

This technical note is intended as a simple guide for customers who would like to use Spectrum Controls new 32 channel analog input module as a replacement for an existing Allen-Bradley 1771-IFE, 16 channel analog input module. It is assumed that the user is familiar with RSLOGIX5 and PLC5 software and hardware. The [1771sc-IFE32 User Manual](#) is intended to be used as a reference and will be referred to in this document.

Installation:

Power down the rack and replace the Allen-Bradley 1771-IFE module with the Spectrum 1771sc-IFE32 module. Take note of the rack and slot number when replacing the IFE module. This information will be used to configure the BTW (Block Transfer Write) instructions for the IFE32 module later in this document. Follow the wiring guidelines outlined in the Spectrum [1771sc-IFE32 User Manual](#) when terminating field wiring. See examples below:

Fig. 1 (Single Ended Current Inputs)

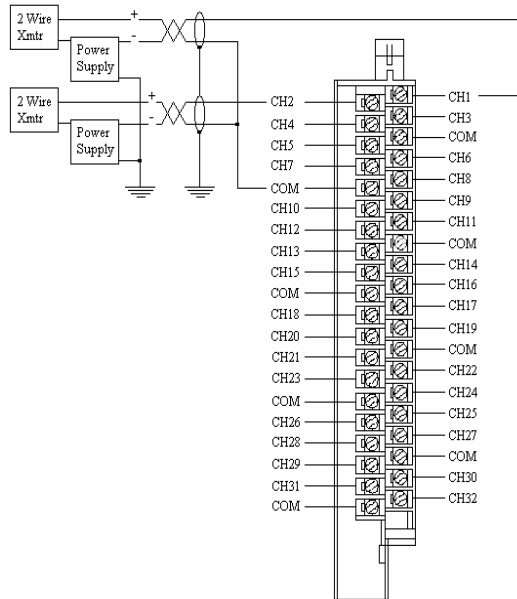
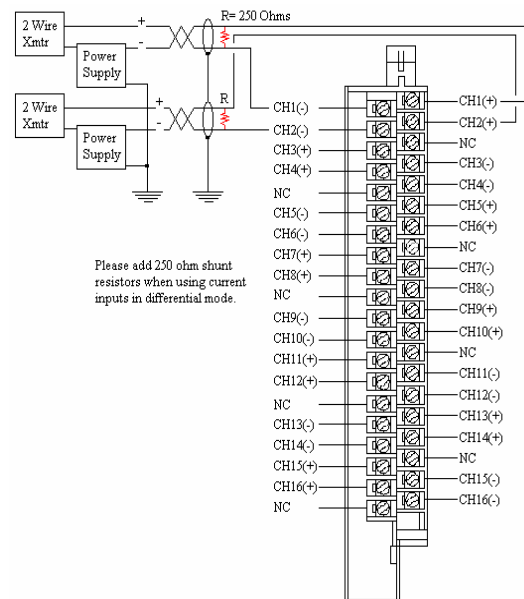


Fig. 2 (Differential Current Inputs)



Configuration:

The IFE32 can be easily configured using generic block transfers. The module supports the standard PLC5 rack addressing scheme. The figure below displays a typical rack configuration.

Fig. 3

I/O Configuration - Chassis Table											
<input checked="" type="checkbox"/> Show Non-I/O Rows											
NAME	I/O Channel	Chassis Type	Adapter	Inh	Res	Rack Addressing	ControlNet Node	Rack	Group	Span	Complementary
Chassis_1	Local	1771-A1B (4 slots)	PLC-5/30	<input type="checkbox"/>	<input type="checkbox"/>	1 Slot		0	0	0/0 - 0/3	--
	0 - <DF1>										
	1A - <DH+>										
	1B - <I/O Scanner>										

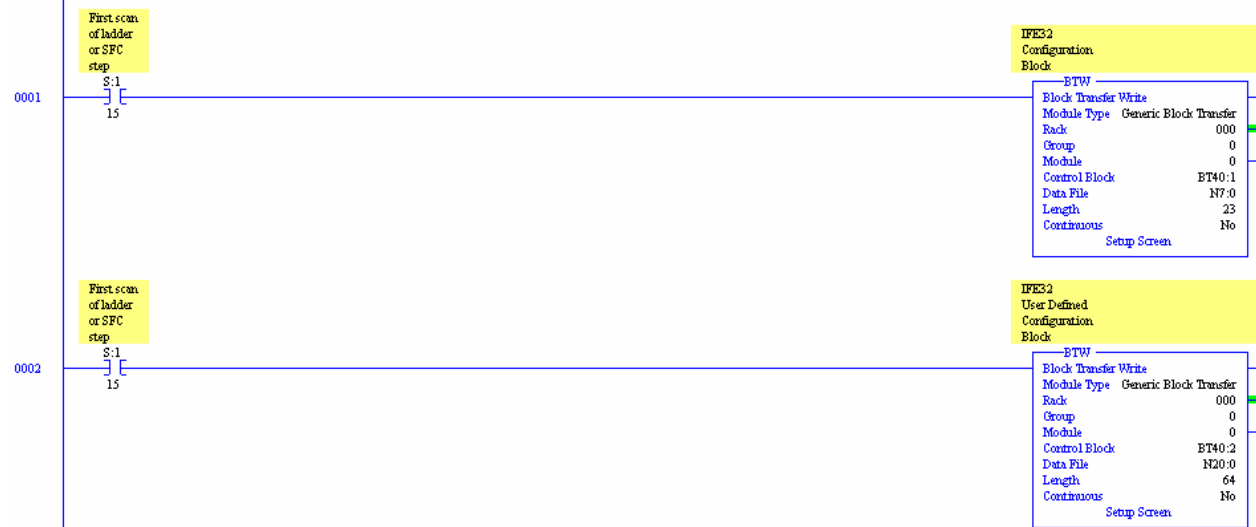
Note1: The RSLOGIX 5 I/O auto configuration feature does not presently support the IFE32.

Note2: There are no jumper settings required to configure the IFE32 module.

The IFE32 is configured using one BTW (Block Transfer Write) instruction, 23 words in length. If the user defined scaling is to be used, another BTW instruction is required. The second BTW instruction will be 64 words in length. See ladder sample below:

Note3: Rung number 2, shown in figure 4 below, is only required if user defined scaling is to be utilized.

Fig. 4



The rack and group values, for the IFE32 module, must be entered into each BTW and BTR instruction. See Figure 4 above.

The BTW instruction, 23 words in length, is used to configure the type/range, data format, filter frequency, etc., for each channel. For a definition of each item listed in the “description” column on the following two tables, please refer to the 1771sc-IFE32 User Manual. *Table 1* below shows how to configure the IFE32 for 4 to 20mA in single ended mode.

Table 1(Single Ended Mode)

Word/Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Description
0		6				6				6							Type/Range
1		6				6				6							Type/Range
2		6				6				6							Type/Range
3		6				6				6							Type/Range
4		6				6				6							Type/Range
5		6				6				6							Type/Range
6		6				6				6							Type/Range
7		6				6				6							Type/Range
8		3				3				3							Data Format
9		3				3				3							Data Format
10		3				3				3							Data Format
11		3				3				3							Data Format
12		3				3				3							Data Format
13		3				3				3							Data Format
14		3				3				3							Data Format
15		3				3				3							Data Format
16	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	Filter Frequency
17	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	Filter Frequency
18	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	Filter Frequency
19	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	Filter Frequency
20								4									Auto Calibrate
21																1	Debug Flags
22																0	RTS

Single Ended (Hex.)	Differential (Hex.)	Limits
0	8	-10 to +10 V
1	9	0 to 10 V
2	A	0 to 5 V
3	B	1 to 5 V
4	C	-5 to +5 V
5	NA	0 to 20mA
6	NA	4 to 20mA
7	NA	-20mA to +20mA
F ¹	F ¹	Disabled

¹You can't disable channels within a group that contains active channels.

Hex Value	Data Format
0	Signed 16 Bit
1	Unsigned 16 Bit
2	Signed 12 Bit
3	Unsigned 12 Bit
4	Signed BCD
5	Unsigned BCD

Binary Value	-3dB Frequency
00	13.65 Hz
01	7.8 Hz
10	209.6 Hz
11	1667 Hz

Hex Value	Rate
0	Once Every 30 Minutes
1	Once an Hour
2	Once a Day
3	On Command
4	Once on Power On/Reset

Hex. Value	Usage
0	BTR Data Only
1	BTR and Configuration Data

Decimal Value	Sample Time	Decimal Value	Sample Time
0	Disabled	16	1.6s
1	100ms	17	1.7s
2	200ms	18	1.8s
3	300ms	19	1.9s
4	400ms	20	2.0s
5	500ms	21	2.1s
6	600ms	22	2.2s
7	700ms	23	2.3s
8	800ms	24	2.4s
9	900ms	25	2.5s
10	1.0s	26	2.6s
11	1.1s	27	2.7s
12	1.2s	28	2.8s
13	1.3s	29	2.9s
14	1.4s	30	3.0s
15	1.5s	31	3.1s

Note4: Within a channel pair both channels must be specified as single acquisition or both as differential acquisition. Also, within a group of 8 consecutive channels, all 8 channels must be from either 8 voltage or 8 current sources.

Table 2 below shows how to configure the IFE32 for 4 to 20mA in Differential mode.

Table 2 (Differential Mode)

Word/Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Description
0	B		B		B		B		B		B		B		B		Type/Range
1	B		B		B		B		B		B		B		B		Type/Range
2	B		B		B		B		B		B		B		B		Type/Range
3	B		B		B		B		B		B		B		B		Type/Range
4	B		B		B		B		B		B		B		B		Type/Range
5	B		B		B		B		B		B		B		B		Type/Range
6	B		B		B		B		B		B		B		B		Type/Range
7	B		B		B		B		B		B		B		B		Type/Range
8	3		3		3		3		3		3		3		3		Data Format
9	3		3		3		3		3		3		3		3		Data Format
10	3		3		3		3		3		3		3		3		Data Format
11	3		3		3		3		3		3		3		3		Data Format
12	3		3		3		3		3		3		3		3		Data Format
13	3		3		3		3		3		3		3		3		Data Format
14	3		3		3		3		3		3		3		3		Data Format
15	3		3		3		3		3		3		3		3		Data Format
16	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	Filter Frequency
17	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	Filter Frequency
18	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	Filter Frequency
19	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	Filter Frequency
20							4										Auto Calibrate
21							1										Debug Flags
22							0										RTS

Single Ended (Hex.)	Differential (Hex.)	Limits
0	8	-10 to +10 V
1	9	0 to 10 V
2	A	0 to 5 V
3	B	1 to 5 V
4	C	-5 to +5 V
5	NA	0 to 20mA
6	NA	4 to 20mA
7	NA	-20mA to +20mA
F ¹	F ¹	Disabled

¹You can't disable channels within a group that contains active channels.

Hex Value	Data Format
0	Signed 16 Bit
1	Unsigned 16 Bit
2	Signed 12 Bit
3	Unsigned 12 Bit
4	Signed BCD
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Binary Value	-3dB Frequency
00	13.65 Hz
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10	209.6 Hz
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Hex Value	Rate
0	Once Every 30 Minutes
1	Once an Hour
2	Once a Day
3	On Command
4	Once on Power On/Reset

Hex. Value	Usage
0	BTR Data Only
1	BTR and Configuration Data

Decimal Value	Sample Time	Decimal Value	Sample Time
0	Disabled	16	1.6s
1	100ms	17	1.7s
2	200ms	18	1.8s
3	300ms	19	1.9s
4	400ms	20	2.0s
5	500ms	21	2.1s
6	600ms	22	2.2s
7	700ms	23	2.3s
8	800ms	24	2.4s
9	900ms	25	2.5s
10	1.0s	26	2.6s
11	1.1s	27	2.7s
12	1.2s	28	2.8s
13	1.3s	29	2.9s
14	1.4s	30	3.0s
15	1.5s	31	3.1s

Note4: Within a channel pair both channels must be specified as single acquisition or both as differential acquisition. Also, within a group of 8 consecutive channels, all 8 channels must be from either 8 voltage or 8 current sources.

Note5: Please note that in Table 2 the (1 to 5 V) input type selection was made. Current modes are not applicable for differential mode. In order to use current inputs in differential mode a 250Ω shunt resistor must be added, see Figure 2, and the module must be configured for (1 to 5 V) or (0 to 5 V).

Table 3 (User Defined Scaling/Single Ended Mode)

Word	Value Entered in Decimal	Description
0	0	Ch0 Scaled Min.
1	100	Ch1 Scaled Max.
2	0	Ch2 Scaled Min.
3	100	Ch2 Scaled Max.
4	0	Ch3 Scaled Min.
5	100	Ch3 Scaled Max.
58	0	Ch29 Scaled Min.
59	100	Ch29 Scaled Max.
60	0	Ch30 Scaled Min.
61	100	Ch30 Scaled Max.
62	0	Ch31 Scaled Min.
63	100	Ch31 Scaled Max.

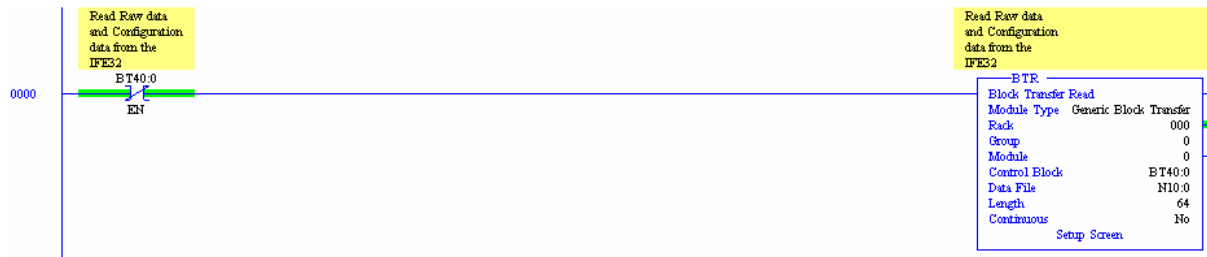
A second BTW instruction is required if one wishes to use the module's user defined scaling option. The second BTW instruction must be 64 words in length. Please refer to Figure 4 for ladder sample. Table 3 shows the layout for the user defined scaling when the module is configured for single ended mode.

Note6: If differential mode is used, every other channel group is skipped. For example, when channel 1 is used in differential mode Scale word 0 (Min Scale) and Word 1 (Max Scale) are used. Word 2 and Word 3 are skipped. Word 4 and Word 5 are Min and Max Scale words for channel 2, etc.

Note7: To disable the user defined scaling for an individual channel the scaled min. and max. must be set to 0.

Module Status & Input Data:

Depending on the value stored in word 21 of the configuration block, see Tables 1 and 2, the BTR (Block Transfer Read) instruction will be either 41 or 64 words in length. The figure below shows the BTR instruction for the latter case.



If only the module data is to be read, the data will be presented in the data registers as follows:

Table 4(Module Data Only)

Word/Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Description
0									CE	HF	EE	CS	RT	IS	OR	PU	Diagnostics
1	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH9	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1	Channel Fault
2	CH32	CH31	CH30	CH29	CH28	CH27	CH26	CH25	CH24	CH23	CH22	CH21	CH20	CH19	CH18	CH17	Channel Fault
3	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH9	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1	Under Range
4	CH32	CH31	CH30	CH29	CH28	CH27	CH26	CH25	CH24	CH23	CH22	CH21	CH20	CH19	CH18	CH17	Under Range
5	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH9	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1	Over Range
6	CH32	CH31	CH30	CH29	CH28	CH27	CH26	CH25	CH24	CH23	CH22	CH21	CH20	CH19	CH18	CH17	Over Range
7	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH9	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1	Sign
8	CH32	CH31	CH30	CH29	CH28	CH27	CH26	CH25	CH24	CH23	CH22	CH21	CH20	CH19	CH18	CH17	Sign
9	Channel 1 Data																Data
10	Channel 2 Data																Data
11	Channel 3 Data																Data
12	Channel 4 Data																Data
39	Channel 31 Data																Data
40	Channel 32 Data																Data

If both the configuration echo and module data is to be read, then the data will be presented as shown in Table 5.

Table 5(Module Data/Configuration Echo)

Word/Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Description
0									CE	HF	EE	CS	RT	IS	OR	PU	Diagnostics
1	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH9	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1	Channel Fault
2	CH32	CH31	CH30	CH29	CH28	CH27	CH26	CH25	CH24	CH23	CH22	CH21	CH20	CH19	CH18	CH17	Channel Fault
3	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH9	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1	Under Range
4	CH32	CH31	CH30	CH29	CH28	CH27	CH26	CH25	CH24	CH23	CH22	CH21	CH20	CH19	CH18	CH17	Under Range
5	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH9	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1	Over Range
6	CH32	CH31	CH30	CH29	CH28	CH27	CH26	CH25	CH24	CH23	CH22	CH21	CH20	CH19	CH18	CH17	Over Range
7	CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH9	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1	Sign
8	CH32	CH31	CH30	CH29	CH28	CH27	CH26	CH25	CH24	CH23	CH22	CH21	CH20	CH19	CH18	CH17	Sign
9	Channel 1 Data																Data
10	Channel 2 Data																Data
40	Channel 32 Data																Data
41	Channel 4				Channel 3				Channel 2				Channel 1				Type/Range
42	Channel 8				Channel 7				Channel 6				Channel 5				Type/Range
43	Channel 12				Channel 11				Channel 10				Channel 9				Type/Range
44	Channel 16				Channel 15				Channel 14				Channel 13				Type/Range
45	Channel 20				Channel 19				Channel 18				Channel 17				Type/Range
46	Channel 24				Channel 23				Channel 22				Channel 21				Type/Range
47	Channel 28				Channel 27				Channel 26				Channel 25				Type/Range
48	Channel 32				Channel 31				Channel 30				Channel 29				Type/Range
49	Channel 4				Channel 3				Channel 2				Channel 1				Data Format
50	Channel 8				Channel 7				Channel 6				Channel 5				Data Format
51	Channel 12				Channel 11				Channel 10				Channel 9				Data Format
52	Channel 16				Channel 15				Channel 14				Channel 13				Data Format
53	Channel 20				Channel 19				Channel 18				Channel 17				Data Format
54	Channel 24				Channel 23				Channel 22				Channel 21				Data Format
55	Channel 28				Channel 27				Channel 26				Channel 25				Data Format
56	Channel 32				Channel 31				Channel 30				Channel 29				Data Format
57	Ch8	Ch7	Ch6	Ch5	Ch4	Ch3	Ch2	Ch1									Filter Frequency
58	Ch16	Ch15	Ch14	Ch13	Ch12	Ch11	Ch10	Ch9									Filter Frequency
59	Ch24	Ch23	Ch22	Ch21	Ch20	Ch19	Ch18	Ch17									Filter Frequency
60	Ch32	Ch31	Ch30	Ch29	Ch28	Ch27	Ch26	Ch25									Filter Frequency
61	Automatic Calibration Rate																Autocal
62	Debug Flags																Debug Flags
63	Real Time Sampling																RTS

Summary:

The 1771sc-IFE32 is a high density module capable of replacing two Allen-Bradley 1771-IFE modules. The IFE32 offers 16 bit resolution, easy installation, and configuration without the need of circuit jumpers. With possible update times of as little as 2.1ms per channel and 16 bit resolution, the IFE32 is an ideal solution for jobs requiring large quantities of analog inputs.