

Digital DC Outputs - Sourcing

Outputs per Module	12 Including 2 Configurable PWM Outputs
Commons per Module	2
Type	Sourcing / 10kΩ pull-down
Absolute Max. Voltage	28VDC
Output Protection	Short Circuit
Max. Voltage Drop at Rated Current	0.25VDC
Max. Inrush	650mA
Max. Output per Point: Sourcing	0.5A @ 24VDC
OFF to ON Time	1μs
ON to OFF Time	1μs
PWM Out	65kHz
Rise Time	150ns
Fall Time	150ns

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Technical Specifications continued

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Analogue Inputs

Number of Channels	4
Safe Input Voltage Range	-0.5V to 12V, protection up to 24V
Nominal Resolution	12 Bits
Max. Over Current	25 mA
Max. Error at 25°C (excluding zero) Adjusting filtering may tighten	<1.50% of FS

Input Ranges	0-20 mA, 4-20 mA, PT100 RTD
Input Impedance (clamped @ -0.5VDC to 12VDC)	Current Mode: 100 Ω
%AI Full Scale	32,000
Conversion Speed	Once per Ladder Scan
Filtering	160 Hz hash (noise) filter 1-128 scan digital running average filter

Analogue Outputs

Number of Channels	2
Output Ranges	4-20mA
Nominal Resolution	12 Bits
Response Time	One update per scan

Minimum Current Load	500Ω
Protection	Protection against miswire up to 24VDC
%AQ Full Scale	32,000
Max. Error at 25°C (excluding zero)	0-20mA < 1.5% of FS

Approvals

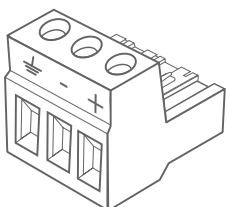
Certifications	CE, UL, cUL, FCC
Shock Tested	IEC 60068-2-27
Vibration Tested	IEC 60068-2-6
IP Protection Degree	IP65 (NEMA 4X)

Port Connectors



- 1 High Capacity MicroSD Slot
- 2 USB Mini-B Port
- 3 Ethernet
- 4 CAN Port (via RJ45)
- 5 RS232/RS485 Serial Connector
- 6 Analogue I/O
- 7 DC Inputs
- 8 DC Power
- 9 DC Outputs

Power Wiring



Primary Power Port Pins

Pin	Signal	Description
1	Ground	Frame Ground
2	DC -	Power Supply Common
3	DC+	Power Supply Voltage

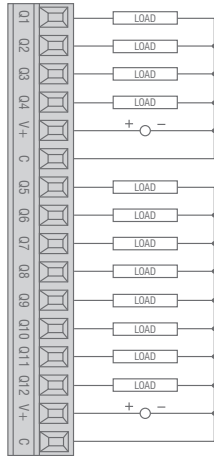
DC Input / Frame

Solid/Stranded wire; 12-24AWG (2.5-0.2mm). Strip length - 0.28" (7mm)
Torque rating: 4.5-7.0 in/lbs (0.50-0.78Nm)
DC- is internally connected to I/O 0V
Class 2 power supply must be used to meet UL requirements

Wiring Connectors

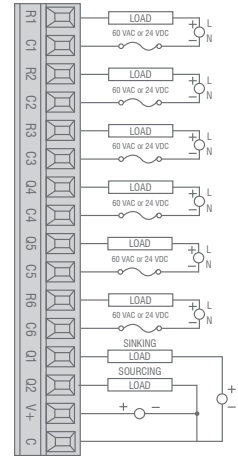
Model -10D14 Digital Out

Position / Pin	Digital Model
1	Q1 Output 1 (PWM)
2	Q2 Output 2 (PWM)
3	Q3 Output 3
4	Q4 Output 4
5	V+ External V+
6	C Common
7	Q5 Output 5
8	Q6 Output 6
9	Q7 Output 7
10	Q8 Output 8
11	Q9 Output 9
12	Q10 Output 10
13	Q11 Output 11
14	Q12 Output 12
15	V+ External V 2+
16	C Common



Model -10D12 Relay & Digital Out

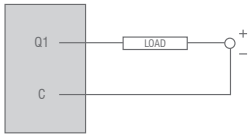
Position / Pin	Digital Model
1	R1 Relay 1 NO
2	C1 Relay 1 C
3	R2 Relay 2 NO
4	C2 Relay 2 C
5	R3 Relay 3 NO
6	C3 Relay 3 C
7	R4 Relay 4 NO
8	C4 Relay 4 C
9	R5 Relay 5 NO
10	C5 Relay 5 C
11	R6 Relay 6 NO
12	C6 Relay 6 C
13	Q1 Output 1 (PWM)
14	Q2 Output 2 (PWM)
15	V+ External V+
16	C Common



NOTE: Internal 10kΩ resistors between: V+ and Q1; V+ and Q2

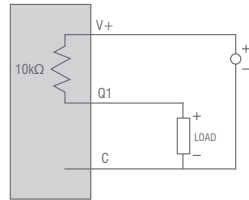
Model -10D14 Sinking & Sourcing Outputs

Sinking Outputs



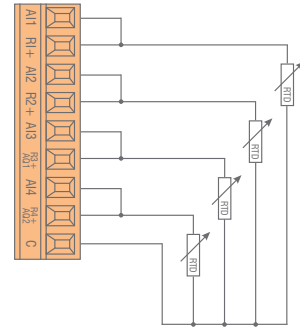
Sinking: Outputs can sink 500mA
Sourcing: 2.4mA sourcing @ 24VDC

Sourcing Outputs



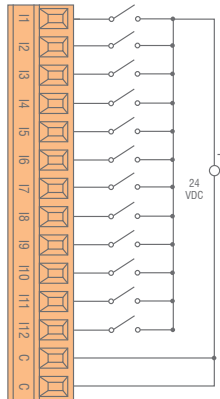
RTD: 4x2-Wire RTD Connection J3 Wiring

Pin	Digital Model
1	AI1
2	RTD1 +
3	AI2
4	RTD2 +
5	AI3
6	RTD3+ /AQ1
7	AI4
8	RTD4+ /AQ2
9	Common



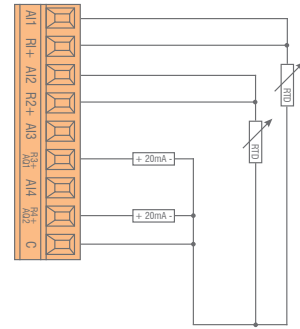
Digital Input

Position / Pin	Digital Model
1	I1 Input 1
2	I2 Input 2
3	I3 Input 3
4	I4 Input 4
5	I5 Input 5
6	I6 Input 6
7	I7 Input 7
8	I8 Input 8
9	I9 Input 9 (HSC)
10	I10 Input 10 (HSC)
11	I11 Input 11 (HSC)
12	I12 Input 12 (HSC)
13	C Common
14	C Common



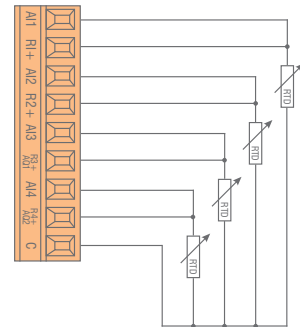
RTD: 2x3-Wire RTD Connection & 2x4-20mA Output J3 Wiring

Pin	Digital Model
1	AI1
2	RTD1 +
3	AI2
4	RTD2 +
5	AI3
6	RTD3+ /AQ1
7	AI4
8	RTD4+ /AQ2
9	Common



RTD: 4x3-Wire RTD Connection J3 Wiring

Pin	Digital Model
1	AI1
2	RTD1 +
3	AI2
4	RTD2 +
5	AI3
6	RTD3+ /AQ1
7	AI4
8	RTD4+ /AQ2
9	Common



Positive Logic Vs. Negative Logic Wiring

The i³C can be wired for positive logic inputs or negative.

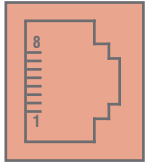
Positive Logic In

Negative Logic In

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CAN Communication



Modular jack (8 posn RJ45)

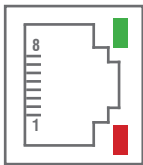
CAN Pin Assignments

Pin	Signal
8	No Connection
7	Ground
6	Shield
5	No Connection
4	No Connection
3	Ground
2	CAN Data Low
1	CAN Data High

The CAN port is provided via the single 8-position modular jack labelled "CAN". It may be used to communicate with other i3 modules using \mathcal{Z} CAN protocol. Additionally, remote expansion I/O such as Smart I/O may be implemented using the \mathcal{Z} CAN protocol.

Termination for the CAN port may be enabled from the System Menu or System Register. This should only occur if the i3CL is at one end of the CAN network or the other. Only the two devices on either end of the CAN network should be terminated.

Ethernet Communication



Link Indicator

Activity Indicator

Modular jack (8 posn RJ45)

10/100 Ethernet port with automatic MDI-X (crossover detection) is provided via the single 8-position modular jack labelled "LAN". Several features are available for use over Ethernet, such as Modbus TCP/IP, Ethernet/IP, SMTP (E-mail), and more.

Ethernet configuration is done via the i3 Configurator Hardware Configuration, though temporary Ethernet configuration may be done through the System Menu directly on the i3C Lite.

For more information on the Ethernet, available features and protocols, refer to the i3C Lite User Manual.

Built-in I/O

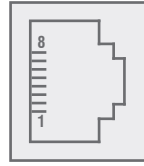
Both i3CL models feature built-in I/O. The I/O is mapped into i3 register space, in three separate areas – Digital/Analogue I/O, High-Speed Counter I/O, and High-speed Output I/O. Digital/Analogue I/O location is fixed starting at 1, but the high-speed counter and high-speed output references may be mapped to any open register location. For more details on using the high-speed counter and high-speed outputs, see the i3C Lite User Manual.

Fixed Address	Digital/Analogue I/O Function	10D12	10D14
%I	Digital Inputs	1-12	1-12
	Reserved	13-23	13-32
%Q	Digital Outputs	1-6	1-12
	Reserved	7-16	13-16
%AI	Analogue Inputs	1-4	1-4
	Reserved	5-12	5-12
%AQ	Analogue Outputs	1-2	1-2
	Reserved	3-6	3-6

Reserved areas maintain backward compatibility with other models

Serial Communication

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Modular jack (8 posn RJ45)

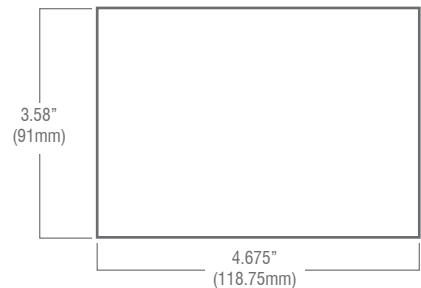
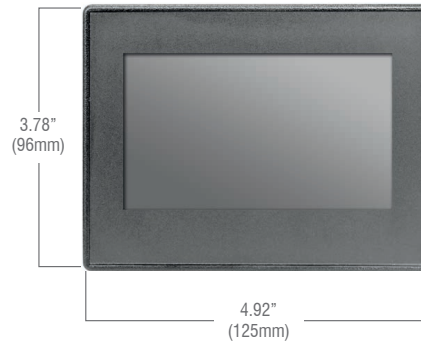
MJ1: RS-232 w/full handshaking

MJ2: RS-485 half-duplex

RS-485 termination and biasing via System Menu or System Register

Pin	MJ1 Pin		MJ2 Pin	
	Signal	Direction	Signal	Direction
8	TXD	OUT	--	
7	RXD	IN	--	
6	0V	Common	0V	
5	+5VDC @ 60mA	OUT	+5VDC @ ± 60mA	OUT
4	RTS	OUT	--	--
3	CTS	IN	--	--
2	--	--	RX- / TX-	IN / OUT
1	--	--	RX+ / TX+	IN / OUT

Installation Dimensions



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IMO

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EN 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 i3 Controller.

WARNING: To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse all Power Sources connected to the i3 controller. Be sure to locate fuses as close to the source as possible.

FR Sécurité

AVERTISSEMENT: la batterie peut exploser si elle est malmenée, endommagée. Ne pas recharger, démonter ou jeter au feu.

AVERTISSEMENT: RISQUE D'EXPLOSION - les Piles ne doivent être changées que dans un endroit sûr (Non Dangereux) respectant les règles de sécurités.

Cet équipement est conçu pour être utilisé uniquement dans des emplacements de classe 1, division 2, groupes A, B, C et D ou non dangereux.

POUR LES ÉTATS-UNIS ET LE CANADA SEULEMENT

Le câblage d'entrée et de sortie d'alimentation (E / S) doit être conforme à la classe 1, Division 2 méthodes de câblage du National Electric Code, NFPA70 pour installations situées aux États-Unis ou telles que spécifiées à l'article 18-1J2 du Code canadien de l'électricité pour les installations situées au Canada et en conformité avec les autorités compétentes.

AVERTISSEMENT: RISQUE D'EXPLOSION - Ne débranchez pas l'équipement si le courant n'a pas été coupé ou que l'endroit est connu pour être non dangereux.

AVERTISSEMENT: RISQUE D'EXPLOSION - La substitution de composants peut compromettre le respect des normes de Classe 1 et Division 2.

Les sorties numériques doivent provenir de la même source que le contrôleur i3.

AVERTISSEMENT: Pour éviter tout risque de choc électrique ou de brûlure, connectez toujours la terre de sécurité avant de faire d'autres connexions.

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: 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.

WARNING: Use caution when connecting controllers to PCs via serial or USB. PCs and especially laptops may use 'floating power supplies' that are ungrounded. This can cause a voltage potential between the laptop and controller. Make sure the controller and laptop are grounded for maximum protection or use an isolated serial or USB cable.

AVERTISSEMENT: Pour réduire les risques d'incendie, de choc électrique ou de blessure, il est fortement recommandé pour fusionner les entrées de mesure de tension. Assurez-vous de placer les fusibles le plus près possible de la source.

AVERTISSEMENT: Remplacez le fusible avec le même type et le même calibre pour vous protéger contre le risque d'incendie etrisques d'électrocution.

AVERTISSEMENT: En cas de défaillance répétée, ne remplacez PAS le fusible à nouveau, car une défaillance répétée indique condition défectueuse qui ne sera pas effacer en remplaçant le fusible.

AVERTISSEMENT: Seul du personnel électrique qualifié et familiarisé avec la construction et le fonctionnement de ce l'équipement et les risques encourus devraient installer, ajuster, utiliser ou réparer cet équipement. Lisez et comprenez ce manuel et les autres manuels applicables dans leur intégralité avant de en cours.

Le non-respect de cette précaution pourrait entraîner des lésions corporelles graves ou la perte de la vie.

AVERTISSEMENT: Soyez prudent lorsque vous connectez des contrôleurs à des PC via une connexion série ou USB. Les ordinateurs, en particulier les ordinateurs portables, peuvent utiliser des 'alimentations flottantes' non mises à la terre. Cela peut provoquer un potentiel de tension entre l'ordinateur portable et le contrôleur. Assurez-vous que le contrôleur et l'ordinateur portable sont mis à la terre pour une protection maximale ou utilisez un câble série ou USB isolé.

Common Cause of Analog 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.

