

# **1** ...Display, Control, Connect...



# User Guide



 $i^3$ User Guide

i<sup>3</sup>

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## Introduction to $i^3$

The  $i^3$  is a brand new concept in control product. It is a combination of a mini-PLC and HMI (pixel based 128x64 backlit LCD display). It is a cost effective family of high performance all-in-one controllers.

The  $i^3$  features an advanced control engine, operator interface, local and remote I/O capabilities, and a variety of communications options. The  $i^3$  is extremely versatile and adept at a variety of automation functions.

The  $i^3$  can be used to perform advanced machine control, factory machine monitoring, and process control.

Model Number	Digital	Analogue	Digital	Analogue	HSC	PWM	CAN
	Inputs	Inputs	Outputs	Outputs			
i3A12X/10A01-SOO	12	1 x 10 bit	6 Relay		4		No
i3A12X/10D03-SCH	12	4 x 10 bit	6 Relay		4		Yes
i3A12X/10B04-SCH	12	2 x 10 bit	12x.5A		4	2	Yes
i3A12X/20B05-SOH	24	2 x 10 bit	16x.5A		4	2	No
i3A12X/13C14-SOH	12	2 x 14 bit	12x.5A	2 (V or mA)	4	2	No

#### **Guide to Part Numbers**



## Installing *i*<sup>3</sup> Configurator Software

The IMO  $i^3$  Configurator software can be obtained from a CD or download from the  $i^3$  Configurator software from the IMO website: <u>www.imopc.com</u>



with the right mouse

Double click on the icon button to open the installation program.

i<sup>3</sup>

Windows Installer	
Preparing to install	
	Cancel

Follow the steps in the installation wizard to install the  $i^3$  Configurator to your PC.

🛃 i3 Config - InstallShield	Wizard
	Welcome to the InstallShield Wizard for i3 Config
	The InstallShield(R) Wizard will install i3 Config on your computer. To continue, click Next.
	WARNING: This program is protected by copyright law and international treaties.
	< Back Next > Cancel





醇 i3 Config - InstallShield Wizard 🛛 🛛 🔀
Destination Folder
Click Next to install to this folder, or click Change to install to a different folder.
Install i3 Config to: C:\Program Files\j3Config\ Change
Charge
InstallShield
< Back Next > Cancel
🖞 i3 Confie - InstallShield Wizard
Setup Type
Choose the setup type that best suits your needs.
Please select a setup type.
<ul> <li>Typical</li> </ul>
All program features will be installed. (Requires the most disk space.)
🔿 Custom
Choose which program features you want installed and where they
will be installed. Recommended for advanced users.
InstallShield
< Back Next > Cancel
📴 i3 Config - InstallShield Wizard 🛛 🛛 🔀
Ready to Install the Program
The wizard is ready to begin installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to
exit the wizard. Current Settings:
Setup Type:
Typical
Destination Folder:
C:\Program Files\i3Config\
User Information: Name: Lewis
Company: IMO
ToctalChield
< Back Install Cancel





🔂 i3 Confi	g - InstallShield Wizard
Installing The prog	i3 Config ram features you selected are being installed.
P	Please wait while the InstallShield Wizard installs i3 Config. This may take several minutes.
	Status:
	Generating script operations for action:
InstallShield –	
ar na carna) interva	< Back Next > Cancel



Tick the "Launch the program" box and click Finish.



#### Powering up and Connecting to an $i^3$

Connecting power to the  $i^3$ 

i<sup>3</sup>





When power is applied the  $i^3$  will then run a system diagnostic before running the user program.





To connect the  $i^3$  to a PC, connect the i3-PC45, RJ45 end into port 1 of the  $i^3$  and the 9 pin serial connector into the serial port of the PC (or USB to Serial adaptor).



## Tour of the $i^3$ Configurator

To launch the  $i^3$  Configurator program, either select the option from the Programs menu in Windows or double click the icon on the desktop with the right mouse button.



 $i^3$ 







The program is launched and we are faced with a blank new program named "untiled1.csp".



With an  $i^3$  connected it will automatically link to the  $i^3$  configurator software and set up the Controller, however it is best to check.

i³ iª Configurator - [untitled1]						
🗟 File Edit Program	Controller	Debug	Tools	Scree		
🔁 🖓 T 🗖 💆	I/O Coni No Film	figure				
12230	Set Tarc	rs iet Netwo	ork ID	_		
A B	Set Netv	vork Bau	d Rate			
1	Set Local Network ID					
Data Watch						
2 Status Diagnostics						
View/Set Clock						
3	Clear Me	emory				
4	Idle/Stop Run/Monitor					



Click the icon or select from the Controller menu "I/O Configure"

There are two ways to configure the controller, manually or automatic.

With an  $i^3$  connected to the PC the easiest method is to Auto-Config.

#### Automatic

I/O Configuration		×
CPU Slots Network I/O		
i3A12X/xxxxx - Net		
Empty	EMPTY Config	
Auto Config System		
	OK Cancel Apply	

Click on the Auto-Config button. A warning pop up will appear, click Yes.





#### Manual

Configure Controller         Type:         i3A12X/xxxxx - Net         i3A12X/xxxxx - Net         i3A12X/xxxxx - Net         i3A12X/xxxxx - Net         i3A12X/xxxxx - No Net         V220-RAH         V220-No Net         V221-iCAN         V250-iCAN         V250-No Net         V250-No Net         V250-No Net         V251-ICAN         V251-No Net         V251-No Net         V251-No Net         V251-ICAN         V251-No Net         V251-KAN         Network Type:         CAN - CsCAN	Model #: i3A12X/10B04-S <	To configure the Controller manually click on the Config button with the right mouse button and then select the type of controller from the pull down list. Then select the correct model number.
Advanced Ladder Functions Supports Analog Data Real Time Clock Support Supports Retentive Data	OK Cancel	



#### **Creating a Program**

Creating a New program, Saving a program or Opening an existing program, all done in the file menu.



The program file name format is "program\_name" followed by the extension .csp For example, program\_name.csp



#### Example

i<sup>3</sup>

Create a new program and save it. Name the program "bestofbothworlds".csp

Select the Boolean elements and right click the mouse on the NC contact.

Insert it at A1.



Insert the following detail into the contact

I/O Point		Σ	K
Address	%10001	✓ Screen >	
Name	em_stop		
		ОК	
		Cancel	

Now using the Boolean elements insert contacts and coils to make the following latching ladder diagram.

3	em_stop	START	STOP	RUN
0-	-1/F	┍━┏┣━┓	<u> </u>	()
1_	%10001	%K0001	%K0002	%Q0001
4		RUN		
			1	
_		%Q0001		
5				

Variable Name	Address	Туре
EM_STOP	%I0001	NC CONTACT
START	%K0001	NO Function Key
STOP	%K0002	NO Function Key
RUN	%Q0001	NO Coil & Contact



Now select another NO coil and insert it to the right of the RUN coil. When the I/O point menu pops up, click the screen button.





This will open up the screen editor.





Select the Text Table button and right click on the screen.



Double click on the word box to open up the properties.



	Text Table Data Properties	3
	Controller Register	
Enter the details as	Address: 200001	
shown		
	Name: operation	
	Data Format	
	Justification Font:	
	Digits: Text Table Number:	
	7 🕂 Text Table >>> 1	Click on the
	🗖 Editable 🔲 3D Sunken	button.
	Display Properties	
Once the	Attributes >>> Background Color >>>	
has been	Legend >>> Line Color >>>	
set up click	Data Color >>>	
button		
	OK Cancel	

Value Text Value Text Value:  Value:  Cancel OK	Table Number: 1 1 Add Edit Remove Bytes Used: 2	Click Add and assign the string STOPPED to the value 0, Click OK. Click Add again and assign the string RUNNING to the value 1. Finally click OK to exit the Text Table Entry.
	OK	



Click OK.

OK Cancel	
Image: constraint     Image: constraint       Operation       Image: constraint       Image: constraint <td>The Text Table box may need to be resized. Click and hold on the edge of the box and drag bigger</td>	The Text Table box may need to be resized. Click and hold on the edge of the box and drag bigger

Now close the graphic edit by clicking on the cross at the top right of the window. Click OK and the I/O point pop up window

The ladder diagram will now look like the diagram below.

**Legend Properties** 

Display Properties

Insert Special Char >>>

Text

Operation





## **Program Options**

Downloading, Uploading and Error Checking the program.



The error check gives the user a report on the project and lists any errors found.

There were no errors or warnings	×
*** Target Model: i3A12X/xxxxx - No Net ***	-
Ladder Size: 934 butes (0.32.9 full)	
La Caula Ciae 100 bates (0.1 % Cill)	
1/0 Coning Size: 1.32 bytes (0.1 % ruli)	
Graphics Objects Size: 736 bytes (U.28 % full)	
Text Table Size: 8 bytes (0.01 % full)	
String Size: 89 bytes (0.07 % full)	
Bitmap Size: 4 bytes (0.0 % full)	
Font Size: 8 bytes (0.0 % full)	
]	
OK	



#### Example

First Error Check the program you just created and then download it to the controller.

Download to Target	
Download program to controller at ID: 253?	
This will briefly STOP the controller while the download completes. The controller will be placed back to its original mode after a successful download.	
Live Graphics Update	
✓ Use SmartLoad (Download Changed Items)	lick the Use
🔽 User Program	SmartLoad and click
I/O and Network Configuration	OK.
🗹 Graphics Objects	
🗂 Setpoint Values	
Verify All After Download	
	Communication Progress
OK Cancel	😑 💆 📑
	Downloading Strings to node: 253
	0% 50% 10

#### Running and Monitoring the *i*3 Program

The  $i^3$  will be by default in STOP mode and requires to be put into RUN mode for the programmed  $i^3$  to operate.





$m{i}^3$ i $^{ m s}$ Configurator - [bestofbot		
🗟 File Edit Program Controller	Debug Tools Screens V	▲
	Debug/Monitor	To Monitor the RUNNING program
	Debug All Stop All Debug	either select from the menu or click the ico
A B C	Forcing (Overrides) 🔸	

When the program is being monitor, made contacts and coils are shown in red.

3 Ø-	em_stop	F1_KEY	F2_KEY	operation	( ) Force Screen: 1	
14	%10001	%K0001	%K0002	%Q0001	Operation TITIT	
5		%Q0001				



## *i*<sup>3</sup> Help File

The help file is extensive and explains all that there is to know on the  $i^3$ , to open the Help file, either use the menu or press F1.



 $i^3$ 



#### Appendix A: Data Types

BOOL -	Boolean; A single bit. '0' or '1', a.k.a 'FALSE' or 'TRUE'
BYTE -	Byte; 8 consecutive bits. Byte format is used more where the value of
	the data is not as important as the bit patterns (shifts and rotates).
WORD –	Word; A string of 16 consecutive bits. Word format is used more
	where the value of the data is not as important as the bit patterns (shifts and rotates).
DWORD -	Double Word; A string of 32 consecutive bits. DWORD format is used
	where the value of the data is not as important as the bit patterns (shifts and rotates).
INT –	Integer; A 16-bit signed value. Integers are used where the value of the
	data is expected to be in the range of -32,768 to +32,767
SINT -	Short Integer; An 8-bit signed value. Short Integers are used where the
	value of the data is expected to be in the range of $-128$ to $+127$ .
DINT -	Double Integer; A 32-bit signed value. Double Integers are used where
	the value of the data is expected to be in the range of -2,147,483,648 to
	+2,147,483,647.
UINT -	Unsigned Integer; A 16-bit unsigned value. Unsigned Integers are
	used where the value of the data is expected to be in the range of $-0$
	(zero) to 65,535.
USINT -	Unsigned Short Integer; An 8-bit unsigned value. Unsigned Short
	Integers are used where the value of the data is expected to be in the
	range of 0 (zero) to 255
UDINT -	Unsigned Double Integer; A 32-bit unsigned value. Unsigned Double
	Integers are used where the value of the data is expected to be in the
	range of 0 (zero) to 4,294,967,296.
REAL -	Floating Point; A 32-bit value. Values are stored and operated on in
	IEEE single precision (six digit) format. Values range from -
CEDING	3.40282E+38 to +3.40282E+38.
STRING –	String; A variable-length succession of characters. Each character is
	represented by one byte.



## Appendix B: $i^3$ Register Types

Туре	Description and example of use	Format	Retentive	#Available
%I	Discrete Inputs from the field; prox sensors, panel buttons, etc	BOOL	YES	2048
%Q	Discrete Outputs to the field; relays, indicator lamps, etc.	BOOL	NO	2048
%AI	Analog Inputs from the field; Thermocouples, 4-20mA inputs	WORD	YES	512
%AQ	Analog Outputs to the field; 0-10VDC or 4- 20mA outputs	WORD	NO	512
%IG	Global Discrete Inputs from the CAN; in from other OCS	BOOL	YES	64 per node
%QG	Global Discrete Outputs to the CAN; out to other OCS	BOOL	NO	64 per node
%AIG	Global Analog Inputs from the CAN; in from other OCS	WORD	YES	32 per node
%AQG	Global Analog Outputs to the CAN; out to other OCS	WORD	NO	32 per node
%T	Internal Temporary bits, use for contacts and coils	BOOL	NO	2048
%M	Internal Temporary bits, use for contacts and coils	BOOL	YES	2048
%R	Internal Registers, use for Timers and Counters and other data	WORD	YES	2048-9999
%К	Keypad bits, reflect Function Key status	BOOL	NO	5-12
%D	Display bits, control screens or indicate screen on/off	BOOL	NO	200-1023
%S	Internal System Bits (See System Registers)	BOOL		
%SR	Internal System Registers (See System Registers)	WORD		



Point	Name	Function
%S01	FST SCN	Indicates First
/0501	rsi_sch	Scan
%S02	NET_OK	Network is OK
%S03	T_10MS	10mS pulse
%S04	T_100MS	100mS pulse
%S05	T_1SEC	1 second pulse
%S06	IO_OK	I/O is OK

Appendix C:	System Bits
-------------	-------------

Point	Name	Function
%S07	ALW_ON	Always ON
%S08	ALW_OFF	Always OFF
%S09	PAUSING_SCN	Pause 'n
%S10	RESUMED_SCN	Pause 'n load done
%S11	FORCE	I/O being forced
%S12	FORCE_EN	Forcing is enabled

#### Appendix D: System Registers

For Details on the functionality of the different SR registers, consult the help file.

SR	Name	Min	Max	SR #	Name	Min	Max
#							
1	User Screen	0	200*	39	<b>BIOS Version</b>		
	Number						
2	Alarm Screen	0	200*	40	FPGA Version		
	Number						
3	System Screen	0	10*	41	LCD Columns		
	Number						
4	Self Test Result			42	LCD Rows		
5	<b>Controller Mode</b>	0	2	43	Keypad Type		
	(RUN)						
6	Scan Rate Avg			44	RTC Seconds	0	59
7	Reserved			45	<b>RTC Minutes</b>	0	59
8	Reserved			46	<b>RTC Hours</b>	0	23
9	<b>Edit Buffer Low</b>			47	<b>RTC Day of Month</b>	1	31
10	Edit Buffer High			48	RTC Month	1	12
11	Ladder Size Low			49	RTC Year	1996	2095
12	Ladder Size High			50	RTC Day of Week	1	7
13	User Text Size Low			51	Network Error Count		
14	User Text Size			52-55	Reserved		
	High						
15	System Text Size			56	Last Key		
	Low						
16	System Text Size			57	LCD Backlight		
	High						
17	I/O Config Size			58	User Leds		
	Low						
18	I/O Config Size			59-60	Reserved		

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Min

0

0

0

5

0

0

0

0

0

0

1

1

1

1200

1000

1000

1000

1000

1000

1000

Max

Name

Num Ids

Reserved

**CF** Free Low

CF Free High CF Total Low CF Total High Reserved Alarms

Unacknowledged Alarms Active System Beep

**User Beep** 

**Screen Saver** 

**Screen Saver Time** 

Network Usage (Avg)

**Network Usage (Min)** 

Network Usage (Max)

Network TX Use (Avg)

Network TX Use (Min)

Network TX Use (Max)

**CF Status** 

SR	Name	Min	Max	SR #
#				
	High			
19	Net Config Size			61
	Low			
20	Net Config Size			62-174
	High			
21	Security Data Size			175
	Low			
22	Security Data			176
	Size High			
23	Ladder CRC			177
24	User Text CRC			178
25	System Text CRC			179
26	I/O Config CRC			180
27	Net Config CRC			181
28	Security Data CRC			182
29	Network ID Low	1	253	183
30	Network Baud	0	3	184
	Rate			
31	Network Required	0	1	185
32	LCD Contrast	1	255	186
33	Key Toggle Mode	0	1	187
34	Serial Protocol			188
35	Serial Number Low			189
36	Serial Number			190
	High			
37	Model Number			191
38	Engine Version	1		192
30	Eligine version			194

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