F500 Elite.

F5004V6C & F50046C

FIELDBUS ADAPTER.

T500 Elite to Ethernet/Modbus TCP/IP communications.

(Software Version 1.4.3)

Approvals: Suitable for use in Hazardous Locations
CL II Div 1 GPS E, F & G (CANADA ONLY)
CL II Div 2 GPS F & G (USA ONLY)

IMPORTANT NOTE: Please refer to page 12 and APENDIX ‘C’ of this manual when converting temperatures from the stored value into actual units.

CONTENTS

F5004V4C & F5004V46C
ETHERNET FIELDBUS ADAPTER.

Dear 4B Customer:

Congratulations on your purchase. 4B appreciates your business and is pleased you have chosen our products to meet your needs.

Please read in its entirety and understand the literature accompanying the product before you place the product into service. Please read the safety precautions carefully before operating the product. With each product you purchase from 4B, there are some basic but important safety considerations you must follow to be sure your purchase is permitted to perform its design function and operate properly and safely, giving you many years of reliable service. Please read and understand the Customer Safety Responsibilities listed below. Failure to follow this safety directive and the Operation Manuals and other material furnished or referenced, may result in serious injury or death.

SAFETY NOTICE TO OUR CUSTOMERS

A. In order to maximize efficiency and safety, selecting the right equipment for each operation is vital. The proper installation of the equipment, and regular maintenance and inspection is equally important in continuing the proper operation and safety of the product. The proper installation and maintenance of all our products is the responsibility of the user unless you have asked 4B to perform these tasks.

B. All installation and wiring must be in accordance with Local and National Electrical Codes and other standards applicable to your industry. (Please see the article "Hazard Monitoring Equipment Selection, Installation and Maintenance" at www.go4b.com.) The installation of the wiring should be undertaken by an experienced and qualified professional electrician. Failure to correctly wire any product and/or machinery can result in the product or machine failing to operate as intended, and can defeat its design function.

C. Periodic inspection by a qualified person will help assure your 4B product is performing properly. 4B recommends a documented inspection at least annually and more frequently under high use conditions.

D. Please see the last page of this manual for all warranty information regarding this product.

CUSTOMER SAFETY RESPONSIBILITIES

1. READ ALL LITERATURE PROVIDED WITH YOUR PRODUCT

Please read all user, instruction and safety manuals to ensure that you understand your product operation and are able to safely and effectively use this product.

2. YOU BEST UNDERSTAND YOUR NEEDS

Every customer and operation is unique, and only you best know the specific needs and capabilities of your operation. Please call the 24-hour hotline at 309-698-5611 for assistance with any questions about the performance of products purchased from 4B. 4B is happy to discuss product performance with you at any time.

3. SELECT A QUALIFIED AND COMPETENT INSTALLER

Correct installation of the product is important for safety and performance. If you have not asked 4B to perform the installation of the unit on your behalf, it is critical for the safety of your operation and those who may perform work on your operation that you select a qualified and competent electrical installer to undertake the installation. The product must be installed properly to perform its designed functions. The installer should be qualified, trained, and competent to perform the installation in accordance with Local and National Electrical Codes, all relevant OSHA Regulations, as well as any of your own standards and preventive maintenance requirements, and other product installation information supplied with the product. You should be prepared to provide the installer with all necessary installation information to assist in the installation.

4. ESTABLISH AND FOLLOW A REGULAR MAINTENANCE AND INSPECTION SCHEDULE FOR YOUR 4B PRODUCTS

You should develop a proper maintenance and inspection program to confirm that your system is in good working order at all times. You will be in the best position to determine the appropriate frequency for inspection. Many different factors known to the user will assist you in deciding the frequency of inspection. These factors may include but are not limited to weather conditions; construction work at the facility; hours of operation; animal or insect infestation; and the real-world experience of knowing how your employees perform their jobs. The personnel or person you select to install, operate, maintain, inspect or perform any work whatsoever, should be trained and qualified to perform these important functions. Complete and accurate records of the maintenance and inspection process should be created and retained by you at all times.

5. RETAIN AND REFER TO THE OPERATION MANUAL FOR 4B'S SUGGESTED MAINTENANCE AND INSPECTION RECOMMENDATIONS

As all operations are different, please understand that your specific operation may require additional adjustments in the maintenance and inspection process essential to permit the monitoring device to perform its intended function. Retain the Operation Manual and other important maintenance and service documents provided by 4B and have them readily available for people servicing your 4B equipment. Should you have any questions, please call the 4B location who supplied the product or the 24-hour hotline number in the USA -309-698-5611.

6. SERVICE REQUEST AND ONLINE PRODUCT REGISTRATION

If you have questions or comments about the operation of your unit or require the unit to be serviced please contact the 4B location who supplied the product or send your request via fax (309-698-5615), email (4b-usa@go4b.com), or call us via our 24-hour hotline number in the USA - 309-698-5611. Please have available product part numbers, serial numbers, and approximate date of installation. In order to assist you, after the product has been placed into service, complete the Online Product Registration section which is accessed via our website www.go4b.com

F500 FIELDBUS ADAPTER.

INTRODUCTION

This version of the F500 Elite Fieldbus adapter had been designed to work as a T500 Elite communications gateway and has been designed specifically to allow up to 4 x T500 control units running software version 2.3.4 and above, to be networked together through their own built in communications system. The network data can then be passed through the Fieldbus adapter to an Ethernet/Modbus TCP/IP network. The communications control unit is housed in a self-contained wall-mounting enclosure, and will operate from 100v to 240v AC or 24v DC.

1. SPECIFICATIONS

1.1 The Control Unit

A plastic enclosure houses the electronics and terminal connectors. The unit contains a printed circuit board to accommodate power supply circuitry, microprocessor, Fieldbus card and terminals. The design is capable of accommodating 8 of the most common Fieldbus interfaces.

Electrical Supply (F5004V46C)	–	100 to 240VAC +/- 10% 50/60Hz
(F5004V4C)	-	24VDC +/- 10%
Power Consumption	-	12VA/12 WATTS
Terminals	-	Power 4mm² 14 AWG max
	-	Communications, as appropriate to the Fieldbus module.
Protection	-	CL II Div 1 GPS E, F & G IP66 (CANADA ONLY) CL II Div 2 GPS F & G IP66 (USA ONLY)
Height	-	9.7”, 246mm
Width	-	7.4”, 188mm
Depth	-	4”, 102mm
Fixing Centres	-	8.75” high x 4” wide, 222mm x 102mm
Cable Entry	-	2 Holes 11/8” DIA, 28mm, ¾” CONDUIT
Weight	-	3lbs, 1.3Kg

2. INSTALLATION INSTRUCTIONS

The Control Unit

The Control Unit box should be installed in a suitable control or starter switch room. The box should have sufficient space to open the lid for wiring.

The Control Unit is susceptible to static voltage. Connection of a clean ground to terminal 29 is essential for optimum performance. Prior to this connection, static handling precautions should be taken.

3 ELECRICAL WIRING

Refer to Drawings A, B, C & E

When installing the equipment in an area which is likely to be hazardous from Ignitable Dusts, use liquid tight conduit and fittings and follow all local codes.

4 OPERATING INSTRUCTIONS

The Fieldbus Adapter is a self contained unit and there are no user configurable options with the exception of the Ethernet IP address. The adapter is equipped with two communications ports; RS485 and Ethernet TCP/IP.

The RS485 port is a four wire, twin twisted pair full duplex serial port and has been specifically configured to work with the T500. You should not connect any other devices to this port

The Ethernet port meets the requirements of the 10/100Base-T twisted pair Ethernet physical layer. Although the Ethernet Fieldbus adapter module is designed for use with the general form of the TCP/IP communications model, it has been specifically configured to work with Ethernet/Modbus TCP/IP. The Fieldbus module should be connected through a standard Ethernet communications hub. Alternatively, a peer to peer connection could be made using a single crossover or uplink cable. The Fieldbus Ethernet module will support up to 16 simultaneous Ethernet TCP connections. The default configurations used by the Fieldbus module are as follows.

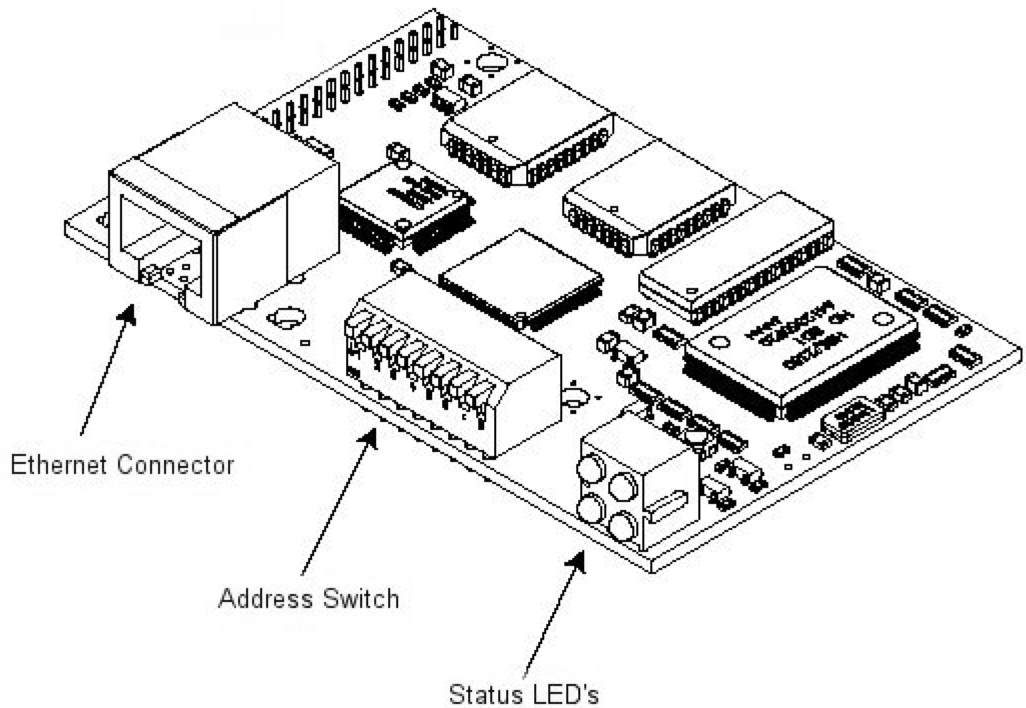
IP Address. 192.168.0.X
Port = 502

This module is currently configured for use as part of an intranet network only therefore further settings are not required. By default, the following settings are also applied.

Subnet address 255.255.255.0, Gateway Address 0.0.0.0.

These settings can be ignored as they are only useful when connecting to an internet network.

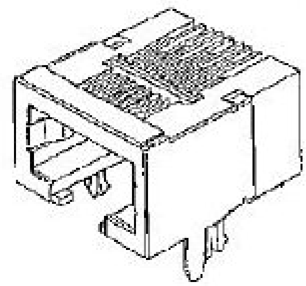
The last byte of the IP address "X" refers to the settings made on the switches located on the Ethernet module. The switch block contains 8 switches which represent the last 255 addresses of the IP address 192.168.0.1-255. The rightmost switch (switch 8) is the Least Significant Bit and the leftmost switch (switch 1) is the Most Significant Bit of the address. The switch is considered on (selected) when in the down position. The F500 is supplied with a default switch setting for IP 192.168.0.100. The address of the module can be changed at any time without the need to recycle power. See Appendix A. Caution must always be exercised when working with an open unit when power is still applied.



The above diagram shows the location of the main parts of the Ethernet Fieldbus module.

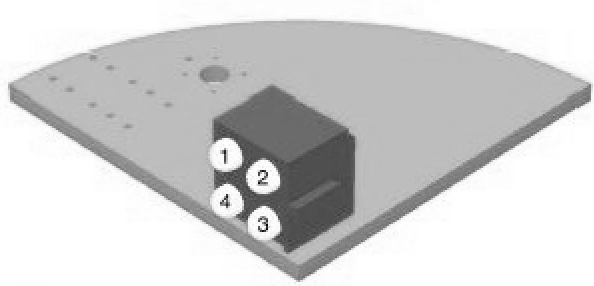
The Ethernet connections are shown below and are identical to the standard Ethernet RJ45 connections.

Connector Pin	Signal	Description.
1	TD+	Positive Transmit Data
2	TD-	Negative Transmit data
3	RD+	Positive Receive Data
4		No Connection
5		No Connection
6	RD-	Negative Receive Data
7		No Connection
8		No Connection
Casing	PE	Protective Earth



In order for the F500 to work correctly it is advisable to connect it to an Ethernet system employing a static IP address rather than a DHCP system. If the DHCP scheme is employed then it will be necessary to allocate a static address to the PC/PLC interface responsible for the data monitoring of the F500 Elite. The F500 Ethernet card can be reconfigured to comply with any IP, Subnet and Gateway configuration but as this is a difficult process we recommend that you adopt the static address method. Refer to Appendix 'B' for details of how to change the IP/Subnet/Gateway address of the F500.

The statuses LED are grouped in a single block of four and indicate the following status.



Led 1 Status

Colour	*Frequency*	*Description*
Green	Steady on	Indicated that the module is connected to an Ethernet network.

Led 2 Status

Colour	*Frequency*	*Description*
Green	Steady on	The module is operating correctly
Green	1 Hz	The module is not yet configured (Standby) See Note 'A'
Red	1 Hz	The module has reported a minor fault.
Red	Steady on	The module has reported a major fault.
Red/Gn	Flash	Power on self test in progress.

Led 3 Status

Colour	*Frequency*	*Description*
Green	Flash	At least 1 Ethernet connection has been made. See Note 'A'
Green	Steady on	No Ethernet connections have yet been made.
Red	Flash	An existing Ethernet connection has timed out. Reset the device and the F500.
Red	Steady on	The module has detected that a duplicate IP address has been used, so change the address and try again.
Red/Gn	Flash	Power on self test in progress.

NOTE 'A': Led 2 and 3 will flash together when the F500 is correctly initialised and connected to an Ethernet HUB. If Led 2 only is flashing, this indicates that the Ethernet module hasn't yet initialised and established a connection.

Led 4 Status

Colour	*Frequency*	*Description*
Green	-	Flashes from green to off when a packet is received or transmitted.

How does it all work?

The F500 is designed to monitor data for 256 sensors and 64 ambient temperatures (refer to the T500 manual for a more detailed explanation of how this number is made up). Due to limitations in the data space available the sensor table in the F500 is divided into 4 pages, each page being capable of holding data for 64 sensors and the ambient temperatures for 16 TN4(e) sensor nodes. Therefore 4 pages of 64 sensors = 256 sensors, and 4 pages of 16 ambient temperatures = 64 ambient. The F500 can be configured to operate as follows:

Blocks in T500-1	Blocks in T500-2	Blocks in T500-3	Blocks in T500-4	Total Sensors	Total Ambient
1 Sensors 1-64	0	0	0	64	16
1 Sensors 1-64	1 Sensors 1-64	0	0	128	32
1 Sensors 1-64	1 Sensors 1-64	1 Sensors 1-64	0	192	48
1 Sensors 1-64	1 Sensors 1-64	1 Sensors 1-64	1 Sensors 1-64	256	64
1 Sensors 1-64	2 Sensors 1-128	1 Sensors 1-64	0	256	64
2 Sensors 1-128	2 Sensors 1-128	0	0	256	64
2 Sensors 1-128	1 Sensors 1-64	1 Sensors 1-64	0	256	64
1 Sensors 1-64	1 Sensors 1-64	2 Sensors 1-128	0	256	64
0	1 Sensors 1-64	0	1 Sensors 1-64	128	64

0	0	1 Sensors 1-64	1 Sensors 1-64	128	64
0	0	0	1 Sensors 1-64	64	32
4 Sensors 1-256	0	0	0	256	64
0	4 Sensors 1-256	0	0	256	64
3 Sensors 1-192	1 Sensors 1-64	0	0	256	64
1 Sensors 1-64	0	3 Sensors 1-192	0	256	64
0	0	0	4 Sensors 1-256	256	64

These are a few examples of the flexible nature of the T500/F500 configuration. There is a simple rule to observe. The F500 can hold 4 blocks of data. Each T500 can supply between 1 and 4 blocks of data. There isn't sufficient room for all 16 blocks of data so you have to decide how many T500 you need to use and how many blocks of sensor data you need to monitor. If you require more than the 4 blocks of data available to the F500 then you will need to add further F500 to the system. The minimum system is 1 T500 connected to 1 F500 and monitoring 1 block of sensor data (64 sensors and 16 ambient temperatures).

The data is stored in the F500 in the following manner.

Data word	Contents
0	T500 – 1, number of active data blocks (1-4)
1	T500 – 1, Activity counter
2	T500 – 2, number of active data blocks (1-4)
3	T500 – 2, Activity counter
4	T500 – 3, number of active data blocks (1-4)
5	T500 – 3, Activity counter
6	T500 – 4, number of active data blocks (1-4)
7	T500 – 4, Activity counter
8	F500 Fault indicator (0-3)
9	Not used…
10	Block 1, first two sensors
…	
41	Block 1, last two sensors (64 sensors in total)
….	
42	Block 2, first two sensors
…	
73	Block 2, last two sensors (64 sensors in total)
….	
74	Block 3, first two sensors
…	
105	Block 3, last two sensors (64 sensors in total)
….	
106	Block 4, first two sensors
…	
137	Block 4, last two sensors (64 sensors in total)
138 & 139	Not Used
140	Block 1, first two ambient temperatures
…	
147	Block 1, last two ambient temperatures (16 in total)
…	
148	Block 2, first two ambient temperatures
…	
155	Block 2, last two ambient temperatures (16 in total)
…	
156	Block 3, first two ambient temperatures
…	
163	Block 3, last two ambient temperatures (16 in total)
…	
164	Block 4, first two ambient temperatures
…	
171	Block 4, last two ambient temperatures (16 in total)
180	T500-1 & T500-2 alarm status
181	T500-3 & T500-4 alarm status

The data is arranged in a logical order to suite each T500 connected to the interface. The data for T500 -1 is represented in the following form.

Word 0 holds the number of blocks allocated to T500 number 1 (this is done in the T500 as part of the set up procedure).

Word 1 is the activity counter for T500 number 1. Because the T500 cycle time is dependant upon the number of sensors being monitored (this can be between 1 and 8 seconds), it is important to know when the data has been refreshed. The activity counter provides this information. Providing the T500 is updating the data to the F500 this counter will increment by 1 every time new data is received by the F500. The counter will increment between 0 and 255 and it will then return back to 0 on a continuous basis. Each T500 can be assigned a unit number between 0 and 4. Assigning a 0 unit number means that the T500 will not respond to the F500 poll requests. If a number between 1 and 4 is assigned to each of the T500 connected to the F500 then each T500 will provide data in a manner described above. Care must be taken when assigning the T500 a unit number as duplication of numbers will cause confusion of the data stored in the F500. It is not necessary to connect all four T500 units to the F500 in order for it to work. A single T500 assigned as unit 1 will work equally well.

Each T500 has two words of data associated with it in an identical manner to that described for T500-1 above; please refer to the table on page 8 for T500-2 to T500-4.

The data is stored in the blocks in numerical order, which means that sensor 1 is stored first and sensor 64 is stores last. If T500-1 is configured to operate with two blocks then the data is stored like this

10 Block 1, first two sensors (T500-1 sensors 1 & 2)
…
41 Block 1, last two sensors (T500-1 sensors 63 & 64)
….
42 Block 2, first two sensors (T500-1 sensors 65 & 66)
…
73 Block 2, last two sensors (T500-1 sensors 127 & 128)

If T500-2 is also configured to operate with two blocks then the data is stored like this

74 Block 3, first two sensors (T500-2 sensors 1 & 2)
…
105 Block 3, last two sensors (T500-2 sensors 63 & 64)
….
106Block 4, first two sensors (T500-2 sensors 65 & 66)
…
137 Block 4, last two sensors (T500-2 sensors 127 & 128)

The same can be said for the ambient temperature sensors.

Allocation of data can become complex to understand but essentially each new block starts where the previous block finishes irrespective of which T500 the data comes from. Sensor numbers always start at 1 and work upwards for example: If 1 block is allocated to T500-1 the sensor data is for sensors 1-64. If T500-2 is also allocated 1 block then it too will send data for sensors 1-64. If T500-1 and T500-2 are both assigned two blocks each then they will each send data for sensor 1-128 (4 blocks in total and 256 sensors in total). Please refer to page 7 and 8 in this manual for further detail of block allocation.

The sensor data is presented as Hexadecimal ($) in 16 bit words. Each word contains two 8 bit sensor values or ambient temperatures. Each value represents the most recent update for that sensor or node. It can be seen from the description on page 7 that it is necessary to further decode the data words in order to extract individual sensor values.

Using this format data can be read from the F500 either in a single large block, by smaller blocks or by single data words.

NTC Temperature sensors
Positive temperatures values are between $0°C and $6E°C. Negative temperature values are represented by numbers between $7F and $96. To calculate negative temperatures subtract $7F from the value and the result is a negative temperature between -$0°C and -$1F°C (e.g. $8A – $7F = -$0B°C). If the value is $EE then this represents an open circuit sensor. If the Value is $FE this represents a sensor which is above the calibrated range and if the value is $FF then this represents a short circuit sensor.

PTC Temperature sensors
As the PTC sensor types can only be represented as NORMAL or HOT, there is only need to provide two values to indicate the state of the sensor. If the value is $F0 then the sensor is NORMAL and if the value is $F1, then the sensor is HOT.

CNT (Contact) Sensors
As the CNT sensor types can only be represented as OPEN or CLOSED, there is only need to provide two values to indicate the state of the sensor. If the value is $FA then the contact is OPEN and if the value is $FB, then the contact is CLOSED.

Ambient Temperatures
See the details for the NTC Temperature Sensor above.
The ambient temperatures are taken from a sensor located on each TN4(e) sensor node.

Communications Errors
If the T500 fails to communicate correctly with the TN4(e) node then it will report a communications error and the F500 will mirror this error by sending the code $EF.

Unallocated sensors
Sensors which have not been programmed into the T500 will present the code $FD.

Below is a table showing a complete list of the data represented in the F500

Decimal	Hex	Description
0 – 110	\$00– \$6E	NTC Temperature 0°C to 110°C
127 – 158	\$7F– \$9E	NTC Temperature -0°C to -31°C
238	\$EE	NTC open circuit sensor
239	\$EF	Communications error (lost contact with sensor node)
240	\$F0	PTC Sensor in the NORMAL state
241	\$F1	PTC Sensor in the HOT state
250	\$FA	CNT contact in the OPEN (off) state
251	\$FB	CNT contact in the CLOSED (on) state
253	\$FD	Sensor not scanned by T500 (this includes the ambient)
254	\$FE	NTC Temperature above maximum range
255	\$FF	NTC sensor is short circuit?

As the temperatures are in °C it may be necessary to convert the value to °F
Calculate the temperature value complete with sign and call it T°C, therefore
T°F = (T°C * 1.8) + 32

E.g. If T°C = 20°C then T°F = (20 * 1.8)+32 = 68°F
If T°C = -20°C then T°F = (-20 * 1.8) + 32 = -4°F

Exception Status

Only three exception codes are generated by the module. These are only generated when one of the following occur. An attempt has been made to use a function call which is not supported by the Fieldbus module. An attempt to read input registers beyond those which have been initialised or an illegal request for data has been received by the module, for example, an attempt to read word data beyond the configured maximum. These codes are generated by the application layer of the Ethernet protocol and are not available for general reading.

Remote alarm acknowledge

The F500 software version 1.3.4 and above is equipped with the ability to remotely acknowledge the T500 alarm state. The T500 can still be acknowledged locally at the T500 (see the T500 manual). As we are able to have between 1 and 4 T500 units connected to the F500 it is essential to know which T500 is generating the alarm. This is already implied by the data read from the T500 (see above) but two data words are reserved to indicate directly the state of the alarm warning condition. Words 180 and 181 are reserved for this purpose. Each word being 16 bits holds the status for two T500 alarms. Word 180 holds the status for T500-1 in the upper 8 bits and T500-2 in the lower 8 bits. Therefore, if word 180 contained \$0000, neither T500 is in alarm. If word 180 contained \$FF00 then T500-1 is in alarm and T500-2 is not in alarm. If word 180 contains \$00FF the T500-1 has no alarms and T500-2 has an alarm. Finally if word 180 contains \$FFFF the both T500's are in alarm. The same can be applied to word 181 which relates to T500-3 and T500-4. Words 180 & 181 are read only.

So now we know which T500 is in alarm and by examining the data we can tell which sensor is generating the alarm. To complete the cycle we need to be able to acknowledge the alarm back to the T500 which generated the alarm(s). Words 1025 and 1026 are reserved for this purpose and they operate in a very similar manner to words 180 and 181. Each word being 16 bits holds the acknowledge request for two T500 units. Word 1025 is the acknowledge request for T500-1 in the upper 8 bits and T500-2 in the lower 8 bits. Therefore, if word 1025 contained $0000, neither T500 alarm will be acknowledged. If word 1025 containes $FF00 then T500-1 is acknowledged and T500-2 is not. If word 1025 contains $00FF the T500-1 has no acknowledge request and T500-2 has an acknowledge request. Finally if word 1025 contains $FFFF the both T500's have an alarm acknowledge request in place. The same can be applied to word 1026 which relates to T500-3 and T500-4. Words 1025 and 1026 are read/write.

One you have requested an alarm acknowledge you can monitor its progress by reading the appropriate word. For example: word 180 contains $FF00 which means T500-1 has an alarm(s) present. Setting word 1025 to $FF00 will tell T500-1 to cancel the alarm warning. After the T500 has done this it will reset word 180 to $0000 thus confirming the alarm acknowledge. **At the end of the acknowledge cycle you must clear the acknowledge request to 00 (set 1025 to $0000) or you will not be able to generate further alarm acknowledge requests for that T500.**

Therefore, the cycle goes like this:
T500-1 generates and alarm (Word 180 = $FF00 – upper 8 bits = $FF)
You want to acknowledge the alarm (set word 1025 to $FF00 – upper 8 bits = $FF)
Then keep looking at word 180 until it changes back to $0000
Then set word 1025 to $0000
This completes the alarm acknowledge cycle.

The T500 responds to a change in value from $00 to $FF and then back to $00. If you leave the acknowledge value at $FF the T500 will acknowledge the current alarm but further alarms can not be acknowledged remotely (but can be acknowledged locally by pressing the set key on the T500 unit).

If you request an alarm acknowledge without an alarm being present, the T500 will ignore the request. You must however clear the request register to $00 ready for use again next time.

Because the T500 update time varies with the number of nodes attached it can take between 1 and 8 seconds to acknowledge an alarm through the F500. Average time to acknowledge is about 3 seconds (based upon a typical installation). The T500 treats the F500 as a low priority interface.

CHECK LIST
For problems after initial start-up

1. Is there excessive interference on the electrical power supply? Power conditioners and surge (spike) suppressor may have to be fitted.

2. Has the wiring for the F500 and Fieldbus been routed away from power cables?

3. Is the F500 Elite circuit properly grounded?

4. Is the Micro-processor control unit overheating, if so mount the unit in a temperature-controlled environment of maximum temperature 113°F (45°C).

5. Check that high powered 'Walkie Talkie' radios are not operated immediately near the control unit or F500 as this will affect the performance.

6. Check that the communications/power cable is connected correctly and in accordance with DRG A,B,C and E.

7. Check that there is no exception status reported.

8. If the T500 units are not responding or are intermittent, check that the termination resistors are correctly fitted.

CONTACT INFORMATION

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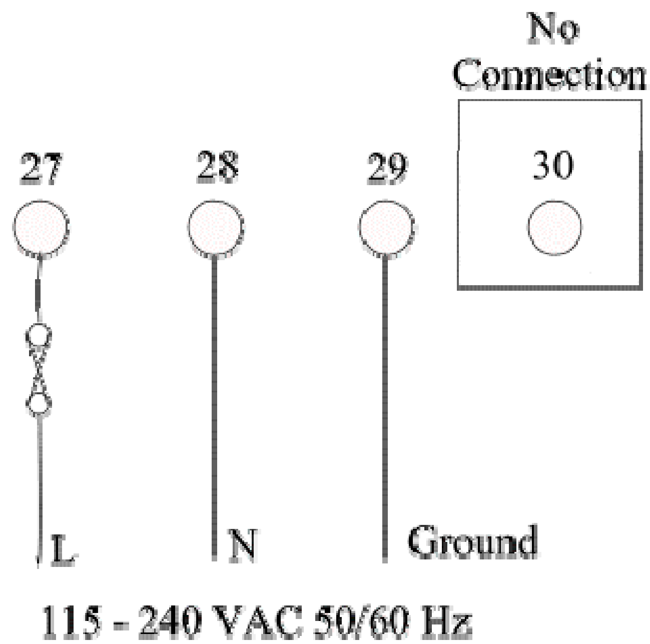
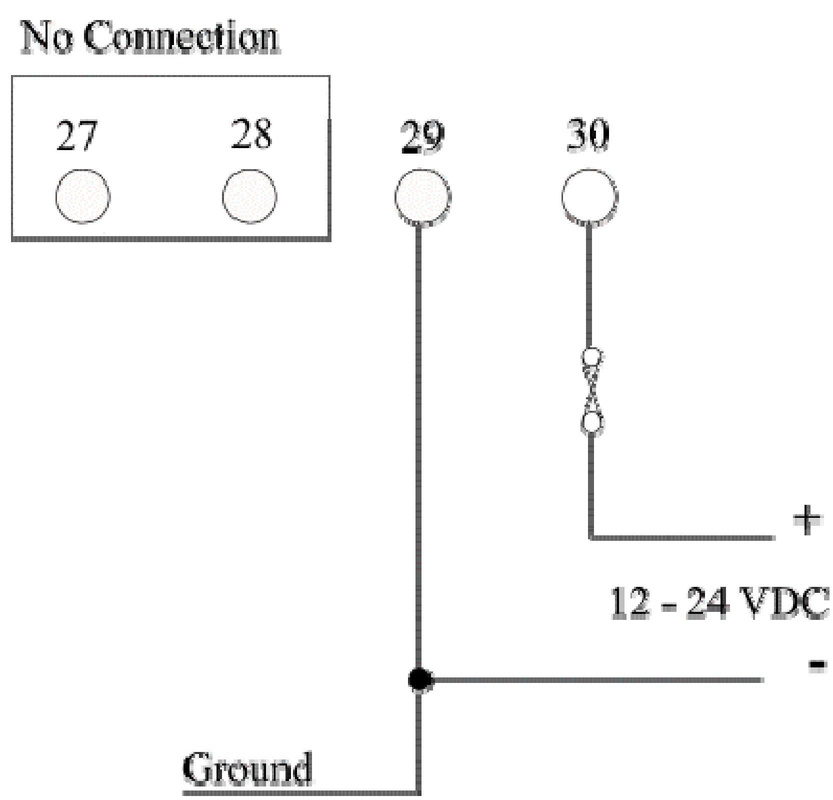
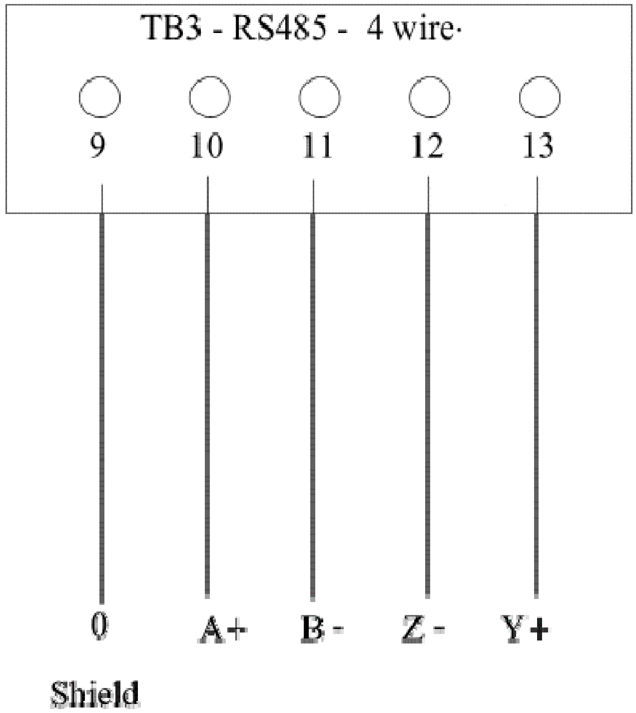

No
Connection
27
28
29
30
L
N
Ground
115 - 240 VAC 50/60 Hz

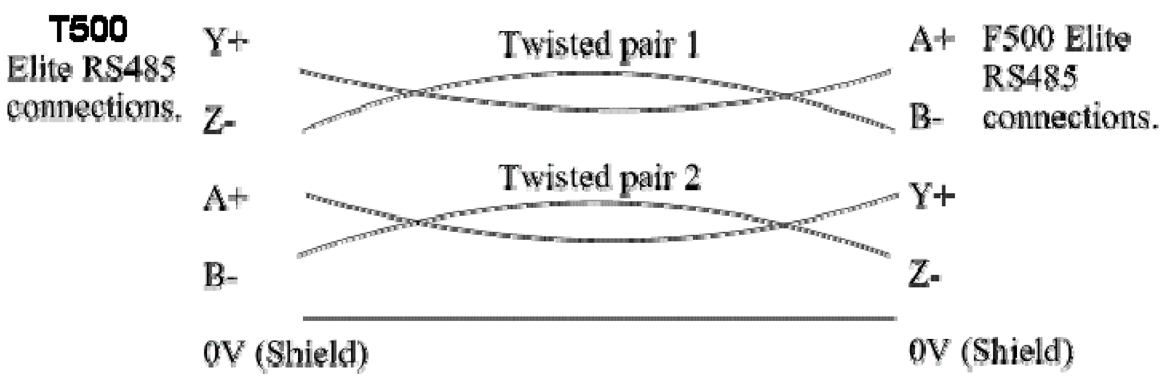
DRG 'A'


No Connection
27
28
29
30
+
12 - 24 VDC
-
Ground

DRG 'B'

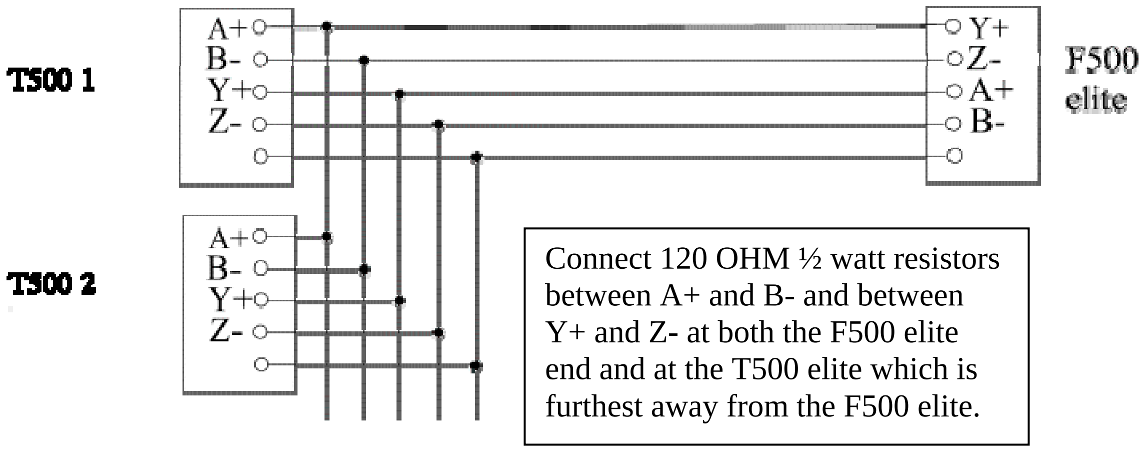
T500 Elite to F500 Elite Connection Diagram

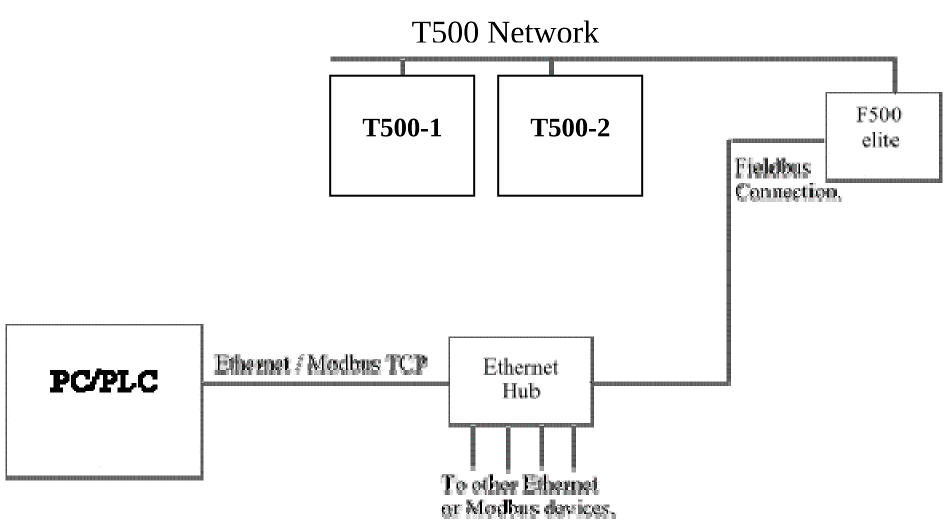




DRG 'C'

General connection detail for the T500 Elite to F500 Elite





DRG 'E'

Appendix 'A'

The table below represents the settings for the Ethernet address switch as described on page 5. The F500 is supplied with a default IP address of 192.168.0.100. The last three numbers of the address can be changed to eliminate conflicts with existing IP address's already in use on your Ethernet system. The switches are numbered 1 to 8 left to right and switch 8 represents the lowest binary number. In the table below a '0' represents the switch in the OFF or UP position and a '1' represents the switch in the DOWN or ON position. The table is made up in the following format

ABC 12345678
Where ABC is the last part of the IP address 192.168.0.ABC and 12345678 represents the switch number from left to right.

001	00000001	033	00100001	065	01000001	097	01100001
002	00000010	034	00100010	066	01000010	098	01100010
003	00000011	035	00100011	067	01000011	099	01100011
004	00000100	036	00100100	068	01000100	100	01100100
005	00000101	037	00100101	069	01000101	101	01100101
006	00000110	038	00100110	070	01000110	102	01100110
007	00000111	039	00100111	071	01000111	103	01100111
008	00001000	040	00101000	072	01001000	104	01101000
009	00001001	041	00101001	073	01001001	105	01101001
010	00001010	042	00101010	074	01001010	106	01101010
011	00001011	043	00101011	075	01001011	107	01101011
012	00001100	044	00101100	076	01001100	108	01101100
013	00001101	045	00101101	077	01001101	109	01101101
014	00001110	046	00101110	078	01001110	110	01101110
015	00001111	047	00101111	079	01001111	111	01101111
016	00010000	048	00110000	080	01010000	112	01110000
017	00010001	049	00110001	081	01010001	113	01110001
018	00010010	050	00110010	082	01010010	114	01110010
019	00010011	051	00110011	083	01010011	115	01110011
020	00010100	052	00110100	084	01010100	116	01110100
021	00010101	053	00110101	085	01010101	117	01110101
022	00010110	054	00110110	086	01010110	118	01110110
023	00010111	055	00110111	087	01010111	119	01110111
024	00011000	056	00111000	088	01011000	120	01111000
025	00011001	057	00111001	089	01011001	121	01111001
026	00011010	058	00111010	090	01011010	122	01111010
027	00011011	059	00111011	091	01011011	123	01111011
028	00011100	060	00111100	092	01011100	124	01111100
029	00011101	061	00111101	093	01011101	125	01111101
030	00011110	062	00111110	094	01011110	126	01111110
031	00011111	063	00111111	095	01011111	127	01111111
032	00100000	064	01000000	096	01100000	128	10000000

129	10000001	161	10100001	193	11000001	225	11100001

130	10000010	162	10100010	194	11000010	226	11100010
131	10000011	163	10100011	195	11000011	227	11100011
132	10000100	164	10100100	196	11000100	228	11100100
133	10000101	165	10100101	197	11000101	229	11100101
134	10000110	166	10100110	198	11000110	230	11100110
135	10000111	167	10100111	199	11000111	231	11100111
136	10001000	168	10101000	200	11001000	232	11101000
137	10001001	169	10101001	201	11001001	233	11101001
138	10001010	170	10101010	202	11001010	234	11101010
139	10001011	171	10101011	203	11001011	235	11101011
140	10001100	172	10101100	204	11001100	236	11101100
141	10001101	173	10101101	205	11001101	237	11101101
142	10001110	174	10101110	206	11001110	238	11101110
143	10001111	175	10101111	207	11001111	239	11101111
144	10010000	176	10110000	208	11010000	240	11110000
145	10010001	177	10110001	209	11010001	241	11110001
146	10010010	178	10110010	210	11010010	242	11110010
147	10010011	179	10110011	211	11010011	243	11110011
148	10010100	180	10110100	212	11010100	244	11110100
149	10010101	181	10110101	213	11010101	245	11110101
150	10010110	182	10110110	214	11010110	246	11110110
151	10010111	183	10110111	215	11010111	247	11110111
152	10011000	184	10111000	216	11011000	248	11111000
153	10011001	185	10111001	217	11011001	249	11111001
154	10011010	186	10111010	218	11011010	250	11111010
155	10011011	187	10111011	219	11011011	251	11111011
156	10011100	188	10111100	220	11011100	252	11111100
157	10011101	189	10111101	221	11011101	253	11111101
158	10011110	190	10111110	222	11011110	254	11111110
159	10011111	191	10111111	223	11011111	255	11111111
160	10100000	192	11000000	224	11100000		

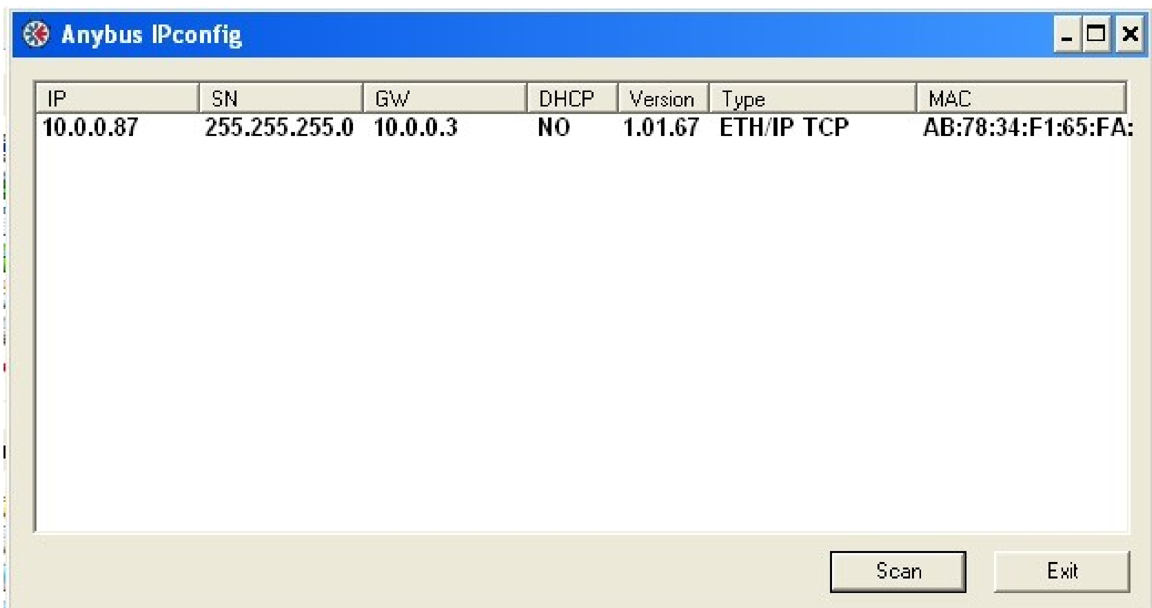
The entry in the table above which has a grey background represents the default switch settings.

Appendix 'B'

The F500 Elite Ethernet interface is preconfigured to operate with an IP address of 192.168.0.100. This is acceptable in most instances. We recommend that you use static IP address allocation in order to minimize difficulty with address conflict. Please refer to your system supplier or maintenance department for details of how to add or change a static IP address for your Ethernet system.

Below is a method by which you can check/change the IP address of the F500 Ethernet module. Contact 4B (ww.go4b.com) and ask for a copy of the "AnyBus IPconfig" software. Install the software on your computer in the usual manner. Set the 8 switches located on the F500 Ethernet interface to the UP position (all OFF).

Connect the F500 and computer to an Ethernet hub or switch (a switch is better). Run the software which will search for the F500 Ethernet module. Once found you will see something like this.



The actual data may vary slightly according to your system. Once you get a response click on the text on the screen (for example, click the IP address 10.0.0.87). This will open a second window. This window allows you to change the settings for the Ethernet interface.

If you set the DHCP setting to 'YES', then the F500 will be assigned an IP address from your computer network if it supports DHCP. If you chose this option you will need to save the configuration changes, and then re-cycle power to the F500. The F500 will then obtain settings from your computer network and begin to operate. Click 'Scan' on the 'Anybus IPconfig' software to check the computer settings.

If your computer network doesn't support DHCP or if you want to assign a static IP address then set the DHCP setting to 'NO', and enter an IP address, a Sub Net Mask and a Gateway address.

Once you have made any changes click ‘save’ to make these changes permanent. Then click ‘Scan’ to update the information on the screen.

If you are setting everything manually then the F500 IP address must be in the same range as your computer. Therefore, if your computer has an IP address of 192.168.1.56 then the F500 IP address must be 192.168.1.###. The ### must be a number between 1 and 254 but not the same as your computer.

The Sub Net Mask is almost always 255.255.255.0 and the Gateway can be 0.0.0.0 or another number in your chosen IP range (eg. 192.168.1.1).

These settings are important so if you are in doubt, ask your IT department for help with the settings or contact 4B service support and they will be able to help.

Appendix 'C'

Because of the design limitations the temperatures measured by the T500/F500 system are in a coded hexadecimal format. It is therefore necessary to apply some conversion to the number in order to extract the actual temperature. Once extracted, the temperature is in °C so if you require the temperature to be in °F, further conversion will be required.

The temperature sensors are capable of measuring between -31°C and +110°C (-23°F and +230°F). Because negative numbers cannot be directly represented in the T500/F500 then some form of coding is needed. Therefore the following rules apply.

Convert the number from Hexadecimal to Decimal (see the following pages for help with this).

If the measured temperature is between 0°C and +110°C (all positive numbers) then the value represents the actual temperature. E.g. Decimal 58 means 58°C.

If the measured temperature is between -0°C and -31°C (all negative numbers) then the value read represents the negative temperature +127. Therefore, numbers between 127 and 158 are used to represent -0°C to -31°C. To get the negative number, first convert the hexadecimal number to decimal. Then, if the number is between 127 and 158 simply subtract 127 taking the remainder as a negative value.

E.g.
If the value is 143, then subtract 127 (143-127 = 16) leaving a temperature of -16°C
If the value is 127, then subtract 127 (127-127 = 0) leaving a temperature of -0°C
If the value is 128, then subtract 127 (128-127 = 1) leaving a temperature of -1°C
If the value is 158, then subtract 127 (158-127 = 31) leaving a temperature of -31°C

Values between 111 and 126 and above 158 are reserved for representing other conditions (see page 12) and should not be treated as a temperature.

As the temperatures are in °C it may be necessary to convert the value to °F
Calculate the temperature value complete with sign and call it T°C, therefore
T°F = (T°C * 1.8) + 32 or T°F = (9/5)*T°C+32

E.g. If T°C = 20°C then T°F = (20 * 1.8)+32 = 68°F
If T°C = -20°C then T°F = (-20 * 1.8) + 32 = -4°F

Further conversions will be necessary to convert to °Kelvin or °Rankine.

Hexadecimal to Decimal Conversion.

Hexadecimal is base 16.
Base 16 is where the 'numbers' you can use are zero through to the letter F (0123456789ABCDEF). i.e. the decimal value for '1' is represented in hexadecimal as '1' but the hexadecimal value of '15' (decimal) is shown as 'F' (hexadecimal) and the value of '17' (decimal) is '11' in Hexadecimal.

Decimal	Hex	Decimal	Hex	Decimal	Hex
1	1	11	B	30	1E
2	2	12	C	40	28
3	3	13	D	50	32
4	4	14	E	60	3C
5	5	15	F	70	46
6	6	16	10	80	50
7	7	17	11	90	5A
8	8	18	12	100	64
9	9	19	13	500	1F4
10	A	20	14	1000	3E8

16^3	16^2	16^1	16^0
4096	256	16	1

Example 1: Hex 3E8	0	3	E	8	
	0 +	(3*256)+	(14*16)	+8	= 1000 decimal
Eaxmple 2: Hex 5A	0	0	5	A	
	0 +	0 +	(5*16)	+(1*10)	= 90 decimal

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