T500 Elite - Hotbus™

PLANT WIDE MONITORING SYSTEM FOR BUCKET ELEVATORS & CONVEYORS

C US APPROVED

OPERATION MANUAL

Part No. T5004V46CAI / T5004V4CAI
Software Version 7.0.x / 7.1.x

www.go4b.com

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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 free 24-hour hotline number (309-698-5611).

6. SERVICE REQUEST

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) 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/usa.

⚠WARNING

- Rotating machinery can cause serious injury or death
- Always lockout and tagout the machine prior to installation

PRODUCT OVERVIEW

The T500 Elite - Hotbus™ is a serial communications system designed to monitor up to 256 sensors for combined belt alignment, belt speed, continuous bearing temperature, pulley alignment, level and plug conditions on bucket elevators and conveyors. With automatic machine shutdown capability and PLC / PC compatibility, this advanced microprocessor based system offers low cost installation, versatility and easy system expansion. Logging and trending software is also available for historic data analysis and preventative or predictive machine maintenance.

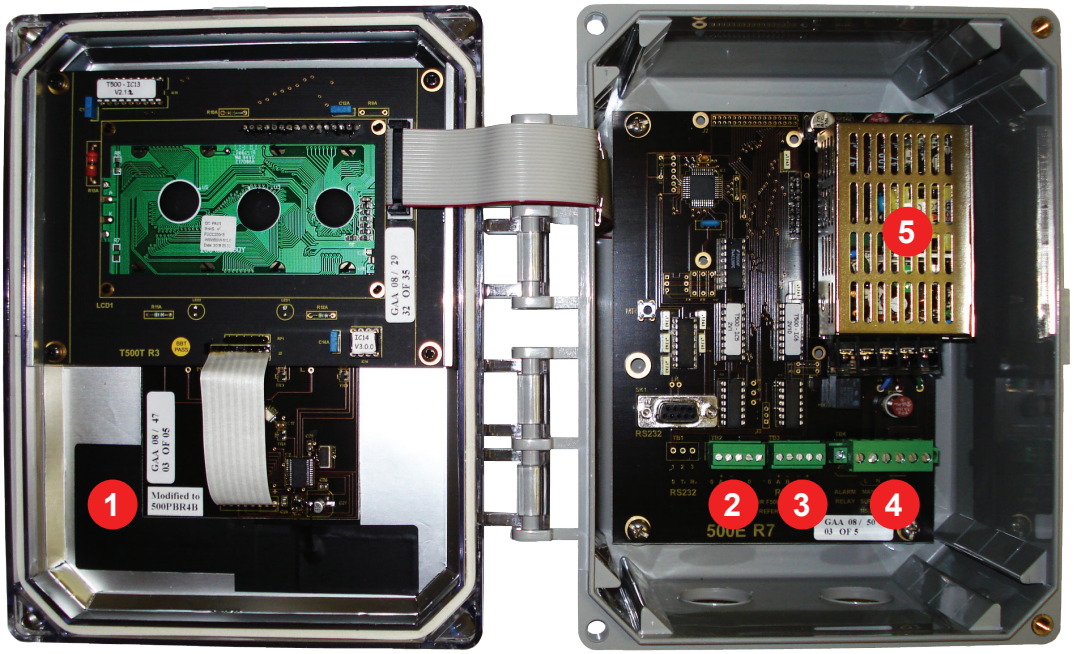
Left -

Front of T500 Showing LCD Message Center & Programming Keys

Bottom -

T500 Inside View:

1. **Inner Lid**
2. **Communications Network**
3. **F500 Communications**
4. **Power / Alarm Terminal**
5. **Power Supply**



SPECIFICATIONS

Input Supply Voltage	120 to 240 VAC or 24 VDC (T5004V46C) 24 VDC (T5004V4C)
Power Consumption	12 Watts Maximum
Alarm Relay Contacts	1 Pole Normally Open - 8A @ 250VAC Optional: 64 (Groups of 16 Using R500 Interface)
Sensor Inputs	RS485 - 2 Wire Communications Network
Sensor Supply	Use External 24 VDC Supply
Terminals	Power - 14 AWG Max. (4 mm²) Signals - 16 AWG Max. (2.5 mm²)
Height	9.7 in. (246 mm)
Width	7.4 in. (188 mm)
Depth	4 in. (102 mm)
Fixing Centers	8.75 in. H x 4 in. W (222 mm x 102 mm)
Cable Entry	2 Holes - 11/8 in. (28 mm) Diameter - 3/4 in. Conduit
Weight	3 lbs. (1.3 Kg)
Maximum Nodes	64
Sensing Temperature Range	-23° F to +230° F (-31° C to +110° C)
Display	LCD - 4 Line by 20 Characters
Keyboard	5 Programming Keys
Status Indicators (Front Panel)	Power Alarm
Approvals / Protection	**ATEX / IECEx - V4** Ex tb IIIC T125° Db IP66 TAMB -20°C to +50°C IECEx BAS05.0026X 1180 Ex II 2D Ex tb IIIC T125° Db IP66 TAMB -20°C to +50°C Baseefa04ATEX0131X **ATEX / IECEx - V46** Ex tc IIIC T125°Dc IP66 TAMB -20°C to +45°C IECEx BAS11.0018X 1180 Ex II 3D Ex tc IIIC T125°Dc IP66 TAMB -20°C to +45°C Baseefa II ATEX 0033X **CSA - V4** Ex tb IIIC T125°C Db IP66 Tamb -20°C to +50°C Zone 21 AEx tb IIIC T125°C Db IP66 Tamb -20°C to +50°C Class II Division 1, Groups E, F and G T125°C (When used with a Class2 power supply) **CSA - V46** Ex tc IIIC T125°C Dc IP66 Tamb -20°C to +45°C Zone 22 AEx tc IIIC T125°C Dc IP66 Tamb -20°C to +45°C Class II Division 2, Groups F and G T125°C **IP66**

Conditions of use:

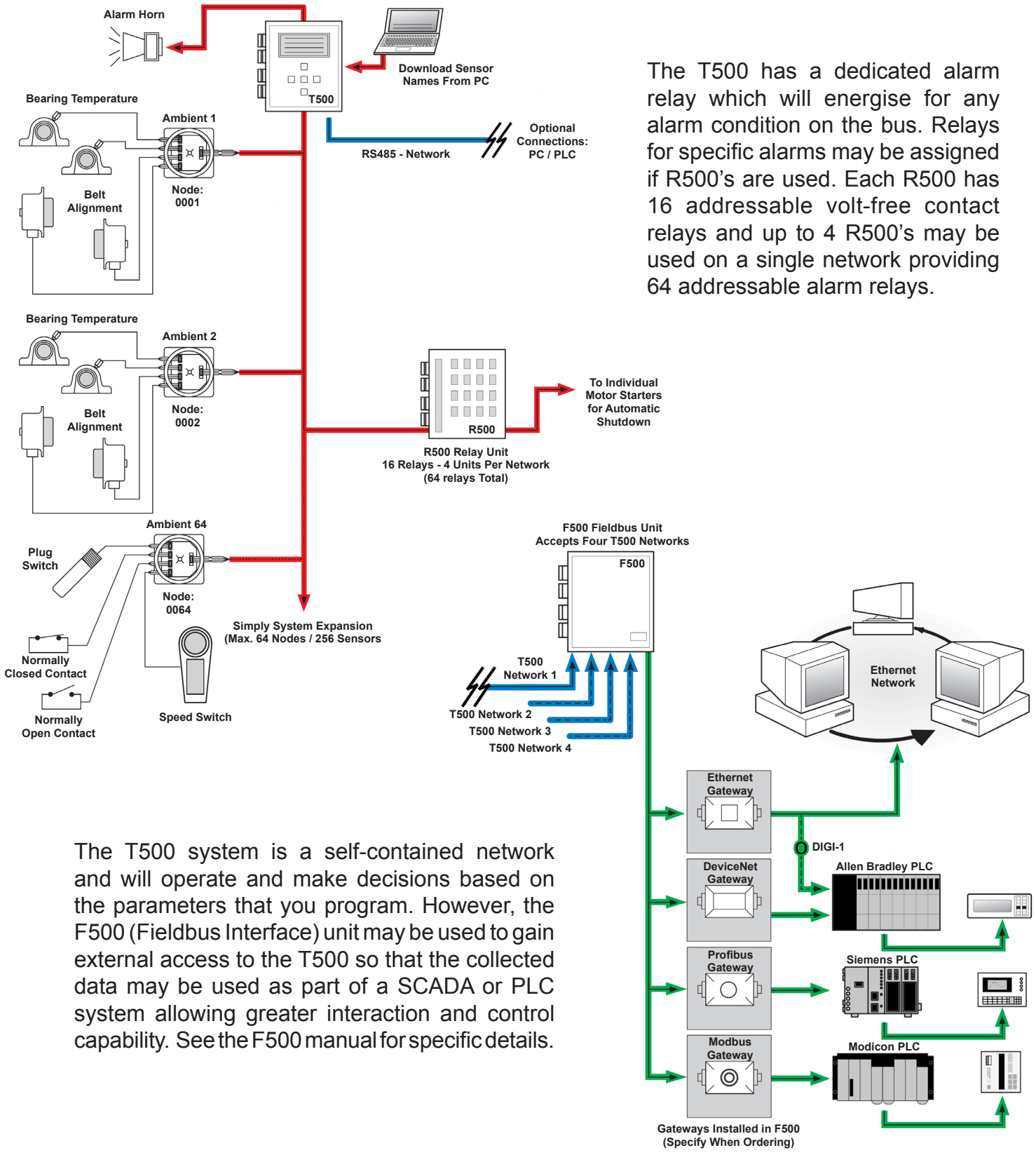
1. The equipment shall be suitably earth bonded via the PCB mounted earth terminal inside the equipment enclosure.

2. Warning: The equipment is a potential static hazard, clean only with a damp cloth.

3. Do not allow dust layers to build up on the equipment.

SYSTEM OVERVIEW

The T500 Elite Hotbus™ system is an industrial communication network (BUS) based on RS485 for collecting hazard monitoring sensor information from dedicated nodes. The T500 acts as the master of this network and requests data from slave nodes. The T500 processes the nodes data and makes decisions whether to raise specific alarms. There may be 64 nodes on a single network covering up to 256 sensing points.

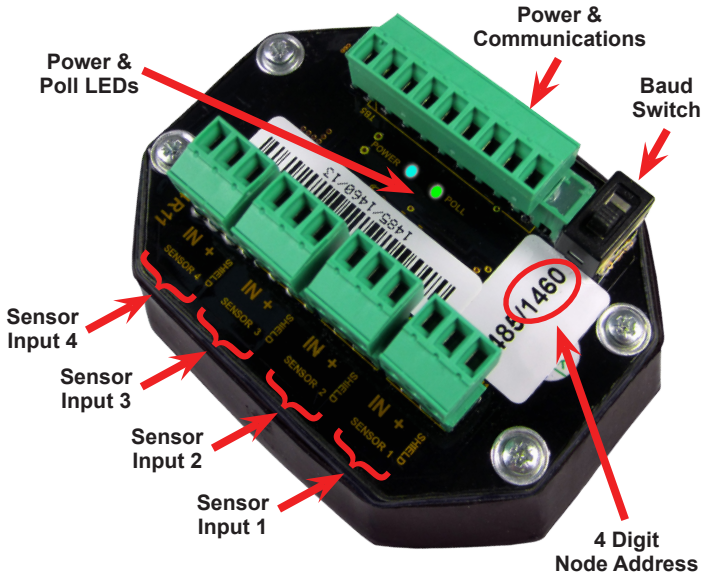


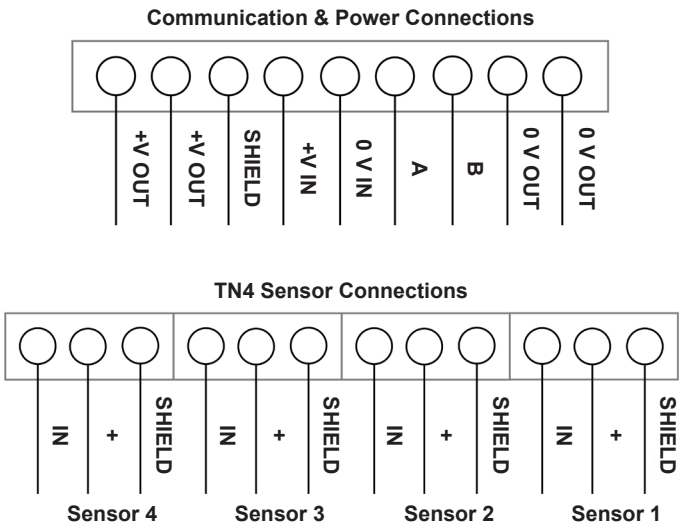
The T500 has a dedicated alarm relay which will energise for any alarm condition on the bus. Relays for specific alarms may be assigned if R500's are used. Each R500 has 16 addressable volt-free contact relays and up to 4 R500's may be used on a single network providing 64 addressable alarm relays.

The T500 system is a self-contained network and will operate and make decisions based on the parameters that you program. However, the F500 (Fieldbus Interface) unit may be used to gain external access to the T500 so that the collected data may be used as part of a SCADA or PLC system allowing greater interaction and control capability. See the F500 manual for specific details.

T500 TN4 NODE

The TN4 is a four input sensor node, powered by 24 VDC. Each input can be an NTC thermistor, PTC thermistor or Volt-Free Contact input; the types may be interchanged on a single node. The Node has a unique 4 digit address which is used to communicate to the T500 via a two wire serial RS485 connection. Every time the T500 accesses the TN4's data, the poll LED will flash.



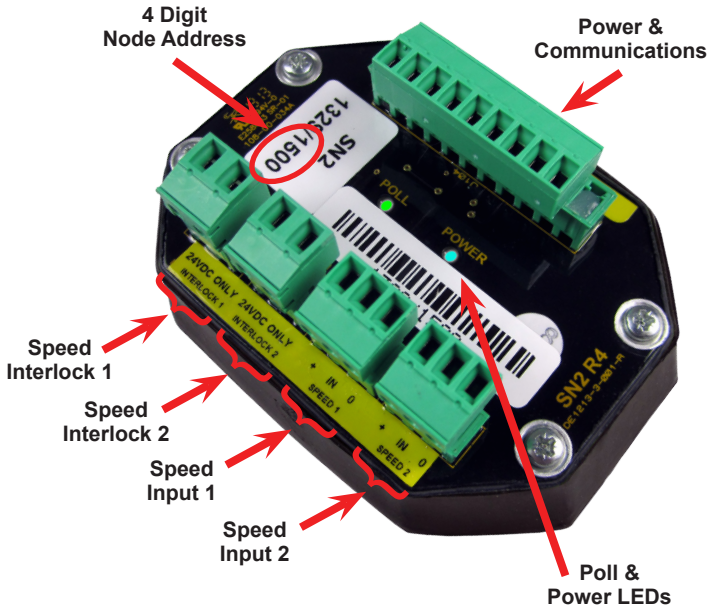


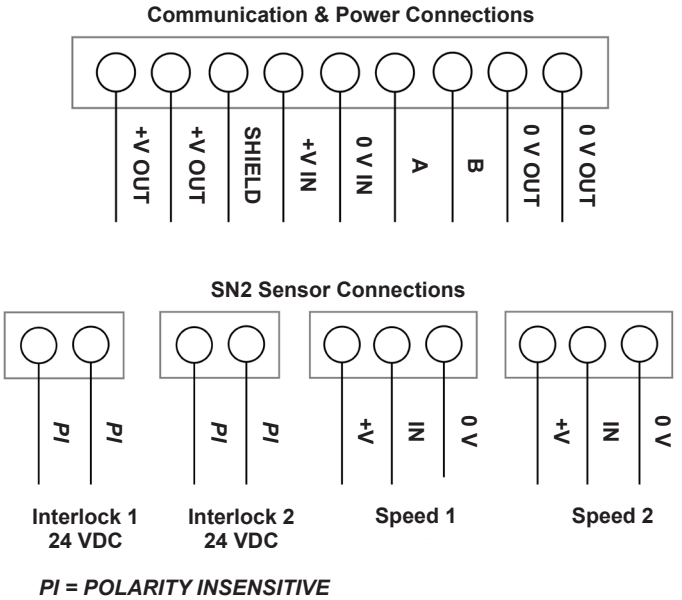
NOTE

The baud rate switch must be in position 2 on power up. Older T500 systems may require the switch in position 1.

T500 SN2 NODE

The SN2 is a two input speed node, powered by 24 VDC. The node is able to monitor two independent pulse (speed) sources for dangerous under speed conditions. For each speed input there is a corresponding interlock input. The SN2 will support pulses which are PNP or sourced. The Node has a unique 4 digit address which is used to communicate to the T500 via a two wire RS485 connection. Every time the T500 accesses the SN2's data the poll LED will flash.





PI = POLARITY INSENSITIVE

R500 ALARM RELAY INTERFACE

The R500 relay units are equipped with 16 alarm relays. Each relay provides a single pole changeover contact rated 250V AC at 5Amp. The T500 can be programmed to operate with up to 64 alarm relays for temperature, alignment and under speed alarm and stop. When a sensor exceeds its programmed alarm tolerance, the relay associated with that sensor will operate. Each relay can be programmed to respond immediately or after a programmed delay period.

ALARM ZONING -

As an example of alarm zoning we consider the TN4 node. Each TN4 can read the state of 4 independent sensors. These sensors can be associated with an alarm relay. Alarm relay 00 (default) is the built in T500 warning relay and operates for all alarm conditions. If the R500 relay units are fitted then up to a further 64 alarm channels are available for the user. Setting the relay number for any of the sensors to between 01 and 64 will associate the alarm relay 01 to 64 to that sensor. Any number of sensors can be associated with an alarm relay.

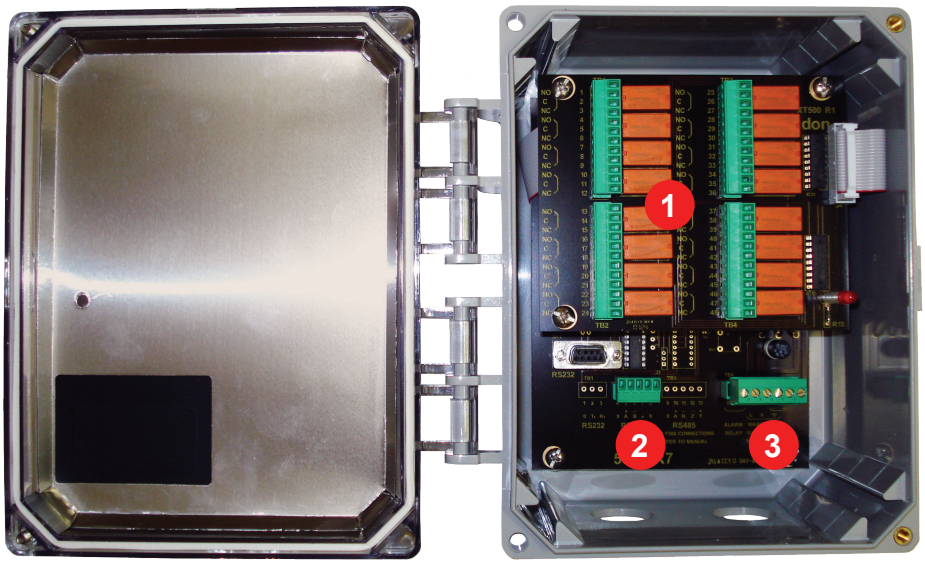
For example:

Node 1001	Sensor 1 = 00	T500 Alarm Warning Relay Only
	Sensor 2 = 04	R500 Relay 4 + T500 Alarm Warning Relay
	Sensor 3 = 01	R500 Relay 1 + T500 Alarm Warning Relay
	Sensor 4 = 14	R500 Relay 14 + T500 Alarm Warning Relay
Node 1003	Sensor 1 = 01	R500 Relay 1 + T500 Alarm Warning Relay
	Sensor 2 = 02	R500 Relay 2 + T500 Alarm Warning Relay
	Sensor 3 = 03	R500 Relay 3 + T500 Alarm Warning Relay
	Sensor 4 = 04	R500 Relay 4 + T500 Alarm Warning Relay

It can be seen from the examples above that a number of sensors can be zoned together, Node 1001 Sensor 3, Node 1003 Sensor 1 are both associated with R500 relay 1. Any one or both of these sensors, which exceed the programmed limits, will operate relay 1 of the R500.

Left -

Front of R500 Alarm Relay Interface



Right -

R500 Inside View:

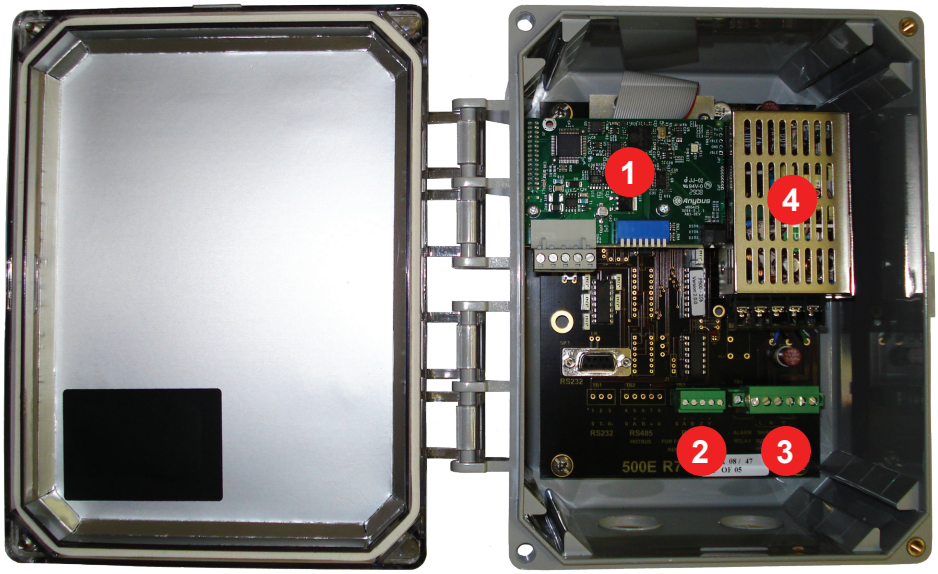
1. **Alarm Relay Terminals**
2. **T500 Communications**
3. **Power Terminal**

F500 FIELDBUS GATEWAY

The F500 Fieldbus gateway communications terminal is a four-wire full duplex RS-485 connection. Via this terminal it is possible to connect a F500 Fieldbus communication gateway. The F500 unit is able to make all the T500 data available via most of the industry standard Fieldbus protocols like Ethernet, DeviceNet, Profibus, Modbus TCP/RTU, etc. Please see the appropriate F500 manual or contact 4B for more information.

Left -

Front of F500 Fieldbus Gateway



Right -

F500 Inside View:

1. **Interface Board**
2. **F500 Communications**
3. **Power Terminal**
4. **Power Supply**

INSTALLATION

The Control Unit box should be installed in a suitable control or starter switch room and mounted at an eye level position so that the warning lights and display can be readily seen. The box should have sufficient space to open the lid for wiring. An audible alarm, hooter and visual indicator lamp should be installed in or outside of the control room.

Please consult the “T500 Hotbus™ Installation Guide” for information on installing and wiring the T500 system.

⚠WARNING

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.

T500 USER INTERFACE

The T500 is equipped with 5 programming keys. These are soft keys and change their function according to the operation required at the time. When entering a numeric value, the following format has been adopted.

T500 KEYPAD OVERVIEW -

UP (↑) key will increase the selected number.
DOWN (↓) key will decrease the selected number.
LEFT (←) will move the flashing cursor one digit to the left
RIGHT (→) will move the flashing cursor one digit to the right
SET will accept the number on the screen and move to the next entry.

If the flashing cursor is placed on a digit using the (←) or (→) keys then the number will be increased or decreased by an appropriate amount.

For example:

If the display shows 000**0** then pressing (↑) will increase the number by 1
If the display shows 00**0**0 then pressing (↑) will increase the number by 10
If the display shows 0**0**00 then pressing (↑) will increase the number by 100
If the display shows **0**000 then pressing (↑) will increase the number by 1000

The (↓) key operates in exactly the same way except that it will decrease the number by the same amount. Each number has a programmed range and will not allow numbers outside of that range. If you press and hold the (↑) or (↓) key for longer than 2 seconds, then the numbers will increase or decrease at a faster rate. Due to a low software priority the key repeat rate will vary, this is normal and should not be a cause for concern. When you are satisfied that the number being displayed is correct, press the SET key to save this number and move on to the next entry.

At other times the keys will have different functions. Please refer to those functions in order to determine the key use.

NOTE

If you are in a menu or edit mode and do not press a key for 1 minute, the edit menu will close and any unsaved data entered will be lost.

ENGINEERS CODE -

The ENGINEERS CODE (ENG. CODE) is used to protect the T500 from un-authorised modifications being made which might lead to incorrect or un-safe operation of the T500. The T500 is shipped with a **default engineer's code (↑),(←),(↑) and (↓) - (Up, Left, Up, Down)** so that the T500 can be commissioned and tested straight from the box. It is then recommended that you change the engineer's code to protect the T500 once commissioning is complete.

NOTE

Once you have changed the engineer's code there is no way of retrieving the code so it is important that you remember it. If you forget the code you will need to contact your supplier and tell them what has happened. They will then help you recover from the lost code.

T500 CONFIGURATION INSTRUCTIONS

SPLASH SCREEN -

When the T500 is powered up a greetings message is displayed (Screen 1) and it automatically enters a self-test mode. All of the internal functions are examined and if no errors are detected the software continues into normal operation. In the event of failure, please contact the factory.

```
**  T500 ELITE  **
    2002 - 2011
         4B
** VERSION 7.0.0 **
```

Screen 1

INITIAL SETUP -

When power is first applied to the T500 the software checks for the existence of set-up information. If this is not present then it is assumed that the T500 is being set-up for the first time. The warning message (Screen 2) will be displayed and the alarm LED will flash.

```
      WARNING
   NO CONFIGURED
SENSOR, PRESS SET
```

Screen 2

The T500 will not continue until the SET button is pressed. At this point the LCD display will change to the T500 setup screen (Screen 3). This option can be accessed at any time once the initial setup has been performed.

```
   - NODE SETUP -
NODE NUMBER 1
NODE ADDRESS = 0000
NODE TYPE = TN4
```

Screen 3

ADDING NODES

The T500 elite is capable of being connected to 64 Hotbus Nodes and therefore it is essential to determine which of the 64 nodes the information is referring to. Each Hotbus node is manufactured with a unique serial number, which is located on a label on the front of the node. The last four digits of the serial number are the address of the node. If 683/1023 is the serial number then 1023 is the node address. As each node may support up to 4 sensors it is important to carefully record which is sensor 1, 2, 3 and 4. Before attempting to setup the T500 elite you should plan your sensor network and record the following for later use.

- Node Type: e.g. TN4
- Node Address: e.g. 1023
- Sensor types for the node: NTC, PTC, CNT (Contact) or Speed
- The names for sensors 1-4 (20 characters maximum)

NODE ADDRESS

When entering the NODE SETUP mode either for the first time or when editing, the following screen (Screen 4) will appear. The first line indicates that you are in the NODE SETUP.

```
   - NODE SETUP -
NODE NUMBER 1
NODE ADDRESS = 0000
NODE TYPE = TN4
```

Screen 4

The second line displays the number of the chosen node (Node 1 by default) and the third line shows the address of the node. The display cursor should be placed to the left of the words 'NODE Number 1'. At this part of the setup procedure, you can use the UP (↑) and DOWN (↓) keys to move your way through the list of 64 nodes. Unprogrammed nodes will by default display with a node address of 0000. When you have selected the node you wish to edit, press the SET key.

The cursor will now move to the address section of the node settings. You can now use the UP (↑), DOWN (↓), LEFT (←) or RIGHT (→) keys to edit the node address (Screen 5).

```
   - NODE SETUP -
NODE NUMBER 1
NODE ADDRESS = 1234
NODE TYPE = TN4
```

Screen 5

When you are satisfied that the number being displayed is correct, press the SET key to save this number and move on to the next entry.

NODE TYPE

After the node address has been entered, the node type must be selected. By default the TN4 will be selected. To accept this node type press SET when the cursor is on TN4. To change it to a SN2 press the UP (↑) or the DOWN (↓) key to change. You will be asked if the change was intentional (Screen 6).

```
NODE TYPE CHANGE
WAS THIS INTENTIONAL?
< = NO
> = YES
```

Screen 6

TN4 NODE SETUP

The T500 then displays the details associated with each of the 4 sensors that make up the TN4 (Screen 7). Using the (↑) and (↓) you must first select which of the 4 sensors you want to edit.

```
SENSOR NUMBER 1
TYPE= NTC : RELAY 00
RELATIVE ALARM 30
ABSOLUTE ALARM 140
```

Screen 7

If this is the first time you have edited this node then all the sensors will be NTC type otherwise the information for each sensor will be displayed in turn as you scroll through the four sensors (Screen 8).

```
SENSOR NUMBER 2
TYPE= NTC : RELAY 00
RELATIVE ALARM 30
ABSOLUTE ALARM 140
```

Screen 8

In order to help you identify the sensor more clearly, each sensor has a unique name. The default names for the first 4 sensors (Node 1) is “Sensor Number 1..4” and the second set of 4 sensors (Node 2) is “Sensor Number 5..8” and so on until the sensors for node 64 which are “Sensor Number 253..256”.

Once you have decided which of the 4 sensors you wish to edit press the SET key. The cursor will now move onto the sensor type (Screen 9).

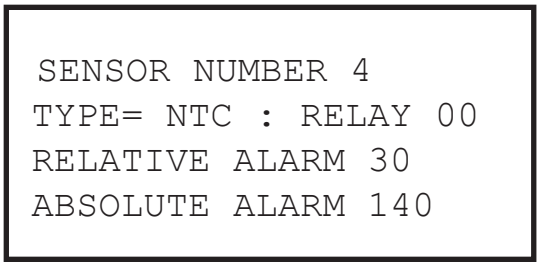
```
SENSOR NUMBER 4
TYPE= NTC : RELAY 00
RELATIVE ALARM 30
ABSOLUTE ALARM 140
```

Screen 9

You can change this option by pressing the (↑) and (↓) keys. As you change the sensor type the information on the display will change to reflect the requirements of each sensor type. Once you have decided on the sensor type press the SET key to move on to the entry detail for that specific sensor.

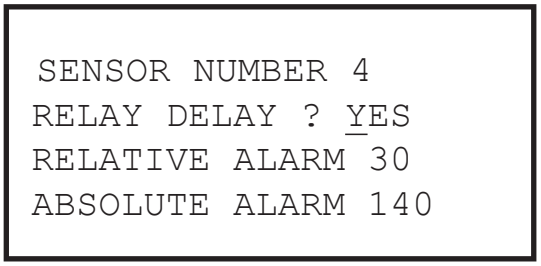
SETUP FOR NTC SENSORS -

The NTC setup screen is shown on Screen 10. The top line shows the name of the sensor, the second line shows the chosen sensor type and the alarm relay number. The third line shows the relative temperature alarm level and the fourth line shows the absolute temperature alarm level.



Screen 10

Once you have selected the NTC type sensor the information on line 2 will change (Screen 11). The T500 asks if you would like to use a Relay Delay with the R500 relay. This can be very useful if you don't want the R500 to respond immediately to an alarm. For example, you may want to set the relay delay long enough to avoid accidental activation if operation is expected to vary in normal use. If you do not require a delay in the relay activation then touch the Down (↓) arrow to select "No", otherwise touch the Up (↑) arrow to select "Yes"; having made your choice then touch the "SET" key to complete that part of the entry.

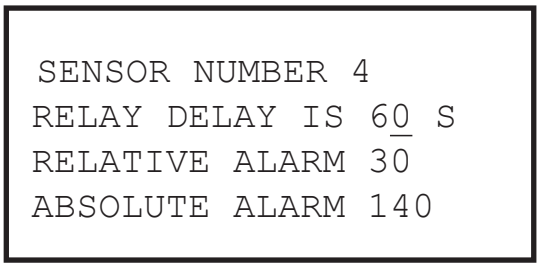


Screen 11

NOTE

Alarm relay delays apply to the R500 relay only. The T500 onboard warning relay will operate immediately upon detection of a fault.

If you chose to have an activation delay then display line 2 will change to "Relay Delay is xx S" (xx represents the current relay activation delay in seconds). The normal default is 60 seconds but the timer range can bet set between 0 and 99 seconds.



Screen 12

If you chose "No" to the delay time then the default is automatically set to 0 (zero) essentially making the relay operate immediately when a fault is detected.

Once you have completed any adjustments to the time delay or if you chose "No" time delay, touching SET causes the software on to ask which relay you would like to assign to this sensor. Line 2 of the display will again change to show the relay number option (Screen 13).

```
SENSOR NUMBER 4
TYPE= NTC : RELAY 01
RELATIVE ALARM 30
ABSOLUTE ALARM 140
```

Screen 13

When you have entered your chosen relay number press SET to continue. The cursor will now move down to the RELATIVE ALARM 30 prompt (Screen 14). The relative temperature alarm provides the ability to set an alarm level which is relative to the ambient temperature of the node.

```
SENSOR NUMBER 4
TYPE= NTC : RELAY 01
RELATIVE ALARM 30
ABSOLUTE ALARM 140
```

Screen 14

For example, if the current ambient temperature is 70°F then setting the relative temperature for sensor 1 to 30°F will result in the alarm level of 70°F+30°F = 100°F. Sensor 1 would have to reach 100°F to cause an alarm. If the ambient temperature was to rise to 80°F then sensor 1 would have to rise to 110°F. This feature only applies to NTC sensors. The relative alarm feature may be disabled by setting the value to 0°F and only the absolute value will cause an alarm.

The cursor will now move down to the ABSOLUTE ALARM prompt. If setting up for the first time then the value will be 140°F otherwise the value will be as previously set.

```
SENSOR NUMBER 4
TYPE= NTC : RELAY 00
RELATIVE ALARM 30
ABSOLUTE ALARM 140
```

Screen 15

This provides an adjustable absolute alarm level for the sensor and can be adjusted between 000°F and 230°F. When the measured temperature exceeds this setting, the T500 will generate an alarm in accordance with the relay settings above. This alarm operates independently of the relative alarm setting and has no relationship with the ambient temperature.

The factory default level is 140°F. When you have entered your chosen Absolute alarm level, press SET to continue.

Pressing the SET button completes the entry page but we sometimes make mistakes during entry of data or need to edit more than one entry before moving on. Before the new information is finally saved for use you have a number of choices that you can make. Pressing the LEFT (←) key saves the new information and returns you back to select a new node. Pressing the RIGHT (→) key saves the information and returns you back to the sensor edit screen. Pressing the SET key just exits the setup mode saving any changes.

```
USE THE KEYS TO
< = GO TO NODE EDIT
> = GO TO SENSR EDIT
SET = DONE WITH EDIT
```

Screen 16

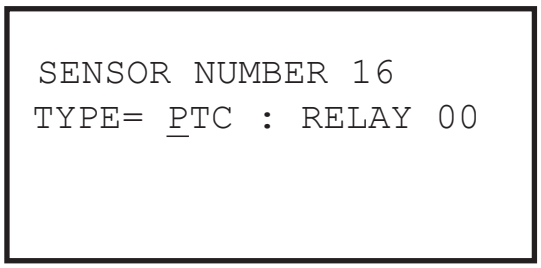
Once you have pressed the (←), (→) or SET key, the information is saved in permanent memory so that the next time the T500 is powered up, these settings will automatically come into effect.

NOTE

If you do not press a key for 1 minute, the edit menu will close and any data entered will be lost.

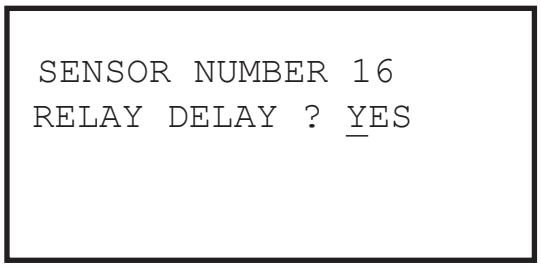
SETUP FOR PTC SENSORS -

The PTC setup screen is shown on Screen 17. The top line shows name of the sensor. The second line shows the chosen sensor type and the alarm relay number. The third and fourth line is blank. PTC sensors do not require an alarm temperature as they are designed to work at fixed alarm temperatures.



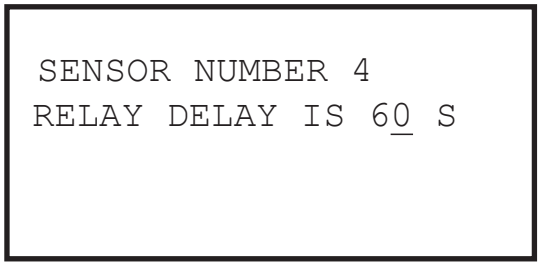
Screen 17

Once you have selected the PTC type sensor the information on line 2 will change. The T500 asks if you would like to use a Relay Delay with the R500 relay (Screen 18). This can be very useful if you don't want the R500 to respond immediately to an alarm. For example, you may want to set the relay delay long enough to avoid accidental activation if operation is expected to vary in normal use. If you do not require a delay in the relay activation then touch the Down (↓) arrow to select "No", otherwise touch the Up (↑) arrow to select "Yes"; having made your choice then touch the "SET" key to complete that part of the entry.



Screen 18

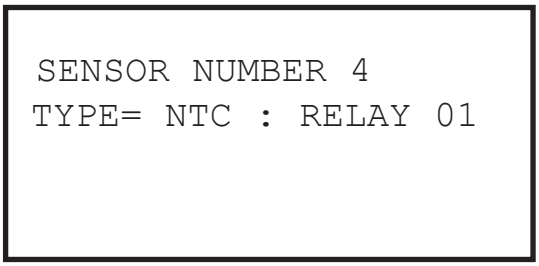
If you chose to have an activation delay then display line 2 will change to "Relay Delay is xx S" (xx represents the current relay activation delay in seconds). The normal default is 60 seconds but the timer range can bet set between 0 and 99 seconds.



Screen 19

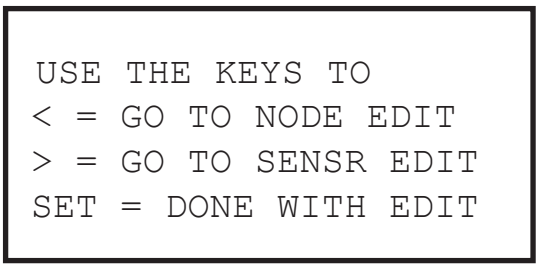
If you chose "No" to the delay time then the default is automatically set to 0 (zero) essentially making the relay operate immediately when a fault is detected.

Once you have completed any adjustments to the time delay or if you chose "No" time delay, touching SET causes the software on to ask which relay you would like to assign to this sensor (Screen 20). Line 2 of the display will again change to show the relay number option.



Screen 20

Pressing the SET button completes the entry page but we sometimes make mistakes during entry of data or need to edit more than one entry before moving on. Before the new information is finally saved for use you have a number of choices that you can make. Pressing the LEFT (←) key saves the new information and returns you back to select a new node. Pressing the RIGHT (→) key saves the information and returns you back to the sensor edit screen. Pressing the SET key just exits the setup mode saving any changes.



Screen 21

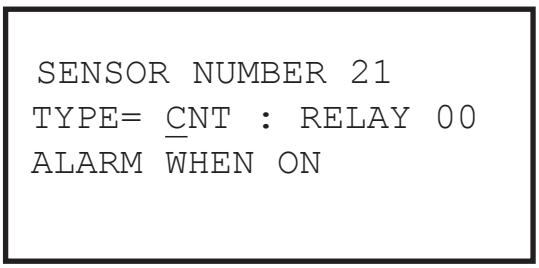
Once you have pressed the (←), (→) or SET key, the information is saved in permanent memory so that the next time the T500 is powered up, these settings will automatically come into effect.

NOTE

If you do not press a key for 1 minute, the edit menu will close and any data entered will be lost.

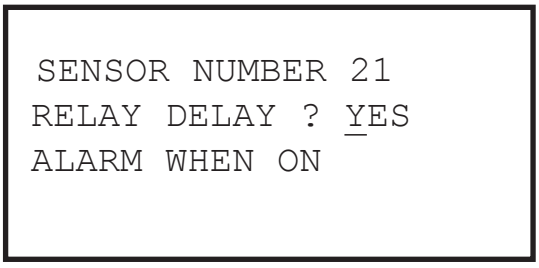
SETUP FOR CNT (CONTACT) SENSORS -

If you selected to edit the CNT type of sensor then the screen should look like it does in Screen 22. The top line shows the sensor name. The second line shows the chosen sensor type and the alarm relay number. The third line shows the current alarm condition for the contact.



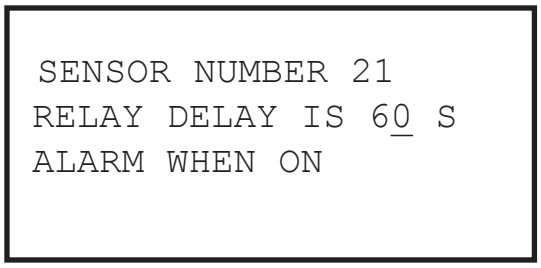
Screen 22

Once you have selected the CNT type sensor the information on line 2 will change (Screen 23). The T500 asks if you would like to use a Relay Delay with the R500 relay. This can be very useful if you don't want the R500 to respond immediately to an alarm. For example, you may want to set the relay delay long enough to avoid accidental activation if operation is expected to vary in normal use. If you do not require a delay in the relay activation then touch the Down (↓) arrow to select "No", otherwise touch the Up (↑) arrow to select "Yes"; having made your choice then touch the SET key to complete that part of the entry.



Screen 23

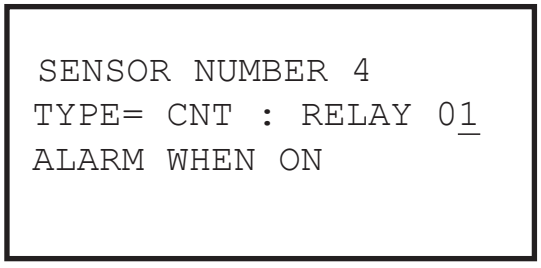
If you chose to have an activation delay then display line 2 will change to “Relay Delay is xx S” (xx represents the current relay activation delay in seconds). The normal default is 60 seconds but the timer range can bet set between 0 and 99 seconds.



Screen 24

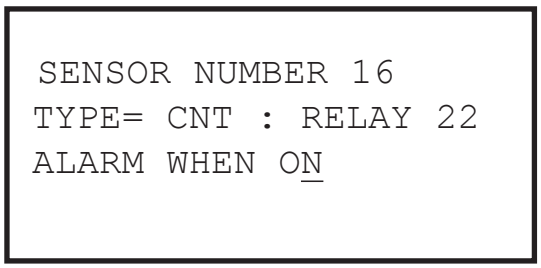
If you chose “No” to the delay time then the default is automatically set to ‘0’ essentially making the relay operate immediately when a fault is detected.

Once you have completed any adjustments to the time delay or if you chose “No” time delay, touching SET causes the software on to ask which relay you would like to assign to this sensor (Screen 25). Line 2 of the display will again change to show the relay number option.



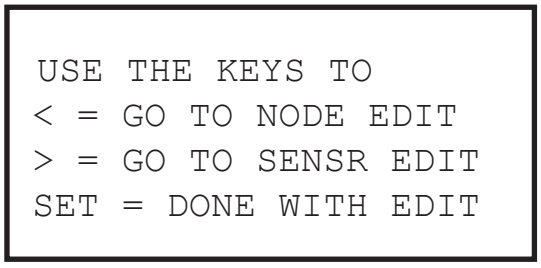
Screen 25

Because contact conditions can be applied in one of two known states the ALARM WHEN condition can be toggled to either OFF or ON by using the UP (↑) or DOWN (↓) keys. This means that if your contact is normally ON, you might want to alarm when it changes to OFF or if it is normally OFF you might want to alarm when it changes to ON. This state can be set individually for each of the contact inputs.



Screen 26

Pressing the SET button completes the entry page but we sometimes make mistakes during entry of data or need to edit more than one entry before moving on. Before the new information is finally saved for use you have a number of choices that you can make. Pressing the LEFT (←) key saves the new information and returns you back to select a new node. Pressing the RIGHT (→) key saves the information and returns you back to the sensor edit screen. Pressing the SET key just exits the setup mode saving any changes.



Screen 27

Once you have pressed the (←), (→) or SET key, the information is saved in permanent memory so that the next time the T500 is powered up, these settings will automatically come into effect.

NOTE

If you do not press a key for 1 minute, the edit menu will close and any data entered will be lost.

SN2 NODE SETUP

The main menu for the SN2 determines whether you would like to set-up the node or whether you would like to calibrate it.

```
SN2 NODE SETUP
<= NODE SETUP
>= CALIBRATE NODE
SET = EXIT - NO SAVE
```

Screen 28

NODE SETUP -

Node setup allows a SUD (start up delay) to be set for each speed input. The parameter range is 5 to 30 seconds. The start up delay is useful for avoiding under speed alarms while the elevator or conveyor comes up to speed from stand still. After the start up delay has passed only then will the T500 begin monitoring the speed for the under speed condition.

The first of three setup screens (Screen 29) shows the node address which is being set-up (for example node 1000) and the SUD for the two speed inputs (I#1 and I#2).

```
SN2 NODE: 1000   1/3
I#1 SUD: 05 S
I#2 SUD: 05 S
```

Screen 29

With the cursor on the SUD time for input 1 use the (↑) and (↓) keys to increment or decrement the time. Pressing SET will move onto the next input. Repeat the same process for setting Input 2. To complete this section press SET.

The next screen is associated with assigning the USA (under speed alarm) and USS (under speed stop) relays to each sensor input (Screen 30). By default the USA will de-energise when the speed drops below the calibrated speed by 10% and the USS below 20%.

```
SN2 NODE: 1000   2/3
I#1 USS RELAY: 00
I#1 USA RELAY: 00
```

Screen 30

With the cursor on the relay number use the (↑) and (↓) keys to increment and decrement the relay choice. Once you are happy with the USS selection then press the SET key to move to the USA and repeat the process. Pressing SET after the USA relay will take you to the equivalent page for input 2. This process should be repeated.

This completes the SN2 node set-up. The screen (Screen 31) will ask what decisions you would like to make with the new settings.

```
SN2 NODE SETUP
<= SAVE & EXIT
>= SAVE & NEXT NODE
SET = EXIT - NO SAVE
```

Screen 31

SN2 CALIBRATION -

The SN2 must be calibrated to perform the under speed function. Therefore, the calibration process will be explained here. The option to enter calibration is shown on screen 28. When calibration is selected you will be asked if you wish to overwrite existing data (Screen 32).

```
ARE YOU SURE?
THIS WILL OVERWRITE
THE EXISTING DATA
<= YES      NO =>
```

Screen 32

If YES is chosen then you will be taken to the calibration start page. If NO then you will be returned to the main menu.

The calibration process starts by applying the interlock signal (start circuit) which should start the elevator running in the usual way. Calibration uses the predefined start-up delay, therefore by default the calibrated speed will be the speed which the elevator is running at 5 seconds after start-up.

```
SN2 NODE 1000   I#1
CALIBRATION STATUS:
START/STOP ELEVATOR
RUN SPEED = 0000 PPM
```

Screen 33

⚠WARNING

Before calibrating the speed, make sure that the belt is tight and is not slipping. Do not introduce any material. Calibrate after the machine has attained normal running speed.

When the elevator begins calibrating, the screen will show the calibration count down and the current speed (Screen 34).

```
SN2 NODE 1000   I#1
CALIBRATION STATUS:
CALIBRATING 05
RUN SPEED = 1000 PPM
```

Screen 34

T500 MAIN MENU

1.0 T500 MENU SELECTION -

During normal operation, pressing the SET key will select the main menu. The main menu has 3 options; SETUP, DOWNLOAD and ALARM LOG.

```
MAIN MENU:-
< = SETUP
> = DOWNLOAD
^ = ALARM LOG
```

Screen 35

Pressing the LEFT (←) key selects SETUP, pressing the RIGHT (→) key selects the DOWNLOAD option, pressing the UP (↑) key selects the ALARM LOG option and pressing the SET key cancels the menu and returns the T500 to normal operation.

1.1 SETUP -

Selecting SETUP from the main menu opens a new display asking you to enter the ENGINEERS CODE. This code is used to protect the T500 from un-authorised setting adjustments.

```
< = NODE SETUP
> = T500 SETUP
^ = SENSOR DISPLAY
v = MANAGER PASSWORD
```

Screen 36

1.1A NODE SETUP -

Selecting NODE SETUP will begin the process of entering nodes, see either the TN4 NODE SETUP OR SN2 NODE SETUP sections depending on your node types.

1.1B T500 SETUP -

Selecting T500 SETUP will present a screen as shown in Screen 37. The main menu has 3 options; FIELDBUS SETUP, DISPLAY IN °F (°C) and WARNING RELAY.

```
< = FIELDBUS SETUP
> = DISPLAY IN °F
^ = WARNING RELAY
SET = EXIT
```

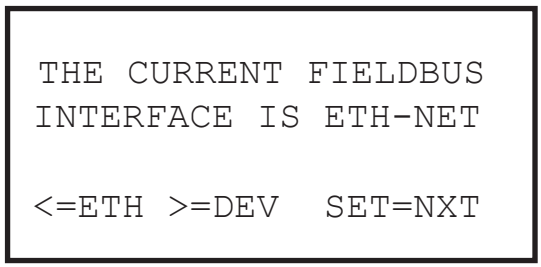
Screen 37

FIELDBUS SETUP allows features to be selected when the T500 is used in conjunction with the F500 Fieldbus communications interface (see FIELDBUS SETUP). DISPLAY IN °F option will toggle this from °F to °C to °F each time the key is pressed. This option is used to set the T500 to display temperature information and alarm settings in °F or °C. WARNING RELAY allows an adjustment to the ALARM WARNING REACTIVATION TIMER. This is the timer used to reactivate the T500 alarm warning relay and LED when any existing alarm warning has been acknowledged.

1.1B-A FIELDBUS SETUP -

The T500 can be connected to an optional F500 communications device. The F500 provides a high level communications interface where up to 4 T500 units can be monitored simultaneously (dependent upon the Fieldbus type). The two most popular types are catered for by the T500 and they are Ethernet TCP/Modbus TCP and DeviceNet.

Using the Fieldbus setup option (Screen 38), you can set the basic configurations required by each interface type. First select Fieldbus Setup from the menu. You can then choose from "<=ETH" which means press the LEFT (←) key to select Ethernet as the Fieldbus option, or ">=DEV" which means press the RIGHT (→) key to select DeviceNet as the Fieldbus option, or you can press SET which means move on to edit the data for the selected Fieldbus type.

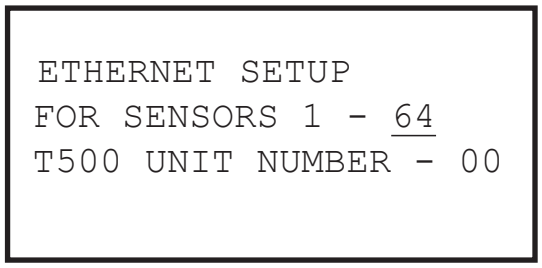


Screen 38

1.1B-A1 ETHERNET FIELDBUS -

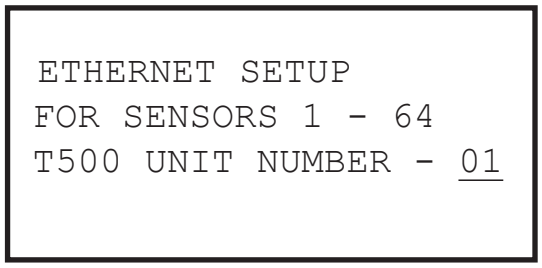
Please refer to the F500 Ethernet manual for complete details about this product and how it works. This manual is only concerned with the T500 settings.

Two menu options are available. You must choose how many sensors you wish to transmit from this T500 to the F500. Using the UP(↑) and DOWN(↓) keys you can select between sensors 1-64, 1-128, 1-192 or 1-256 (Screen 39).



Screen 39

The maximum number of sensors that one F500 can monitor is 256, which if 4 blocks of 64. This can be made up of 1 - 4 T500's as long as the total number of blocks is no more than 4. Once you have selected the number of sensors that suits your needs press the SET key. Each T500 must have a unique identifier so the F500 knows where the data has come from. To achieve this you can set the T500 address to between 0 and 4 (Screen 40).



Screen 40

The 0 setting effectively stops the T500 from sending data to the F500. Each T500 must have a unique setting (but they can all be set to 0). If you have 2 T500 units, then you would logically set them to address 1 and address 2. Setting them to 2 and 4 would still work but could be confusing. Using the UP(↑) and DOWN(↓) keys you can select between T500 address 0 to 4. Once you have decided what address you want to use, press the SET key to save the settings. The T500 will now configure data internally to suit the F500 Ethernet interface. These settings will be effective immediately as far as the T500 is concerned but the F500 will require power to be recycled in order for the changes to become effective.

1.1B-A2 DEVICENET FIELDBUS -

Please refer to the F500 Ethernet manual for complete details about this product and how it works. This manual is only concerned with the T500 settings.

Two options are available. The first option is the allocation of free space bytes.

DeviceNet and its implementation are governed by a set of rules determined by the ODVA (www.odva.org). The F500 has been designed with as much flexibility in mind as possible. However, when using the F500 with other DeviceNet systems such as Allen Bradley a number of limitations apply. The F500 is a DeviceNet slave and will not instigate the transmitting of data without the proper instruction from a master unit, which in most cases is a DeviceNet scanner or bridge module. Screen 41 shows the DEVICENET SETUP menu.

```
DEVICENET SETUP
FREE SPACE 070 BYTES
T500 UNIT NUMBER - 00
```

Screen 41

An example of this is the Allen Bradley 1756 DNB module. This DeviceNet scanner allows a PLC or other appropriate device to be connected to a DeviceNet system with multiple slave nodes attached of which the F500 is one. The 1756 DNB has a limited amount of memory available to it and each slave unit connected will require the use of some of this memory. Currently the 1756 DNB has 490 bytes of data memory of which a maximum of 255 bytes can be allocated to a single slave unit. Therefore, the maximum amount of data that can be read from an F500 is 255 bytes. Each sensor node connected to the T500 has 4 sensors inputs and an ambient temperature sensor. This means that the data for 5 sensors is available from each node. Therefore, the amount of TN4 nodes that can have their data retrieved by the F500 is determined by the amount of memory available to the scanner module. If a scanner module has 255 bytes free, then 255 / 5 = 51, the maximum amount of memory available is 255 bytes and each nodes presents 5 bytes of data so you can read the data for 51 nodes. There is also a two byte overhead for the activity counter (Byte 0 and Byte 1) which means that a maximum of 50 nodes can be read by a scanner module.

This applies to a scanner dedicated to the F500 but in many cases the scanner is part of a much bigger system where existing DeviceNet nodes are in place and are using some of the scanners memory allocation. This means that the scanner will have to read fewer than the maximum of 50 nodes as calculated above. The minimum is 1 node and this requires 5 bytes + 2 bytes so 7 bytes in total (Screen 42).

```
DEVICENET SETUP
FREE SPACE 070 BYTES
T500 UNIT NUMBER - 01
```

Screen 42

In order that the F500 and DeviceNet scanner module communicate successfully they must both be configured with the same amount of data bytes. Once you have decided, using the calculation above, how many bytes of data are required by the DeviceNet scanner module, you can configure the T500 to match. You can now use the UP (↑), DOWN (↓), LEFT (← or RIGHT (→) keys to change the "Free Space xxx Bytes" entry to any value between 5 which is the minimum and 255 which is the maximum. This information is later passed to the F500 to configure the DeviceNet interface. If this value is incorrectly set, the DeviceNet interface will not initialise correctly. Once you have selected the number of bytes that suits your need press the SET key.

The T500 must have a unique identifier so the F500 knows where the data has come from. To achieve this you can set the T500 address to between 0 and 1. The 0 setting effectively stops the T500 from sending data to the F500. Using the UP(↑) and DOWN(↓) keys you can select between T500 address 0 and 1. Once you have decided what address you want to use, press the SET key to save the settings. The T500 will now configure data internally to suit the F500 DeviceNet interface. These settings will be effective immediately as far as the T500 is concerned but the F500 will require power to be recycled in order for the changes to become effective.

NOTE

The T500 is equipped with the ability to have the Ethernet F500 Fieldbus interface perform a remote alarm acknowledge. This is done by passing a request through the Fieldbus interface of the F500 to the T500. At the present time remote alarms acknowledge can only be performed through the Ethernet series interface.

1.1B-B DISPLAY IN °F OR °C -

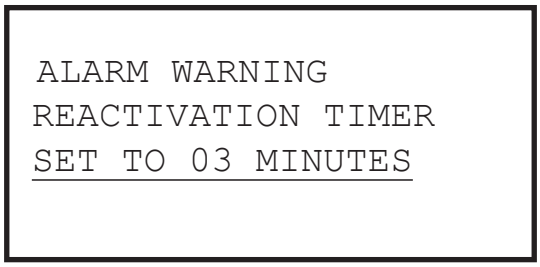
The T500 has the option to display temperature information and alarm information in either Fahrenheit (°F) or Celsius (°C). The DISPLAY IN °F option will toggle the temperature function from °F to °C to °F each time the key is pressed.

⚠WARNING

4B recommends that you set the DISPLAY IN °F (°C) before you set up any NTC node alarms. Toggling between °F and °C may reset the values to defaults.

1.1B-C WARNING RELAY -

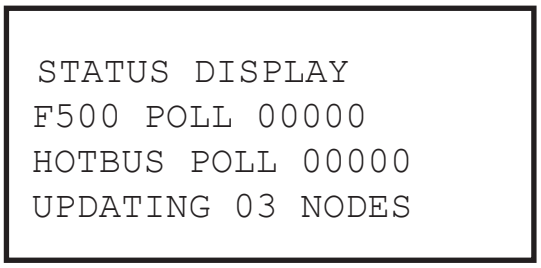
The default value is 3 minutes (Screen 43) and values between 0 and 5 minutes can be set in 1 minute increments by pressing the UP(↑) and DOWN(↓) keys. If the SET button was pressed to acknowledge the alarm warning condition and a new alarm occurs during the timing period, then the alarm warning relay will automatically reactivate and the timer will be reset. Setting this value to 0 means that the warning will NOT reactivate until a new alarm has occurred.



Screen 43

1.1C SENSOR / STATUS DISPLAY -

By default the T500 will display the information for each programmed node. However, there is a special Status Display available. This screen displays information relating to the communications with the Hotbus nodes and with the F500 interface if connected.

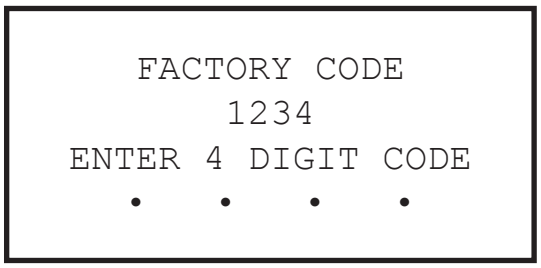


Screen 44

This is a simple diagnostics display and is an aid to installation only. If the T500 and F500 communicate successfully and the data exchange is valid, then the F500 Poll count will increase by 1 with each event. Every time the T500 communicates successfully with a node then the Hotbus Poll count will increase by 1 with each poll. Because of the update times involved, this number might increase by amounts bigger than 1 each time, but this is normal. The bottom line shows how many nodes are responding correctly to the poll. This number doesn't reflect the number of physical nodes connected to the system but represents the number of nodes that the T500 can communicate with. The Status Display can be selected at any time by pressing the SET key to select the main menu. From the main menu pressing the UP (↑) key will select the STATUS DISPLAY option, and pressing SET again will select the "Sensor Display" (normal display) option. If an alarm occurs while viewing the status display, then the alarm display will operate as normal, however, you will need to select SENSOR DISPLAY to be able to view the offending sensor and the alarm condition.

1.1D MANAGE PASSWORDS -

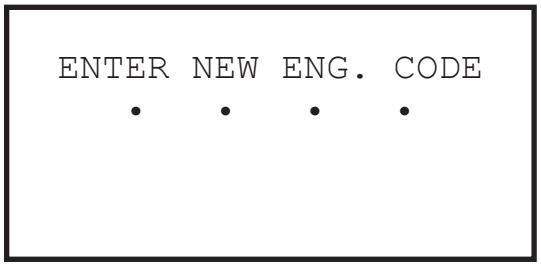
If MANAGE PASSWORD is selected from the main menu then the T500 will stop monitoring the sensors and enter the password mode. Once you have selected the MANAGE PASSWORD option from the main menu (Screen 45).



Screen 45

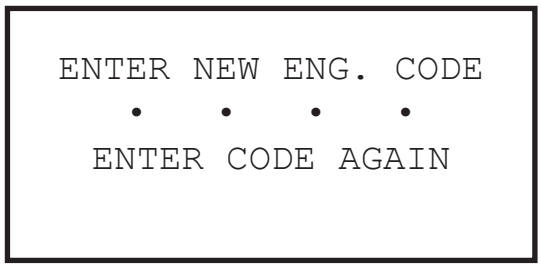
The FACTORY CODE number (1234 in our example) is a special code that is generated by the T500. You need to contact your supplier and give them this code. They will give you a code in return. This code represents an access code and only works once with the number that is displayed as the factory code on the screen. Each time you press a key the next "." on the display is replaced by a "*" to show how many keys you have pressed. If you enter the code and get it wrong then the T500 will generate a new Factory Code and you will have to begin again.

If you enter the correct access code you can then change the engineer's code to something that only you know (Screen 46).



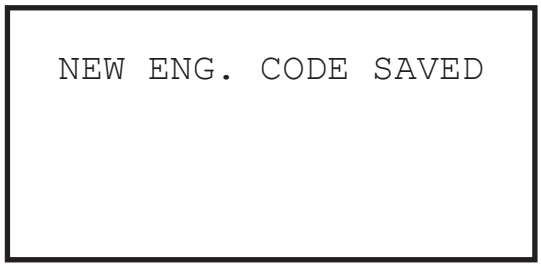
Screen 46

When you have entered a good access code you can change the engineer's code. The display prompts you to enter a new code. The code is made up of 4 key presses and can be any combination of the arrow keys (↑ ↓ ← →) in any order. Once you have entered the code you will be prompted to enter it again (Screen 47).



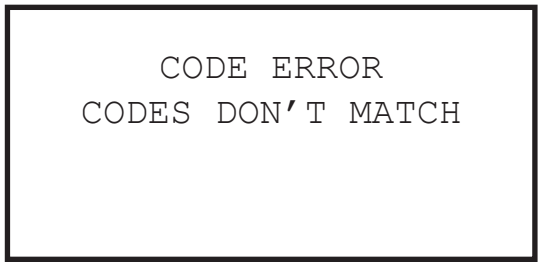
Screen 47

If you enter the code again and it correctly matched the first time you entered the code then the new code is accepted and will be saved (Screen 48).



Screen 48

If you make a mistake in entering the code you will be denied access and the new engineer's code will be discarded. You are then returned back to the main menu and you will have to begin again (Screen 49).



Screen 49

NOTE

If you do not press a key for 1 minute, the password menu will close and any data entered will be lost. If you wish to change the engineer's code it is recommended that you contact 4B from a mobile phone next to the T500 because if the menu times out and clears the display the factory code will automatically change and any access code you may have will not work for the new factory code.

1.2 DOWNLOAD -

The DOWNLOAD feature is not currently supported.

1.3 ALARM LOG -

The T500 is equipped with a simple ALARM LOG. Every alarm detected by the T500 will be entered into this log no matter how briefly the alarm exists. This is a useful feature for finding troublesome intermittent alarms. The log has space for 20 alarms and the newest alarm is always at the top of the list at position 1. As the alarms are entered into the alarm log, the log is pushed down by 1 each time making room for the latest alarm to be entered. Eventually, when the log is full the oldest alarm (alarm 20) will be discarded. Using the ALARM LOG option in the main menu, you can examine the log at any time. **The log is erased when power is removed from the T500.**

TN4 NORMAL OPERATION -

Once the initial setup has been performed and at least 1 TN4 has been connected to the system then the T500 will enter the normal monitoring mode. During normal operation, the T500 will continuously scan all of the programmed Nodes and respond to their programmed alarm settings. This mode displays the status of a single sensor connected to the T500 (Screen 50).

```
SENSOR NUMBER 1
TEMPERATURE = 082°F
AMB 070°F :RELAY 10
REL 30: ABS 140: NTC
```

Screen 50

The actual sensor being displayed can be selected by using the Up(↑) and Down(↓) arrow keys. During the normal sensor display the software is capable of showing any one of the 256 sensors, which may be available (Screen 51).

```
SENSOR NUMBER 3
CONTACT STATE = OFF
ALARM = ON :RELAY 11
SENSOR TYPE = CNT
```

Screen 51

As each TN4 node has 4 sensors connected to it, the display shows consecutively connected sensors. For example if you were to connect three nodes 1,2 and 3 to the T500 then the display will show the settings for sensors 1 to 12. If a sensor is connected and working correctly then its actual state will be displayed in either °C or °F if the sensor is an NTC type, NORMAL or HIGH if the sensor is a PTC type and ON or OFF if the sensor is a CNT type.

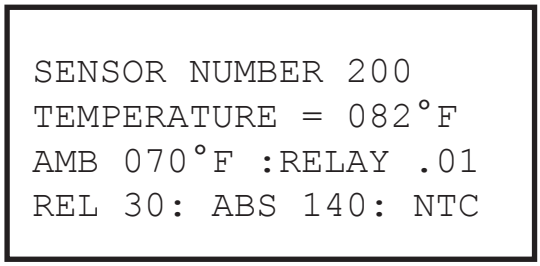
If a node is not programmed (see the section on setting up the T500) then the display will show <-> as the current sensor value (including <-> ambient if the sensor is an NTC type). All 256 sensors, programmed or not programmed, can be displayed in this manner (Screen 52).

```
SENSOR NUMBER 200
TEMPERATURE = <->°F
AMB <->°F :RELAY 00
REL 30: ABS 150: NTC
```

Screen 52

As you scroll up or down through the sensors, the alarm zone number and alarm trip level or alarm condition associated with each sensor will update automatically on the screen. Although no restrictions are placed upon the order of programming for the nodes, it can be seen that it is to your advantage to program them in a logical order. Three nodes programmed consecutively will result in the first 12 sensors being displayed. This makes it easy to choose the sensor, which you want to monitor. If you program the nodes with holes in the sequence, 1,15 and 26 for example, then the associated sensors numbers will be 1..4 for node 1, 57..60 for node 15 and 101..104 for node 26. It can be seen that this is not an efficient way in which to program the nodes as it takes a long time to scroll through the list to reach a programmed sensor.

If a decimal point (period) appears between the word RELAY and the relay number (RELAY .01 - Screen 53) then this indicates that the relay has an activation delay timer set. If no timer is set then the period will not be displayed.

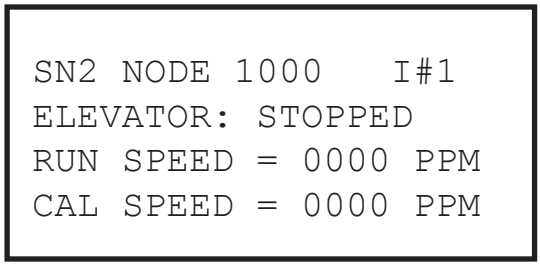


Screen 53

SN2 NORMAL OPERATION

The SN2 is designed to monitor and detect the under speed condition by comparing the current speed with a calibrated speed. A motor interlock signal is used to tell the SN2 to monitor the speed. This avoids an under speed condition occurring when the elevator intentionally slows during stopping because the interlock signal will have been removed as part of the elevators stop/start circuit.

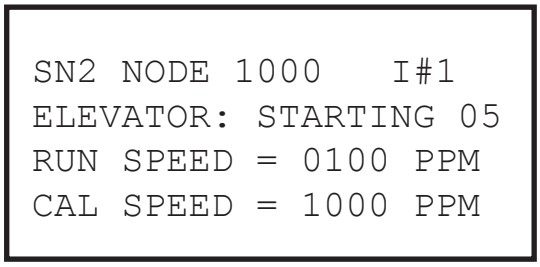
The SN2 operational screen is shown in Screen 54. The node address is shown (in this case shown 1000) along with input of the SN2 (in this case input 1 = I#1). The elevator status is shown and can range in normal operation from STOPPED, STARTING and RUNNING. The RUN SPEED is the current speed of the elevator and the CAL SPEED is the calibrated speed (Screen 55).



Screen 54

STARTING & STOPPING THE ELEVATOR -

The start elevator process is to apply the interlock (motor start circuit) which should cause the elevator to run and produce pulses (speed). When the interlock is applied the SN2 will begin the start-up delay and energize the USS (underspeed stop) relay, which should allow the machine to start (Screen 55).



Screen 55

The elevator should be up to full speed by the time the start up delay ceases. The run and calibrated speeds should be close (Screen 56).

```
SN2 NODE 1000   I#1
ELEVATOR: RUNNING
RUN SPEED = 1005 PPM
CAL SPEED = 1000 PPM
```

Screen 56

The elevator will continue to be monitored. Alarm conditions will be explained in the SN2 SENSOR ALARM DETECTION & DISPLAY section. To stop the elevator, the normal procedure would be to drop the interlock via the stop/start circuit which will cause the USS (underspeed stop) relay to de-energize and shut down the machine. It is important that the interlock is removed before the pulses (speed) otherwise the SN2 will cause an under speed alarm. Stopped screen shown on Screen 57.

```
SN2 NODE 1000   I#1
ELEVATOR: STOPPED
RUN SPEED = 0000 PPM
CAL SPEED = 1000 PPM
```

Screen 57

⚠WARNING

Always test the underspeed trip points! This can easily be done with a 4B *Speed*Master™ calibration tester. If you do not have a 4B tester, then use some other suitable means.

COMMUNICATION ALARMS

In order that the system maintains integrity at all times all programmed nodes are monitored for communications faults. If a programmed node is disconnected by unplugging it from the communication system or if a node should fail a communications alarm will be generated and the T500 internal warning relay will be operated. Communication alarm shown on Screen 58.

```
*ALARM* DETECTED ON
NODE ADDRESS 1023
COMMUNICATION ERR.C5
ALARM 01 OR 01
```

Screen 58

The remaining nodes and their sensors will continue to operate as normal for as long as the T500 cable integrity is maintained.

Any alarm relays associated with the disconnected node will not be updated and no further alarms can be generated for those sensors. If the communications problem is resolved then the alarm will be cleared and the monitoring of that node will continue as normal.

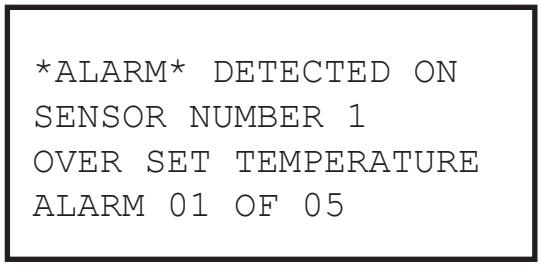
There are 5 communication errors reported by the T500 for each Node connected and they are C1 to C5 (see table below).

Error Code	Diagnosis
C1	Missing first byte of packet - check both termination resistors are present, communication wiring is routed noise free and connector wiring is good and shield grounded at one point
C2	Header byte number 2 is incorrect - check both termination resistors are present, communication wiring is routed noise free and connector wiring is good and shield grounded at one point
C3	Header byte number 1 is incorrect - check both termination resistors are present, communication wiring is routed noise free and connector wiring is good and shield grounded at one point
C4	Packet corrupted (CRC error) - check both termination resistors are present, communication wiring is routed noise free and connector wiring is good and shield grounded at one point
C5	Complete loss of communication - check node is powered, present and wired correctly. Check that the node address is correct, and make sure that the dipswitch is in the correct position.

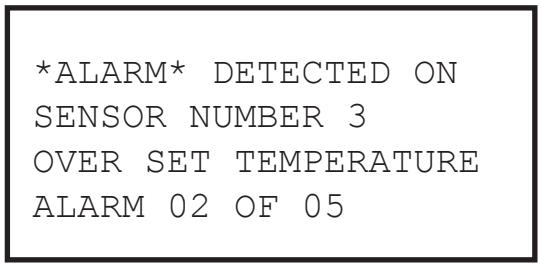
C5 is the most frequently seen communication error as this is the result of a complete failure of communication with the node. If a node becomes unplugged or fails in some way then this is the error that you would normally expect to see. The other errors usually occur when there is a problem with the installation of the cable or when there is electrical interference which is disrupting the communication system. Communications errors are not common, those which occur due to transient electrical interference will be ignored. If a communications problem persists, then the T500 will correctly respond to the error by triggering an alarm and placing an entry into the alarm log.

TN4 SENSOR ALARM DETECTION & DISPLAY

Each programmed node will have its status constantly updated on a first to last basis. As the sensor data is read from a node, the status is compared with the programmed alarm setting. If the actual status matches the programmed alarm condition an alarm is generated.



Screens 59



If the alarm zone was programmed at the default 00, then only the T500 alarm relay will operate. If the alarm zone was programmed with a number between 01 and 64, then the associated alarm relay on the optional R500 relay interface will operate as well as the T500 warning relay.

When an alarm is detected, the display changes to show the details for the sensor, which generated the alarm. Up to 20 alarms can be detected and displayed in this manner. The display will toggle between the original normal display as described in the TN4 normal operation section and the alarm display at approximately three second intervals.

The bottom line of the alarm screen shows the total number of detected alarms and which of those alarms is currently being displayed. NTC sensors are monitored for fault conditions. As well as reporting the over temperature alarm the T500 will also show when it detects an NTC sensor which it believes to be open or short circuit. These alarm conditions are displayed in much the same way as the other alarms listed.

SN2 SENSOR ALARM DETECTION & DISPLAY

The SN2 has under speed alarm (USA) and under speed stop (USS) conditions. The USA condition is caused when the running speed drops below the calibrated speed by 10%. This condition de-energizes the associated USA relay on the R500; if the speed continues to drop by 20% then the USS will be reached de-energizing the associated USS relay on the R500.

```
*ALARM* DETECTED ON
SN2 SPEED NODE 1000
UNDER SPEED ALARM(1)
ALARM 01 OF 01
```

Screens 60

```
*ALARM* DETECTED ON
SN2 SPEED NODE 1000
UNDER SPEED STOP(1)
ALARM 01 OF 01
```

The alarm detected screens will alternate between the normal running screen and the alarm detected screen.

Alarm conditions will be logged into the alarm log as explained in the Alarm Log section.

NO INTERLOCK CONDITION -

If for any reason pulses are read by the SN2 but there is no interlock then the SN2 will not monitor the under speed condition. The user is warned of this problem via the running screen (Screen 61).

```
SN2 NODE 1000    I#1
ELEVATOR: NO I -LOCK
RUN SPEED = 1005 PPM
CAL SPEED = 1000 PPM
```

Screen 61

⚠WARNING

No alarms will be raised. It is the installer's responsibility to ensure that the elevator cannot be run without an interlock signal being present at the SN2!

GENERAL ALARM FEATURES

WARNING RELAY CANCEL (ACKNOWLEDGE) -

If the SET key is pressed during any alarm condition and while the T500 internal alarm warning relay is in operation, then the internal alarm relay and LED warning will be cancelled. If the alarm condition persists, after a programmed period of time (see menu options) the warning relay and LED indicator will operate again. The warning alarm may be cancelled in this way any number of times. This version of software has a facility for remote alarm acknowledge through the F500 Fieldbus interface. See the section titled "*Remote Alarm Acknowledgement"* in the Ethernet F500 manual for more details.

⚠WARNING

All alarms should be investigated, and the problem detected should be corrected prior to putting the machine back into operation.

ALARM CONDITION STOP (SHUT DOWN) -

The T500 is not equipped with any shutdown or stop relays. It was intended that the internal alarm relay be used for audible or visual warnings. However, providing that the correct ratings are observed, there is no reason why the relay cannot be used for indirect control of a stop/start circuit. The T500 relay operates as a normally open relay and will close contact when an alarm is generated. If you require greater flexibility in your alarm/stop circuits then we recommend the use of the optional relay interface R5004. This unit provides 16 additional relays each with a single pole changeover contact rated 250 VAC @ 5Amp, which are more suited to use in interface applications. Four R5004 relay interface units may be connected to a T500 elite sensor monitoring system providing a total of 64 relays. None of the relay contacts are 'SAFETY' contacts and as such must not be relied upon for emergency stop purposes.

CHECKLIST

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 Sensors been routed away from power cables?.

3. Is the T500 Elite circuit properly grounded?

4. Is the Micro-processor control unit overheating? If so mount it in a temperature-controlled environment of maximum temperature 104°F (40°C).

5. Check that high powered two way radios are not operated immediately near the T500 Elite control unit or Sensors as this will affect the performance.

6. Check that the communications/power cable is connected correctly.

7. If the T500 display shows only information similar to this example and does not update the temperature on screen then you are attempting to run the T500 without having configured sensors first. This can happen when you pressed SET to exit the setup screen without first saving any configuration. To clear this problem, remove power from the T500, wait approximately 5 seconds and then re apply power. The T500 should now enter the initial set up mode.

```
SENSOR NUMBER 1
TEMPERATURE = <->°F
AMB <->°F :RELAY 00
REL 30: ABS 140: NTC
```

8. Have you set the optional R5004 address switch correctly?

9. If you are using NTC sensors have you set the Relative and/or Absolute alarm level ABOVE the NORMAL working conditions for the sensor.

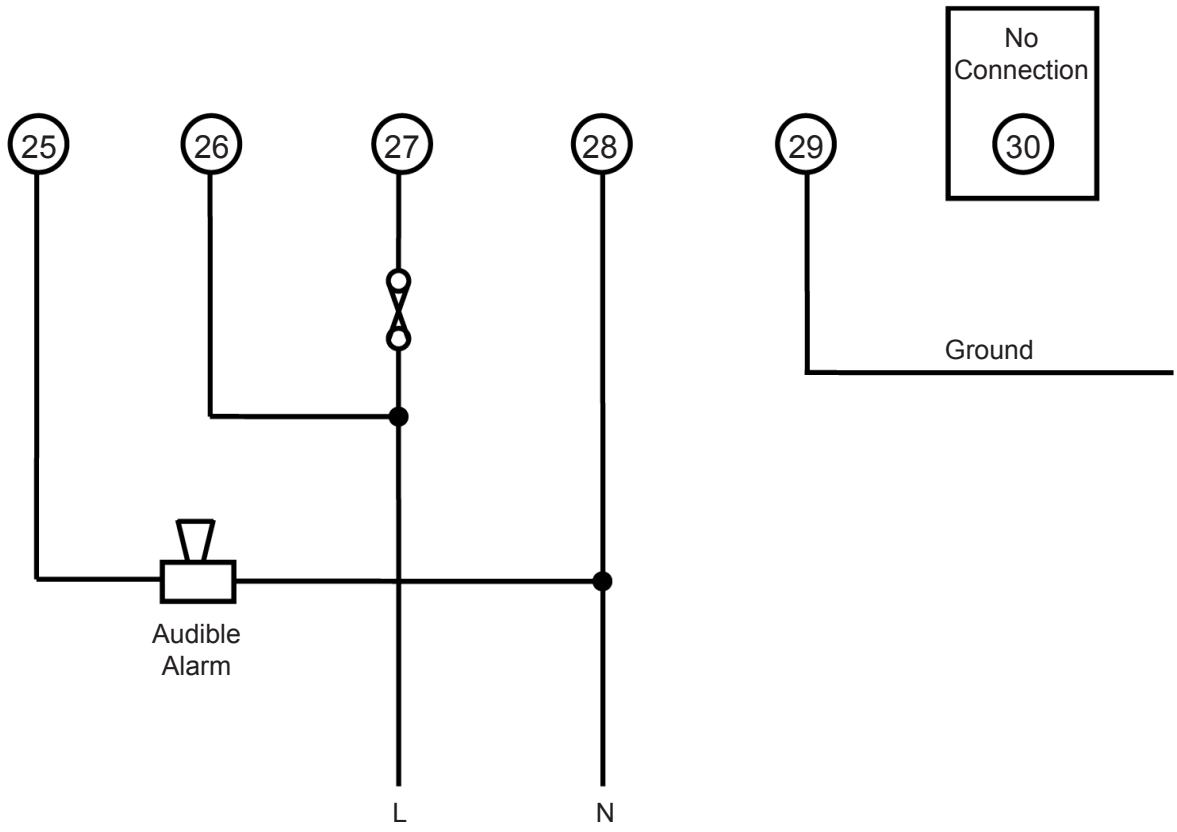
10. If you have programmed an NTC sensor and do not have a sensor connected, then an open circuit sensor alarm will occur. Unused sensors on a TN4 should be programmed as CNT type, see 11 below.

11. Ensure that any unused CNT inputs are programmed as ‘ALARM WHEN ON’ to avoid unexpected alarms.

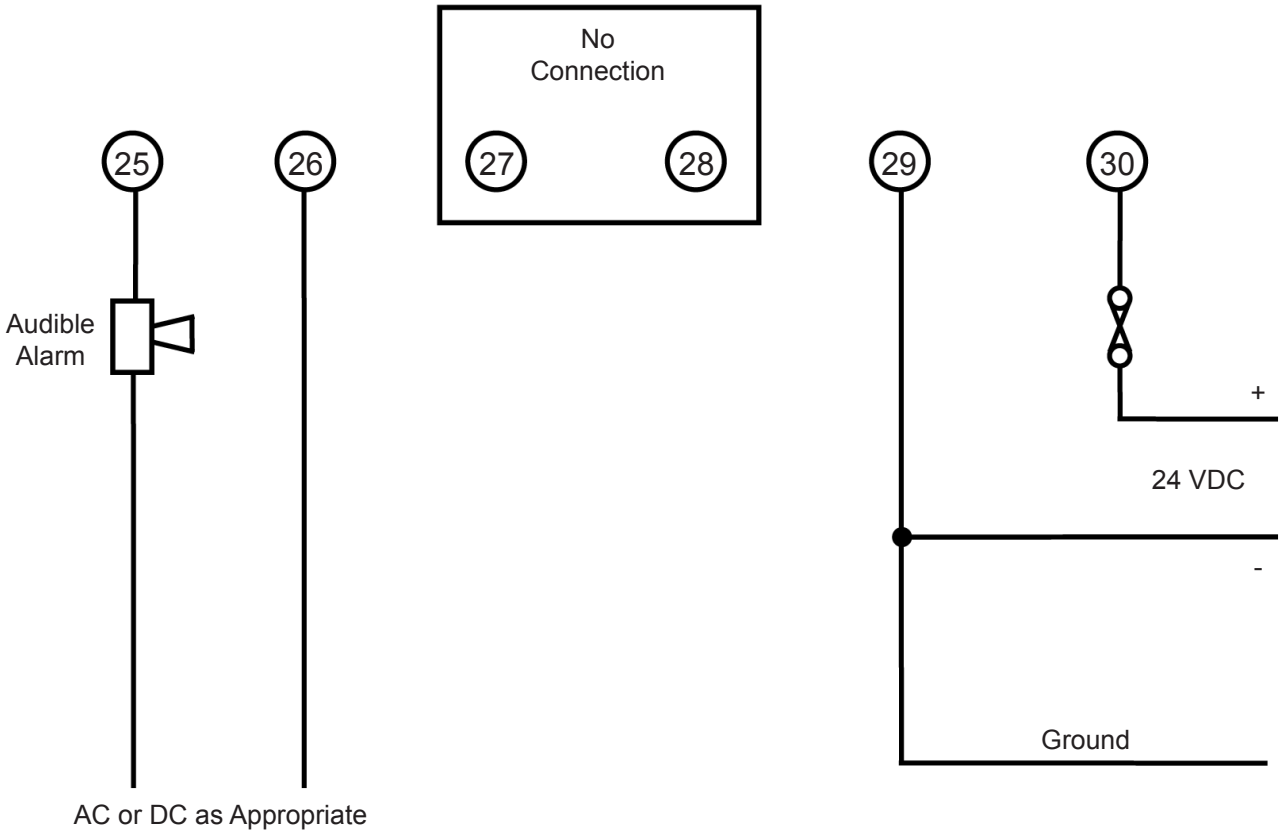
12. Ensure that any unused PTC inputs have a wire link connected across the sensor terminals to avoid unexpected alarms.

APPENDIX 1

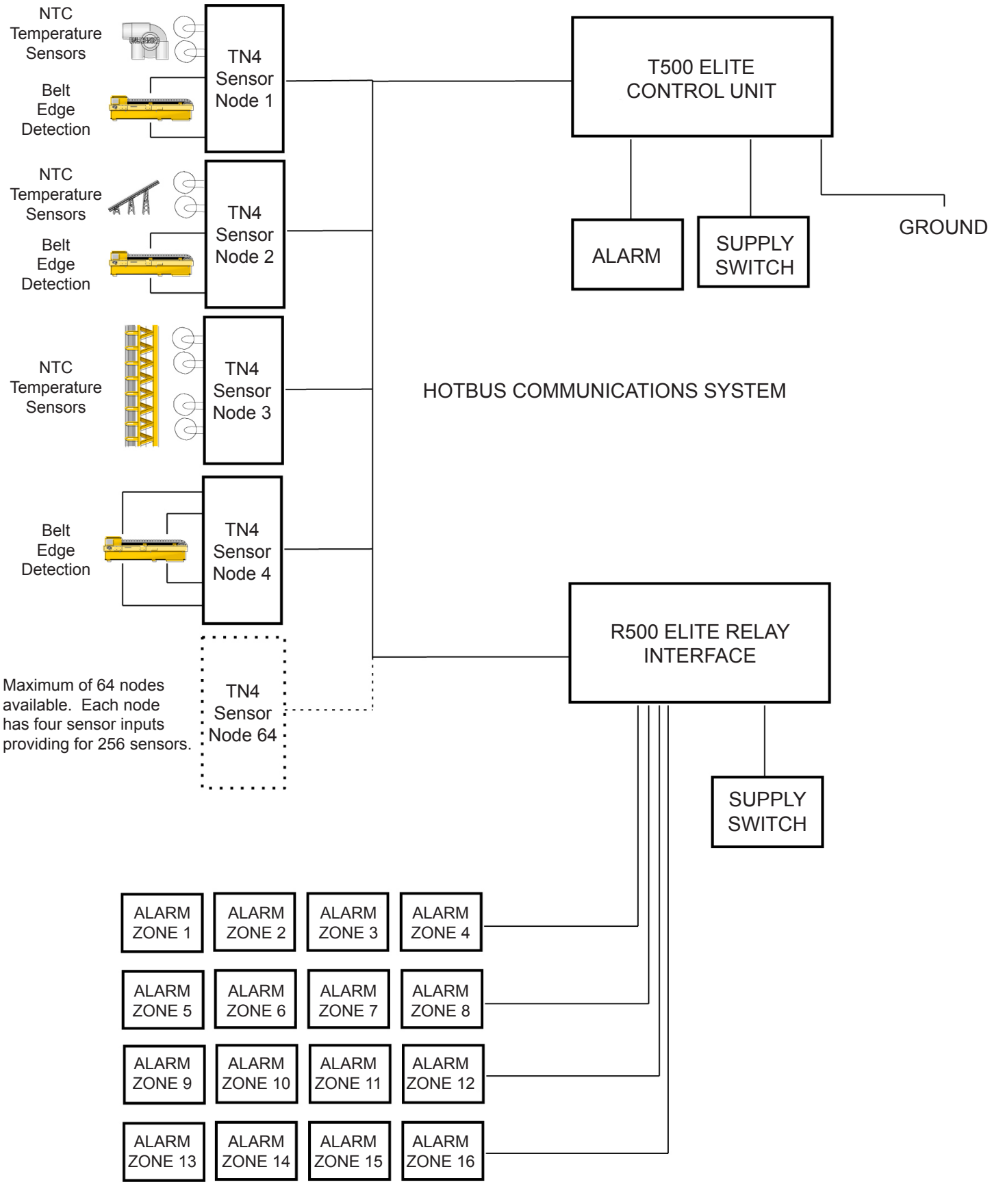
SUPPLY VOLTAGE WIRING (120 TO 240 VAC)



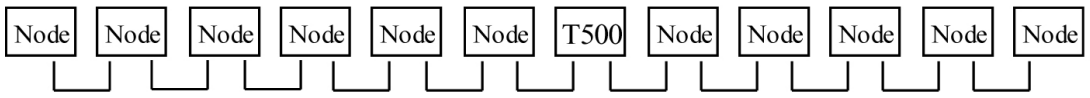
SUPPLY VOLTAGE WIRING (24 VDC)



T500 ELITE NETWORK BLOCK DIAGRAM



T500 ELITE LINEAR TOPOLOGY



HOTBUS RS485 Twisted pair communications cable

FIG.1 (This is equivalent to fig.2)

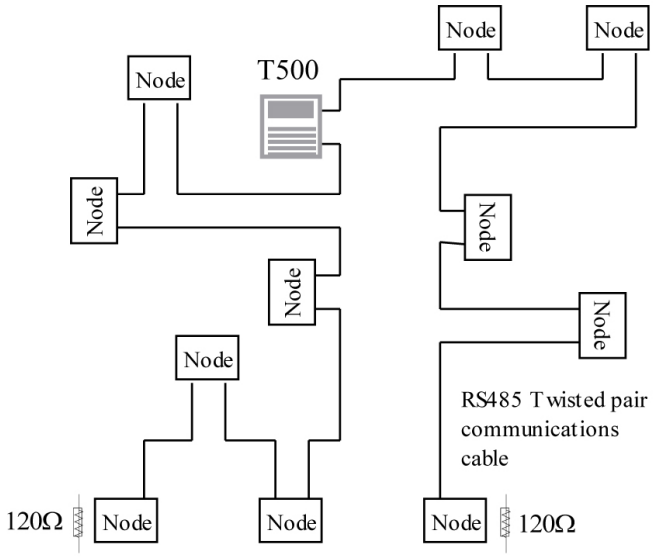


Fig 2
Correct

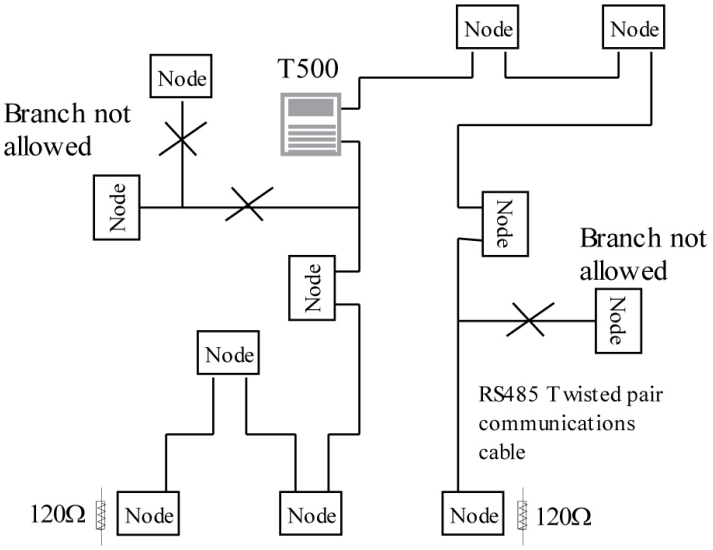


Fig 3
Wrong

Figure 2 shows the correct approach to wiring the T500 Hotbus system with nodes. The maximum cable distance between ends is 1KM, but this is only possible with good wiring practice.

Figure 3 shows an example of the wrong way to wire the T500 Hotbus system. You are NOT allowed to wire branches off of the main cable run. Incorrect wiring will cause signal reflections in the wire which in turn causes poor communications reliability.

Each end of the communications cable MUST be terminated with a 120 OHM resistor ¼ watt or above.

There is no minimum cable distance between nodes.

Ensure that the wiring is neat and tidy. Avoid loose wires which may cause shorting.

NOTES

NOTES

NOTES

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