Introduction

Knowledge

The purpose of this tutorial is to demonstrate the Modbus slave communication functions of the i3.

In this tutorial we will demonstrate the i3 as a Modbus slave with HMI connected to the i3 controlling it. The advantage of having the capability of connecting to an external HMI allows data to be represented in different aspects in another location.

To demonstrate the connection between an i3 and an HMI we will connect an i3 to an iView. This gives us the advantage of being able to provide the user with another and more graphical interface.

i3 Modbus Map

Modbus Master Mapping					
Internal Reference	Maximum Range	Traditional Modbus Reference	Expanded Modbus Reference	Modbus Command(s)	Modbus Offset
%Q1	2048	00001	000001		00000
%M1	2048	03001	003001	Read Coil Status (1)	03000
%T1	2048	06001	006001	Force Multiple Coils (15)	06000
%QG1	256	09001	009001		09000
%11	2048	10001	100001		00000
%IG1	256	13001	103001	Read Input Status (2)	03000
%S1	256	14001	104001		04000
%K1	256	15001	105001		05000
%AI1	512	30001	300001		00000
%AIG1	32	33001	303001	Read Input Register (4)	03000
%SR1	32	34001	304001		04000
%AQ1	512	40001	400001		00000
0/ D	9999	(previously 43001 for 2048 registers)	410001	Read Holding Registers (3)	03000
70 K				Preset Single Registers (6) Preset Multiple Registers (16)	06000
%AQG1	32	46001	406001		10000

Protocol Configuration

Unlike with the master setting there is no protocol to set up before programming the ladder logic. The Modbus slave configuration is completely set up in Ladder logic.

Programming Example

In this tutorial we are going to demonstrate the screens on the i3 demonstration program on a Graphical IV04M

The i3 program will be very straightforward, we are just going to add the Modbus slave function to the demonstration program. The iView program will be programmed to display a similar screen to the screen showing on the i3.

Ladder Logic Programming

Using the program i3 demo prog.csp add to the program the Modbus slave function and Open Port function.

Comm Operations 💽
Bitwise Operations
Boolean Élements
Compare Operations
Convert Operations
Math Operations
Move Operations
Simple Elements
Timer/Counter Operation
Special Operations
Advanced Math
Comm Operations
String Operations

Select from the Communication Operations the Open Communication Port function icon insert it into a rung with an 'Always On' contact. Now select a Modbus slave function icon insert it into the same rung.

ALV_ON		OPEN		MODBUS	
%S007	MJ2- 38400- None- 8-	PORT Baud Parity Data Bits	MJ2- 1- 200-	PORT Address Timeout	
	1- MD half- M RTU- RS-485-	Stop Bits Handshake Protocol Mode		Status	-%R00100



Double click on the functions and insert the parameter details as shown. This Port Open Function Opens the selected port and designates a protocol to it. The Modbus slave function defines the slave's address and a status register so that the communication link status can be viewed.

Open Comm Port	×	Comm Modbus Slave	×
C Settings From Registers		Port: MJ2	
Address: Name:	8x 16-BIT	Slave ID: 1 Name:	▼ 16-BIT
Port: MJ2		Timeout: 200 Name:	The second secon
· <u> </u>		Status: %R00100 Name:	▼ 16-BIT
Baud Rate: 9600		Inhibit Write Command	
		Enable	
Parity: None		Inhibit Bit: Name:	
Data Bits: 8		Exception Message	
Stop Bits:		Enable	
		Byte Count: Name:	
Handshake: Multidrop Half 💌		New Pole	
Protocol: Modbus BTU		Message Data:	
		Store and Forward	
Mode: RS-485		Enable	
		Table Count:	
OK Cancel		Alias Table: Name:	- 16-BIT
		,	
		OK	Cancel

Screen Editor Programming

The screen editor program will be exactly the same as in the demo program.

iView Programming

The iView screens will change as the i3 screens change and display a similar screen to that on the i3. Please refer to the iView Training manual for programming instructions on the iView.

Screen	i3 Address	Modbus Reference Address	
2	Timer PV - %R3	43003	
2	Timer CV - %R7	43007	
2	Bar Graph - %R7	43007	
3	Lamp - %M1	03001	
3	Meter - %R9	43009	
3	CV - %R9	43009	
3	PV - %R11	43011	
4	Message - %R4	43004	
5	Graph - %R7	43007	
5	Up - %K6	15006	
5	Reset - %K10	15010	
6	Keys - %K1 to %K4	15001 to 15004	
7	Alarm - %R4	43004	
8	Inputs - %I1 to %I4	10001 to 10004	

iView - i3 Screens





1.1		1.1				1.1		1.1
	Timer	Valu	ie 👘	1 - 1 - 1	Т	imer	Prese	t
#### mS 100					###1	ŧ mS		
1. A.				1.00			1. A. A.	
		· · ·						
S	Screen 3							
				1.00		1.1	1.1	1.1
		· · · ·	· · ·					



Alarms and Logging

A. A. А.

A.

TTTTTTTTTT

Lamp

Lamp







Time Status 31/12/16 23:59 AAA A.

31/12/16 23:59 AAA A.
 31/12/16
 23:59
 AAA

 31/12/16
 23:59
 AAA

 31/12/16
 23:59
 AAA

31/12/16 23:59 AAA

Lamp

Screen 5

· · ·	Function Keys				· · ·	
· ·	• •	· · ·			· · ·	
-	к1 ()	к2 (0)) (кз <mark>0</mark>	к4 ©	
	· ·					
		So	reen	7		

Function Keys











Wiring Diagram

We are using Port 2 on the i3 as a RS485, 2 wire, twisted-pair to connect to the iView. The wiring for this is as follows.

Port 2 connections

Pin	MJ2 Pins		
8	TXD	OUT	
7	RXD	IN	
6	0 V	GND	
5	N/C	N/C	
4	TX-	OUT	
3	TX+	OUT	
2	RX-	IN	
1	RX+	IN	



i3 to iView

This wiring has the advantage that both the iView and i3 can still have their programming ports connected, thus making debugging easier.



Remember to connect the RS-485 termination jumper as shown

Running the Program

Please connect the i3 and iView as shown and use the programs below:

As the user scrolls through the screens on the i3 the iView screens will change in sync. The user will also be able to enter data on the iView and change the values in the i3.





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