

ET315 & WET315 Ethernet Terminal
ET315FP & WET315FP Ethernet Fingerprint Terminal
Product Manual
Version 1.30

Introduction

The ET315 family of Ethernet Terminals are small, low cost data collection devices that communicate with a software application program over a TCP/IP network. The ET315FP/WET315FP terminals include a biometric fingerprint reader. The ET315/ET315FP terminal has a wired 10/100BaseT network interface for connection with a network hub or switch. The WET315/WET315FP terminal has a wireless interface for connection through a network access point. Each terminal includes an operator interface consisting of an LCD display and membrane switch keypad. Additional operator include inputs barcode, magstripe, or RFID card reader and serial port. Terminal control interface options include relay outputs and digital inputs with counters. (The various terminal models will be referred to generally as ET315 through this document except as noted.)

Enhancements

The ET315 is a complete redesign of the older ET215 Ethernet terminal using newer technology and supporting additional features. Some of the significant enhancements include (but are not limited to):

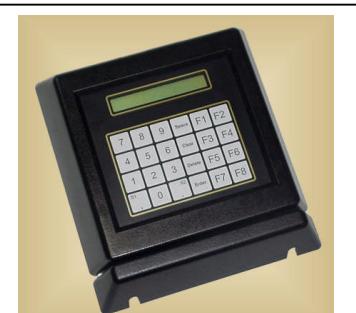
- Password protection for network communications
- Simple configuration with special AID protocol client
- New web browser interface for configuration
- Support for DHCP protocol (Ver 1.30)
- Lower power consumption
- Additional commands for more control
- Improved fingerprint reader technology (ET315FP/WET315FP)
- Optional Power Over Ethernet (POE) (ET315/ET315FP)
- Optional wireless Ethernet (802.11b/g) (WET315/WET315FP)

Theory of Operation

When the ET315 terminal is connected to the network it functions similar to a “dumb” terminal. The host software can send commands and displayable messages to the terminal via the network. User input is entered at the keypad or one of the optional input functions and is sent to the host software. To minimize network traffic the user input is typically transferred as a complete string instead of character by character. Strings are completed by the “Enter” key and terminated with the ASCII <CR> & <LF> characters. The barcode, magstripe, and RFID decoders automatically include the “Enter” function.



ET315



ET315 Wall Mount



ET315FP

Terminal Emulation

The ET315 terminal has two (2) distinct emulation modes, the “Virtual Terminal Command” (VTC) mode and the “ANSI Emulation Mode”. The VTC mode provides a unique but simple protocol that eliminates the need to know all the particulars of the lower level ANSI protocol. The ANSI emulation mode provides a subset of the standard ANSI terminal protocol and can send data as either a string or character by character.

Network Interface

The ET315/ET315FP terminal connects to the network through a 10/100BaseT network hub or network switch with standard RJ-45 Ethernet (CAT-5) cable. The WET315/WET315FP terminal communicates over the network through an 802.11b/g compatible wireless access point. From a network perspective either terminal interface occupies a single “socket” at a specified TCP/IP address and port number. The device must be configured with a unique IP address, netmask, and port number BEFORE it can be used on the network (see “Network Configuration Mode”). The WET315/WET315FP must also be configured for operation with the wireless network access point (see “Wireless Configuration Mode”). The host software communicates with the terminal by establishing a connection with the terminal and then sending and receiving data based on the terminal mode (see “Software Interface”).

In addition to the primary TCP/IP network port the ET315 supports an additional Telnet port (#23). This port can be used by a Telnet client for remote configuration and control using the “Telnet Command Mode”. A “Serial Command Mode” is also provided to allow local configuration and testing using the auxiliary serial port. The “Telnet Command Mode” and the “Serial Command Mode” allow configuration and control commands to be executed on the terminal.

AID Protocol

The AID Protocol is a proprietary mechanism designed to identify and configure Ethernet devices manufactured by Computerwise, Inc. It provides a simple method to configure the device network parameters without the need of a keypad/display console or serial port. This allows an AID enabled Ethernet device to be initially configured by simply connecting it to the local network and running a special AID client on a host computer. The ET200UP/ET300UP utility programs include an AID client function.

DHCP Protocol

The DHCP protocol (Ver 1.30) can be used to automatically assign network interface parameters (NETIP, NETSUBMASK and NETGATEWAY) to the device. The DHCP protocol can be enabled by setting the DHCPTIME parameter to any value greater than zero. Each time the device is reset it will attempt to get the network interface parameters from a DHCP server. If the network parameters can not be obtained dynamically from a DHCP server during the specified time (DHCPTIME) the static network configuration parameters (MYIP, NETMASK and GATEWAY) will be used as defaults.

It should be understood that the network parameters assigned using the DHCP protocol are dynamic and may change each time the device is reset. Therefore in most applications this feature should be used only for initial configuration until a static IP address can be configured. The dynamic network interface parameters will be reported by the AID protocol client or with the NETSHOW command.

Web Browser Interface

The ET315 includes a simple web browser interface for easy access to the most common features and configuration parameters. Once the device has been configured and operating on the network a standard web browser can be used to access to the relay outputs, counter inputs, and many of the configuration parameters.

POE Option

The ET315/ET315FP terminal can be configured with an optional Power Over Ethernet (POE) interface. This option is useful in applications where a power receptacle is not readily available. The POE option is fully 802.3af compliant and should only be used with a POE network switch or power supply.

Wireless Option

The WET315/WET315FP terminal provides a wireless Ethernet interface in place of the standard 10/100BaseT wired interface. This feature allows the terminal to communicate with a standard 802.11b/g compliant wireless access point. This option may be useful in applications where the terminal is not located near a convenient Ethernet port.

Fingerprint Reader Option

The ET315FP/WET315FP fingerprint reader allows for biometric validation of an enrolled user. Each user must first be “enrolled” in the fingerprint database which is stored locally on the terminal. Typically the fingerprint reader is used to perform a “1 to 1” verification with a specific fingerprint stored in the database. In some cases it can also be used to provide a “1 to many” look up in the database for identification. User enrollment is normally performed locally at the terminal using a special administrator mode (see Fingerprint Administration Mode).

Once a user fingerprint has been enrolled it can be replicated to another terminal remotely over the network using special commands. Up to 900 users can be enrolled in each ET315FP/WET315FP terminal.



Operator Interface

The ET315 includes an LCD display and a numeric keypad as the primary operator console interface. In addition the terminal may include optional barcode, magstripe, or RFID input card readers and a serial RS-232 serial port for connection of a serial input device. Optional digital inputs with counters and software controlled relay outputs provide machine control for an external device.

Display

The ET315 display is a two (2) line by twenty four (24) column LCD character display. It can display the 96 standard ASCII characters and 96 non-standard symbols in a 5 x 7 dot matrix font. The cursor position is identified by a blinking box and can be positioned under software control. A display backlight is available as an option for low light installations.

Keypad

The ET315 operator keyboard consists of a four (4) row by six (6) column membrane switch keypad. Two (2) shift keys ("S1" & "S2") are provided to generate upper case alpha characters and several special characters. The keypad also includes eight (8) programmable function keys ("F1" – "F8") for use as needed. The keypad is covered by a windowed overlay allowing the function keys to be relegendable by inserting a new graphic behind the overlay and membrane switch array.

Default Alpha/Numeric Legend

A 7	B 8	C D 8	E 9	G Space	H	" F1	' F2	() F2
I 4	J 5	K L 5	M 6	O Clear	P	# F3	\$ F4	: ;
Q 1	R 2	S T 2	U 3	W BackSpace	X	= F5	@ F6	* ?
S1	Y 0	Z S2	,	.	Enter	- F7	+\br/>F8	\ /

Most of the keypad switches generate a single ASCII character code. The "**Space**", "**Clear**", "**Backspace**", and "**Enter**" keys generate ASCII codes <SP> (20h hex), <CAN> (18 hex), <BS> (08 hex), and <CR> (0D hex) respectively.

The programmable function keys generate an ASCII character string with up to fourteen (14) characters each. The default string for each key is the ASCII "F" character followed by an ASCII numeric character corresponding to the function key number and followed by a <CR> code (automatic "**Enter**"). For example the "**F5**" key generates the ASCII string "F5<CR>. The function keys can be reprogrammed under software control (see "Software Interface" section) for different character strings if desired.

The shift keys ("S1" & "S2") are used to expand the number of ASCII characters that can be generated by the keypad. Holding down a shift key and pressing one of the other 22 keys generates an alternate ASCII character. For example holding down "**S2**" and pressing the "**3**" key generates the ASCII "V" character code. In addition holding down both shift keys and pressing a function key results in a special local terminal function. The following table shows the assigned local terminal functions.

Key Combination	Local Function
S1 & S2 + F1	Enter Network Configuration
S1 & S2 + F2	Enter Console Configuration

S1 & S2 + F3	Enter Serial Port Configuration
S1 & S2 + F4	Enter Fingerprint Administration
S1 & S2 + F5	Enter Wireless Configuration
S1 & S2 + F8	Reset Device

Serial Port

The serial port allows an additional RS-232 device to be connected to the terminal. Input to the serial port is treated similar to keyboard entered data and can be used to attach a serial barcode scanner, weight scale or similar input device. Software can also redirect output data to the serial port to support an attached device such as a serial printer. Access to the serial port is provided by a DB9M connector configured as a DTE device. The serial port can also be used to access the “Serial Command Mode” which provides local communications for configuration and testing.

Barcode Input Option

The barcode decoder input option allows one (1) or two (2) barcode input devices to be interfaced to the terminal. Decoded input is treated just like keyboard entered data and includes an automatic “Enter” (<CR>) code. The terminal will automatically discriminate and decode Code 39, Code 128, Interleave 2/5, Codabar, and UPC/EAN symbologies. Available input scanning devices include wands, slot readers, and wand emulating CCD or laser scanners. The wall mount version of the ET315 can be supplied with an integral slot reader as one of the barcode input devices.

Magstripe Input Option

The magnetic stripe decoder input option allows either a single or dual track magnetic card reader to be supported. Either single Track #1 or Track #2 reader can be decoded and the input is treated just like keyboard entered data and includes an automatic “Enter” (<CR>) code. If a dual track reader is installed both track #1 and track #2 will be decoded.

RFID Input Option

The RFID decoder input option supports either a standard RFID or Wiegand card reader with standard bit formats. The Card Serial Number (CSN) is decoded, converted to an ASCII string and terminated with an automatic “Enter” (<CR>) code. A special option is available to support reading/writing the data sectors on MiFare cards.

Counter Input Option

The digital input option provides up to four (4) digital inputs which can be read under software control. In addition each input will increment a 32 bit digital counter which can be read/cleared under software control. Each digital input must be active for at least 10 milliseconds and inactive for at least 10 milliseconds to accurately increment the counter. Therefore the maximum count frequency is 50 counts/second. To activate an input the voltage must be between 5Vdc min and 26Vdc max.

Relay Output Option

The ET315 can be quipped with up to four (4) solid state relay (SSR) outputs that can be individually activated under software control. Each relay has a single "form A" contact rated at 10va (100vdc, 100ma.) max. Typically these outputs are used to controlled an external relay for larger loads. For more information on external connections see application note AN0202.

Power Supply

The ET315 is powered by a 12vdc power adapter that plugs directly into a 120vac receptacle. Actual power consumption is determined by the model number and options installed. Attaching optional input devices (laser scanners, card readers, etc.) can also increase the power consumption. Alternate power supplies are available for international customers or the terminal can be powered using a 12Vdc supply connected to the power jack. The POE option eliminates the need for an external power supply.

Fingerprint Administration Mode

The ET315FP/WET315FP terminal supports a biometric fingerprint reader which can be used to validate a user. Before a fingerprint can be read each user must be enrolled in the fingerprint database stored in the local terminal memory. The Fingerprint Administration Mode is used to enroll, verify, and delete users in the local database memory. Once enrolled special commands are provided to replicate the user fingerprint data records over the network to other ET315FP/WET315FP terminals.

Fingerprint Basics

Every human has a unique fingerprint pattern on each finger of their hand. By placing the finger on an electronic sensor the fingerprint pattern can be read and converted to a digital image. The digital image is then processed using sophisticated software algorithms and compressed into a fingerprint data record. These fingerprint data records are captured and stored (a process called “enrollment”) for future reference. When a new fingerprint is read the data record is compared with the stored fingerprint data record (a process called “verification”) to determine if they match.

Managing Fingerprint Records

The Fingerprint Administration mode can be enabled through the keypad (S1 & S2 + F4). In this mode the administrator can enroll a new user fingerprint, verify an enrolled fingerprint, and delete an enrolled fingerprint. A menu system is used to navigate through the different commands. To navigate through the menu system press the corresponding number next to the command you wish to perform, then press the “Enter” key.

Enrolling a new user

When “1” is pressed the terminal will prompt the operator for a user ID number to enroll. Enter the user ID number on the keypad and press “Enter” (or scan the user ID card). The ID number is typically a numeric string containing 3 to 9 digits. Entering the ID number will trigger the fingerprint reader to activate and prompt the user to hold a finger on the sensor until the display prompt indicates completion of the enrollment. Press any key to return to the main menu.

Verifying an enrolled user

When “2” is pressed the user will be prompted for an already enrolled ID number to verify. Enter the user ID number on the keypad and press “Enter” (or scan the user ID card). The fingerprint reader will activate and prompt the user to place the enrolled finger on the sensor until the display provides the results. If the ID number and the stored fingerprint data match the “Success” message will be displayed. If they do not match, an error message will be displayed. Press any key to return to the main menu. If an enrolled user can not be reliably verified the ID number should be deleted and the user ID number should be enrolled again.

Deleting a user

When “3” is pressed, terminal will prompt the user for an user ID number to be deleted from the enrolled fingerprint database. Enter the user ID number on the keypad and press “Enter” (or scan the user ID card). The display will indicate the results when the delete function has finished. Press any key to return to the main menu.

Exiting

When “4” is pressed, the fingerprint administration mode is terminated and terminal will exit the administration mode and return to normal operation.

Improving User Success

The effectiveness of the fingerprint reader is largely dependant on how well the sensor can read the user fingerprint image. Several factors can greatly effect how well the fingerprint image can be read. These factors should be kept in mind when enrolling or verifying a user fingerprint.

- The finger should be positioned on the fingerprint sensor at the same location for each read. The single most important factor for effective use of the fingerprint reader is consistent positioning of the finger on the sensor.
- Generally, the index finger is the easiest to position on the sensor and therefore provides the most consistent results.
- The center of the fingerprint image should be centered on the fingerprint sensor window. The center of the fingerprint is normally about half way between the tip of the finger and the finger tip joint. Usually the center of the fingerprint pattern is located right behind the fingernail cuticle.
- Fingers should be kept clean from materials that can distort the fingerprint image. This would include dirt, glue, grease, and powder.
- A cut, scar, or burn can greatly effect the fingerprint image. If a fingerprint becomes damaged the user may have to be enrolled again to get a consistent read.
- Often fingerprints of the elderly have been worn to a place where they simply can not be read. In this case they will not be able to be enrolled and alternate means of validation will be required.
- Gloves should not be worn when using the fingerprint reader.

Maintenance

The fingerprint reader requires no maintenance other than occasional cleaning. Dust or grit should be removed from the fingerprint reader using clean compressed air to avoid scratching the sensor surface. A soft dry cloth can be used to clean the sensor but liquid cleaners should NOT be used.

Software Interface

Software communications with the ET315 terminal is simple and straight forward. The primary TCP/IP port is used for terminal communications with the application program. Normally the host software (client) is responsible for establishing a network connection with the ET315 (server mode) on the specified port (TCPPORT). As an alternative the terminal can be configured to automatically establish a connection (client mode) with a host computer application program (server) using the SERVER parameter (see “Setup & Configuration” section).

Once the connection is established the host application software can send data to and receive data from the terminal. Typically the data transfer is accomplished in ASCII character strings instead of character by character to minimize network packet traffic. The communications protocol is determined by the terminal emulation mode (see the MODE parameter) and can be changed dynamically by the host software.

Virtual Terminal Command Mode

The “Virtual Terminal Command” (VTC) mode (MODE=1) establishes a simple communication protocol using ASCII text strings. All data transfers between the ET315 and the application software consist of ASCII character command strings followed by a <CR> (and optional <LF>) character sequence.

Software commands are provided in two (2) formats. The first format directs the terminal to perform an action while the second format will set a value.

To request the ET315 to perform an action send the command name followed by the <CR> terminator. For example to instruct the terminal to sound the internal “bell” send it the command as follows:

BELL <CR>

In some cases the command format is used to retrieve a value from the terminal. For example to retrieve the emulation mode parameter send the following command:

MODE <CR>

The terminal responds with the following text string response:

MODE=1 <CR><LF>

Other commands are used to set or change a value in the terminal from the host software. This command format consists of the command name, followed by the “=” character, followed by the new value and terminated with the <CR> (and optional <LF>) sequence. For example to move the display cursor to the 1st column of the 2nd line send the following command:

CURSOR=2,1 <CR>

The following table provides a summary of the VTC mode commands. An example of valid data values (if applicable) and a brief description of the command is also included in the table. In addition to these commands, all of the Network, Wireless, Serial, and Console configuration mode parameters are available as VTC commands (see “Network Configuration Mode”).

Name	Example Data	Description
AUX	Hello World	This command is used to send a data string out the serial port to an external device.
	12345	Sent by the terminal when the serial port has received a complete input string terminated by a <CR> and/or <LF> code and SPINPUT=0.
BELL		Activate terminal internal “bell” sound.

CLEAR		Clear the console display.
CLOSE		Same as EXIT. Forces the terminal to terminate the network session and close the connection. On the primary port the terminal will return to the “Offline” mode.
CONFIGURATION		Sent by the terminal to notify the host Telnet client that a connection has been established with the terminal “Telnet Command Mode”.
CONNECTED		Sent by the terminal to notify the host application software that a connection has been established with the terminal on the primary TCP/IP port.
COUNTER	12,43,0,789	Requests the terminal to respond with the current value of the optional digital input counters. The return value string consists of the count values separated by commas (cnt 1, cnt 2, cnt 3, cnt 4).
	1 3 0	This command can also be used to clear one or more of the counters. If the command is sent with a parameter field the specified counter (1 – 4) will be cleared. If the parameter value send is “0” then all the counters will be cleared.
CURSOR	2,1	Moves the display cursor to the specified row and column. The value string includes the row number (1 - 2) followed by the column number (1 - 24) and separated by a comma.
DEVICE	ET315	A read only parameter that returns the model number of the terminal device. Possible values are: ET315 ET315FP WET315 WET315FP
DISPLAY	Hello World	Presents the information to the console display at the current cursor location.
ECHOCODE	42	Used to define a substitute character code that will be echoed to the display for keypad entry. The default value (0) will display the ASCII character associated with entered character. If the value is set to an ASCII character code (32 – 127) value then it will be substituted for each character entry. The default value (0) will be reset after each entry.
ERROR		Sent by the terminal if an invalid command is received from the host software.

FKEY	1,YES 2,NO	Will reprogram one of the console function keys. The value string defines the function key number (1 – 8) followed by the ASCII character string to be programmed into the function key. Each key can have up to 14 total characters. A key number of zero (0) will save all of the function key values to non-volatile memory.
HOSTNAME		Defines an optional name (up to 15 characters) for the terminal. Although not required this parameter allows a name to be associated with the terminal.
INPUTS	0,1,0,0	Requests the terminal to respond with the current state of the optional digital inputs. The return value consists of the state (1=active, 0=inactive) of the digital inputs separated by commas (inp 1, inp 2, inp 3, inp 4).
KEY	12345	Sent by the ET315 when the user completes an input string. At the keypad this is done by pressing the “Enter” key. For barcode, magstripe, or RFID reader the command is sent when the input is decoded.
KEYPAD	0	Used to enable or disable the terminal keypad. The default zero (0) value enables the keypad for normal use. When set to one (1) the keypad will be disabled.
LIST		Returns a list of the files stored in the terminal file memory and shows the amount of memory used. File memory is not present on most models but can be present based on special options and configurations.
ERASE		Used to delete a file from the terminal file memory. The file is specified with the 8.3 file format.
EXIT		Same as CLOSE. Forces the terminal to terminate the network session and close the connection. On the primary port the terminal will return to the “Offline” mode.
MEMORY	221335	Returns the amount (in bytes) of available file memory in the device. File memory is only present on some models.
MODE	1	Defines terminal emulation mode. The three (3) valid emulation modes are as follows: 1 = VTC Mode (default) 2 = ANSI Mode (string) 3 = ANSI Mode (single character)
MYMAC	0050C2163007	This command will return a 12 character hexadecimal string representing the Ethernet hardware MAC address.

NETRETRY	10	Used to define the number of seconds between attempts to connect to a host application when the terminal is operated in the client mode (see SERVER parameter). When set to zero (0) no connection is attempted until an entry is made on the terminal.
NETIP		(Ver 1.30) Returns the dynamic network interface IP address. If the DHCP protocol is disabled this value will be the same as the MYIP parameter.
NETSUBMASK		(Ver 1.30) Returns the dynamic network interface subnet mask. If the DHCP protocol is disabled this value will be the same as the NETMASK parameter.
NETGATEWAY		(Ver 1.30) Returns the dynamic network interface gateway IP address. If the DHCP protocol is disabled this value will be the same as the GATEWAY parameter.
NETSHOW		(Ver 1.30) Returns a list of the dynamic network interface parameter values.
PASSWORDTCP		Defines a password (up to 15 characters) used to control access to the primary network port and the Network Command mode. If this value is empty (blank) then no password is required for access (default). This parameter is case sensitive. Prior to (Ver 1.23) this password also controlled access to the web browser port.
PASSWORDTEL		Defines a password (up to 15 characters) used to control access to the Telnet port and Telnet Command mode. If this value is empty (blank) then no password is required for access (default). This parameter is case sensitive.
PASSWORDCON		Defines a password (up to 15 characters) used to control access the console configuration modes. If this value is empty (blank) then no password is required access these modes (default). This parameter is case sensitive.
PASSWORDWEB		(Ver 1.23) Defines a password (up to 15 characters) used to control access to the web browser port. If this value is empty (blank) then no password is required for access (default). This parameter is case sensitive.

RELAY	1,1	This command will activate one of the optional relay outputs. The value string defines the relay number (1 – 4) followed by the control function value separated by a comma. A control value of “1” turns the relay on and a value of “0” turns the relay off. A value between 2 – 255 defines the number of seconds the relay will be active before it automatically turns off.
RESET		Reboot the terminal (same as power-on initialization). Can be used after changing network parameters and saving them in order to restart the terminal with the new parameters. THE NETWORK CONNECTION WILL BE LOST AND MUST BE REESTABLISHED WITH THE HOST SOFTWARE.
SAVE		Saves configuration parameters to non-volatile terminal memory. Typically used after one or more of the configuration parameters has been changed.
SHOW		Returns a list of the static Network Configuration parameters and their current values.
SPINPUT	0	(Ver 1.24) Defines how data received at the serial port will be processed. When set to the default value “0” the serial data will be sent to the host application (AUX=). When set to “1” the serial data will be processed as if it had come from the console keypad (KEY=). When set to “2” the serial data is also echoed back to the sending device.
SPOUTPUT	0	(Ver 1.24) Defines how certain console commands may be redirected to the serial port. When set to the default value “0” data is directed to the serial port with the AUX= command. When set to “1” the DISPLAY, CLEAR, CURSOR, and ECHOCODE commands are directed to the serial port instead of the device console.
SPSHOW		Returns a list of the Serial Configuration parameters and their current values.
VERSION	1.00	A read only parameter that returns the current firmware version information.

WATCHDOG	0	Will enable or disable the watchdog timer on the primary port connection. The default value (0) disables the timer and the connection will never close unless the remote end forces it closed. The watchdog timer is enabled by setting this value for the time out period (in seconds). If no data is received on the primary connection within the specified number of seconds the connection will be forced closed.
WEBPROTOCOL	1	(Ver 1.23) Will enable or disable access to the web browser interface port. The default value (1) enables the web browser port.
WLSHOW		Returns a list of the Wireless Configuration parameters and their current values. This command is only valid for the ET315 or WET315FP terminals.

Some commands may require a non-displayable ASCII code to be embedded in the value portion of the string. This can be accomplished by delimiting the decimal value of the character code with the “{“ and “}” characters. For example to embed a “Enter” code (<CR>) in a function key string send the command:

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FKEY=2>Hello{13}<CR><LF>
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Fingerprint Commands

The ET315FP/WET315FP also includes the following additional commands to support the fingerprint reader. These commands are only valid for the ET315FP or WET315FP terminals.

Name	Command Value(s)	Response Value(s)	Description
FPENROLL	ID number	0	Used to enroll a user with a specific ID number in the fingerprint reader.
FPVERIFY	ID number	ID number	Used to perform a “1 to 1” verification with a specific ID number.
	ALL	ID number	Used to perform a “1 to many” identification of a user ID number.
FPDELETE	ID number	ID number	Used to delete a specific ID number fingerprint record from the fingerprint reader database memory.
	ALL	0	Used to delete ALL of the fingerprint records in the reader database memory.
FPUSERS		Number of enrolled users	Will return the number of user ID numbers currently enrolled in the fingerprint reader database memory.
FPIDLIST		List of enrolled ID numbers	Used to return a list of currently enrolled ID numbers. The last line of the list is the FPIDLIST=END<CR> string which indicates the command is complete.
FPEXTRACT	ID number	Status	Used to extract a user fingerprint data record from the database memory and store it in a fingerprint data file (FPRECORD.DAT). The file can then be downloaded using the TFTP protocol and then uploaded to another terminal.
	ALL	Status	Used to extract all user fingerprint data records from the database memory and store them in a fingerprint data file (FPRECORD.DAT). The file can then be downloaded using the TFTP protocol and then uploaded to another terminal.
FPINSERT	ALL	Status	Used to insert one or more user fingerprint records from a fingerprint data file (FPRECORD.DAT) in to the fingerprint database memory. The fingerprint data file must be created using the FPEXTRACT command. All fingerprint records in the data file will be inserted in to the database memory. Any record with the same user ID number will be replaced by the record in the data file.

FPERROR		Error code	Sent to report an error when executing one of the fingerprint commands. The meaning of the error code depends on the command context.
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Telnet Command Mode

The ET315 includes a Telnet port (#23) feature which allows a remote Telnet client to connect to the terminal and execute the VTC commands (see Virtual Terminal Command Mode”). This connection is in addition to the primary network port and can be used for remote configuration of the terminal. Once a Telnet connection is established the host client can send any of the VTC commands directly to the terminal. These commands can be used to change operating parameters or retrieve terminal information. The Telnet port connection will be automatically closed after 4 minutes if no data is received.

Serial Command Mode

This feature allows a serial terminal or computer running a serial client program to connect directly to the ET315 and execute the VTC commands. The “Serial Configuration Mode” is enabled by sending three (3) consecutive <SYN> characters (0x16) to the serial port. Once enabled all of the VTC commands can be executed. Each ASCII character received at the serial port will be echoed to the sending device. Sending a single <CAN> code (0x18) to the serial port will disable the “Serial Command Mode” and return the port to it’s normal input function.

ANSI Emulation Mode

In addition to the standard VTC mode (see “Virtual Terminal Command Mode”) the ET315 terminal supports two (2) ANSI emulation modes. These modes provide a lower level communication protocol than the VTC mode and permit a more generic “Telnet” type dumb terminal. In string mode (MODE=2) no data is sent until the “Enter” key is pressed. In the character mode (MODE=3) each character is sent as it is entered. To dynamically change from the VTC mode to the ANSI mode use the “MODE=2” or “MODE=3” command. The mode can be switched back to VTC mode with the following character sequence:

<SYN><SYN><SYN>

The ET315 supports a subset of the standard ANSI protocol. Displayable ASCII character codes are presented to the display at the current cursor location. Terminal functions and display control are provided by ASCII control codes and escape control sequences. The following table provides a summary of the ASCII control (00 - 1F hex) codes recognized by the terminal along with a brief description.

ASCII	Hex	Decimal	Description
BEL	07	07	Activate the internal bell for approximately 150 msec.
BS	08	08	Backspace will move the cursor left by one character position.
LF	0A	10	Line Feed will move the cursor down by one row position. If the cursor is on the last row the display will scroll up by one row.
FF	0C	12	Form Feed will clear the display contents and put the cursor in the home position.
CR	0D	13	Carriage Return will move the cursor to the left column of the display.
DC2	12	18	Redirect output from the display to the aux serial port output.
DC4	14	20	Direct output back to the terminal display from the aux serial port.
ESC	1B	27	Escape is the lead in character for an escape control sequence.
SYN	16	22	Used to change terminal emulation to VTC mode.

The ET315 ANSI mode recognizes escape control sequences to provide special features and control of the terminal. These multiple character sequences start with the ASCII <ESC> (1B hex) code followed by one or more ASCII character codes. Escape control sequences are divided into two categories, functions that can be implemented using the standard ANSI protocol and functions that are unique to the terminal features. The following table provides a summary of the standard ANSI escape sequences recognized by the ET315 terminal.

Function	ANSI Sequence	Description
CUU	<ESC> [A <ESC> [nnn A	Cursor Up - moves the cursor up by the specified number of rows (nnn = number of rows). If no parameter is included the cursor is moved up by one row.
CUD	<ESC> [B <ESC> [nnn B	Cursor Down - moves the cursor down by the specified number of rows (nnn = number of rows). If no parameter is included the cursor is moved down by one row.
CUF	<ESC> [C <ESC> [nnn C	Cursor Forward - moves the cursor forward by the specified number of character positions (nnn = number of characters). If no parameter is included the cursor is moved forward by one character.

CUB	<ESC> [D <ESC> [nnn D	Cursor Back - moves the cursor back by the specified number of character positions (nnn = number of characters). If no parameter is included the cursor is moved back by one character.
HVP	<ESC> [rrr ; ccc F	Same as CUP (see below)
CUP	<ESC> [H <ESC> [rrr ; ccc H	Cursor Position - moves the cursor to the specified display position (rrr = row, ccc = column). If no position parameters are included the cursor is moved to the home position. The home position (upper left corner) is position 1;1.
ED	<ESC> [0 J <ESC> [2 J	Erase Display - clears the display based on the numeric parameter. 0 = clear from cursor to end of display 2 = clear all of display & home the cursor
EL	<ESC> [K <ESC> [0 K	Erase Line - clears the row from the cursor position to the end of the row.
SCP	<ESC> [s	Save Cursor Position - saves the current cursor position until it is recalled by the RCP sequence.
RCP	<ESC> [u	Recall Cursor Position - repositions the cursor to the location last saved with the SCP sequence.

The following table shows the escape character sequences which are unique to the ET315 terminal and are non-ANSI compatible.

Function	Sequence	Description
TRV	<ESC> nnn V	Transmit Register Value - returns the contents of a console configuration register (1 - 8 specified by nnn) followed by a <CR><LF> terminator.
SRV	<ESC> nnn ; vvv R	Set Register Value – programs a console configuration register (1 - 8 specified by nnn) with an 8 bit value (0 - 255 specified by vvv). A register value of "0" will store all of the configuration registers to the non-volatile memory.
XFK	<ESC> nnn K	Transmit Function Key - returns the contents of a function key string (1 - 8 specified by nnn) followed by a <CR><LF> terminator.
PFK	<ESC> nnn W d a ... a d	Program Function Key - programs the specified function key (1 - 8 specified by nnn) with a character string (specified by a ... a) defined between the occurrence of a delimiter code (specified by d). Function keys can be up to 12 characters long and the delimiter can be any character not contained in the character string. A specified function key value of "0" will store all of the function key strings to non-volatile memory.
DBC	<ESC> nnn b	Display Backlight Control – controls the display backlight if the option is installed. 0 = backlight off 1 = backlight on This command is not valid for LED backlight displays.

RLY	<ESC> nnn ; ccc q	Relay Control – controls a relay (1 - 4 specified by nnn) based on a function code (0 - 255 specified by ccc) as follows: 0 = relay off 1 = relay on (until turned off) 2 - 255 = relay on for duration (in seconds).
CNT	<ESC> nnn ; ccc i	Counter Input Control – provides access to the optional input counters (1 – 4 specified by nnn). The function code (0 – 2 specified by ccc) is defined as follows: 0 = xmit input status (all inputs) 1 = xmit counter value 2 = clear counter value
KDF	<ESC> nnn k	Keypad Disable Control – sets or clears (0 or 1 specified by nnn) the keypad disable flag. The disable flag is set as follows: 0 = keypad enabled (default) 1 = keypad disabled
SAV	<ESC> S	Save network and console configuration parameters and function key strings to non-volatile memory.
RST	<ESC> X	Restart the terminal (same as power-on initialization). Can be used after changing network parameters and saving them in order to restart the terminal with the new parameters. THE NETWORK CONNECTION WILL BE LOST AND MUST BE REESTABLISHED WITH THE HOST SOFTWARE.

Setup & Configuration

The ET315 terminal must be configured for a specific application BEFORE it can be properly used on the network. The operator console can be used to configure the Network, Wireless, Console, and Serial Port parameters. Network configuration parameters can also be modified with the AID Protocol using an AID Client (ET200UP/ET300UP), the DHCP Protocol (dynamic only), or the “Serial Command Mode” using the serial port. Once the initial network configuration is complete additional features can be configured or reconfigured through the Telnet port, web browser interface, AID Protocol or the serial port. The “SAVE” command followed by the “RESET” command will complete the configuration sequence and store the configuration parameters in non-volatile memory.

Network Configuration Mode

The Network Configuration mode is used to configure the ET315 network communication parameters. These parameters must be set BEFORE the terminal can be used on the network. Holding down the “S1” & “S2” shift keys and pressing the “F1” key will enable the Network Configuration mode. A menu will be displayed allowing the operator to either restore the factory defaults (1) or to modify the existing values (2). When the modify function is selected the operator is presented with a series of parameters and their current values. A value can be changed by modifying the current value or entering a new value on the keypad. After the last parameter is entered the values are saved in memory and the menu is displayed again. To exit from the configuration mode menu press the “Enter” key.

Once the network parameters are set properly they can be modified via software over the network. A Telnet client program can use the VTC commands to configure the device (see “Telnet Command Mode”). In addition, the configuration parameters can be modified through the web browser interface or the serial port (see “Serial Command Mode”) using VTC commands.

The “SHOW” command will display the network parameters and their current values. Any parameter can be changed using a VTC command (see “Virtual Terminal Command Mode”) and the new value. A VTC command consists of the parameter name, followed by the “=” character, followed by the new value, and terminated by a <CR> (and optional <LF>) character sequence. For example, to change the NETMASK parameter use the command:

NETMASK=255.255.255.0<CR>

The following table summarizes the “Network Configuration Mode” parameters and the VTC command names used to change them. Also the factory default value and a description of each parameter is provided.

Name	Default Value	Description
MYIP	192.168.168.50	Defines the static network address of the device. This value must be set BEFORE using the device on a network. The default value may NOT be appropriate and a new address should be obtained from the network administrator.
NETMASK	255.255.255.0	Defines the static subnet mask for the device IP address. This value must be set BEFORE using the device on a network. The default value may NOT be appropriate and a new value should be obtained from the network administrator.

GATEWAY	0.0.0.0	Defines a static network IP address of a router or gateway if the network extends to multiple segments. This value must be set BEFORE using the device on a network. The default value may NOT be appropriate and a new address should be obtained from the network administrator.
SERVER	0.0.0.0	Defines a TCP/IP address of a server application program. Normally this value is set to 0.0.0.0 which causes the device operate in the “server” mode and connects with a host computer running a “client” application. If this value is set to any other IP address the device will operate in the “client” mode and will attempt to automatically connect to a host computer “server” application program.
TCPPORT	1070	Defines the primary TCP/IP port number used for this device. In most cases the default value will be acceptable. However it may NOT be appropriate for some application programs and a new port number should be obtained from the network administrator.
DHCPTIME	0	(Ver 1.30) Enables the DHCP protocol and defines the amount of time (in seconds) the device will wait for network interface parameters from a server. Typical values are 30 – 60 seconds. The DHCP protocol is disabled when this value is set to zero.
MODE	1	Defines terminal emulation mode. The three (3) valid emulation modes are as follows: 1 = VTC Mode (default) 2 = ANSI Mode (string) 3 = ANSI Mode (single character)
MYMAC	0050C2163007	This command will return a 12 character hexadecimal string representing the Ethernet hardware address. It is read only and can not be used to change the hardware address.

Wireless Configuration Mode

The Wireless Configuration mode is used to configure the wireless terminal parameters. This configuration mode is only available for the wireless terminals (WET315/WET315FP). Holding down the “S1” & “S2” shift keys and pressing the “F5” key will enable the Wireless Configuration mode. A menu will be displayed allowing the operator to either restore the factory defaults (1) or to modify the existing values (2). When modify is selected the operator is presented with a series of parameters and their current values. A value can be changed by modifying the current value or entering a new value on the keypad. After the last parameter is entered the values are saved in memory and the menu is displayed again. To exit from the configuration mode menu press the “Enter” key.

Once the wireless parameters are set properly the wireless terminal will need to be reset before the new parameters will take effect. The following table summarizes the Wireless Configuration parameters, the factory default value, and a description of each parameter. These commands are only available in the WET315/WET315FP terminal.

Name	Default Value	Description
WLCHANNEL	6	Defines the default WLAN radio channel number of the access point. In most applications the terminal will automatically negotiate a channel with the access point and this parameter is not used. In cases where the access point uses only a fixed channel number this parameter must be set to match the access point channel.
WLSSID	DEFAULT	Defines the WLAN network name. This character string value defines the unique wireless network name and must match the SSID value in the access point. This parameter is case sensitive.
WLSECURITY	0	Defines the WLAN security level. This parameter will enable the wireless security mechanism used with the access point. The following security mode and encryption combinations are available. 0 = None (security disabled) 64 = WEP 64 bit 128 = WEP 128 bit 2 = WPA TKIP 3 = WPA2 CCMP The security level and security key must match the access point security values.
WLKEY		Defines the WLAN security key value. The security key is a character string value and the format is based up on the encryption mode. The security key value must exactly match the key value in the access point. For WEP encryption the key is provided as a hexadecimal string (0-9, A-F) of either 10 characters (WEP64) or 26 characters (WEP128). For WPA or WPA2 encryption the key value is a passphrase string of up to 60 characters.

WLSHOW		Returns a list of the Wireless Configuration parameters and their current values. This command is only valid for the WET315/WET315FP device.
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Console Configuration Mode

The Console Configuration Mode is used to configure the terminal operator console parameters.

Typically the factory default values for these parameters will NOT need to be changed. Should a change be required for a specific application this mode can be enabled by holding down the “S1” & “S2” shift keys and pressing the “F2” key. A menu will be displayed allowing the operator to either restore the factory defaults (1) or to modify the existing values (2). When modify is selected the operator is presented with a series of parameters and their current values. A value can be changed by modifying the current value or entering a new value on the keypad. After the last parameter is entered the values are saved in memory and the menu is displayed again. To exit from the configuration mode menu press the “Enter” key.

Warning. Changing any of these parameters could adversely effect the operation of the terminal and should only be done by experienced technicians.

Each configuration parameter is displayed and entered as an 8-bit decimal value (0 - 255). Some parameter values represent a group of eight (8) individual flags (bits) and the decimal value is set as a sum of the bits desired. For example, if a parameter should have the 1st (value 1), 4th (value 8) and 8th (value 128) bits set the configuration parameter would be $1 + 8 + 128 = 137$. The following table provides a summary of the configuration parameters, the register name, their default values, and a description. An asterisk identifies default bit values.

Any parameter can also be changed using a VTC command (see “Virtual Terminal Command Mode”) and the new value. A VTC command consists of the parameter name, followed by the “=” character, followed by the new value, and terminated by a <CR> (and optional <LF>) character sequence. The following table summarizes the “Console Configuration Mode” parameters and the VTC command names used to change them. Also the factory default value and a description of each parameter is provided.

Name	Default	Description		
CONSOLE	8	Console operation features determine how the keyboard/display operator console will behave		
		Bit	Value	Definition
		1	1	Enable Numeric Only keypad mode.
		2	2	Spare
		3	4	Spare
		4 *	8	Enable New Line - keyboard will append a <LF> code after the <CR> code.
		5	16	Spare
		6	32	Enable remap of keypad
		7	64	Spare
		8	128	Spare
MAGSTRIPE	5	Defines how the magnetic card reader operates when the option is installed.		
		Bit	Value	Definition
		1*	1	Enable magstripe reader
		2	2	Include “~” character preamble
		3*	4	Automatic “Enter” postamble
		4	8	Spare

		<table border="1"> <tr><td>5</td><td>16</td><td>Disable track #1</td></tr> <tr><td>6</td><td>32</td><td>Disable track #2</td></tr> <tr><td>7</td><td>64</td><td>Enable Wiegand input</td></tr> <tr><td>8</td><td>128</td><td>Include Magstripe Start/Stop or Wiegand Facility Code in decoded string</td></tr> </table>	5	16	Disable track #1	6	32	Disable track #2	7	64	Enable Wiegand input	8	128	Include Magstripe Start/Stop or Wiegand Facility Code in decoded string															
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BARCODE	5	<p>Defines how the bar-code decoder operates when the option is installed</p> <table border="1"> <thead> <tr> <th>Bit</th><th>Value</th><th>Definition</th></tr> </thead> <tbody> <tr><td>1 *</td><td>1</td><td>Enable bar-code reader</td></tr> <tr><td>2</td><td>2</td><td>Include "~" character preamble</td></tr> <tr><td>3 *</td><td>4</td><td>Automatic "Enter" postamble</td></tr> <tr><td>4</td><td>8</td><td>Include Codabar Start/Stop codes</td></tr> <tr><td>5</td><td>16</td><td>Code 39 Extended Mode</td></tr> <tr><td>6</td><td>32</td><td>Code 39 Concatenation Mode</td></tr> <tr><td>7</td><td>64</td><td>Include Code 39 Check Digit</td></tr> <tr><td>8</td><td>128</td><td>Include UPC-A Check Digits</td></tr> </tbody> </table>	Bit	Value	Definition	1 *	1	Enable bar-code reader	2	2	Include "~" character preamble	3 *	4	Automatic "Enter" postamble	4	8	Include Codabar Start/Stop codes	5	16	Code 39 Extended Mode	6	32	Code 39 Concatenation Mode	7	64	Include Code 39 Check Digit	8	128	Include UPC-A Check Digits
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OPTIONS	0	<p>Defines various decoder options.</p> <p>Barcode - length of Interleave 2/5 symbol if not zero (0).</p> <p>Wiegand - matching Facility Code if not zero (0).</p>																											
XMITINPUT	0	<p>Used to enable a status message if a digital input changes state. The output message is:</p> <p>INP={Ix=s} <CR><LF></p> <p>Where:</p> <p>x = input (1 – 4)</p> <p>s – status (0 – 1) where 0 = inactive and 1 = active.</p> <table border="1"> <thead> <tr> <th>Bit</th><th>Value</th><th>Definition</th></tr> </thead> </table>	Bit	Value	Definition																								
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1	1	Counter #1 changes to active
2	2	Counter #2 changes to active
3	4	Counter #3 changes to active
4	8	Counter #4 changes to active
5	16	Counter #1 changes to inactive
6	32	Counter #2 changes to inactive
7	64	Counter #3 changes to inactive
8	128	Counter #4 changes to inactive

Serial Configuration Mode

The Serial Configuration mode is used to configure the terminal serial port parameters. Holding down the “S1” & “S2” shift keys and pressing the “F3” key will enable the Serial Configuration mode. A menu will be displayed allowing the operator to either restore the factory defaults (1) or to modify the existing values (2). When modify is selected the operator is presented with a series of parameters and their current values. A value can be changed by modifying the current value or entering a new value on the keypad. After the last parameter is entered the values are saved in memory and the menu is display again. To exit from the configuration mode menu press the “Enter” key.

Once the serial parameters are set properly the terminal can be interfaced to a serial RS232 device to capture additional data input or be used for the Serial Command mode. The following table summarizes the Serial Configuration parameters, the factory default value, and a description of each parameter.

Name	Default Value	Description
SPBAUD	9600	Defines the serial port baud rate.
SPPARITY	0	Defines the serial port parity. The value can be 0=none, 1=even, 2=odd, 3=mark, 4=space.
SPDBITS	8	Defines the serial port data bits. The value can be 5, 6, 7, or 8.
SPSTOP	1	Defines the serial port stop bits. The value can be 1 or 2
SPHANDSHAKE	0	Defines the serial port handshake protocol. The value can be 0=none, (no others supported at this time).
SPSHOW		Returns a list of the Serial Configuration parameters and their current values.

Factory Defaults

The ET315 configuration parameters can be reset to their factory default values. To reset the default values install a jumper between RTS (pin #7) and RXD (pin #2) on the serial port while performing a power on reset function. This operation will reset all of the Configuration Parameters to their factor default state. This might be required if the device gets in an unknown configuration state and all other communications are lost.

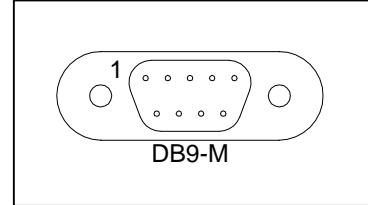
Physical Interface

Power Jack

Tip (center post)	+12 Volt DC
Ring (outer sleeve)	Ground

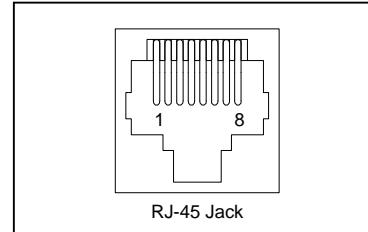
Serial Port (DB9M, DTE configuration)

Pin #	RS-232 Signal	Description	Direction
1	DCD	Data Carrier Detect	Input
2	RXD	Receive Data	Input
3	TXD	Transmit Data	Output
4	DTR	Data Terminal Ready	Output
5	SG	Ground	Common
6	DSR	Data Set Ready	Input
7	RTS	Request To Send	Output
8	CTS	Clear To Send	Input
9	RI	Ring Indicator	Input



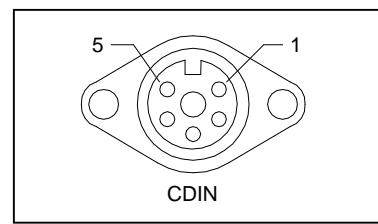
Ethernet 10/100Base-T Jack (RJ-45)

Pin #	Ethernet Signal	Description
1	XXT+	Transmit Data +
2	XXT-	Transmit Data -
3	XRC+	Receive Data +
4	NC	
5	NC	
6	XRC-	Receive Data -
7	NC	
8	NC	



Barcode, Magstripe, RFID Input (DIN - 5, 240 degree)

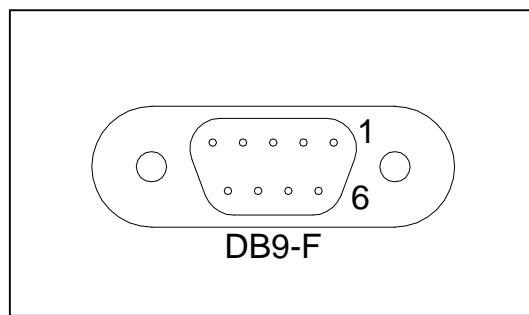
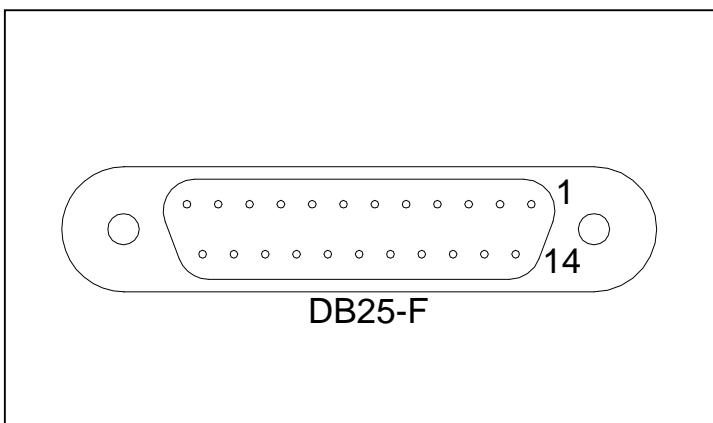
Pin #	Barcode	Magstripe	RFID
1	+5 Vdc	+5 Vdc	+5 Vdc
2	Data	Clock	Data 0
3	Ground	Ground	Ground
4	NC	Data	Data 1
5	NC	NC	NC



Digital I/O Interface (DB25F or DB9F)

The digital I/O interface connections are available in several configurations depending on the options installed. Either a DB25F or DB9F connector is provided for the digital I/O interface.

Signal	Quad I/O	Dual I/O	Quad Out	Quad In	Dual Out	Dual In
	DB-25F	DB-9F	DB-9F	DB-9F	DB-9F	DB-9F
Relay #1 N.O.	1	1	1		1	
Relay #1 COM	14	6	6		6	
Relay #2 N.O.	2	2	2		2	
Relay #2 COM	15	7	7		7	
Relay #3 N.O.	3		3			
Relay #3 COM	16		8			
Relay #4 N.O.	4		4			
Relay #4 COM	17		9			
Count #1 +	6	3		1		1
Count #1 -	19	8		6		6
Count #2 +	7	4		2		2
Count #2 -	20	9		7		7
Count #3 +	8			3		
Count #3 -	21			8		
Count #4 +	9			4		
Count #4 -	22			9		
+12Vdc	11				9	9
Ground	24	5	5	5	5	5
+12Vdc	12				8	8
Ground	25				4	4



ET315 Specifications

- 2 x 24 LCD display with optional backlight
- 24 key numeric membrane keypad with 8 function keys
- Serial Port Input/Output (RS-232)
- Optional Barcode decoder interface (single or dual)
- Optional Magnetic stripe card reader interface (Trk 1 and/or Trk 2)
- Optional RFID/Wiegand card reader interface (standard formats)
- Optional MiFare card reader interface (read/write data sectors)
- Optional Digital Inputs (2 or 4) with Counters
- Optional Relay control outputs (2 or 4)
- Optional Wall Mount Enclosure (w/ or wo/ integral slot reader)
- Optional Panel Mounting Bezel
- Optional NEMA Rated Industrial Enclosure
- Ethernet Communications
 - ET315 – 10/100BaseT wired Ethernet
 - WET315 – 802.11b/g wireless Ethernet
- Enclosure Dimensions
 - Desk top Model – 6.8” W x 5.7” H x 1.7” D (173mm x 145mm x 43mm)
 - Wall mount Model – 8.5” W x 9.3” H x 2.1” D (216mm x 236mm x 54mm)
 - NEMA Rated Model – 8.8” W x 11.5” H x 4.4” D (315mm x 292mm x 112)
- Terminal Weights
 - Desk top Model – 2.5 Lbs. (1.14 Kg.)
 - Wall mount Model – 4 Lbs. (1.82 Kg.)
 - NEMA Rated Model – 8.8 Lbs. (4.02 Kg.)
- Power Consumption
 - ET315 (no options) - 3 Watts (typical)
 - ET315FP (no options) - 3.5 Watts (typical)
 - WET315 (no options) - 10 Watts (typical)
 - WET315FP (no options) – 10.5 Watts (typical)
- Temperature Ranges
 - Operating: 0C to 60C (32F to 140F)
 - Storage: -30C to 70C (-20F to 158F)