Honeywell

UDA2182 Communications User Guide

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Reference: Modicon Modbus Protocol Reference Guide - PI-MBUS-300 Rev. G

About This Document

Abstract

This document provides information specific to the communications interface for Honeywell's Universal Dual Analyzer (UDA) 2182.

In this document you will find:

- How to wire the Ethernet and serial ports
- How to configure the Ethernet port settings
- How to use Modbus RTU to read and write UDA parameters on the serial port
- How to use Modbus TCP to read and write UDA parameters on the Ethernet port
- How to use the UDA web pages
- How to send email alarm events from the UDA

Contacts

World Wide Web

The following lists Honeywell's World Wide Web sites that will be of interest to our customers.

Honeywell Organization	WWW Address (URL)
Corporate	*http://www.honeywell.com*
Honeywell Field Solutions	*http://www.honeywell.com/ps*
Technical tips	*http://content.honeywell.com/ipc/faq*

Telephone

Contact us by telephone at the numbers listed below.

Country	Organization	Phone Number	
United States and Canada	Honeywell	1-800-423-9883 1-800-525-7439	Tech. Support Service

Acronyms and Definitions

UDA	Universal Dual Analyzer
TCP	Transmission Control Protocol
IP	Internet Protocol
IE	Internet Explorer
SMTP	Simple Mail Transfer Protocol
DNS	Domain Name System
DHCP	Dynamic Host Configuration Protocol
TFTP	Trivial File Transfer Protocol

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1. Introduction

1.1 Overview

The UDA2182 provides Modbus communications support on two communication interfaces using the optional Communication Card.

Serial port provides

- RS422/RS485 multi-drop
- 2400 to 115200 programmable baud rate
- Modbus RTU protocol to read signals including PV, Temperature, Alarm Status, outputs, relay status, etc.
- Read/write four analog and four digital variables ***(Note 1)***
- Can communicate to the P.IE. tool

Ethernet port provides:

- Up to 5 Modbus TCP connections simultaneously
- Ethernet parameters are configured via the front-panel or web pages.
- Web server with up to 10 clients simultaneously
- Web pages ***(Note 2)*** setup the Ethernet port settings and monitor readings, alarms, statuses, events. See Section 12
- Multi-language email to send alarm status changes. Alarm notification to eight email addresses. These must be configured using web pages signed in as the administrator.
- *DHCP*: *(Dynamic Host Configuration Protocol)* selectable via web page or front-panel
- Firmware upgrade to Main CPU board
- Firmware upgrade to Communications card
- Can communicate to the P.IE. tool

Note 1

There are four analog and four digital variables. These variables can be read and written remotely using Modbus function codes.

Variables will appear as a selection for various parameters:

- *Analog variables* can be an alarm source, analog relay source, current output source, monitor source, math source, auxiliary switch source, PID TRV, and PID remote setpoint.
- *Digital variables* can be an alarm disable, remote setpoint select, Tune Set2 select, digital relay source, logic-in source, auxiliary switch select, PID TRC select, PID RSP select, and auto cycle start source.

Note 2

Web pages (Section 12) provide the following:

- Multiple language support
- “Guest” accessibility for read-only permission
- “Admin” accessibility for read and write permission
- Readings of Inputs, Outputs, and Relay Outputs
- Status of Inputs, Outputs, and Alarms.
- Readings and Status of optional parameters (control, pharma, and auto-cycle)
- List of last twelve events
- Network configuration including IP address, subnet mask, gateway etc.
- Email configuration for alarm event notification

1.2 Specifications

RS422/RS485 Modbus RTU Slave Communications Interface (Optional)	*Baud Rate*: 2400, 4800, 9600, 19200, 38400, 57600, or 115200 selectable *Data Format:*: IEEE floating point and 32-bit integer. Word swap configurable. *Length of Link*: 2000 ft (600 m) max. with Belden 9271 Twinax Cable and 120 ohm termination resistors 4000 ft (1200 m) max. with Belden 8227 Twinax Cable and 100 ohm termination resistors *Link Characteristics*: Two-wire (half-duplex), multi-drop Modbus RTU protocol, 15 drops maximum or up to 31 drops for shorter link length. *Modbus RTU slave*: Provides monitoring of inputs outputs, statuses, alarms, and variables. Provides writing of variables for remotely modifying parameter settings.
Ethernet TCP/IP Communications Interface (Optional)	*Type:* 10 or 100 BaseT; auto-speed and auto-polarity sensing *Length of Link*: 330 ft. (100 m) maximum. Use Shielded twisted-pair, Category 5 (STP CAT5) Ethernet cable. *Link Characteristics*: Four-wire plus shield, single drop, five hops maximum *IP Address*: IP Address is 192.168.1.254 as shipped from the factory *Recommended network configuration*: Use Switch rather than Hub in order to maximize UDA Ethernet performance *Configuration*: Ethernet parameters are configured via the front-panel or web pages. *Modbus TCP/IP*: Five simultaneous socket connections provide monitoring of inputs outputs, statuses, alarms, and variables. Provides writing of variables for remotely modifying parameter settings. *Modbus TCP/IP Data Format*: IEEE floating point and 32-bit integer. Word swap configurable. *Web server*: multiple client support *Web pages*: monitoring inputs, outputs, statuses, alarms, and events *Multi-language Email*: Alarm notification to eight email addresses. These must be configured using web pages signed in as the administrator. *DHCP*: (Dynamic Host Configuration Protocol) selectable via web page or front-panel

2. Communication Card Wiring

2.1 Overview

The Communications Card provides one Serial Port and one Ethernet Port. It is installed in the slot next to the Power Supply Board.

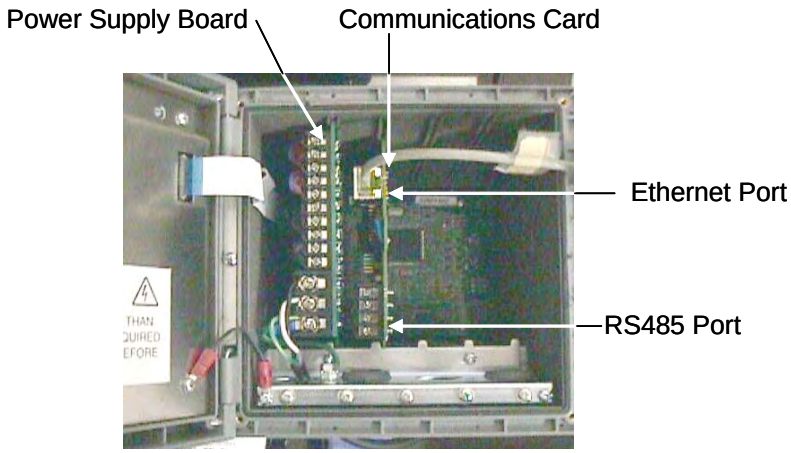


Figure 2-1 Communication Card Location

2.2 Ethernet Port Wiring

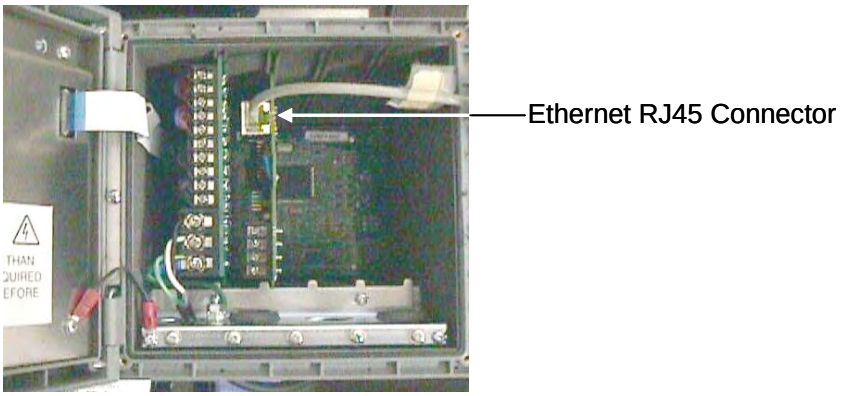


Figure 2-2 Ethernet Port Wiring

- Connect terminal 1 of the Communications Card to the chassis ground bar
- Connect an Ethernet cable to the Ethernet card's RJ45 connector. Cable polarity can be either Straight-thru or Cross over.

2.3 Serial Port Wiring

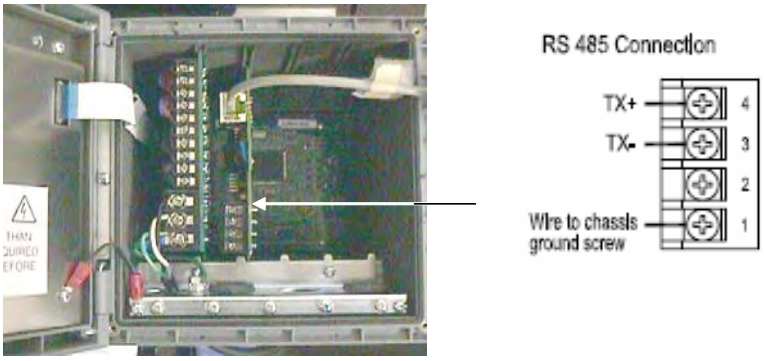


Figure 2-3 Serial Port Wiring

- Terminal 1 **must** be connected to chassis ground even if only Ethernet communications will be used. The jumper is not installed by the factory.
- Terminal 2 is a floating terminal that can be used to daisy-chain the shield.
- Terminal 3 is the negative communication signal
- Terminal 4 is the positive communication signal
- If the UDA is at the end of the link, connect a terminating resistor across TX+ and TX-. Use a 120 ohm resistor for Belden 9271 Twinax Cable. Use a 100 ohm resistor for Belden 8227 Twinax Cable.
- The shield must be grounded at one end. Normally, this is done at the host's connector. If this is not possible, and the UDA is at the end of the link, connect a jumper between terminal 1 (chassis ground) and terminal 2 (shield).

3. UDA Communications Setup

3.1 UDA Ethernet Communications Setup

3.1.1 Overview

The UDA provides the capability to use either a static IP address or a dynamically allocated IP address. A dynamically allocated IP address requires a DHCP host to be present on the network which provides the UDA with an IP address when it first connects to the link. In most cases, a static IP address will be used for Modbus TCP because the client needs to know the actual IP of the UDA in order to communicate to it. If DHCP is desired, the DHCP IP address should be permanently assigned to the MAC address of the UDA communication card. The MAC address is visible from the front panel in the Communications Status Menu and the "about" web page.

The Ethernet parameters can be set up using the UDA front-panel or the web pages. The PIE tool cannot be used to setup the Ethernet parameters.

Table 3-1 Configurable Parameters

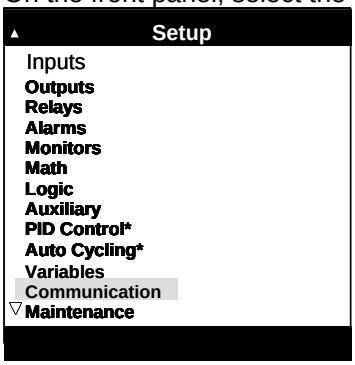
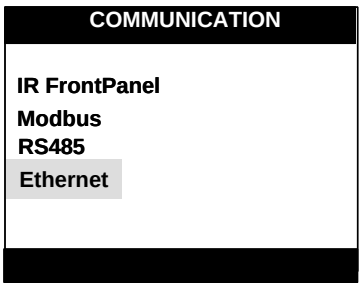
Parameter	Description	Default value
IP Address	This is the address of the device on the Ethernet link. It is made up of four bytes called octets and is identified in decimal notation where each number represents a value from 0 to 255. If DHCP is used, this address gets automatically assigned by the DHCP server.	192.168.1.254
Subnet Mask	The subnet mask defines the size of the subnet.	255.255.255.0
Default Gateway	The IP address of the device (router or switch) that provides access to another network. If the Modbus TCP client and the UDA are on the same subnet, this address is not needed. It is needed if e-mail and web pages are used. If DHCP is used, this address gets automatically assigned by the DHCP server.	1.0.0.0
DNS Server	The IP address of the network's domain name server. This address is needed when a domain name is used for the email server. It is not used for Modbus TCP or web pages. If DHCP is used, this address gets automatically assigned by the DHCP server.	1.0.0.0

3.1.2 Setting up a Static IP Address using the Front Panel

Be sure you have an IP address that allows it to be accessible on the intended Ethernet network. Consult your IT department or network administrator for allocating IP addresses to the UDAs as required.

You will need to set each UDA's IP address prior to network connection since every UDA is shipped with the default IP address of 192.168.1.254. Placing multiple UDAs on the same network before they have been given unique IP addresses will cause problems.

Table 3-2 Setting Up a Static Address

Step	Action
1	On the front panel, select the *Communication* menu option in the *Setup* menu. 
2	In the *Communication* menu, select *Ethernet*.  You will see the following Parameters: **Port Reset** **DHCP** (Dynamic Host Configuration Protocol) **IP Addr Octet 1-4** (IP Address) **SbntMsk Octet 1-4** (Subnet Mask) **Dflt Gtwy Octet 1-4** (Default Gateway) **DNS Srvr Octet 1-4** (Domain Name Service)
3	Set **DHCP** to *No.*
4	Set the **IP Addr octets** 1 through 4 to the IP address where octet 1 is the left-most IP address octet and octet 4 is the right-most IP address octet. For example, for the default address of 192.168.1.254, octet 1 equals 192, octet 2 equals 168, octet 3 equals 1, and octet 4 equals 254.
5	Set the **subnet mask octets** 1 through 4.
6	Set the **Default gateway octets** 1 through 4.
7	If you are not using a DNS server to identify your email server's address, you can leave the

Step	Action
	DNS server octets equal to their defaults. You don't need the DNS server for Modbus TCP or web pages.
8	Scroll to ***Port Reset*** at the top of the menu, and press enter. Change the value to *Enable* and press enter to lock the values into the communication card.

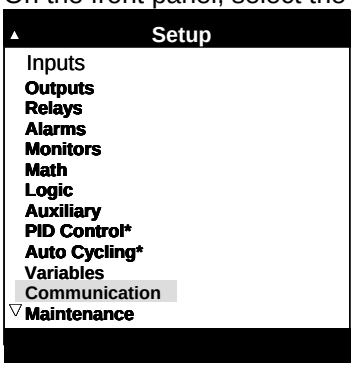
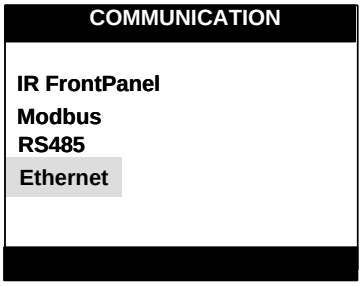
To verify the UDA IP address, connect the UDA to your network or directly to a PC, and ping the IP address. When connecting directly to the PC, you need to make sure the PC Network card is configured to be on the same subnet.

Note: The fixed IP address of each UDA shall be set independently prior to placing on the network. See your IT systems administrator for allocating IP addresses, subnet masks, or default gateway IP address as necessary (network address filtering and routing may be necessary if the UDA network access will not to be confined locally within the plant environment).

3.1.3 Setting up DHCP using the front-panel

It is recommended that the IP addresses assigned to the UDA by the DHCP server are fixed, so that the Modbus host can locate the UDA on the network. Consult your IT department or network administrator for allocating DHCP IP addresses to specific devices.

Table 3-3 Setting Up DHCP using the Front Panel

Step	Action
1	On the front panel, select the *Communication* menu option in the *Setup* menu. 
2	In the *Communication* menu, select *Ethernet*.  You will see the following Parameters: **Port Reset** **DHCP** (Dynamic Host Configuration Protocol) **IP Addr Octet 1-4** (IP Address) **SbntMsk Octet 1-4** (Subnet Mask) **Dflt Gtwy Octet 1-4** (Default Gateway) **DNS Srvr Octet 1-4** (Domain Name Service)
3	Set **DHCP** to *Yes.*
4	Scroll to *Port Reset* at the top of the menu, and press enter. Change the value to *Enable* and press enter to lock the setting into the communication card.

Once all of the UDAs are set to DHCP, power them down, connect them to the network, and then power them up. The DHCP server should automatically assign the IP address for each UDA.

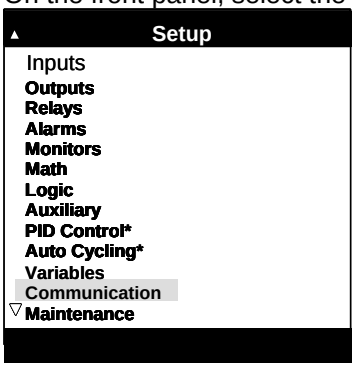
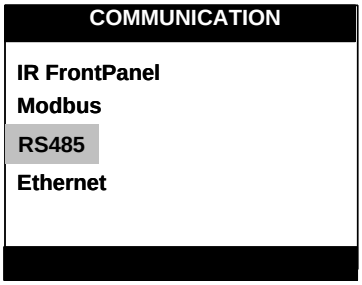
Go to the Comm Status menu in the Status Displays menu to verify that the DHCP server automatically set the IP address.

3.2 UDA Serial Communications Setup

Be sure you have an IP address that allows it to be accessible on the intended Ethernet network. Consult your IT department or network administrator for allocating IP addresses to the UDAs as required.

You will need to set each UDA's IP address prior to network connection since every UDA is shipped with the default IP address of 192.168.1.254. Placing multiple UDAs on the same network before they have been given unique IP addresses will cause problems.

Table 3-4 Setting Up the serial communications

Step	Action
1	On the front panel, select the *Communication* menu option in the *Setup* menu. 
2	In the *Communication* menu, select *RS485*.  You will see the following Parameters: **Port Reset** **Address** **Baud Rate**
3	Set the **Address** to a unique address on your RS485 link. Note: An address of 0 sets the UDA to its offline state.
4	Set the **Baud Rate** to the link's baud rate. Note: Other link characteristics are fixed to: no parity, 1 stop bit, and eight bit characters
5	Scroll to ***Port Reset*** at the top of the menu, and press enter. Change the value to *Enable* and press enter to lock the values into the communication card.

4. Modbus RTU Serial Communication Port

4.1 Overview

The Modbus RTU implementation is designed to provide a popular data exchange format connecting the UDA to both Honeywell and foreign master devices via the optional serial communication port. Modbus RTU allows the instrument to be a citizen on a data link shared with other devices, which subscribe to the Modicon Modbus Protocol Reference Guide PI-MBUS-300 Rev. G specification.

The UDA does not emulate any MODICON type device. The Modbus RTU specification is respected in the physical and data link layers. The message structure of the Modbus RTU function codes is employed and standard IEEE 32-bit floating point and integer formats are used. Data register mapping is unique to the UDA. Sections 10 and 11 describe the parameter mapping for the UDA.

4.2 Modbus RTU Message Format

Table 4-1 Modbus RTU Message Formats

Coding system	8 bit binary
Number of data bits per character	10 Bits start bits – 1 data bits – 8 stop bits – 1
Parity	None
Bit transfer rate	2400, 4800, 9600, 19200, 38400, 57600, 115200 Selectable
Duplex	Half duplex Transceiver or TX/RX
Error checking	CRC (cyclic redundancy check)
Polynomial	(CRC-16 10100000000001)
Bit transfer order	LSB first
End of message	Idle line for 3.5 or more characters (>1.82 msec for 19200).

4.3 Modbus RTU Link Layer

The link layer includes the following properties/behaviors:

- Slave address recognition,
- Start / End of Frame detection,
- CRC-16 generation / checking,
- Transmit / receive message time-out,
- Buffer overflow detection,
- Framing error detection,
- Idle line detection.

Errors detected by the physical layer in messages received by the slave are ignored and the physical layer automatically restarts by initiating a new receive on the next idle line detection.

4.4 General Modbus RTU message format

Query message format
[Slave Address, Function Code, Function code dependent data, CRC 16]

Response message format
[Slave Address, Function Code*, Function code dependent data, CRC 16]

* If an error is detected in a valid message the response function code is modified by adding 80 (hex) and the function code dependent data is replaced by an exception response code as described in 9 - Modbus RTU Exception Codes .

Between messages, the RS-485 link is in a high impedance state. During this time receiving devices are more susceptible to noise generated false start of messages. Although noise-generated messages are rejected due to address, framing, and CRC checking, they can cause the loss of a good message when they are included in the message stream. In the slave the transmitting device enables its transmitter line diver and forces an idle line state onto the link for three character time slots prior to transmitting. This forces termination of any noise generated messages and improves message frame synchronization.

4.5 Modbus RTU Data Layer

The data layer includes:

- Diagnostic loopback,
- Function code recognition / rejection,
- Busy / repoll,
- Data error code generation

Errors detected by the data layer are rejected and the slave responds to the polling device with a Modbus-type status exception error. A summary of the Modbus status exception codes is listed in Section 9 - Modbus RTU Exception Codes.

5. Modbus/TCP Interface

5.1 Introduction

UDA2182 supports the Modbus/TCP (also called Modbus TCP/IP or Modbus Ethernet) protocol for communications with third party HMI and SCADA software via a direct Ethernet TCP/IP connection.

The UDA's optional Ethernet 10/100Base-T Host port is used for the Modbus/TCP connection. Ethernet TCP allows multiple concurrent connections to hosts for data interchange. The UDA supports 5 concurrent host connections using Modbus/TCP protocol messaging via this port. The number of client hosts that can access the UDA depends upon the ability of the applications to share these connections.

5.2 Modbus/TCP Protocol

Modbus/TCP protocol, developed by Groupe Schneider's Modicon Division, is a popular, open standard for data interchange over Ethernet TCP/IP networks using a Modbus RTU command structure.

It is simply an encapsulation of Modicon's Modbus RTU protocol within a TCP/IP frame as shown below, which includes header information and the Modbus frame.

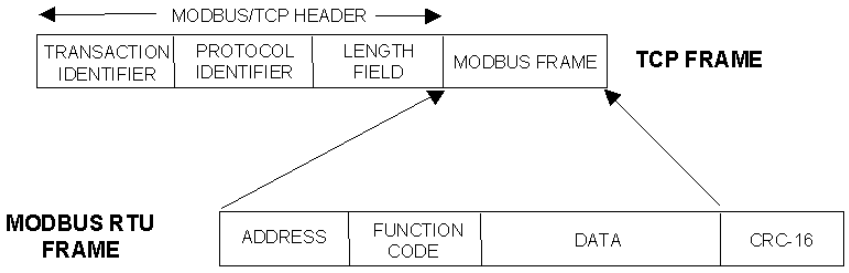


Figure 5-1 Modbus RTU Protocol within a TCP/IP Frame

The Open Modbus/TCP Specification is followed with respect to the physical, data link, and network layers. The message structure within the Modbus frame uses standard Modbus RTU function codes.

The Address part of the Modbus frame is not used (set to 00) since there is no sub-addressing intended or required. The UDA IP address is the identifying address, set independently at the UDA.

The error checking is supported by TCP/IP network protocols and not part of the Modbus frame.

The Transaction Identifiers and Protocol Identifiers in the header are normally all 0's (4 bytes total) while the Length field identifies the number of bytes in the Modbus frame.

The standard IEEE 32-bit floating point, 32-bit and 16-bit integer formats are used. Both big and little endian floating point word order are supported using a Modbus Word Swap configuration parameter.

5.3 Parameter Addressing

Shown in Sections 10 and 11 are maps listing the parameter addresses.

Examples for read or write access to parameters supported by the various function codes are provided in Section 8.

6. IEEE 32-bit Floating Point Register Information

The Modbus interface supports IEEE 32-bit floating point information for several of the function codes.

6.1 IEEE Floating Point Data Format

The formula for calculating the floating point number is:

$$\text{mantissa} \times 2^{(\text{exponent} - 127)}$$

(23 bit signed binary with 8 bit biased binary exponent)

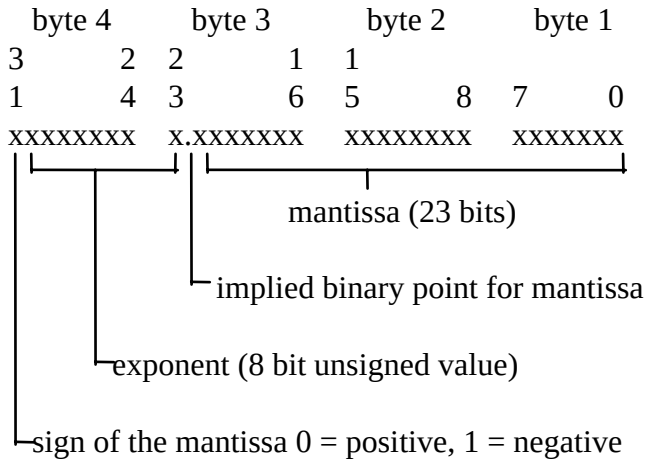


Figure 6-1 IEEE Floating Point Data format

Mantissa and Sign

The mantissa is defined by a sign bit (31) and a 23-bit binary fraction. This binary fraction is combined with an "implied" value of 1 to create a mantissa value, which is greater than or equal to 1.0 and less than 2.0.

The mantissa is positive if the sign bit is zero (reset), and negative if the sign bit is one (set). For example:

DECIMAL	HEXADECIMAL	BINARY
100	42C80000	01000010 11001000 00000000 00000000

The sign bit (31) is zero, indicating a positive mantissa. Removing the sign bits and exponent bits, the mantissa becomes:

HEXADECIMAL	BINARY
480000	xxxxxxxx x1001000 00000000 00000000

Add an "implied" value of one to the left of the binary point:

BINARY
1.1001000 00000000 00000000

Using positioned notation, this binary number is equal to:

$$1.0 + (1x2^{-1}) + (0x2^{-2}) + (0x2^{-3}) + (1x2^{-4}) = 1.0 + 0.5 + 0.0 + 0.0 + 0.0625 = 1.5625$$

Exponent

The exponent is defined by an unsigned 8-bit binary value (bits 23 through 30). The value of the exponent is derived by performing a signed subtraction of 127 (decimal) from the 8-bit exponent value.

DECIMAL	HEXADECIMAL	BINARY
100	42C80000	01000010 11001000 00000000 00000000

Removing the sign and mantissa bits, the exponent becomes:

DECIMAL	HEXADECIMAL	BINARY
133	85	x1000010 1xxxxxxx xxxxxxxx xxxxxxxx

or:

$$1x2^7 + 0x2^6 + 0x2^5 + 0x2^4 + 0x2^3 + 1x2^2 + 0x2^1 + 1x2^0$$

Subtract a bias of 127 (decimal) from the exponent to determine its value: 133 – 127 = 6.

Mantissa and Exponent Combination

Combining the mantissa and exponent from the two previous examples:

$$\text{float number} = \text{mantissa} \times 2^{\text{exponent}}$$

$$\text{float number} = 1.5625 \times 2^6 = 1.5625 \times 64 = 100.0$$

Below is a list of sample float values in IEEE format:

DECIMAL	HEXADECIMAL
100.0	42C80000
-100.0	C2C80000
0.5	3F000000
-1.75	BFE00000
0.0625	3D800000
1	3F800000
0	00000000

Reserved Operands

Per the Standard certain exceptional forms of floating point operands are excluded from the numbering system. These are as follows:

EXCEPTION	EXPONENT	MANTISSA
+/- Infinity	All 1's	All 0's
Not-a-Number (NAN)	All 1's	Other than 0's
Denormalized Number	All 0's	Other than 0's
Zero	All 0's	All 0's

7. Modbus Double Register Format

7.1 Overview

Data that is 32 bits requires 2 sequential registers (4 bytes) to transfer its data. Data of this type includes IEEE 32-bit floating point, 32-bit signed integer and 32-bit unsigned integer. The stuffing order of the bytes into the two registers differs among Modbus hosts. To provide compatibility, the double register format for the UDA is configurable.

To set the UDA's double register byte order, go to the *Modbu*s menu in the *Setup/Communication* menu and configure *Word Swap* parameter.

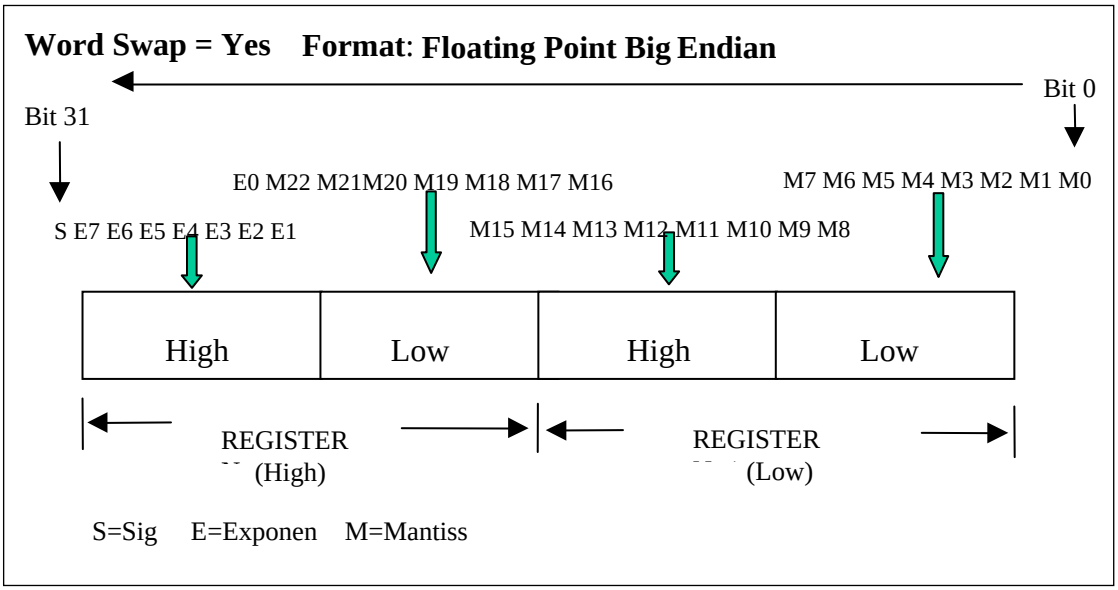
The selections are:

Table 7-1 Modbus Double Register Format Selections

Selection	Description	Byte order (See Figure 6-1)	Notes
No	Little Endian	3, 4, 1, 2	
Yes	Big Endian	4, 3, 2, 1	UDA default

NOTE: Word Swapping only applies to Function Codes 3, 4, and 16.

7.2 IEEE Floating Point Formats



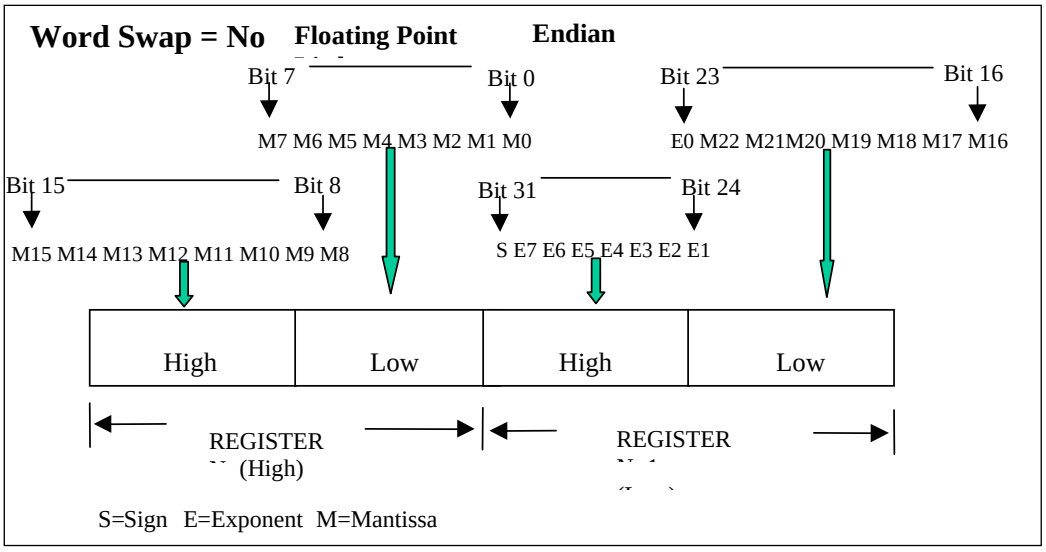


Figure 7-1 IEEE Floating Point Formats

Table 7-2 IEEE Floating Point Number Examples in Big Endian Format

Value (decimal)	IEEE Big Endian MSB LSB	Register N		Register N+1	
		high	low	high	low
100.0	42C80000h	42h	C8h	00h	00h
55.32	425D47AEh	42h	5Dh	47h	AEh
2.0	40000000h	40h	00h	00h	00h
1.0	3F800000h	3Fh	80h	00h	00h
-1.0	BF800000h	BFh	80h	00h	00h

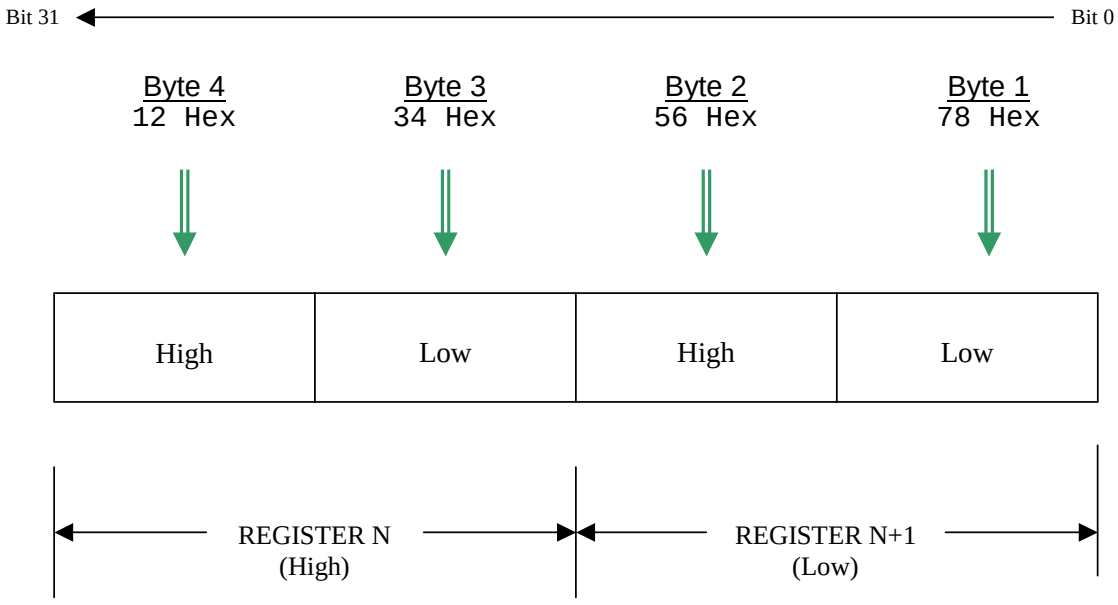
7.3 Unsigned/signed 32-bit Register Formats

The formats descriptions below use the value 12345678 Hex as an example. Where the binary representation is:

	Byte 4 = 12 Hex								Byte 3 = 34 Hex								Byte 2 = 56 Hex								Byte 1 = 78 Hex							
Bits	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	0	0	1	0	0	1	0	0	0	1	1	0	1	0	0	0	1	0	1	0	1	1	0	0	1	1	1	1	0	0	0

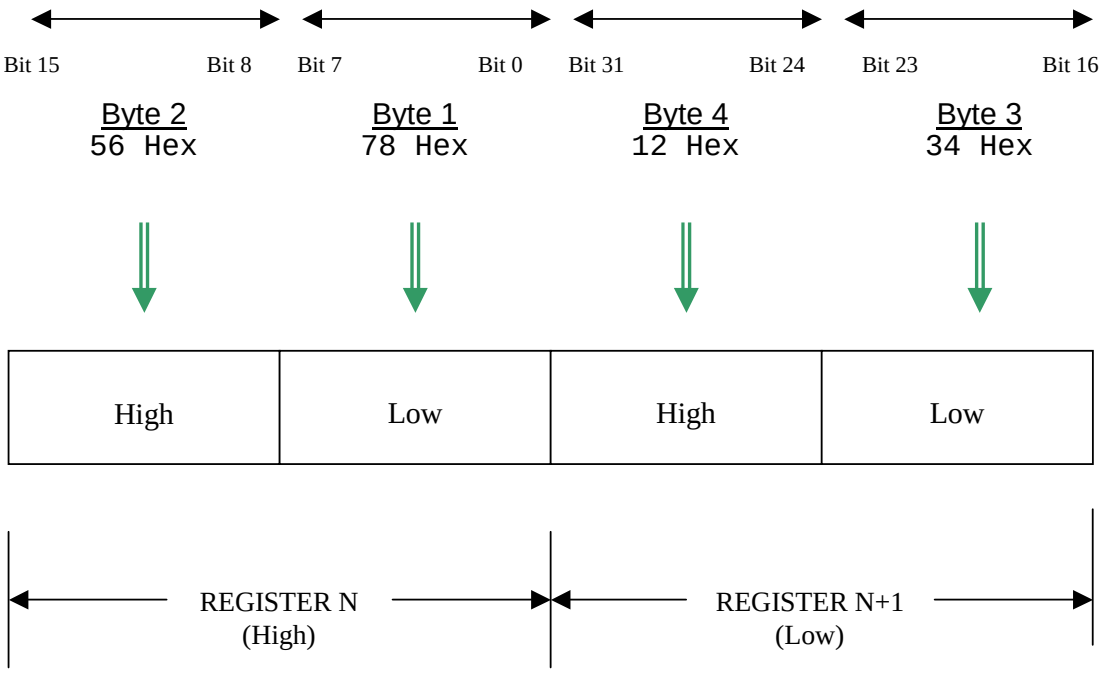
Word Swap = Yes – Big Endian Format

The value 12345678 Hex will be represented as follows:



Word Swap = No – Little Endian Format

The value 12345678 Hex will be represented as follows:



7.4 Setting Up the Modbus Double Register Format

The UDA predominantly uses double registers for communicating data to software applications providing Modbus/TCP protocol communications drivers. Double registers are sent as (2) consecutive 16-bit registers, each register of which consists of two 8-bit bytes. Software packages require the registers and bytes to be sent in a certain order. The UDA can be configured to deliver the data in two different word orders. They are big endian and little endian.

Little Endian is the standard word order of the Modbus link.

Big Endian is the word order swapped. The UDA provides a configuration parameter to swap the word order. This parmeter is called *Word Swap*.

Set it to *no to* use the Little Endian format.

Set it to *yes to* use the Big Endian format.

Selection	Description	Byte order	Notes
No	Little Endian	3, 4, 1, 2	
Yes	Big Endian	4, 3, 2, 1	UDA default

The word order is configurable using the front panel. The PIE tool cannot be used. To configure it using the front panel, do the following:

1. On the front panel, select the *Communication* menu option in the *Setup* menu.
2. In the *Communication* menu, select *Modbus*.
3. Set *Word swap* to *Yes* for big endian, and *No* for little endian.

The Modbus TCP double register little endian transmission format (*Word Swap = No)*, would be selected for interfacing to most third party software packages. This is their standard.

The default Big Endian format (*Word Swap = Yes)* is used with SpecView32 or Honeywell's PlantScape/Experion/EBI software and follows the "Honeywell" default format of other control and recording products. It should be noted that most PC software packages offer a register (word) swap selection in their driver package anyway, so there should never be an incompatibility.

8. Modbus/TCP & Modbus RTU Function Codes

8.1 Function code definitions

The UDA Modbus protocol uses a subset of the standard Modbus function codes to provide access to process-related information. These standard function codes provide basic support for IEEE 32-bit floating point numbers, 32-bit unsigned/signed integer and 16-bit integer register representation of instrument's process data.

Repolling of data is not supported by this instrument.

Table 8-1 Modbus/TCP and Modbus RTU Function Codes Definitions

Function Code	Name	Usage	Max. Number of registers per transaction
03	Read Holding Registers	Read data in 16-bit Register Format (high/low). Used to read integer or floating point process data. Registers are consecutive and are imaged from the instrument to the host.	120
04	Read Input Registers	Provides Read access to any Analog Input Channel positioned in any Rack or Slot.	120
16 (10h)	Preset Multiple Registers	Write Data in 16-bit Format (high/low). Used to write integer and floating point data. Registers are consecutive and are imaged from the host to the instrument.	120
17 (11h)	Report Device ID	Read instrument ID and connection information, ROM version, etc.	n/a

8.2 Function Code 03- Read Holding (Data) Registers

Description

Function code 03 (also referred to as 4X decimal references) is used to read 32-bit floating point analog variables and 32-bit integer digital variables in the UDA as described in Section 10. Registers are consecutive. These registers are writeable using function code 16.

If a request is made to an address that does not exist in the map in Section 10 , the UDA will honor that request and return zeros for that address.

Broadcast is not supported.

Query

The query message specifies the starting register and quantity of registers to be read. Registers are addressed starting at zero: registers 1-16 are addressed as 0-15.

Example: Read Analog variable #1, Analog variable #2, Analog variable #3, and Analog variable #4 as floating point values in the UDA at slave address 1.

Query message format for function code 03

	Slave Address (00 for TCP)	Function Code	Starting Address High	Starting Address Low	Number Addresses High	Number Addresses Low	CRC (RTU)	CRC (RTU)
TCP Example	00	03	00	00	00	08		
RTU Example	01	03	00	00	00	08	CRC	CRC

Response

The register data in the response message is packed as two bytes per register. For each register, the first byte contains the high order bits and the second contains the low order bits.

The floating point values require two consecutive registers. The word order of the floating point number is determined by the setting of the word swap configuration value. In this example, and the examples that follow, the word swap order is yes which is big endian. Refer to section 7. The first 16 bits of the response contain the IEEE MSB of the float value. The second 16 bits of the response contain the IEEE LSB of the float value. If the master station requests only one register at an address of a floating point value then half of a float will be returned.

Example: Return Analog variable #1, Analog variable #2, Analog variable #3, and Analog variable #4 where Analog variable #1=100.0, Analog variable #2=100.0, Analog variable #3=100.0, and Analog variable #4=55.32

Response message format for function codes 03

	Slave Address (00 for TCP)	Function Code	Byte Count	Data	Data	Data	Data	CRC (RTU)	CRC (RTU)
TCP Example	00	03	10	42 C8 00 00 (100)	42 C8 00 00 (100)	42 C8 00 00 (100)	42 5D 47 AE (55.32)		
RTU Example	01	03	10	42 C8 00 00 (100)	42 C8 00 00 (100)	42 C8 00 00 (100)	42 5D 47 AE (55.32)	CRC	CRC

8.3 Function Code 04 - Read Input Registers

Description

Function code 04 (3X references) provides read access to the UDA signals.

If a request is made to an address that does not exist in the map in Section 101, the UDA will honor that request and return zeros for that address. These registers are read-only.

Broadcast is not supported.

Query

The query message specifies the starting register and quantity of registers to be read. Registers are addressed starting at zero: registers 1-16 are addressed as 0-15.

Example: Read PV1, PV2, TEMP1, and TEMP2 as floating point values in the UDA at slave address 1.

Query message format for function code 04

	Slave Address (00 for TCP)	Function Code	Starting Address High	Starting Address Low	Number Addresses High	Number Addresses Low	CRC (RTU)	CRC (RTU)
TCP Example	00	04	00	00	00	08		
RTU Example	01	04	00	00	00	08	CRC	CRC

Response

The register data in the response message is packed as two bytes per register. For each register, the first byte contains the high order bits and the second contains the low order bits.

The floating point values require two consecutive registers. The word order of the floating point number is determined by the setting of the word swap configuration value. In this example, and the examples that follow, the word swap is set to yes for big endian. Refer to subsection 7. The first 16 bits of the response contain the IEEE MSB of the float value. The second 16 bits of the response contain the IEEE LSB of the float value. If the master station requests only one register at an address of a floating point value, then half of a float will be returned.

Example: Return PV1, PV2, TEMP1, and TEMP2 where PV1=100.0, Analog PV2=100.0, TEMP1=100.0, and TEMP2=55.32

Response message format for function codes 04

	Slave Address (00 for TCP)	Function Code	Byte Count	Data	Data	Data	Data	CRC (RTU)	CRC (RTU)
TCP Example	00	04	08	42 C8 00 00 (100)	42 C8 00 00 (100)	42 C8 00 00 (100)	42 5D 47 AE (55.32)		
RTU Example	01	04	08	42 C8 00 00 (100)	42 C8 00 00 (100)	42 C8 00 00 (100)	42 5D 47 AE (55.32)	CRC	CRC

8.4 Function Code 16 (10h) - Preset Multiple Registers

Description

Function code 16 presets values into a sequence of holding registers (also refered to as 4X references).

Broadcast is not supported.

Query

The query message specifies the register references to be preset. Registers are addressed starting at zero: Register 1 is addressed as 0.

Example: Preset Digital variable #1 (address 0008h) and Digital variable #2 (address 000Ah) to 1 in the UDA at slave address 1.

Query message format for function code 16 (10h)

	Slave Address (00 for TCP)	Function Code	Start Address High	Start Address Low	Number Addresses High	Number Addresses Low	Byte Count	Data	CRC (RTU)	CRC (RTU)
TCP Example	00	10	00	08	00	04	08	00 00 00 01 00 00 00 01		
RTU Example	01	10	00	08	00	04	08	00 00 00 01 00 00 00 01	CRC	CRC

Response

The normal response returns the slave address, function code, starting address and the quantity of registers preset.

The analog and digital variables use double-registers. Analog variables are floating point values and digital variables are 32-bit integer values. A request to preset a variable must be for two registers. The byte order of the number is determined by the setting of the word swap configuration value. In this example the word swap order is set to yes which is big endian. Refer to subsection 7.

For an analog variable, the first 16 bits of the response contain the IEEE MSB of the float value. The second 16 bits of the response contain the IEEE LSB of the float value. The word order is configurable. See Subsection 7.

Example: Response from presetting digital variable #1 (address 0008h) and digital variable #2 (address 000Ah) from the UDA.

Response message format for function code 16 (10h)

	Slave Address (00 for TCP)	Function Code	Start Address High	Start Address Low	Number Addresses High	Number Addresses Low	CRC (RTU)	CRC (RTU)
TCP Example	00	10	00	08	00	04		
RTU Example	01	10	00	08	00	04	CRC	CRC

8.5 Function Code 17 (11h) - Report UDA ID

Description

Function code 17 (11h) is used to report the device information such as Slave ID, device description and firmware version.

Query

The query message specifies the function code only.

Example: Read Device ID from a slave at address 2.

Query message format for function code 17 (11h)

	Slave Address (00 for TCP)	Function Code	CRC (RTU)	CRC (RTU)
TCP Example	00	11		
RTU Example	02	11	CRC	CRC

Response

The response is a record format describing the instrument.

Response message format for function code 17 (11h)

Slave Address	Function Code	Byte Count	Slave ID	Run Indicator Status	Device Description	Model ID	Device Class ID	Device Mapping	CRC (RTU)	CRC (RTU)

Slave Address – 00 for TCP. RTU is slave address. Example: 02

Slave ID - The Slave ID number for the UDA2182 is 21 (hex).

Run Indicator Status - (one byte) (byte 4). FF=ON

Device Description - (bytes 5-20)- 16 Character ASCII Message with the following format:

'H'	'C'	'9'	'5' or '3' or '7'	'0' or 'A'	''	''	*up to 9 character version number in floating point notation.*	*zeros are appended for the remaining bytes*

For example, a UDA with version number 3.10 would have the following device description:

'U'	'D'	'A'	'2'	'1'	'8'	'2'	' '	*'0'*	*'3'*	*'.'*	*'1'*	*'0'*	*0*	*0*	*0*

Model ID - 00 (one byte) (byte 21)

Device Class ID - The Device Classification. (one byte) (byte 22)

Class ID	Class
00	Generic Class (Fixed Address Mappable)
01-FF	Future

Continued

Generic Class (00) Device Mapping - Describes the I/O and feature mapping.

Number of Records	Record #1	Record #2	Record ...	Record #n

Number of Records - 1 Byte unsigned value 00-FFh (byte 23)

Record Description:

Byte	Description
00	Type of Data Element (See Data Element Values Table Below)
01	Starting Address of Data Element Record (High)
02	Starting Address of Data Element Record (Low)
03	Number of Data Elements (High)
04	Number of Data Elements (Low)

Data Element Values Table:

Value	Description
06	Variables
11	Signal tags

9. Modbus RTU Exception Codes

9.1 Introduction

When a master device sends a query to a slave device it expects a normal response. One of four possible events can occur from the master's query:

- *Slave device receives the query without a communication error and can handle the query normally.* It returns a normal response.
- *Slave does not receive the query due to a communication error.* No response is returned. The master program will eventually process a time-out condition for the query.
- *Slave receives the query but detects a communication error (parity, LRC or CRC).* No response is returned. The master program will eventually process a time-out condition for the query.
- *Slave receives the query without a communication error but cannot handle it (i.e., request is to a non-existent coil or register).* The slave will return with an exception response informing the master of the nature of the error (Illegal Data Address.)

The exception response message has two fields that differentiate it from a normal response:

Function Code Field:
In a normal response, the slave echoes the function code of the original query in the function code field of the response. All function codes have a most-significant bit (MSB) of 0 (their values are below 80 hex). In an exception response, the slave sets the MSB of the function code to 1. This makes the function code value in an exception response exactly 80 hex higher than the value would be for a normal response.

With the function code's MSB set, the master's application program can recognize the exception response and can examine the data field for the exception code.

Data Field:
In a normal response, the slave may return data or statistics in the data field. In an exception response, the slave returns an exception code in the data field. This defines the slave condition that caused the exception.

Query

Example: Internal slave error reading 2 registers starting at address 1820h from the UDA at slave address 01.

TCP: 00 03 18 20 00 02
RTU: 01 03 18 20 00 02 CRC CRC

Response

Example: Return MSB in Function Code byte set with Slave Device Failure (04) in the data field.

TCP: 00 83 04
RTU: 01 83 04 CRC CRC

Table 9-1 Modbus RTU Data Layer Status Exception Codes

Exception Code	Definition	Description
01	Illegal Function	The message received is not an allowable action for the addressed device.
02	Illegal Data Address	The address referenced in the function-dependent data section of the message is not valid in the addressed device.
03	Illegal Data Value	The value referenced at the addressed device location is not within range.
04	Slave Device Failure	The addressed device has not been able to process a valid message due to a bad device state.
06	Slave Device Busy	The addressed device has rejected a message due to a busy state. Retry later.
07	NAK, Negative Acknowledge	The addressed device cannot process the current message. Issue a PROGRAM POLL to obtain device-dependent error data.

10. Parameters accessible with Function Codes 03 and 10h

Function codes 03 and 10h provide read/write access to the holding registers. The holding registers contain the four analog and four digital variables.

10.1 Variables

Variables provide a means for the user to remotely set the value of setpoints and switches within the UDA database. They are connected to parameters using the UDA front panel or PIE tool. In the function block model, you can think of them as values connected to the inputs of function blocks that can be changed during run-time. Analog variables are floating-point values that can be selected for parameters such as alarm source, relay source, and RSP. Digital variables are long integer values that can be selected for parameters such as alarm disable, RSP select, and tuneset 2 select. Variables have programmable startup values, and their operating values can be monitored in the status menu. Refer to the UDA2182 User manual for additional information.

10.2 Holding Registers Map

Table 10-1 describes the holding register map for Function Code 03 and 10h.

Conversion between Address (Hex) Number and Register (Decimal) Number
To convert the address number to the register number, convert the address from hexidecimal to decimal and add 40,001. Registers are addressed starting at zero: registers 40,001-40,016 are addressed as 0-15. To convert the register number to the address number, subtract 40,001 from the register and convert to hex.

Table 10-1 Holding Registers Map

Address (hex)	Register (decimal)	Parameter Name	Type	Notes
0000	40001	Analog Variable 1	Float	
0002	40003	Analog Variable 2	Float	
0004	40005	Analog Variable 3	Float	
0006	40007	Analog Variable 4	Float	
0008	40009	Digital Variable 1	Long	0=OFF; 1=ON
000A	40011	Digital Variable 2	Long	0=OFF; 1=ON
000C	40013	Digital Variable 3	Long	0=OFF; 1=ON
000E	40015	Digital Variable 4	Long	0=OFF; 1=ON

Example

Read Analog Variables 1 and 2 from UDA at slave address 01 using Function Code 03.

TCP:

00	03	00	00	00	04

RTU:

01	03	00	00	00	04	CRC	CRC

Response from UDA where Analog Variable 1 = 100.0 and Analog Variable 2 = 55.32

TCP:

00	03	08	42	C8	00	00	42	5D	47	AE

RTU:

01	03	08	42	C8	00	00	42	5D	47	AE	CRC	CRC

11. Parameters accessible with Function Code 04

Function code 04 provides read access to the read-only input registers. The input registers contain the signals of the UDA2182.

11.1 Signals

Signals provide a means for the user to remotely read status values within the UDA database. In the function block model, you can think of them as values connected to the output of function blocks. Since they are controlled by the function block algorithm, they are read-only. Signals can be either analog (floating-point) or digital (long) depending on the type of output it is monitoring. They are permanently connected to the function block outputs. In other words, the user doesn't have to configure the connection to make the output visible. The output value is always visible.

11.2 Input Registers Map

Table 11-1 describes the input register map for Function Code 04.

Conversion between Address (Hex) Number and Register (Decimal) Number
To convert the address number to the register number, convert the address from hexidecimal to decimal and add 30,001. Registers are addressed starting at zero: registers 30,001-30,016 are addressed as 0-15. To convert the register number to the address number, subtract 30,001 from the register and convert to hex.

Table 11-1 Holding Registers Map

Address (hex)	Register (decimal)	Parameter Name	Type	Notes
0000	30001	PV 1	Float	Input 1 Process Value
0002	30003	PV 2	Float	Input 2 Process Value
0004	30005	Temperature 1	Float	Input 1 Sensor Temperature
0006	30007	Temperature 2	Float	Input 2 Sensor Temperature
0008	30009	Alarm1	Long	0=Inactive; 1=Active
000A	30011	Alarm2	Long	0=Inactive; 1=Active
000C	30013	Alarm3	Long	0=Inactive; 1=Active
000E	30015	Alarm4	Long	0=Inactive; 1=Active
0010	30017	Alarm group 1 output	Long	On if any Analog Alarm is active
0012	30019	Alarm group 2 output	Long	On if any PID Control Alarm is active
0014	30021	Analog monitor 1 output	Long	
0016	30023	Analog monitor 2 output	Long	
0018	30025	Analog monitor 3 output	Long	
001A	30027	Analog monitor 4 output	Long	
001C	30029	Logic 1 output	Long	
001E	30031	Logic 2 output	Long	

Address (hex)	Register (decimal)	Parameter Name	Type	Notes
0020	30033	Logic 3 output	Long	
0022	30035	Logic 4 output	Long	
0024	30037	Output 1	Float	
0026	30039	Output 2	Float	
0028	30041	Output 3	Float	
002A	30043	Relay 1 state	Long	
002C	30045	Relay 2 state	Long	
002E	30047	Relay 3 state	Long	
0030	30049	Relay 4 state	Long	
0032	30051	PID 1 PV	Float	
0034	30053	PID 1 SP	Float	
0036	30055	PID 1 Auto/Manual	Long	0 = auto; 1 = manual
0038	30057	PID 1 Output	Float	
003A	30059	PID 2 PV	Float	
003C	30061	PID 2 SP	Float	
003E	30063	PID 2 Auto/Manual	Long	0 = auto; 1 = manual
0040	30065	PID 2 Output	Float	
0042	30067	Digital Input 1	Long	
0044	30069	Digital Input 2	Long	
0046	30071	Input 1 fail	Long	0= no failure; 1= failure
0048	30073	Input 2 fail	Long	0= no failure; 1= failure
004A	30075	Input Sum	Float	Input 1 + Input 2. Input types the same.
004C	30077	Input Differnece	Float	Input 1 – Input 2. Input types the same.
004E	30079	Input Ratio	Float	Input 1 / Input 2. Input types the same.
0050	30081	Percent Passage	Float	100 * Input 1 / Input 2. Input types the same
0052	30083	Percent Rejection	Float	100 * (1 – Input 1/ Input 2). Input types the same.
0054	30085	Cation Conductivity	Float	Both inputs are conductivity type.
0056	30087	Input 1 US Pharmacopia uS / cm monitored Value	Float	Input 1 Conductivity
0058	30089	Input 1 US Pharamacopia Sensor monitored Temperature Value	Float	Input 1 Conductivity

Address (hex)	Register (decimal)	Parameter Name	Type	Notes
005A	30091	Input 1 Pharmacopia Calculated limit Value	Float	Input 1 Conductivity
005C	30093	Input 1 Pharmacopia Percentage of Limit Output	Float	Input 1 Conductivity.
005E	30095	Input 1 Pharacopia Warning Alarm	Long	Input 1 Conductivity. On if calculated percent of limit exceeds user congured warning value.
0060	30097	Input 1 Pharmacopia Limit Alarm	Long	Input 1 Conductivity. On if input uS/cm exceeds USP scheduled limit value.
0062	30099	Input 1 US Pharmacopia uS / cm monitored Value	Float	Input 2 Conductivity
0064	30101	Input 1 US Pharamacopia Sensor monitored Temperature Value	Float	Input 2 Conductivity
0066	30103	Input 1 Pharmacopia Calculated limit Value	Float	Input 2 Conductivity
0068	30105	Input 1 Pharmacopia Percentage of Limit Output	Float	Input 2 Conductivity.
006A	30107	Input 1 Pharacopia Warning Alarm	Long	Input 2 Conductivity. On if calculated percent of limit exceeds user congured warning value.
006C	30109	Input 1 Pharmacopia Limit Alarm	Long	Input 2 Conductivity. On if input uS/cm exceeds USP scheduled limit value.
006E	30111	UDA control execution cycle time	Float	In seconds. Typically 0.25 seconds.
0070	30113	Execution time	Float	Time it takes to complete the algorithm execution.
0072	30115	Peak execution time	Float	Longest execution time encountered.
0074	30117	Percent resource used	Float	Fixed number that is the ratio of memory available and memory used for algorithm execution. Usually equals 100%.
0076	30119	Stack resource	Float	Diagnostic data indicating how much stack is used.
0078	30121	Control 1 Alarm 1	Long	PID Option Installed
007A	30123	Control 1 Alarm 2	Long	PID Option Installed
007C	30125	Control 1 Alarm 2	Long	PID Option Installed
007E	30127	Control 2 Alarm 2	Long	PID Option Installed
0080	30129	Output 1 Fault	Long	0= no fault; 1= fault
0082	30131	Output 2 Fault	Long	0= no fault; 1= fault
0084	30133	Output 3 Fault	Long	0= no fault; 1= fault

Address (hex)	Register (decimal)	Parameter Name	Type	Notes
0086	30135	Hold	Long	0= hold-inactive; 1=hold active
0088	30137	Math 1 output	Float	
008A	30139	Math 2 output	Float	
008C	30141	Math 3 output	Float	
008E	30143	Math 4 output	Float	
0090	30145	Function generator 1 output	Float	
0092	30147	Function generator 1 output	Float	
0094	30149	Switch 1 output	Float	
0096	30151	Switch 2 output	Float	
0098	30153	Control 1 output	Float	
009A	30155	Control 2 output	Float	
009C	30157	Setup Change	Long	
009E	30159	Power on counter	Long	
00A0	30161	Unit reset counter	Long	
00A2	30163	Auto cycle 1 extract status	Long	
00A4	30165	Auto cycle 1 rinse status	Long	
00A6	30167	Auto cycle 1 calibration point 1	Long	
00A8	30169	Auto cycle 1 calibration point 2	Long	
00AA	30171	Auto cycle 1 failure	Long	
00AC	30173	Auto cycle 2 extract status	Long	
00AE	30175	Auto cycle 2 rinse status	Long	
00B0	30177	Auto cycle 2 calibration point 1	Long	
00B2	30179	Auto cycle 2 calibration point 2	Long	
00B4	30181	Auto cycle 2 failure	Long	
00B6	30183	PV1 Calibration	Long	
00B8	30185	PV2 Calibration	Long	
00BA	30187	Output 1 Calibration	Long	
00BC	30189	Output 2 Calibration	Long	
00BE	30191	Output 3 Calibration	Long	
00C0	30193	Input 1 Hold status	Long	
00C2	30195	Input 2 Hold status	Long	
00C4	30197	UNIX Clock Time	Long	Number of seconds since January 1, 1970.
00C6	30199	Number of messages sent by main CPU card to communication card via SPI link.	Long	

Address (hex)	Register (decimal)	Parameter Name	Type	Notes
00C8	30201	Number of messages sent by main CPU card to communication card via SPI link that failed.	Long	
00CA	30203	Number of messages sent by communication card to main CPU card via the SCI link.	Long	
00CC	30205	Number of messages sent by communication card to main CPU card via the SCI link that failed.	Long	
00CE	30207	Number of times the communication card was commanded to reset.	Long	
00D0	30209	Analog variable 1 operating value	Float	
00D2	30211	Analog variable 2 operating value	Float	
00D4	30213	Analog variable 3 operating value	Float	
00D6	30215	Analog variable 4 operating value	Float	
00D8	30217	Digital variable 1 operating value	Long	
00DA	30219	Digital variable 2 operating value	Long	
00DC	30221	Digital variable 3 operating value	Long	
00DE	30223	Digital variable 4 operating value	Long	
00E0	30225	Number of times the database was changed.	Long	
00E2	30227	Number of times a tagname was changed.	Long	
00E3-00FF	30228-30229	*spare*		
0100	30257	PID1 LSP/RSP selected	Long	0 = LSP; 1 = RSP
0102	30259	PID1 AUTO/MANUAL selected	Long	0 = auto mode; 1 = manual mode
0104	30261	PID1 Tune request active	Long	1 = Auto tune is requested
0106	30263	PID1 RSP	Float	RSP in engineering units
0108	30265	PID1 Deviation	Float	Deviation in engineering units
010A	30267	PID1 Tuneset selected	Long	0 = tuneset 1; 1 = tuneset 2
010C	30269	PID1 PV	Float	PV in engineering units
010E	30271	PID1 Working setpoint	Float	Working setpoint in engineering units
0110	30273	PID1 Output	Float	PID output

Address (hex)	Register (decimal)	Parameter Name	Type	Notes
0112	30275	PID1 Mode	Float	PID mode encoded as floating point number: 0.0 = RSP/Auto 1.0 = RSP/Manual 2.0 = RSP/Initializing manual mode 3.0 = RSP/TRC 4.0 = LSP/Auto 5.0 = LSP/Manual 6.0 = LSP/ Initializing manual mode 7.0 = LSP/TRC
0114	30277	PID1 Alarm 1 state	Long	0 = PID alarm 1 inactive 1 = PID alarm 1 active
0116	30279	PID1 Alarm 2 state	Long	0 = PID alarm 2 inactive 1 = PID alarm 2 active
0118	30281	PID1 Auto tune state	Long	0 = auto tune inactive 1 = auto tune active
011A	30283	*spare*		
011C	30285	*spare*		
011E	30287	*spare*		
0120	30289	PID2 LSP/RSP selected	Long	0 = LSP; 1 = RSP
0122	30291	PID2 AUTO/MANUAL selected	Long	0 = auto mode; 1 = manual mode
0124	30293	PID2 Tune request active	Long	1 = Auto tune is requested
0126	30295	PID2 RSP	Float	RSP in engineering units
0128	30297	PID2 Deviation	Float	Deviation in engineering units
012A	30299	PID2 Tuneset selected	Long	0 = tuneset 1; 1 = tuneset 2
012C	30301	PID2 PV	Float	PV in engineering units
012E	30303	PID2 Working setpoint	Float	Working setpoint in engineering units
0130	30305	PID2 Output	Float	PID output
0132	30307	PID2 Mode	Float	PID mode encoded as floating point number: 0.0 = RSP/Auto 1.0 = RSP/Manual 2.0 = RSP/Initializing manual mode 3.0 = RSP/TRC 4.0 = LSP/Auto 5.0 = LSP/Manual 6.0 = LSP/ Initializing manual mode 7.0 = LSP/TRC
0134	30309	PID2 Alarm 1 state	Long	0 = PID alarm 1 inactive 1 = PID alarm 1 active

Address (hex)	Register (decimal)	Parameter Name	Type	Notes
0136	30311	PID2 Alarm 2 state	Long	0 = PID alarm 2 inactive 1 = PID alarm 2 active
0138	30313	PID2 Auto tune state	Long	0 = auto tune inactive 1 = auto tune active

Example

Read PV1 and PV2 from UDA at slave address 01 using Function Code 03.

TCP:

00	04	00	00	00	02

RTU:

01	04	00	00	00	02	CRC	CRC

Response from UDA where PV1 = 100.0 and PV2 = 55.32

TCP:

00	04	08	42	C8	00	00	42	5D	47	AE

RTU:

01	04	08	42	C8	00	00	42	5D	47	AE	CRC	CRC

12. Web Pages

12.1 Overview

The UDA has web browsing capability. With a web browser, such as Internet Explorer, you can view many of the operating parameters of the UDA. Configuration of the Ethernet parameters is also provided using a web browser.

To view web pages:

1. Connect a PC to the UDA. A static or a dynamic IP address can be assigned to the UDA using the communication menu from the front panel. (Table 3-1 Configurable Parameters)
2. On the UDA's front-panel, go to the Comm status display menu and record the IP address.
3. On the PC connected to the UDA, start up a web browser such as Internet Explorer 6 and above.
4. To browse the web pages, type the IP address into the address bar of Internet explorer and press enter. After a few seconds, the UDA login screen should appear.

Following sections explains various web pages that can be browsed.

12.2 Login Page

Login page is displayed when the UDA is browsed from Internet Explorer using the IP address assigned to it. The page is displayed as shown below:

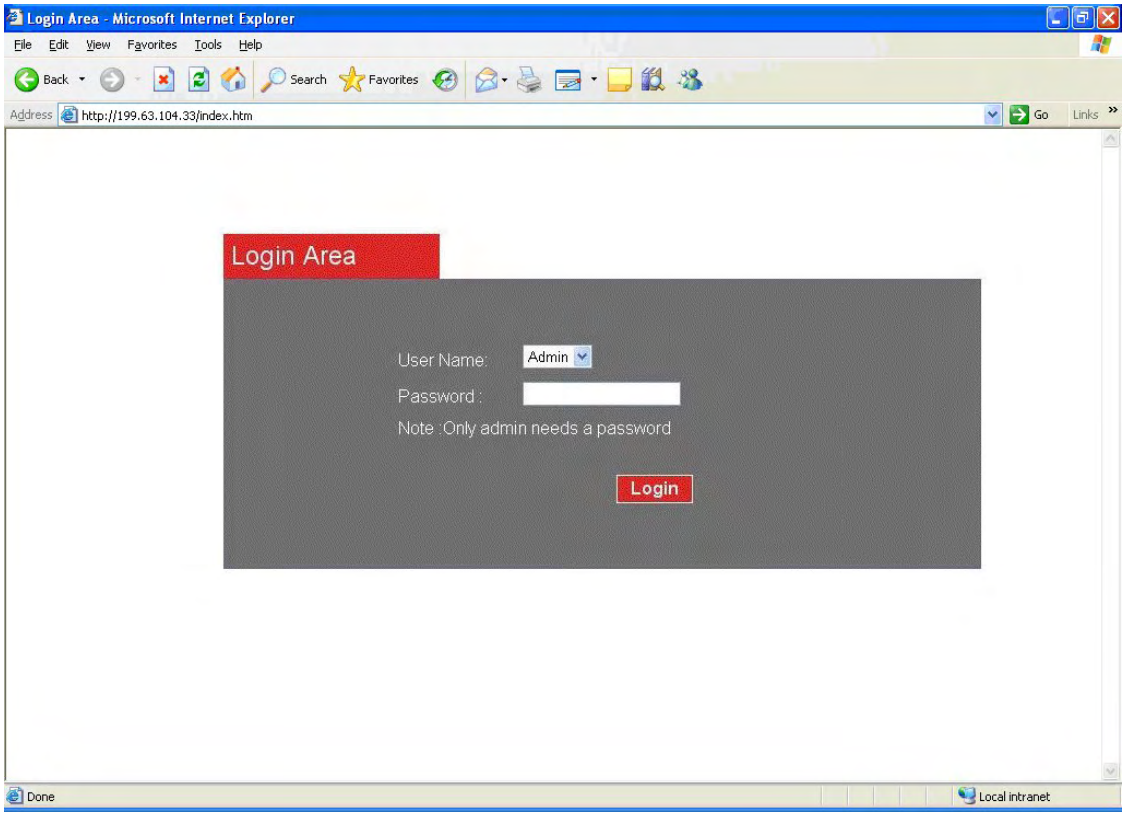


Figure 12-1 Login Page

Login Types

There are two login types: Admin and Guest.

Admin Access:

For a user to get an Admin access a password other than zero must be set for the UDA from the maintenance menu of the front panel. The user can login as Admin using this case-sensitive password. If no password is entered or the password is entered incorrectly when the User Name is Admin; access rights assigned will be of a guest. Only the admin has configuration capability.

There is no indication on the page denoting admin accessibility. If you think you are logged in as admin, but are unable to change settings, your admin session may have timed out or you may have actually logged in as guest. First, do a log off, and then log back in as admin. If this still doesn't solve the problem, there may be someone else logged in as admin on another computer, and you will need to wait until the other session is terminated.

Note: Only one user can login as Admin at a time. If there is no activity for 10 minutes for an Admin session, the session times out.

Guest Access:

A user can log in with Guest Access if only UDA monitoring is desired. For the User Name Guest, password is not required. A user logged in with guest access rights will not be able do any configurations

Note: Up to 10 users can login as guests simultaneously.

12.3 Welcome Page

The first page that appears after the user logs in as Admin or Guest is the welcome page. The page will appear as shown below:

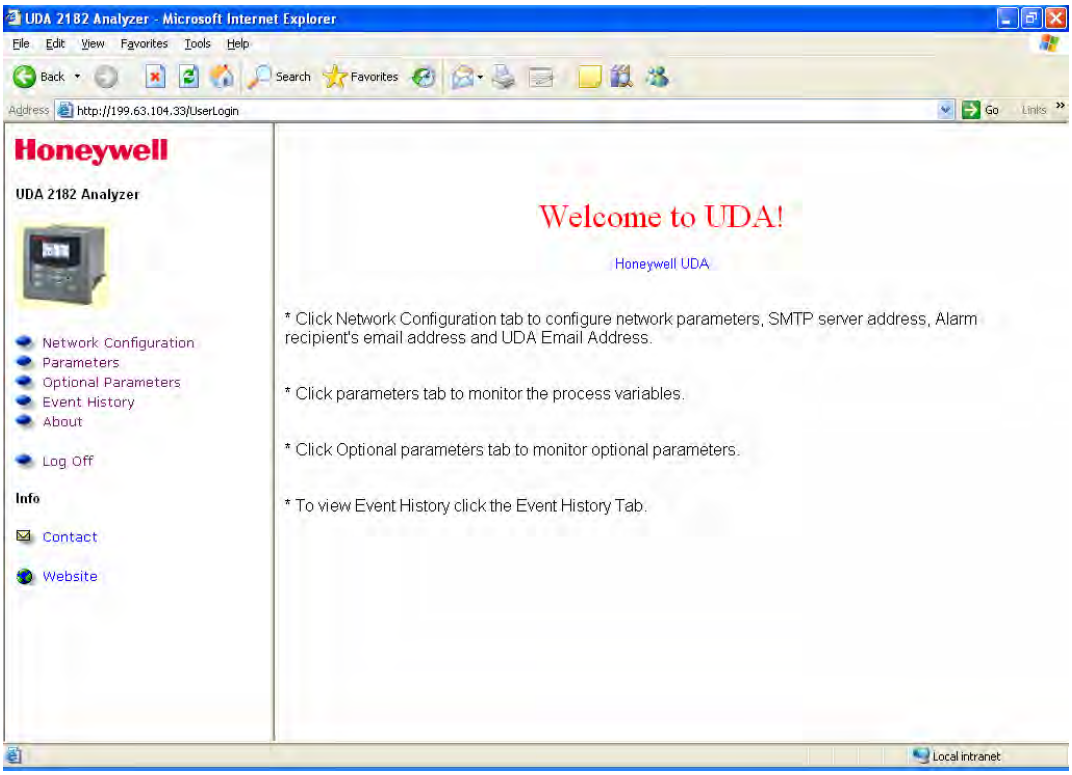


Figure 12-2 Welcome Page

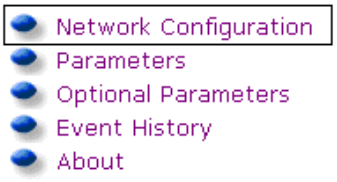
The welcome page gives information about the tabs present on the left. The tagname set for the UDA is displayed just below the welcome message on the right frame.

A main menu will appear on the left hand side which has various tabs that can be clicked to view that particular page which will be displayed on the right side of the frame.

12.4 Network Configuration Page

Accessing the Network Configuration page

Click on the Network Configuration tab in the main menu on the left hand side to view the page.



Only the user with Admin Access will be able to change configurations on this page.

User logged in as Guest will only be able to view the configurations.

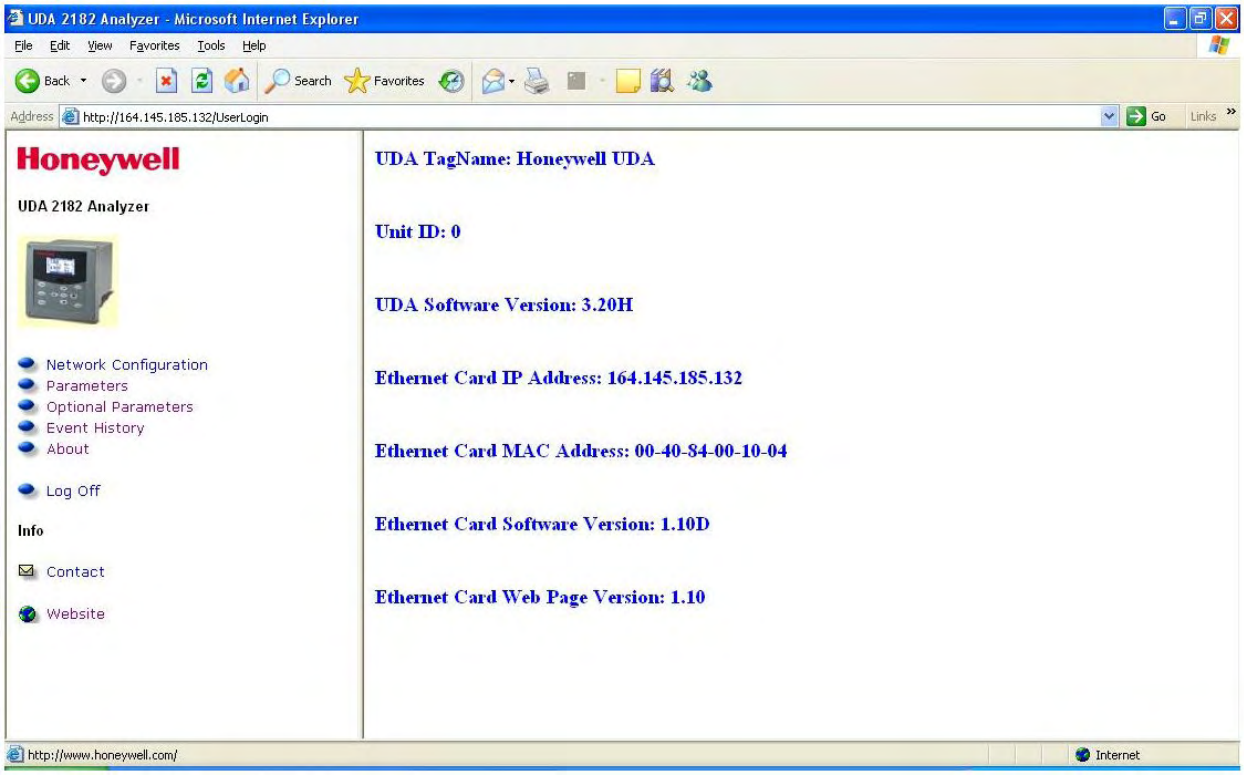


Figure 12-3 Network Configuration Page

Network Configuration Page Tabs

The Network Configuration Page has four tabs on the top:

Select a tab and click on it to view the particular page.

12.4.1 IP Address Configuration Page

Overview

Click on the “IP Address” tab on the Network Configuration page.

Only the user with Admin Access will be able to change configurations on this page. User logged in as Guest will only be able to view the configurations. IP address configuration for the UDA can be done from this page.

This page will display the existing configurations of the device which can be changed by a user with Admin access. So if the UDA is already using a dynamic IP the radio button for this choice is selected. In case of dynamic IP the field for Static IP will be displayed as empty.

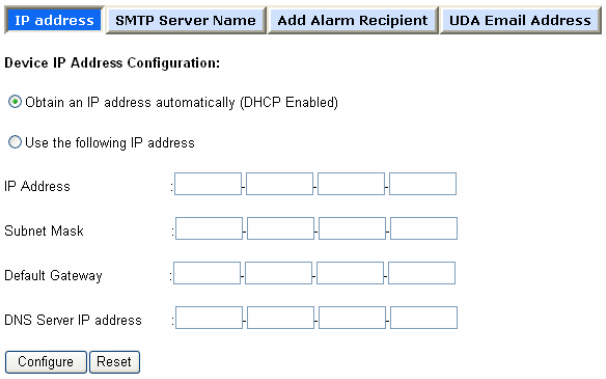


Figure 12-4 IP Address Configuration

Setting a Static IP

If the static IP address is already assigned to the UDA then the existing settings are displayed on this page.

Table 12-1 Setting a Static IP Address

Step	Action
1	Select the radio button which says “Use the following IP address”
2	Enter the IP address, subnet mask, default gateway and the DNS server IP as per the local network settings. All the octets for the IP addresses must be less than 256. If you will be using an SMTP server name, i.e. smtp.honeywell.com, rather than an IP address, you will need to enter the DNS Server IP address. Note: if DHCP is used, this step can be skipped because the DNS server will automatically configure the DNS Server IP address.
3	To configure the address, type it into the edit boxes then press **Configure.** If you need to reset the entries back to the actual values, press the Reset button before pressing the configure button.
4	Press the Log Off tab on the left hand menu. The IP address configuration will take effect Note: after you change the IP address, and press Log Off, you will need to change the IP address in your browser to access the UDA with its new IP address.

Setting a Dynamic IP

If you want to change the setting from the Dynamic to Static then the radio button should be selected accordingly and the Configure button should be pressed. The new IP address will be assigned when the user logs off.

12.4.2 SMPT Server Name Configuration Page

Overview

Click on the “SMTP Server Name” tab on the Network Configuration page.

Only the user with Admin Access will be able to change configurations on this page. User logged in as Guest will only be able to view the configurations.

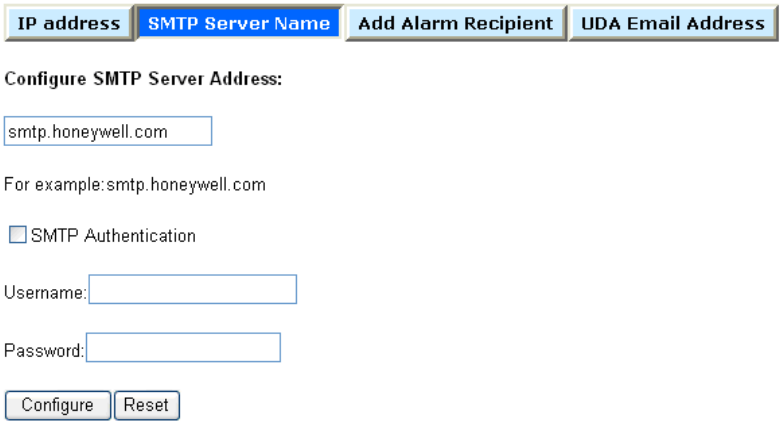


Figure 12-5 SMTP Server Name

Setting a SMTP

The existing name of the SMTP server will be displayed in the text box.

Table 12-2 Setting a SMPT Server Name

Step	Action
1	If the sever needs authentication enter the user name and password. Configure button should be pressed after all the entries are done. But the entries will take effect only when the log off button is pressed. Note: *The SMTP Sever Name length shall not exceed 255 characters with each label not exceeding 63 characters.*
3	To configure the address, type it into the edit boxes then press **Configure.** If you need to reset the entries, press the Reset button before pressing the configure button. This reset does not reset the device but the entries on the page are replaced with the actual entries.
4	Press the Log Off tab on the left hand menu. The SMTP Server Name configuration will take effect

Note: if you only know the SMTP server’s IP address, you can enter that instead.

12.4.3 Add Alarm Recipient Configuration Page

Overview

Click on the “Add Alarm Recipient” tab on the Network Configuration page.
You can assign alarm alerts to be sent to a particular email address.

Only the user with Admin Access will be able to change configurations on this page. User logged in as Guest will only be able to view the configurations.

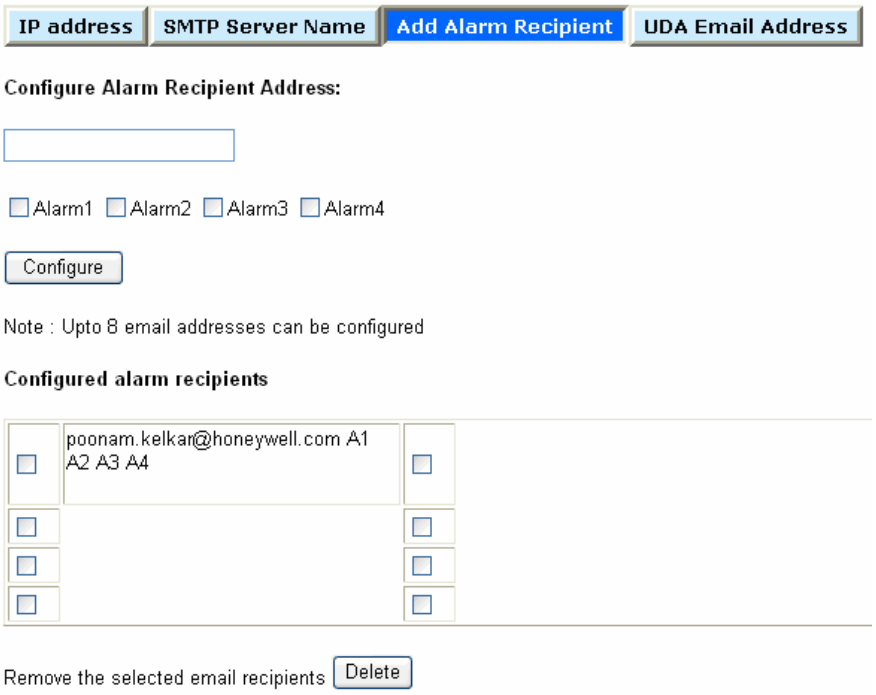


Figure 12-6 Add Alarm Recipient

Adding an Alarm Recipient

Up to 8 Alarm Recipients can be configured. Whenever the Alarm’s state changes, the recipients will reveive alarm alerts for the alarms for which they have subscribed.

Table 12-3 Adding an Alarm Recipient

Step	Action
1	Enter the email address of the alarm recipient in the text box. The address should not exceed 255 characters.
2	Click on the boxes to select the Alarms for which the recipient wants to subscribe. A recipient can subscribe to any number of alarms.
3	Press “Configure” to **add** the alarm recipient to the table of configured alarm recipients. Note: *If already 8 alarm recipients are entered, a new entry will replace the first entry in the table.*
4	To **Delete** any of the Alarm recipients, select the appropriate boxes, then press the “Delete” button.
4	Press the Log Off tab on the left hand menu.

12.4.4 UDA Email Address Configuration Page

Overview

Click on the “UDA Email Address” tab on the Network Configuration page.
From this page, the email address that appears in the FROM field of an alarm alert email can be configured.

Only the user with Admin Access will be able to change configurations on this page.

User logged in as Guest will only be able to view the configurations.

Figure 12-7 UDA Email Address Configuration

UDA Email Address Configuration

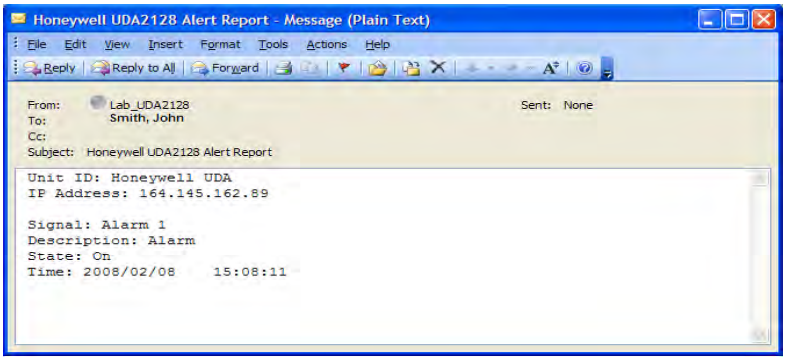
The existing Email address is displayed in the text box.

Table 12-4 UDA Email Address Configuration

Step	Action
1	To change the UDA Email Address, enter the new address in the same text box then press the “**Configure”** button. The Email address length should not exceed 255 characters.
2	Press the “**Reset**” button to replace the text entry of an earlier Email address.
3	Press the Log Off tab on the left hand menu.

Note: The UDA Email Address does not need to be a valid email address nor does it need to be a name with the ‘@’ symbol in it. It can be any name you want to use to uniquely identify the UDA to the email recipient.

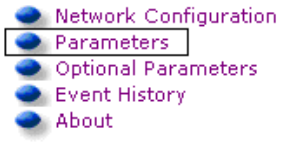
Example email



12.5 Parameters Page

Accessing the Parameters page

Click on the Parameters tab in the main menu on the left hand side to monitor the parameters shown.



No configuration can be done from this page.

Parameter Tables

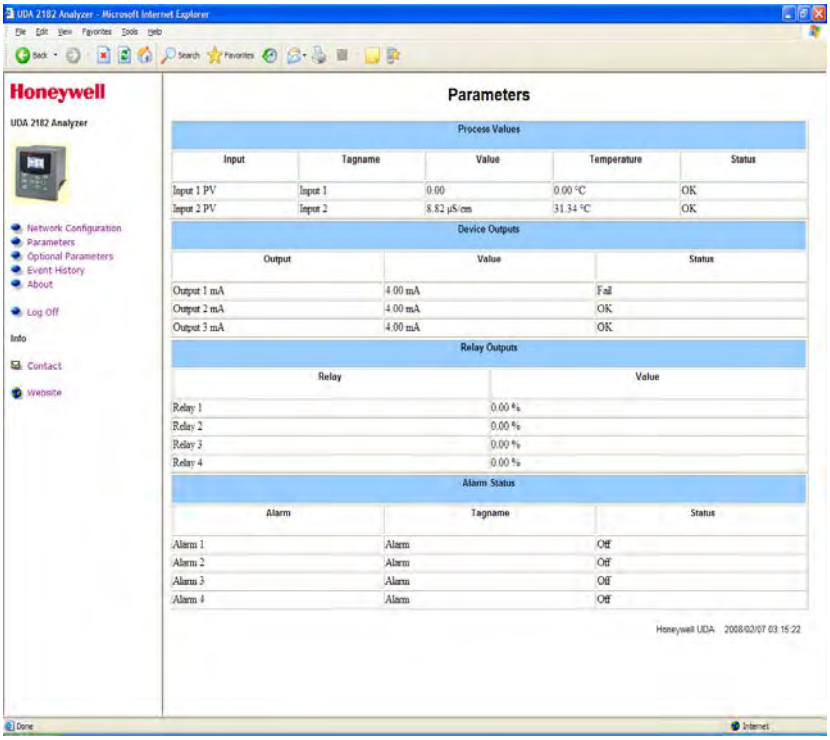


Figure 12-8 Monitor Parameters Page

Paremeter Tables Details

Process Values	Displays the Tag Name, Value, Temperature, and the Status of the Inputs presently connected to the UDA.
Device Output	Displays the value and the Status of the Outputs present on the UDA.
Relay Outputs	Displays the Status of the four Relay Outputs.
Alarm Status	Displays the Status of the four Alarms and their tagnames.

The parameters page gets refreshed at the rate of 10 seconds. A slight flicker can be observed while the page gets refreshed.

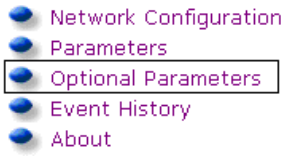
Tagname, Device date and Time are displayed on the right bottom corner of the page.

Note: If you don't see all of the parameters on a single screen, you can increase your screen resolution for your windows desktop display properties.

12.6 Optional Parameters Page

Accessing the Optional Parameters page

Click on the Optional Parameters tab in the main menu on the left hand side to monitor the parameters.



No configuration can be done from this page. For the options that are not enabled or bought, nothing is displayed in the respective tables

Optional Parameters Tables

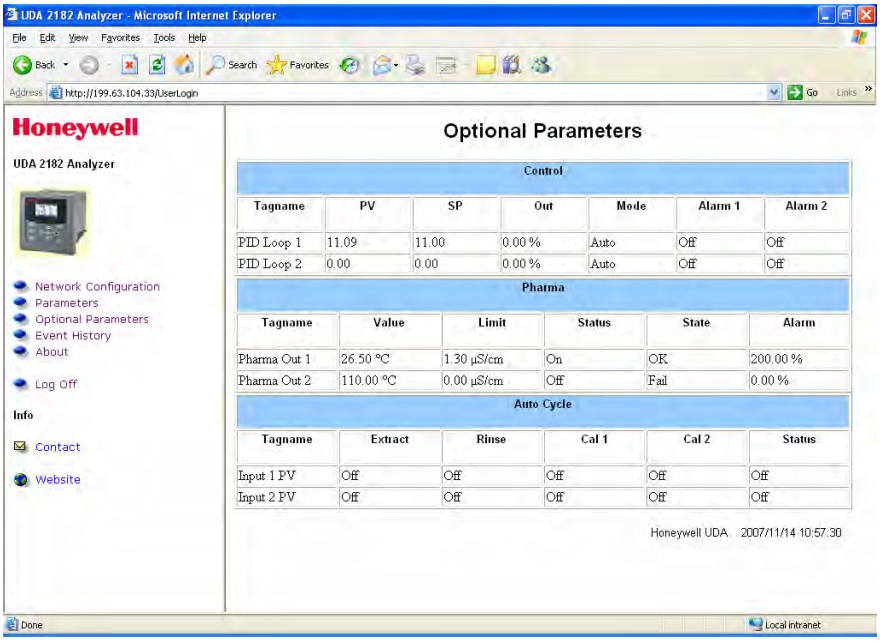


Figure 12-9 Monitor Optional Parameters Page

Optional Parameter Tables Details

Control Table — Displays the PV, SP, Output, Mode and Alarm Status for the PID loops currently present on the UDA. The entries will be blank for the options that are either not enabled or bought.

Pharma Table — Displays the Value, Limit, Status, State and the Alarm Status for the Pharma Outputs that are currently enabled on the UDA. The entries will be blank for the options that are either not enabled or bought.

Auto Cycle Table — Displays the Status of the Auto Cycle 1 and 2. “ON” is displayed for the state or states which is currently active, otherwise “OFF” is displayed. Auto Cycle process can be in either Extract, Rinse, Cal1, Cal2 states. The status of the cycle is also displayed.

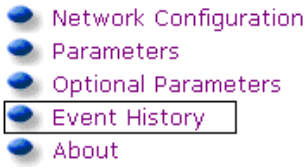
The parameters page gets refreshed at the rate of 10 seconds. A slight flicker can be observed while the page gets refreshed.

Tagname, Device date and Time are displayed on the right bottom corner of the page.

12.7 Event History Web Page

Accessing the Event History page

Click on the Event History tab in the main menu on the left hand side to monitor the Event History.



This page displays the first 12 Events of the UDA

No configuration can be done from this page.

Event History Page

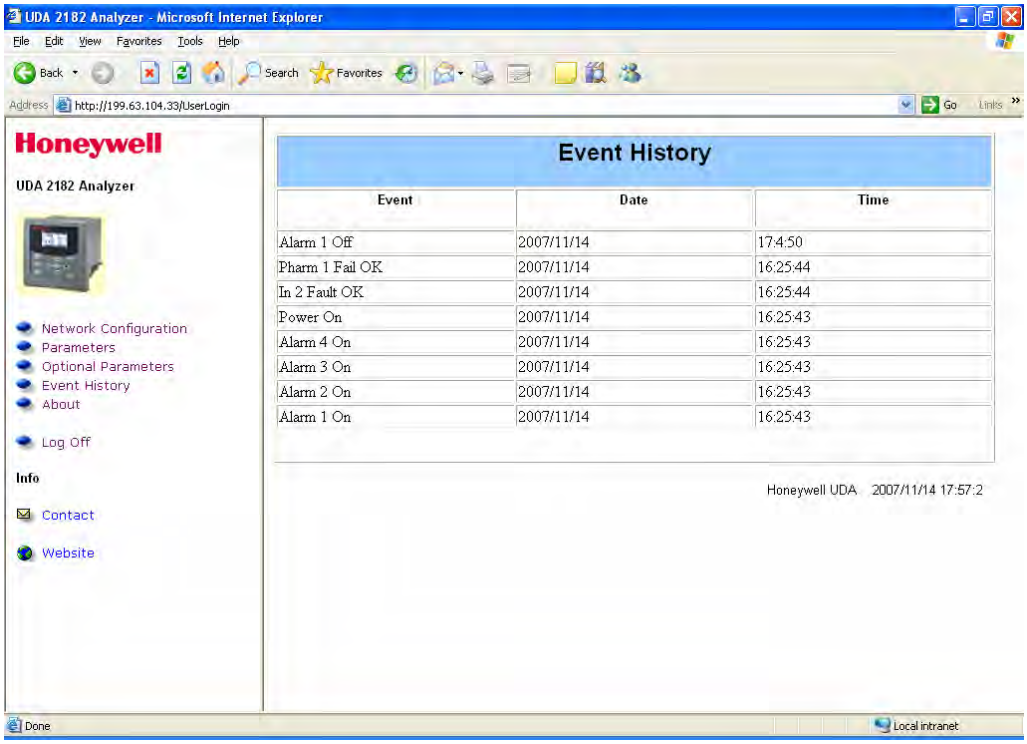


Figure 12-10 Event History Page

Event History Page Details

The Event Date and Time is displayed along with the description of the event.

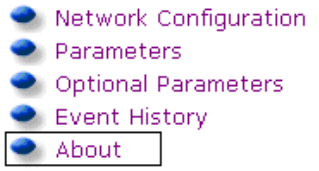
If the Event History is cleared from the UDA front panel and no event has occurred on the UDA, a blank table will be displayed.

The Event History page gets refreshed at the rate of 10 seconds.

12.8 About Web Page

Accessing the About page

Click on the About tab in the main menu on the left hand side to the page.



This page displays Tag Name, Unit ID, UDA Software Varsion, The Ethernet Card version, and the Ethernet card IP Address.

About Page

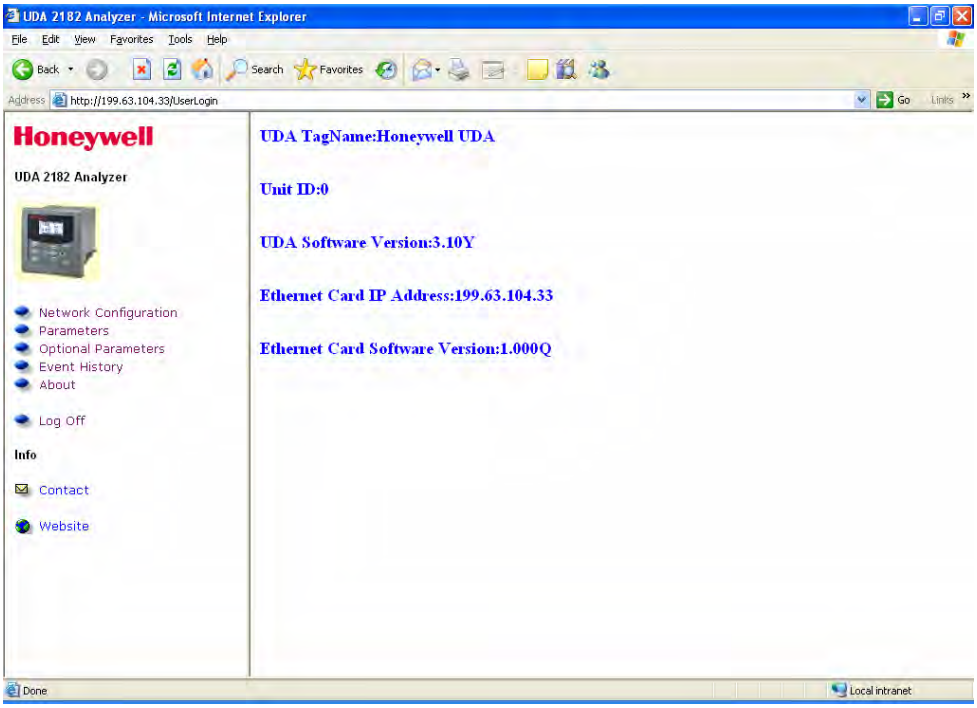


Figure 12-11 About Page

12.9 Contact Web Page

Accessing the Contact page

Click on the Contact Symbol in the main menu on the left hand side to draft an Email to a contact person.

An Email composer will open up with the contact address in the "TO" field as shown below.

Contact Page

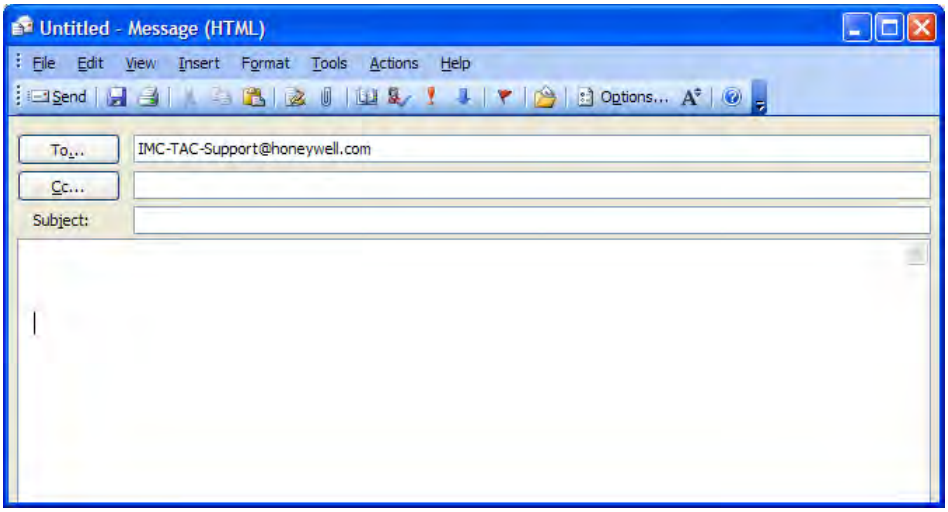


Figure 12-12 Contact Page

12.10 Website Page

Accessing the Website page

Click on the Website Symbol in the main menu on the left hand side to browse the Honeywell Website for more information.

The Honeywell website will be displayed on the right hand side.

WebsitePage

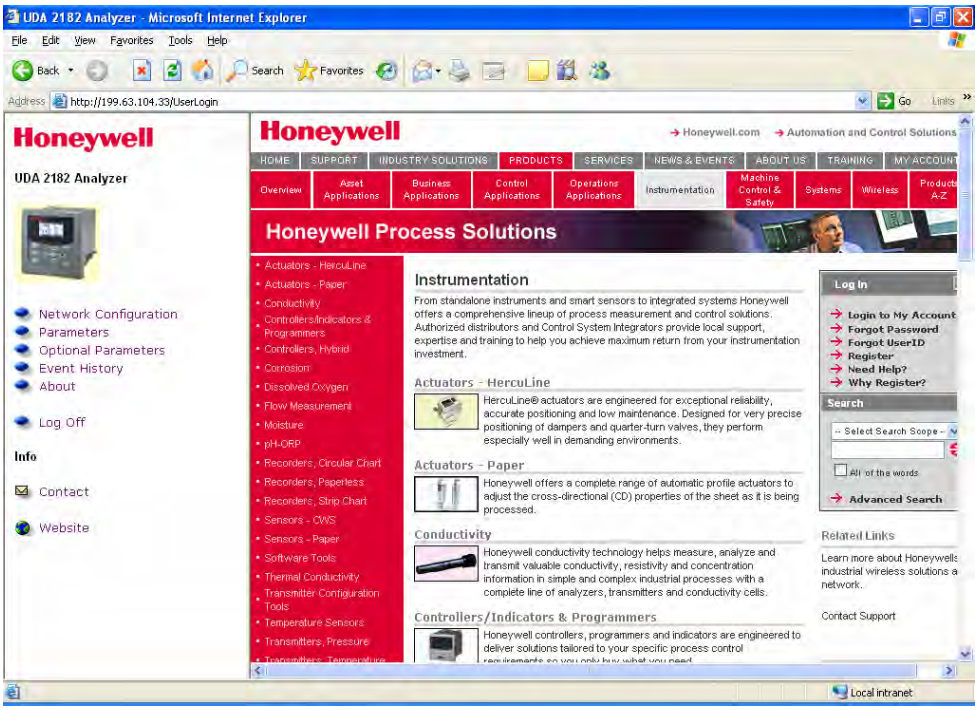


Figure 12-13 Honeywell Website Page

12.11 Log Off Page

Accessing the Log Off page

Click on the Log Off tab in the main menu on the left hand side.

In case of Admin access, all the changes made, if any, will take effect when the Log Off tab is clicked.

The Log Off page displayed will have a link which can be selected to Log in again.

NOTE: If the IP Address has been changed, the Log Off page will not be displayed since the session with the earlier IP no longer exists.

Log Off Page

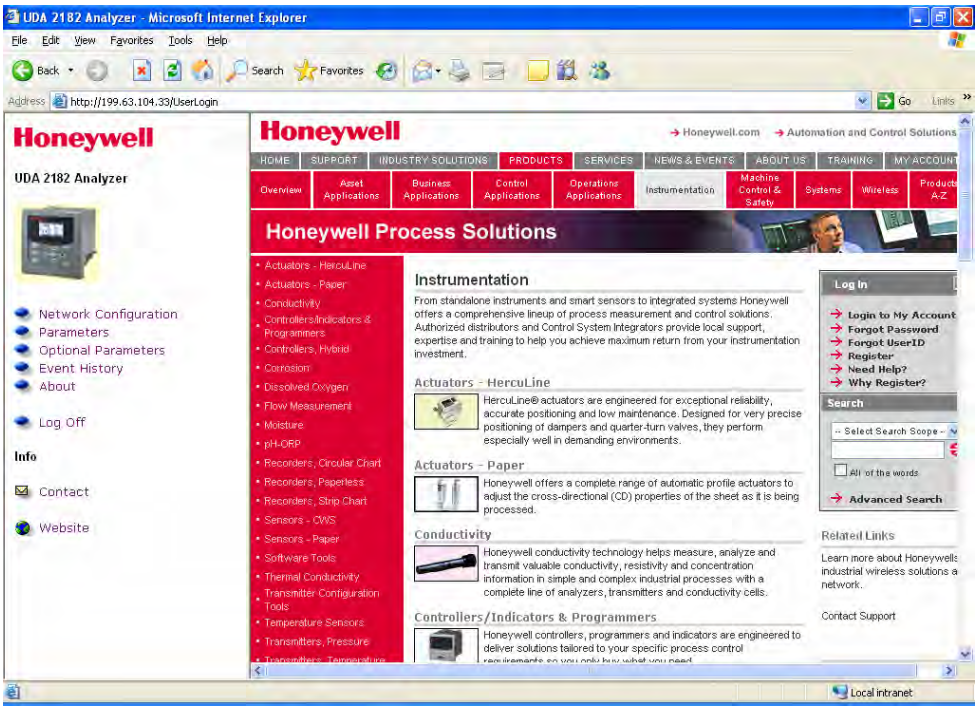


Figure 12-14 Log Off Page

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