Communications and Displays

SITRANS RD500

Operating Instructions · 03/2011

SITRANS

SIEMENS

Safety Guidelines: Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

Qualified Personnel: This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Unit Repair and Excluded Liability:

- The user is responsible for all changes and repairs made to the device by the user or the user's agent.
- All new components are to be provided by Siemens Milltronics Process Instruments.
- Restrict repair to faulty components only.
- Do not reuse faulty components.

Warning: Cardboard shipping package provides limited humidity and moisture protection. This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.
This product is intended for use in industrial areas. Operation of this equipment in a residential area may cause interference to several frequency based communications.

Note: Always use product in accordance with specifications.

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- For a selection of Siemens Milltronics level measurement manuals, go to: **www. siemens.com/processautomation**. Under Process Instrumentation, select *Level Measurement* and then go to the manual archive listed under the product family.
- For a selection of Siemens Milltronics weighing manuals, go to: **www. siemens.com/processautomation**. Under Weighing Technology, select *Continuous Weighing Systems* and then go to the manual archive listed under the product family.

Safety Notes

Special attention must be paid to warnings and notes highlighted from the rest of the text by grey boxes.

WARNING: relates to a caution symbol on the product, and means that failure to observe the necessary precautions can result in death, serious injury, and/or considerable material damage.

WARNING[1]: means that failure to observe the necessary precautions can result in death, serious injury, and/or considerable material damage.

Note: means important information about the product or that part of the operating manual.

Safety marking symbols

In manual	On product	Description
⏚		Earth (ground) Terminal
⏚		Protective Conductor Terminal
⚠	⚠	(Label on product: yellow background.) WARNING: refer to accompanying documents (manual) for details.

FCC Conformity

US Installations only: Federal Communications Commission (FCC) rules

WARNING: Changes or modifications not expressly approved by Siemens Milltronics could void the user's authority to operate the equipment.

Notes:

- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
- This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference to radio communications, in which case the user will be required to correct the interference at his own expense.

1. This symbol is used when there is no corresponding caution symbol on the product.

The Manual

Notes:
- This product is intended for use in industrial areas. Operation of this equipment in a residential area may cause interference to several frequency based communications.
- Please follow the installation and operating procedures for a quick, trouble-free installation and to ensure the maximum accuracy and reliability of your SITRANS RD500 application.
- This manual applies to the SITRANS RD500 application only.

This manual will help you set up your SITRANS RD500 for optimum performance. We always welcome suggestions and comments about manual content, design, and accessibility. Please direct your comments to techpubs.smpi@siemens.com.

For other Siemens Milltronics level measurement manuals, go to: www.siemens.com/level and look under **Level Measurement.**

Technical Support

Support is available 24 hours a day.

To find your local Siemens Automation Office address, phone number and fax number go to:

www.siemens.com/automation/partner

- Click on the tab **Contacts by Product** then drill down to find your product group (**+Process Automation > +Process Instrumentation > +Level Measuring Instruments)**.
- Select the team **Technical Support.** Click on **Next**.
- Click on the appropriate continent, then select the country followed by the city. Click on **Next**.

For on-line technical support go to:

www.siemens.com/automation/support-request

- Enter the device name (SITRANS RD500) or order number, then click on **Search**, and select the appropriate product type. Click on **Next**.
- You will be prompted to enter a keyword describing your issue. Then either browse the relevant documentation, or click on **Next** to email a detailed description of your issue to Siemens Technical Support staff.

Siemens A&D Technical Support Center: phone +49 180 50 50 222

fax +49 180 50 50 223

Abbreviations and Identifications

Short form	Long Form	Description	Units
UL	Underwriters Laboratories	safety approval	
CSV	Comma Separated Values		
D/A	Digital to analog		
DCS	Distributed Control System	control room apparatus	
GPRS	General Packet Radio Service		
PV	Primary Variable	measured value	
RTD	Resistance Temperature Detector		
SMS	Short Message Service		
CF	CompactFlash		

SITRANS RD500 Overview

SITRANS RD500 is a remote data manager providing integrated web access, alarm event handling and data capture for instrumentation. It offers flexible I/O, including 0(4) to 20 mA, 0 to 10 V, digital, pulse, RTD, Modbus, and thermocouple inputs. SITRANS RD500 can be easily expanded for future I/O needs.

Benefits of RD500 remote data manager

- Auto I/O detection and I/O scalability as well as flexible and varied I/O options
- Alarm and remote monitoring notification via email, SMS, or FTP
- Web visualization for remote site management
- Simple configuration with no programming required
- Large datalogging capacity with 2 GB CompactFlash card support
- Flexible communications options with Ethernet, GPRS, and support for other serial modems

SITRANS RD500 Solution

The RD500 is an easy-to-use remote data management solution, using a web-based application and hardware modules. The unique modular approach allows a variety of process signals to be monitored, while the serial ports allow data to be collected from any Modbus RTU device.

The RD500 supports up to 16 modules. Various module types are available including 0(4) to 20 mA, 0 to 10 V, digital, pulse, Modbus, serial, thermocouple, and RTD, allowing up to a maximum of 128 analog and digital inputs. The master's serial ports can collect data from up to 247 RTU slave devices.

The RD500's built-in web server allows the process to be monitored remotely. Alarm notifications are communicated through email or SMS text messages to one or more recipients to notify personnel.

The RD500's optional GPRS cellular modem provides access to information in hard-to-access locations. It also provides a secure option when you are unable to install on an existing LAN. The system also supports other external modems, providing flexibility for applications in which other serial modems such as GSM or landline connectivity is desired.

The RD500 is configured via a web-based interface - a standard browser is all the software you need to configure your system.

SITRANS RD500 Components

Recommended Field Instruments

The RD500 is ideally suited to work with any instrument offering a current (4 to 20), voltage (0 to 10), digital, pulse, RTD, Modbus serial, or thermocouple output.

Siemens supplies many products including level, pressure, temperature, flow, and weighing instruments that are ideally suited for monitoring your applications and will easily connect to the RD500 to provide remote data management functionality to these instruments.

The RD500 is not limited to Siemens instruments but also readily accepts outputs from any of your existing instrument infrastructure that support the above mentioned I/O.

System Hardware

For more information on connection to RD500 modules, please refer to RD500 hardware manuals, available at **www.siemens.com/sitransRD500**.

RD500 Application

The application is stored on the RD500 onboard memory while the expandable CompactFlash offers storage capacity for datalogging and saving configuration.

Note: Due to the nature of Flash memory, it is best to also have backup of your configuration and send data files to a remote server or other backup media.

Data is compiled and stored in CSV (comma separated value) files, as requested by the on-line user through the web interface. The database stores up to 2 GB of historic data. Based on typical usage, 2 GB could store years of data.

Specifications

For specifications of RD500 modules, please refer to RD500 hardware manuals, available at **www.siemens.com/sitransRD500**.

SITRANS RD500 Application

The RD500 is an easy-to-use remote data management solution, using a web-based application and optional I/O modules. The unique modular approach allows a variety of process signals to be monitored, while the serial ports allow data to be collected from any Modbus RTU device using only a PC with a web browser and an Ethernet or serial modem (such as GSM/GPRS or PSTN) connection.

Using simple menus, on-screen buttons, and drop-down lists, you can easily access any monitored instrument. The straightforward, consistent interface makes operation of SITRANS RD500 fast and convenient. As well, the configuration of the modules is easy and automatic, with no manual configuration required.

This section provides information for complete SITRANS RD500 site management, including configuration, access, and navigation. See hardware module operating instructions for details on setup of modules (www.siemens.com/RD500).

Note: Example RD500 screens used in this manual are not derived from a real organization or company. Any resemblance to a real organization or company is accidental.

Configuration

Web Browser Settings

The SITRANS RD500 application is accessible via standard web browsers including Internet Explorer 6.0 and higher, Firefox, and Google Chrome.

Web browsers can vary between versions and computer platforms (PC or Macintosh).

Note: Make sure your web browser accepts *cookies* and has *JavaScript* enabled. These settings are usually enabled by default but can also be set.

Changing JavaScript and cookies settings (Internet Explorer)

Please note that setup option locations and settings may vary among versions.

1. Open your browser.
2. Click **Tools** and select **Internet Options.**
3. Click the **Security** tab and then click the **Custom Level** button.
4. Scroll down the **Settings** box to the Cookies section and enable both stored and non-stored cookies.
5. Click **OK** to save your new settings and close the Settings box.
6. Click **OK** to close the Internet Options box.

Using with Mozilla Firefox

Please note that setup option locations and settings may vary among versions.

1. Open your browser.
2. Click **Tools** and select **Options.**
3. Click the **Privacy** tab and then click the **Cookies** tab.
4. Check **Allow site to set Cookies**.
5. Click **OK** to save your new settings and close the **Options** box.

Connection

Note: On the instruction manual CD included with the product, you will find the RD500 USB Windows-based configuration application. This application can be used by connecting your PC to the RD500 with a USB type A to B cable. The RD500 USB application allows for firmware updates, resetting of the password, setting the IP address, and resetting the RD500 to factory defaults.
This utility is also available on our website at **www.siemens.com/sitransRD500** under Downloads.

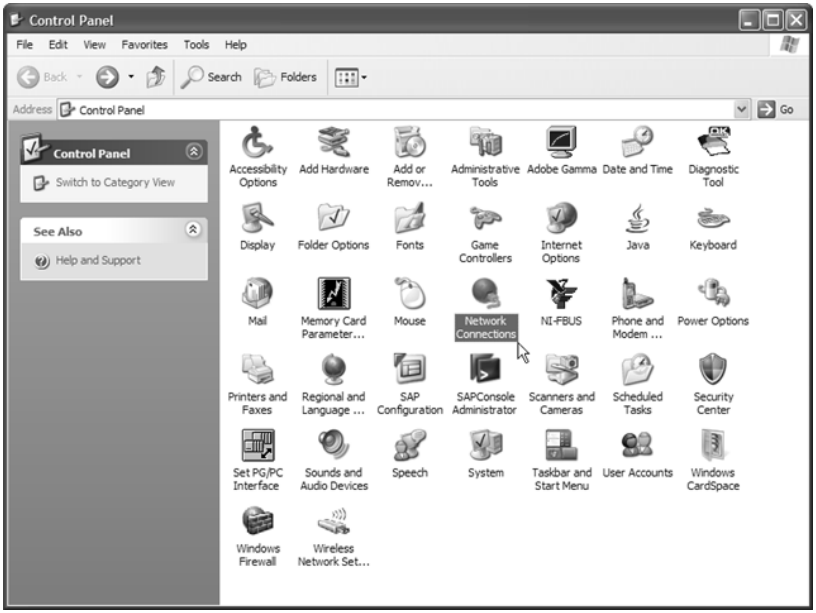
For initial setup, connect to the RD500 via an Ethernet crossover cable. This will allow a point-to-point connection to your PC for the purpose of configuration and application testing.

The RD500's default IP address is 192.168.2.100. For a simple network, the first three octets of your PC's IP address must match the RD500's. Therefore, a suitable IP for your PC would be 192.168.2.10.

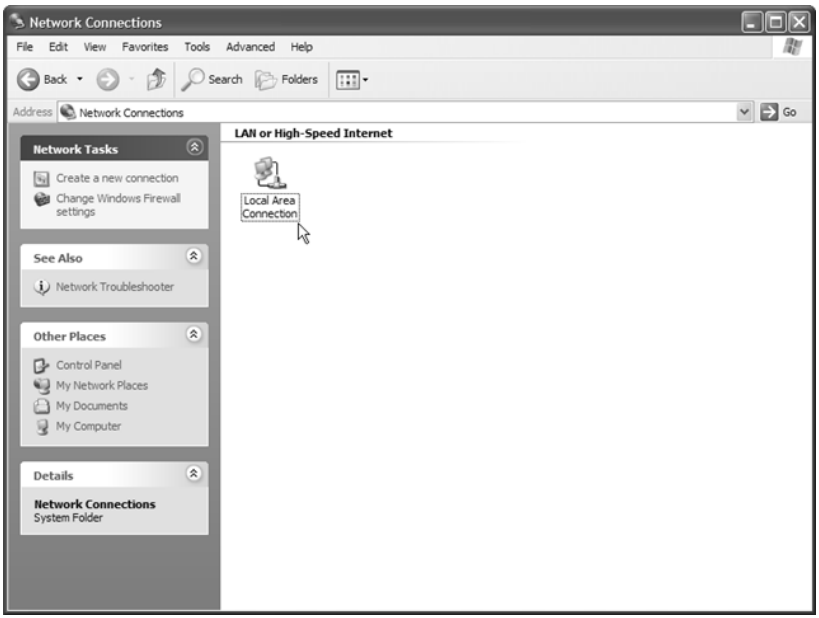
Note: The crossover Ethernet cable is used for a point-to-point network, while a standard straight-through Ethernet cable is used in most LAN or WAN networks. Straight-through Ethernet cable can be used for direct connection if PC or laptop supports auto crossover detection.

Setting your PC's IP address

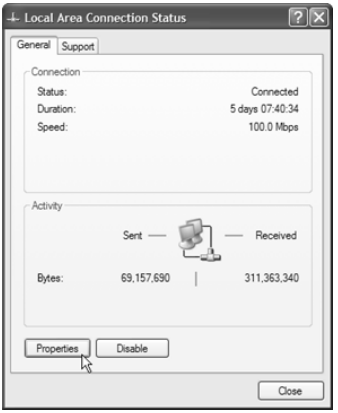
Go to the Windows Control Panel, and double-click **Network Connections**.

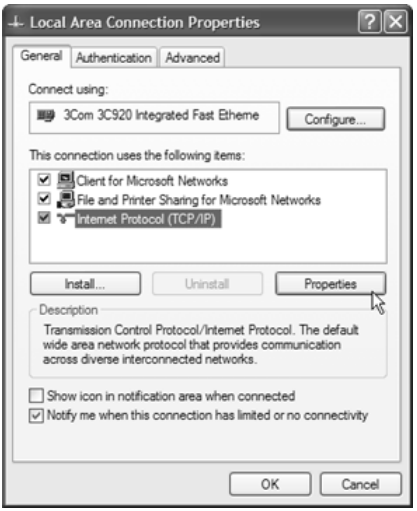


Double-click **Local Area Connection**.

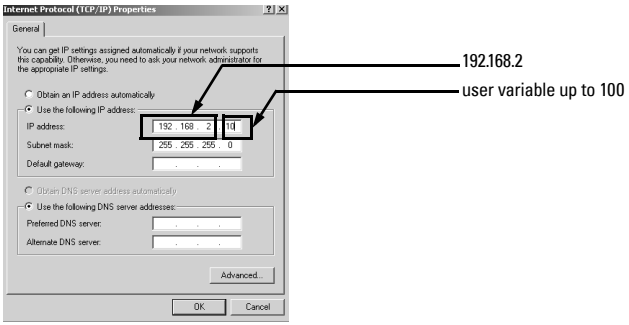


Click **Properties**, and then **Internet Protocol (TCP/IP)** at the bottom of the list. Click **Properties** to edit this item.



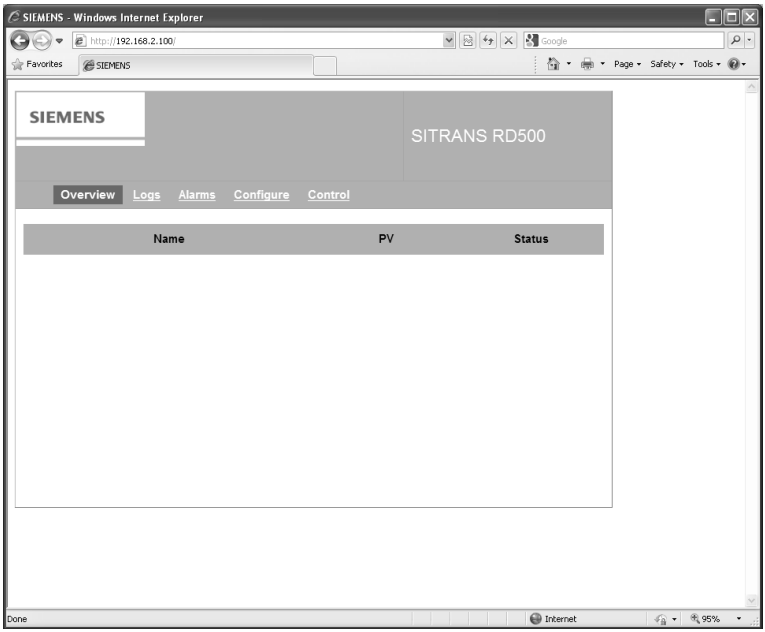


Select the radio button for **Use the following IP address**, and enter an IP address so that the first three octets are **192.168.2** and the final octets are different, up to 100 (for example, 10 or 20). Enter a Subnet mask of **255.255.255.0**, and click **OK**.



This may require a computer reboot to update your network settings. Be sure to close all open browser windows, before opening the RD500 application for the first time below.

Open your Internet Browser and type the RD500's default IP address of 192.168.2.100. If the system has not yet been configured, all fields on the Overview screen will be blank.

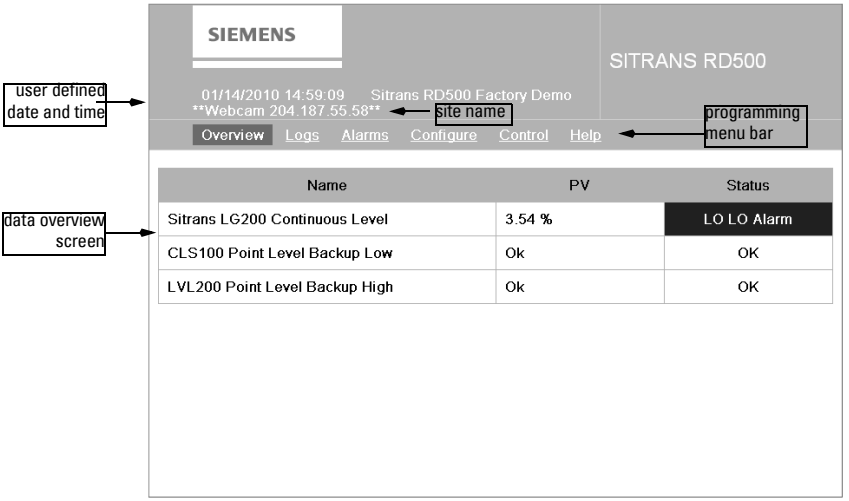


Note: LED activity will be visible on both your computer Ethernet port and on the RD500 Ethernet port if your crossover cable is connected.

Screen Appearance

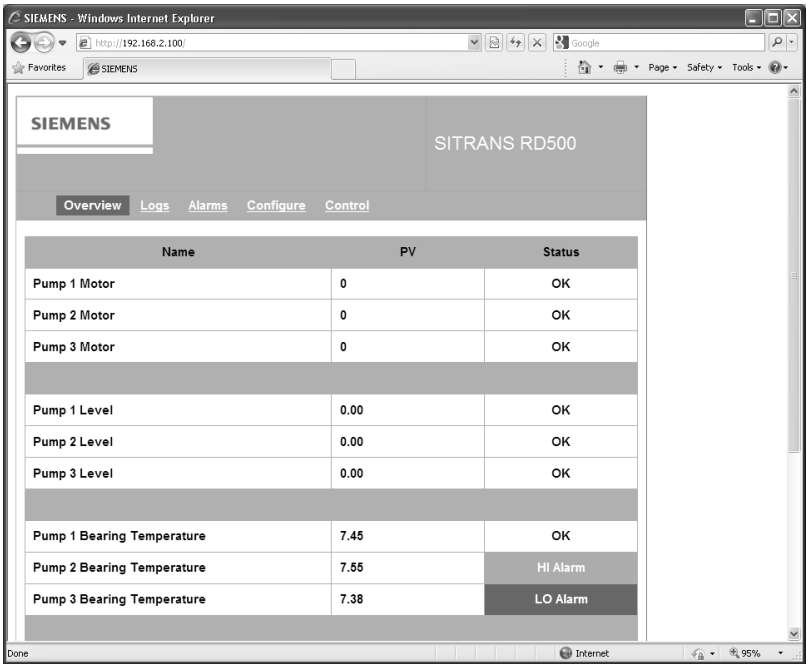
The actual appearance of the buttons and text on your screen depends on your terminal settings and display resolution. If the display exceeds screen size, use the scroll bars to see additional content.

Screen Layout



Overview

The Overview page of the RD500 is the default home page and displays enabled I/O and alarm information at a glance.



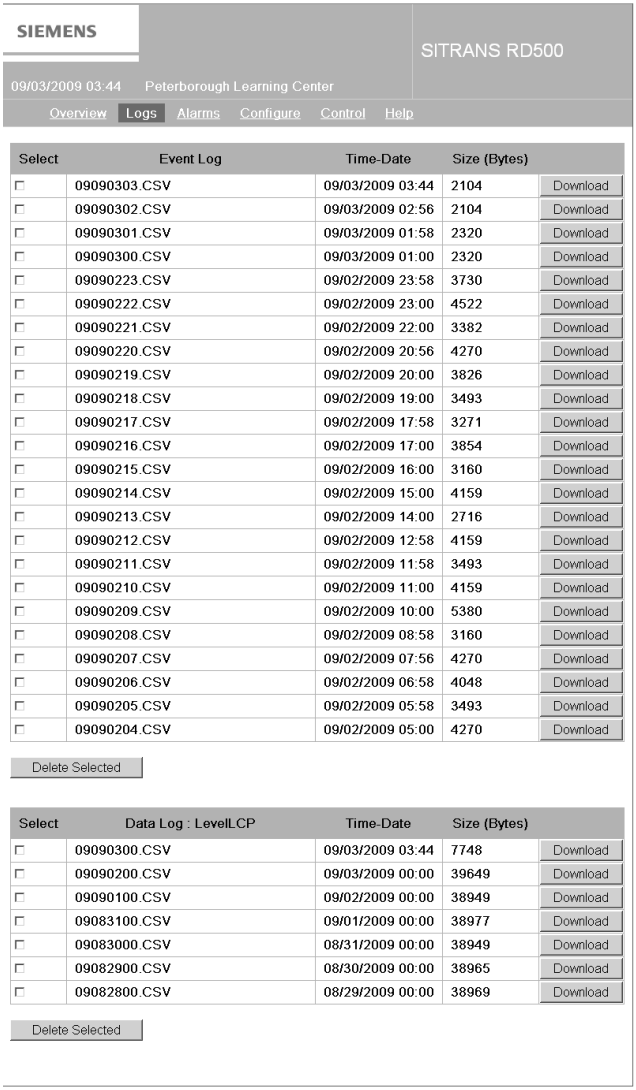
HI HI Alarm	HI HI alarms are displayed in red
HI Alarm	HI alarms are displayed in yellow.
LO Alarm	LO alarms are displayed in light blue.
LO LO Alarm	LO LO alarms are displayed in dark blue.

Shown on the Overview page:

- all configured I/O devices that are enabled for monitoring. (I/O that are not enabled will not display on overview screen; also, if view option is set to "no", I/Os will not be displayed.)
- the current value (PV) of the device
- the status of the PV relative to the programmed alarm values

Logs

The Logs page lets the operator view the log and event files stored on the CompactFlash (files are stored as .CSV files with the size in bytes). Files may also be deleted from the Logs page by selecting the checkbox to the left of the file, and clicking **Delete Selected**.



Select	Event Log	Time-Date	Size (Bytes)	
☐	09090303.CSV	09/03/2009 03:44	2104	Download
☐	09090302.CSV	09/03/2009 02:56	2104	Download
☐	09090301.CSV	09/03/2009 01:58	2320	Download
☐	09090300.CSV	09/03/2009 01:00	2320	Download
☐	09090223.CSV	09/02/2009 23:58	3730	Download
☐	09090222.CSV	09/02/2009 23:00	4522	Download
☐	09090221.CSV	09/02/2009 22:00	3382	Download
☐	09090220.CSV	09/02/2009 20:56	4270	Download
☐	09090219.CSV	09/02/2009 20:00	3826	Download
☐	09090218.CSV	09/02/2009 19:00	3493	Download
☐	09090217.CSV	09/02/2009 17:58	3271	Download
☐	09090216.CSV	09/02/2009 17:00	3854	Download
☐	09090215.CSV	09/02/2009 16:00	3160	Download
☐	09090214.CSV	09/02/2009 15:00	4159	Download
☐	09090213.CSV	09/02/2009 14:00	2716	Download
☐	09090212.CSV	09/02/2009 12:58	4159	Download
☐	09090211.CSV	09/02/2009 11:58	3493	Download
☐	09090210.CSV	09/02/2009 11:00	4159	Download
☐	09090209.CSV	09/02/2009 10:00	5380	Download
☐	09090208.CSV	09/02/2009 08:58	3160	Download
☐	09090207.CSV	09/02/2009 07:56	4270	Download
☐	09090206.CSV	09/02/2009 06:58	4048	Download
☐	09090205.CSV	09/02/2009 05:58	3493	Download
☐	09090204.CSV	09/02/2009 05:00	4270	Download

Delete Selected

Select	Data Log : LevelLCP	Time-Date	Size (Bytes)	
☐	09090300.CSV	09/03/2009 03:44	7748	Download
☐	09090200.CSV	09/03/2009 00:00	39649	Download
☐	09090100.CSV	09/02/2009 00:00	38949	Download
☐	09083100.CSV	09/01/2009 00:00	38977	Download
☐	09083000.CSV	08/31/2009 00:00	38949	Download
☐	09082900.CSV	08/30/2009 00:00	38965	Download
☐	09082800.CSV	08/29/2009 00:00	38969	Download

Delete Selected

Event Logs

Event logs record system information. The various events recorded to CompactFlash are explained below:

POWER ON - System powered up.

STOPPED - System stopped for config update.

STARTED - System restarted after config update.

BATTERY - Battery is low.

ALARM - Alarm event for any connected I/O showing OK, LO LO, LO, HI, HI HI.

DEVICE - ONLINE, OFFLINE.

Data Logs

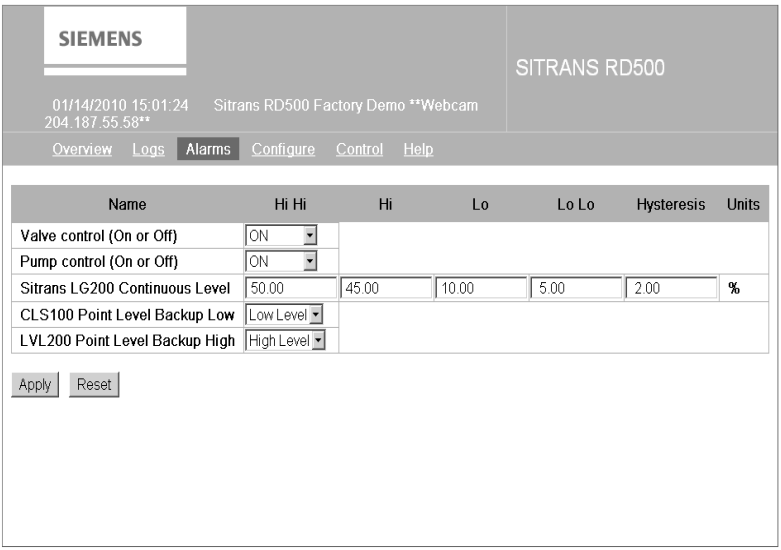
Data logs record instrumentation values being collected, set as per your connected I/O. The various events recorded to CompactFlash are explained below. They are available for viewing, downloading, or transferred via FTP synchronization.

Log files can have a user configured timestamp, I/O value, and tag name.

See *Data Log Configuration* on page 30 for details on creating and deleting logs.

Alarms

The Alarms page allows modification of the I/O alarm trigger points.



After entering the appropriate alarm values (HI HI, HI, LO, and LO LO), click **Apply** to store the new information.

Reset will clear the current typed values and will return to last saved values (will **not** reset to factory defaults.)

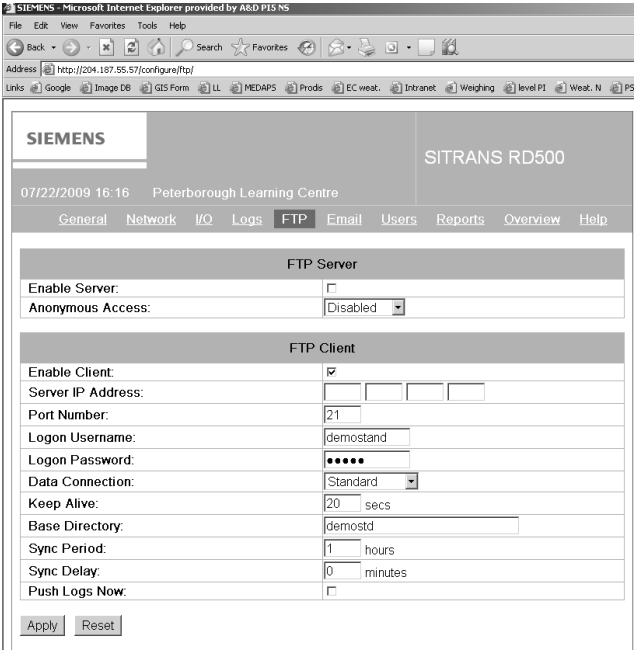
When an alarm trigger point is set and activated, the Overview screen will show alarm conditions using colors. If the functionality is set up, the alarm trigger point can result in an email or SMS alarm message being sent to someone on the contact list.

As well, alarms can also be logged and can be sent via FTP synchronization to a central server. They can be sent using the RD500 built-in FTP client server (contact your FTP server administrator for necessary access information).

Note: After factory reset, the event log will be erased and some data log files may be overwritten. Be sure to backup your data log files before any factory reset.

FTP Service

In addition to using the RD500's built-in FTP client to send data to an external FTP server, the SITRANS RD500 also has a built-in FTP Server allowing external FTP clients to access data on the RD500's CompactFlash card. To enable this, click **Enable Server** and select if you wish to support anonymous or unsecured access. See *FTP Server* on page 32 for more information.

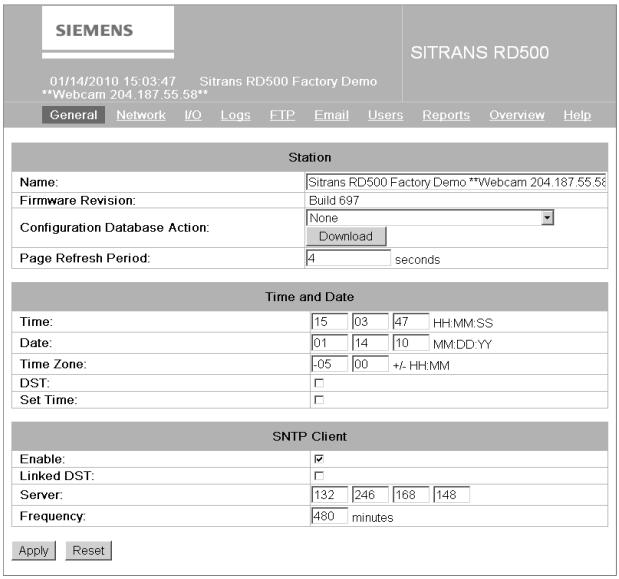


Configuration

General configuration

From Overview screen, click **Configure.**

The General configuration properties define the name of your site, the Firmware Revision of the RD500 application, and allow the user to set the time and date, as well as enabling the SNTP (Simple Network Time Protocol) Client.

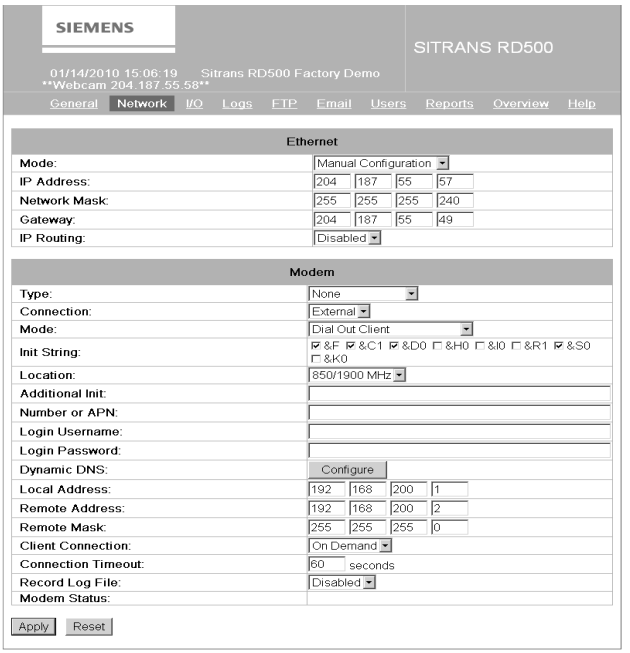


- The **Site Name** property allows a descriptive name to be applied to the RD500. This is useful when more than one RD500 is deployed at multiple locations, as the site names can identify specific locations.
- The **Configuration Database Action** allows the user to:
  - Reboot with Current Configuration
  - Clear to Factory Default: backs up original configuration file with extension .old. Event logs are removed and data log files may be overwritten (be sure to backup before selecting Clear to Factory Default).
  - Clear to Factory Default Keep Network Settings: backs up original configuration file with extension old, and maintains network settings.
  - Format CF Card: Removes all data from CompactFlash card
  - Backup to CF Card: Backs up RD500 configuration settings to CF card only. Log files will not be backed up.
  - Restore from CF Card. (This option will not be available directly after a Clear to Factory Default, because the RD500 will create a new configuration file; or, a previously saved backup file must be copied to CF card).
- To set the **Time** and **Date** fields, edit the **Time** or **Date** field in question, then check the **Set Time** checkbox, and then click **Apply**.

- **Time Zone** provides offset from GMT (Greenwich Mean Time) and **DST** is used to indicate whether or not the panel time has been adjusted for Daylight Savings Time. The email client uses this adjustment to ensure timestamps are correctly applied to email headers.
- SNTP Client allows the user to **enable** the SNTP Client, a **Linked DST**, and also enter **Server address**, as well as the **frequency** accessed. SNTP is a simplified version of NTP used to ensure accurate synchronization of the RD500 clock time.

Network configuration

The RD500's network properties define how the system will connect to your Ethernet network as well defining modem settings. From the Overview page, click **Configure** and then **Network** to configure the Network settings.



Note: When both GPRS and Ethernet are activated, GPRS is the default gateway. The Ethernet mask determines which packets are routed via the Ethernet interface and which are routed to the default gateway.

Ethernet

- The Ethernet **Mode** field controls the method by which the RD500 obtains its IP configuration. If DHCP mode is selected, the RD500 will try to obtain an IP address and associated parameters from a DHCP server on the local network. This option will only function if the DHCP server is configured to allocate a well-known IP address to the MAC address associated with the unit, as otherwise, users will not be sure how to address the RD500.

  Under **Mode**, if Ethernet is disabled, the ethernet access port will no longer be

available. This port should only be disabled if a serial modem device will be used and has already been configured.

Note: If the Ethernet port is disabled, you can restore the unit to factory defaults using the USB utility.

- The **Manual Configuration** mode asks the user to complete the IP Address, Network Mask, and Gateway fields. Be sure to consult your network administrator when selecting appropriate values, and be sure to adjust these values before connecting the RD500 to your company's network. Otherwise, it is possible, although unlikely, that you will cause problems on your network.
- The **IP Routing** property enables or disables the packet routing. When set to Enabled, packets will be routed between the modem and the Ethernet interfaces, allowing a client connected via modem to access not only the RD500, but also any other device connected to the Ethernet interface.

Modem

- The Modem **Type** field defines the connecting modem communication configuration. None indicates that no modem is installed and the client will use Ethernet to connect. Generic landline uses a standard PSTN landline modem. GSM via CSD uses GSM modems supporting Circuit Switched Data (CSD). GSM via GPRS uses GSM modems supporting General Packet Radio Service (GPRS).
- The Modem **Mode** field controls the dialing method of the modem. Dial Out Client with Firewall sets the modem to dial including a firewall. Dial Out Client sets the modem to dial without a firewall. Dial In Server allows outside applications to dial in to access the SITRANS RD500 as a server.

Note: When using a GPRS modem, set the **MODE** field to **Dial Out Client**. For details on setting up other modem types, refer to the modem app guide.

- **Init String** allows the user to configure their modem using standard AT command set.
- **Additional Init** allows the user to customize their initialization string using advanced AT command set. See Modem manual for correct settings.
- **Dynamic DNS:** Allows RD500 to use Dynamic DNS server to update its IP address for a defined host name.

Note: For Dynamic DNS to function correctly, the following criteria must be met:

- The DNS server whose IP address is returned during the link negotiation stage must be able to resolve the address **members.dyndns.org** where the DynDNS update is registered.
- The IP address allocated by the GPRS provider must not be a private address.

- The following information will be provided by the user's Mobile Data Plan Provider:[1]

Number or APN	Local Address
Login Username	Remote Address
Login Password	Remote Mask

- **Client Connection** allows the user to select the type of client connection (on demand, or permanent connection).

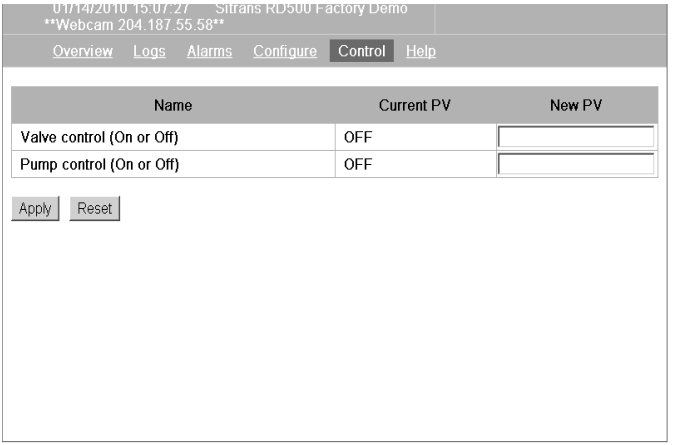
Note: The RD500 ensures the GPRS communicaiton link by monitoring traffic. The RD500 must see both transmit and receive traffic otherwise the inactivity timer forces the link to be dropped. The inactivity timer period is 10 minutes.

- **Modem Status** shows the current status of your connected modem.

Control

After the Modbus device or the digital module with output is properly configured, the following fields are available.

On the Control tab, the user can write values to a connected Modbus Slave device (for example, writing a pump setpoint), or activate a relay or solid state output from the digital modules. Permission levels Operator and Super User only have write access to these fields (see below).



1. User must contact a local data plan provider for data plan options.

Password and User Management

Access and Security

Accessing SITRANS RD500 is the same as accessing any website. However, to ensure that your access is secure, you are required to enter your User Name and Password.

User Management

There are three levels of user for the SITRANS RD500:

Basic: Read only access to RD500 data; can download logs.

Operator: All basic user rights; also on Control tab, can write to units configured for write access.

Super User: Full access to set up and configure RD500, including allocating user accounts, and changing password.

Note: Up to 10 users can be added to each SITRANS RD500 system.

Defaults

Default User Name : admin

Default Password: rd500

The User Name is not case sensitive; the Password is case sensitive. Password entry can be any combination of the full ASCII character set, without spaces or "(quotation marks).

Changing Password

Once you have successfully logged on, you can change your password.

1. Click **Configure** on the navigation bar.
2. Click on **Users**.
3. Check box **Allow passwords to be modified: this is a secure or direct connection** and click **Apply**. Enter new password and click **Apply**.

Note: If you have forgotten your password, perform a local reset of the unit to gain access. This will reset the user name and password to Defaults shown above. Password reset requires USB utility available on CD and online at www.siemens.com/sitransRD500.

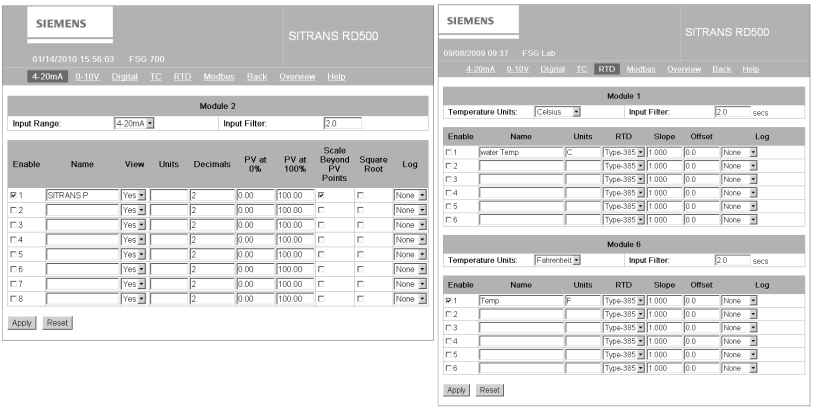
Any connected modules are automatically detected by the SITRANS RD500. Enter the pertinent information for any device connected to the installed modules.

Module detection is carried out on power up, so removing old or inserting new modules with the power on is only permissible with modules of the same type. If a module is removed from its base, its configuration will be retained and written back to the module when it is re-inserted. To completely remove a module, with the power off, you must remove it along with its base. When inserting a new module, with the power off, insert it, and then power up. The RD500 will detect the new module and the new module type will now be available in the I/O configuration.

Process variables can be collected from the RD500's optional accessory modules, as well as from Modbus RTU serial devices.

The I/O configuration screens allow the user to define the devices that are to be monitored. The various modules are grouped by the type of input signal that they accept, regardless of their physical position in the system.

From the Overview page, click **Configure** and then **I/O** to configure the I/O settings.



The upper left picture demonstrates a system that contains only a single 4-20 mA input module. The upper right picture demonstrates a system contains two RTD (Resistance Temperature Detector) input modules.

Note that the inputs are numbered sequentially by module, so for example, there are two RTD modules for a total of 12 RTD inputs.

Analog Input Modules - 0 to 10 V and 0 (4) - 20 mA

The following describes how to create and define I/O channels for the DC current and voltage input modules.

- The **Input Range** property specifies the input type most suited for the sensor being measured. This property is specific to the module, rather than to a given input.

- **View**: If set to "Yes", the channel will be visible in the overview screen. If "No", it will not be shown in overview screen.
- The **Input Filter** is a time constant used to stabilize fluctuating input signals. This property is specific to the module, rather than to a given input.
- The **Enable** field enables or disables each channel independently. Channels must be enabled for them to function.
- The **Name** property allows a descriptive name to be applied to the I/O channel, e.g. Tank 1 Level. Avoid using duplicate names.
- The **Units** are user defined in this text field. Units can be entered based on customer application specific requirements.
- **Decimals** indicates the number of decimal places after the decimal in the data displayed.
- The **PV at 0%** and **PV at 100%** properties scale the input signals. Enter the desired PV reading for the minimum and maximum input signal levels. ie. For a 4-20 input module, if the application involves a flow sensor with a 4-20 mA output proportional to 5 to 105 GPM, enter 5 for the PV at 0% setting, and enter 105 for the PV at 100% setting.
- The **Scale Beyond PV Points** property allows the PV value to continue extrapolating beyond the PV at 0% and PV at 100% values if the input exceeds its typical limits. If Scale Beyond PV Points is not checked, the PV value will only measure to its limits, even if the signal is slightly outside of the measurement range.
- The **Square Root** property allows the unit to be used in applications in which the measured signal is the square of the PV. This is useful in applications such as the measurement of flow with a differential pressure transducer.
- The **Log** property is used to select the log file into which the channel's data is recorded.

Digital Module

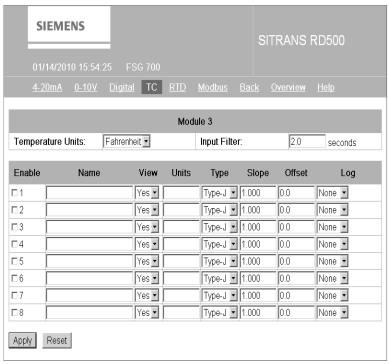
Below, see how to create and define I/O channels for digital I/O modules. Digital module supports digital inputs, pulse counter, and output.

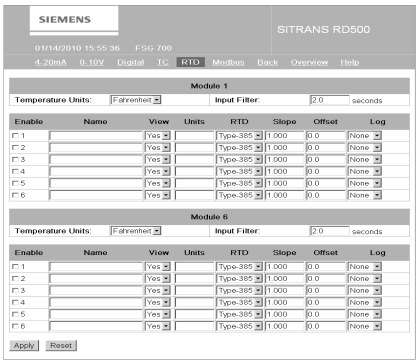
- The **Enable** field enables or disables each channel independently. Channels must be enabled in order for them to function.
- The **Name** property allows a descriptive name to be applied to the I/O channel, e.g. High Point Level Alarm. Avoid using duplicate names.
- **On State/Off State** allows a descriptive name to be applied to the on and off states of the digital input (for example, High Level Tank 1).
- The **Mode** property defines whether the low or high state of the input is to be considered active.
- The **Log** property is used to select the log file into which the channel's data is recorded.

- When using Pulse counter, **IN** represents digital inputs, **OP** represents relay or soild-state output depending on your module, and **CNT** represents pulse counter.
- When using pulse counter, you can select your pulse count multiplier using **Scaling**, and can turn the visibility of the input in the overview screen using **View**.

Temperature Input Modules (TC/RTD)

Below, see how to create and define I/O channels for the thermocouple and RTD modules.





- The **Temperature Units** property is used to select between the Kelvin, Fahrenheit or Celsius temperature scales. This property is specific to the module, rather than to a given input.
- The **Input Filter** is a time constant used to stabilize fluctuating input signals. This property is specific to the module, rather than to a given input.
- The **Enable** field is used to enable or disable each channel independently. Channels must be enabled in order for them to function.
- The **Name** property allows a descriptive name to be applied to the I/O channel, e.g. Pump 1 Bearing Temperature. Avoid using duplicate names.
- The **Units** are user defined in this text field. Units can be entered based on customer application specific requirements.
- The **Type** (Thermocouple or RTD) property is used to select the appropriate sensor type. Each input can be programmed independently.
- The **Slope** property can be used to change the ratio of the PV in relationship to the sensor reading. This is useful in applications in which the sensor error is non-linear. See the application example below.
- The **Offset** property can be used to compensate, or shift, the PV value. This setting allows customization of each input based on a given sensor's error. It also allows correction of the PV value in applications in which the sensor isn't measuring the process directly, thereby inducing an error. See the application example below.
- The **Log** property is used to select the log file into which the channel's data is recorded.
- The **View** property is used to set the display of the channel's information in the overview screen.

Application Example

The PV reading from a thermocouple is 3 degrees lower than the actual temperature when the process is at +200 degrees. It reads only 1 degree lower than the actual temperature when the process is at +300 degrees.

Desired PV = (PV x Slope) + Offset

Slope = $\frac{300-200}{299-197}$ = 0.980

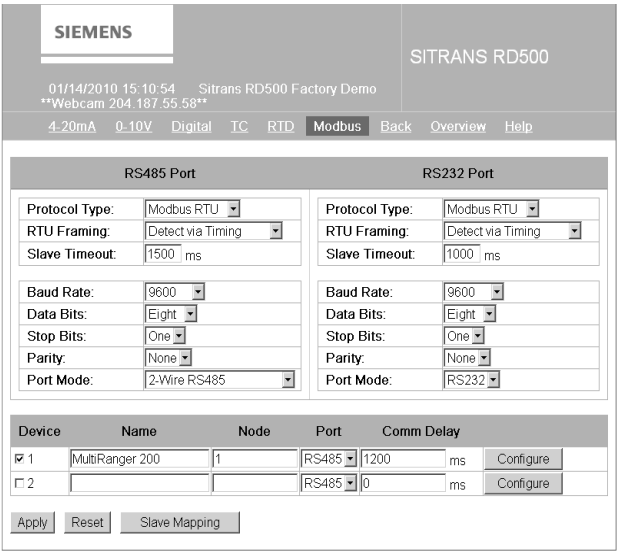
Offset = 200 - (0.980 x 197) = 6.940

A Slope value of 0.980 and an Offset value of 6.940 corrects the sensor error.

Modbus - Adding Devices

Below, see how to add I/O data that originates from external serial Modbus devices. This allows the RD500's capabilities to be extended to any device equipped with a serial port and that supports the Modbus RTU slave protocol.

For more information regarding the serial connectivity of the RD500, refer to the hardware manual found at www.siemens.com/sitransRD500.



After adding each Modbus device, click **Apply**, and the next device field will become available.

Driver Settings

- **Protocol Type**: Selects Modbus protocl: RTU or ASCII
- **RTU Framing**: Detect via Timing and Track Frame Contents options
- **Slave Response Timeout**: The time in milliseconds (mS) that the Modbus master allows the Modbus slave device to respond. If the Modbus master does not receive a response from the slave in the specified time, the master will enter a timeout error in the event log.

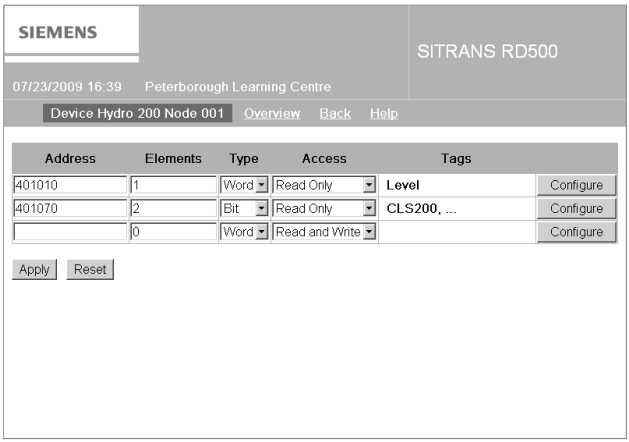
Port Settings

- **Baud Rate**: speed of data transmission in a system
- **Data Bits**: number of bits used to represent one character of data
- **Stop Bits**: number of bits used to mark the end of a unit of transmission
- **Parity**: an extra bit added to a byte or word to reveal errors in storage
- **Port Mode**: method of connection

- The **Device** field is used to enable or disable configured serial Modbus devices.
- The **Name** property allows a descriptive name to be applied to the Modbus enabled sensor or device, e.g. HydroRanger 200 1.
- The **Node** property is used to define the Modbus address of the target slave device. Nodes are addressable from 1 to 255.
- **Slave Mapping** supports communication to standard OPC server. Configured instruments will be addressed to allow OPC servers to access their values through the SITRANS RD500.

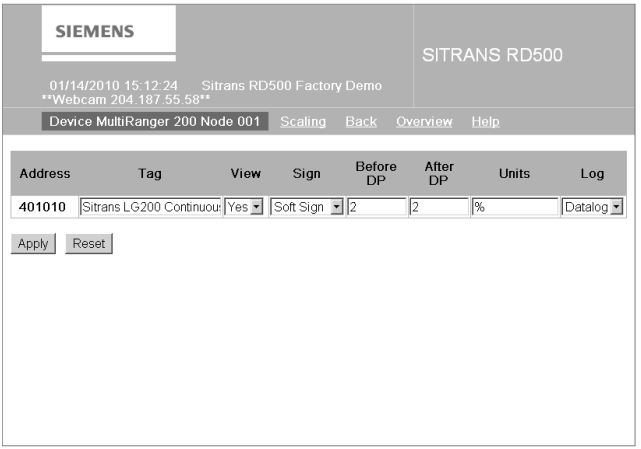
Configuring Modbus I/O

Once the Modbus devices have been added to the RD500 configuration, click **Configure** to specify the registers to be monitored.



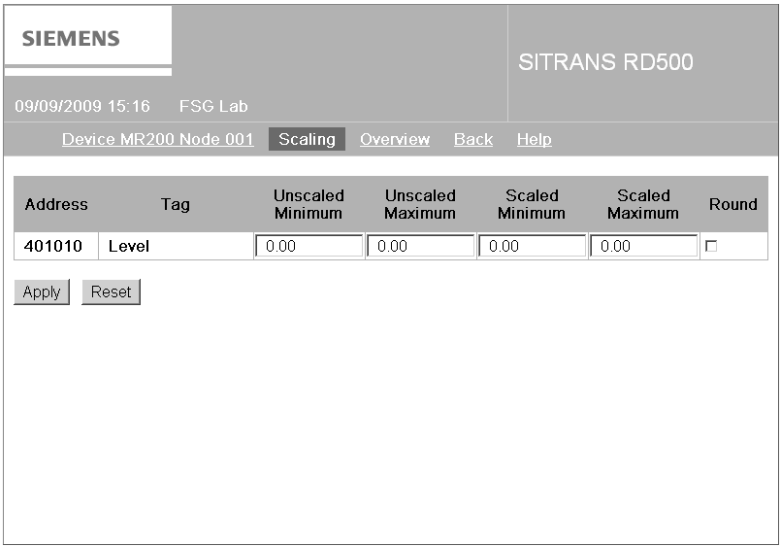
- The **Address** specifies the starting Modbus register address to be polled.
- The **Elements** field is used to specify the number of consecutive registers to be polled, e.g. An Address of 400001 and an Elements property of 2 will result in the RD500 collecting registers 400001 and 400002.
- The **Type** property defines the data type of the slave's data, including Bit, Word, Long, and Real. Bits are packed into registers in groups of 16 bits (1 word).
- The **Access** property defines the registers as read-only, write-only, or read and write.

Once the appropriate Modbus devices and registers have been defined, click **Configure**.



- The **Tag** property allows a descriptive name to be applied to the I/O channel, e.g. HydroRanger 200 1. Avoid using duplicate names.
- The **Sign** property can be Unsigned, Soft, or Hard Signed.
- The **View** property is used to set the display of the channel's information in the overview screen.
- **Before DP** indicates the number of decimal places before the decimal in the data displayed.
- **After DP** indicates the number of decimal places after the decimal in the data displayed.
- The **Units** are user defined in this text field. Units can be entered based on customer application specific requirements.
- The **Log** property is used to select the log file into which the channel's data is recorded.
  After adding Configuration information, click **Apply** to write changes to the RD500.

Choose **Scaling** to allow your raw data from your Modbus device to be scaled into realistic useful values using the SITRANS RD500.



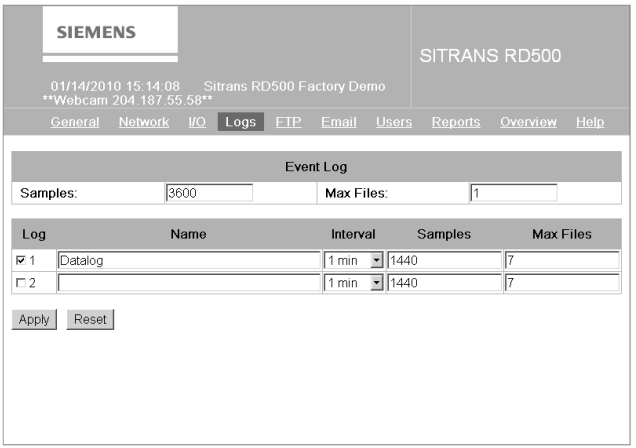
- The **Address** specifies the starting Modbus register address to be polled.
- The **Tag** property allows a descriptive name to be applied to the I/O channel, e.g. HydroRanger 200 1. Avoid using duplicate names.
- **Unscaled Minimum** is the minimum raw value from the Modbus device.
- **Unscaled Maximum** is the maximum raw value from the Modbus device.
- **Scaled Minimum** is the corresponding minimum value desired by the user.
- **Scaled Maximum** is the corresponding maximum value desired by the user.
- **Round** when checked will round the numbers to the nearest full digit.

Data Log Configuration

The RD500 can record any of the I/O values to CompactFlash (CF) for later review. Data recorded is stored in industry-standard comma separated variable (CSV) files, making it compatible with virtually any external application.

Note: When using the RD500, we recommend installing a supported CF card for best results when datalogging and other key features. A 1 GB CF card is included with the SITRANS RD500 and an optional 2GB card is available for order.

From the Overview page, click **Configure** and then **Logs** to create and edit the logging facility.



Note: If the CF card LED is not ON, the card is probably not available and you will be unable to create or access log files. If this happens, do the following:

- Power down the RD500.
- Remove the CF card and re-insert it, ensuring that it is seated correctly. (For more details, refer to the SITRANS RD500 Hardware Operating Instructions.)
- Turn power back on. The LED should now be ON and your log files available from the log screen.

To create new log:

Click Configure, and then Logs. Enter a log name in the next available box, and then choose the Interval, Samples, and Max files. Click **Apply**.

To delete log: Ensure the Log checkbox is checked. Then delete the log **Name** and click **Apply**.

- The **Log** property is used to enable and disable log files.
- The **Name** property allows a descriptive name to be applied to the folder in which this log's data will be stored (limited to 8 characters).
- The **Interval** property is used to indicate how often this log takes a sample of data. All of the I/O assigned to this log will be sampled at the same rate.

- The **Samples** property is used to indicate how many samples will be included in each log file. When this many samples have been recorded, a new log file will be created using a different name. Typically, the Samples and Interval properties are set such that each log file contains a sensible amount of data. For example, the LevelLCP log shown above is configured to take a new sample for log file each minute, while the CLS_LOG_ log is configured to take a new sample for log file every half hour.
- The **Max Files** property is used to indicate how many CSV files will be kept on CompactFlash before the oldest file is deleted. This property should be set to allow sufficient time for the data to be synchronized to an external server.

Note: The Log filename is the scheduled interval time, regardless of when the log sampling actually begins.

Log File Storage

A data log stores its data in a series of files on the RD500's CompactFlash card. These files are placed in a subdirectory named after the data log, with this directory being stored under a root directory entry called LOGS.

Filenames for Data Logging

The files are named after the interval and date at which the log is scheduled to begin, but the naming convention varies depending on the interval of the log. If each file is scheduled to contain an hour or more of information, the files will be named YYMMDDhh.CSV, where YY represents the year of the file, MM represents the month, DD represents the day, and hh represents the hour.

If each file is scheduled to contain less than one hour of information, the files will instead be named MMDDhhmm.CSV, with the initial six characters as described above, and the final mm representing the minute at which the log began. These rules ensure that each log file has a unique name. The logs are ordered by the creation time date stamp.

Log files are generated based on time span, not when the sample count is reached. An hourly log file will create a new file on the hour, regardless of when the system was started. So, a unit powered at 08:07 will generate the following logs:

YYMMDD08.csv (samples starting at 08:07; no samples prior to 08:07)

YYMMDD09.csv (samples starting from 09:00)

YYMMDD10.csv (samples starting from 10:00)

Note: Log entries will be written to on-board buffer memory first, and then will be copied to the CompactFlash memory. Buffer memory is written to the CF card every two minutes.

FTP Server

The RD500's FTP Server provides a means to exchange files between the CompactFlash card and an FTP client application. The RD500 will act as a server, waiting for client applications to connect and download.

This also allows remote users to access the CompactFlash card as if it were a drive within the PC. Log files can be manually copied and pasted from the RD500 to the user's computer.

From the Overview page, click **Configure** and then **FTP** to configure this facility.

Check **Enable FTP Server** check box to activate the FTP Server support. The following setting then applies.

- The Anonymous Access defines the rights for a user accessing the server with anonymous username and blank password. If Disabled, no anonymous users can access the server. In Read-Only mode, the anonymous user can only download files from the CompactFlash card. In Read-Write, the user will have full access to the CompactFlash card. For security reasons, **Disabled** is recommended.
  To access the FTP server when anonymous is disabled, the RD500 account username and passwords should be used.

Accessing the Server

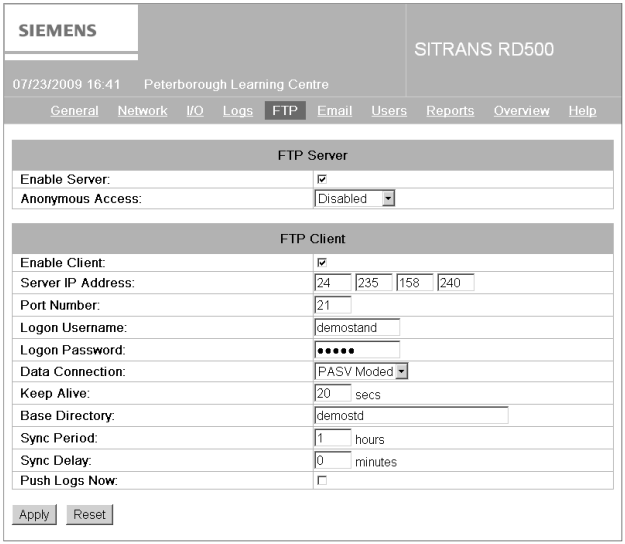
For anonymous access: to access an FTP server from a web browser, type **ftp://192.168.200.1** (replace **192.168.200.1** with your unit IP address).

For secure access: to access an FTP server from a web browser securely, type **ftp://admin:rd500@192.168.200.1** (replace **192.168.200.1** with your unit IP address).

FTP Client

The RD500 can automatically synchronize the contents of the CompactFlash card to an FTP server for permanent storage.

From the Overview page, click **Configure** and then **FTP** to configure this function.



Check **Enable FTP Client** checkbox to activate the FTP Client. The following settings then apply.

- The **Server IP Address** indicates the IP address of the FTP server. In most applications, this address will be a computer/server IP address
- The **Port Number** represents the TCP port to which the Master FTP client service connects. This port number is set up in the FTP server. The default value (Port 21) is suitable for most applications. All ports support values from 0 to 65535. Contact FTP adminstrator if different port is required.
- The **Logon Username** and **Logon Password** are credentials required by the server for a client to connect. It has to match a user set up in the Server. Both are case sensitive. For anonymous login, enter "anonymous" in Username and leave the password blank.
- The **Data Connection** provides a choice between standard and PASV mode. You can enable the PASV mode to have the FTP client initiate all data connections rather than waiting for incoming connections from the server. This mode is sometimes required when working behind non-FTP aware firewalls or when using certain forms of network address translation. It is also used when working over a GPRS modem connection.
- The **Keep Alive** time is the period for which the FTP connection should be kept alive in case further transfers are required. A value of zero will close the connection as soon as the current transfer has been completed. Non-zero values make for more efficient operation when transferring multiple files and for slower connections such as GPRS.
- The **Base Directory** defines the directory on the server where the log files will be synchronized. This directory is relative to the folder settings given in the FTP server.

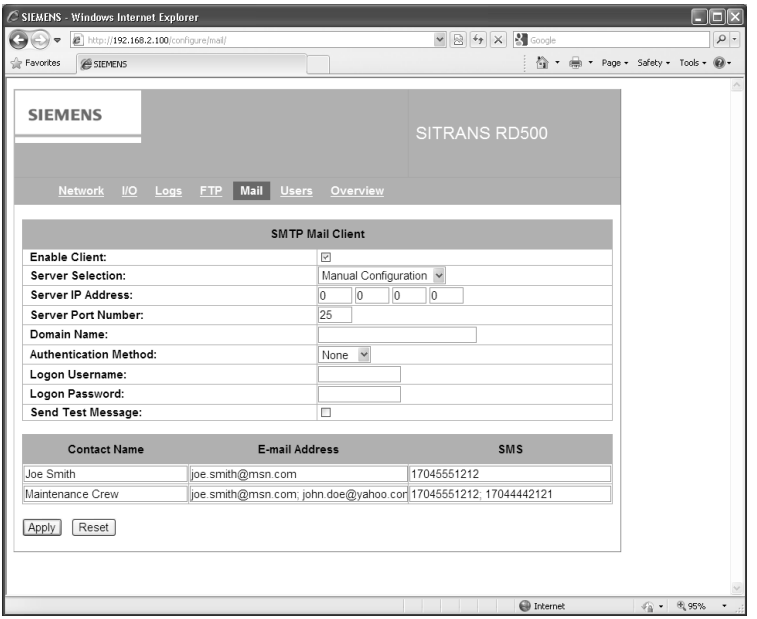
For example, if the FTP server is programmed to save any FTP connection under C:\inetpub\ftproot and the Base Directory is \MyFolder, then all log files will be saved under C:\inetpub\ftproot\MyFolder. The RD500 will duplicate the folder tree present on the CompactFlash card in the Base Directory so data remains in the same order.

- The **Sync Period** is the frequency at which the RD500 will synchronize files.
- The **Sync Delay** is the offset in minutes past the hour between file transfers. Use this property to allow multiple RD500 file transfers to be offset to avoid collisions. Maximum setting is 59 minutes.
- The **Push Logs Now** checkbox allows the user to force log synchronization. This is useful when commissioning and testing systems.
  Click **Apply** to write any changes to the SITRANS RD500.

Configuring Mail and SMS Notification

The RD500 provides alarm notification via email and SMS text messages. Notification can be sent to a single recipient, or a group of recipients.

From the Overview page, click **Configure** and then **Mail** to configure this facility.



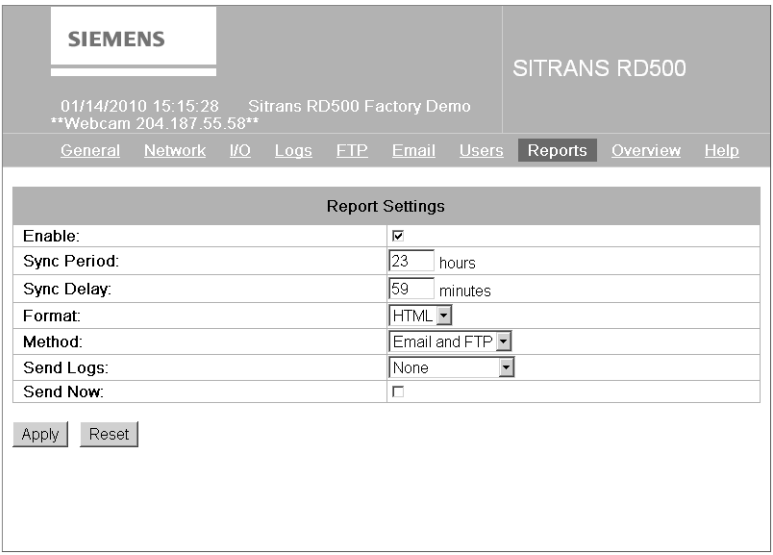
Check the **Enable Client** checkbox to activate the SMTP Mail Client. The following settings then apply.

- The **Server Selection** property is used to define how the transport will locate an SMTP server. If Manual Selection is used, the Server IP Address property should be used to manually designate a server. If Configured via DHCP is selected, the unit's Ethernet port must be configured to use DHCP, and the network's DHCP server must be configured to designate an SMTP server.
- The **Server IP Address** property is used to designate an SMTP server when manual server selection is enabled. The server must be configured to accept mail from the RD500, and to relay messages if required by the application.

- The **Server Port Number** property is used to define the TCP port number that will be used for SMTP sessions. The default value is 25. This value will be suitable for most applications, and will only need to be adjusted if the SMTP server has been reconfigured to use another port. The range is 0 to 65535.
- The **Domain Name** property is used to specify the domain name that will be passed to the SMTP server in the HELO command. The vast majority of SMTP servers ignore this string. In the unlikely event that your SMTP server attempts to do a DNS lookup to confirm the identity of its client, contact your network administrator for correct Domain name info.
- The **Reverse Path** property is used to specify the email address that will be supplied as the originator of the messages sent by the RD500. The property comprises a display name, and an email address. Since the RD500 is not capable of receiving messages, the email address will often be set to something that will return an "undeliverable" message if a reply is sent.
- The **Authentication Method** property (None, Login, Digest).
  - None: no authentication.
  - Login: see below.
  - Digest: The RD500 supports secure HTTP Digest access authentication. This method is one of the agreed methods a web server can use to negotiate credentials with a web user. Digest authentication is intended to supersede unecrypted use of the Basic access authentication, allowing user identity to be established securely without having to send a plain text password over the network.
- The **Login Username** and **Login Password** fields are provided by email provider.
- The **Initial Timeout** property is used to specify how long the mail client will wait for the SMTP server to send its welcome banner. Some Microsoft servers attempt to negotiate Microsoft-specific authentication with mail clients, thereby delaying the point at which the banner appears. You may want to extend this time period to 2 minutes or more when working with such servers.
- The **Send Test Message** checkbox allows the user to force the RD500 to send a test email. This is useful when commissioning and testing systems. After enabling this property, click the Apply button.
- The **Contact Name** field is the human-readable name of the address book entry.
- The **Email Address** property is used to define one or more recipients for this address book entry. Multiple recipients should be separated by semicolons. The format of each recipient will depend on the transport that is expected to deliver the message.
- The **SMS** field is used to enter short message service cellular phone number. (Enter phone number without spaces or hyphens.)

Configuring Reports

The RD500 provides reports which are HTML files sent via email or FTP. The report page includes the current overview page information, and the current IP address information.



- The **Enable** property activates the report feature.
- The **Sync Period** property determines how often the report is sent.
- The **Sync Delay** indicates how many minutes after the hour the report will be sent.
- The **Format** property indicates the type of file format for the report.
- **Method** property indicates whether the report will be sent via Email or FTP or both.
- **Send Logs** property determines whether to include the last datalog or event log with the report.
- **Send Now** sends the report immediately.

Appendix A: Input Modules

Modbus Port

Note: Belden 9842 is a multi-conductor cable which is recommended for use with RS-485 industrial networks. The cable comprises four conductors and an overall braided shield. It is recommended that you use three of the four conductors for A, B, and Common connections. The shield on the cable should be connected to ground at one point to ensure best noise immunity.

The RD500 hardware includes an RS-485 Modbus RTU interface to field instruments using an RJ-45 connector.

- Allows for long cable runs and multi-drop instrument connection.
- Address up to 247 Modbus instruments on a single two-wire network up to 1200 m (3900 ft) away. Can be increased using a repeater and/or standard RS-485 network equipment.

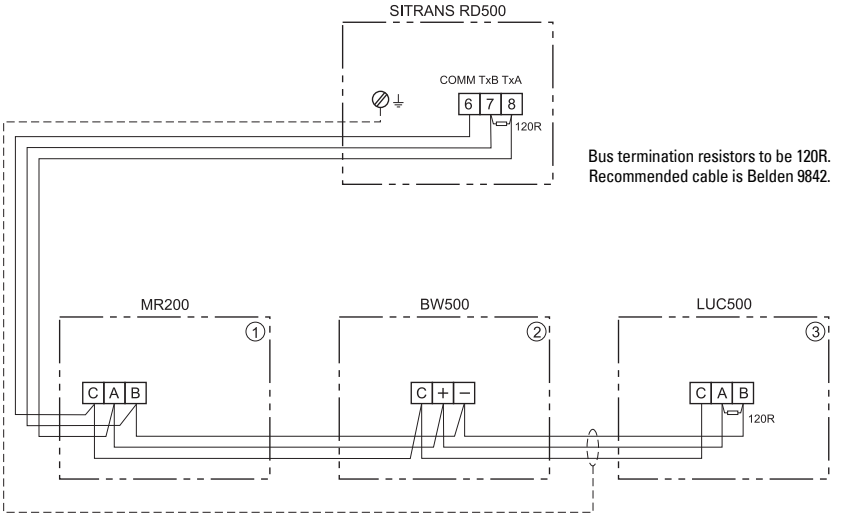
Notes:

- RS-485 wiring maximum length 1200 m (3900 ft)

Communication Settings

- Protocol Type = Modbus RTU and Modbus ASCII
- RTU Framing = Detect via Timing
- Slave Response Timeout = 1000
- Baudrate = selectable
- Databits = 1
- Parity = None
- Stopbits = 1

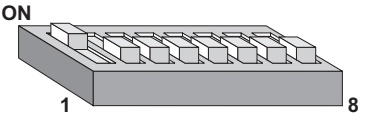
Modbus and Siemens Instruments



Modbus

SITRANS LU with SmartLinx® Modbus RTU Card

SmartLinx Modbus RTU Card port configuration (for RS-485 transmission):

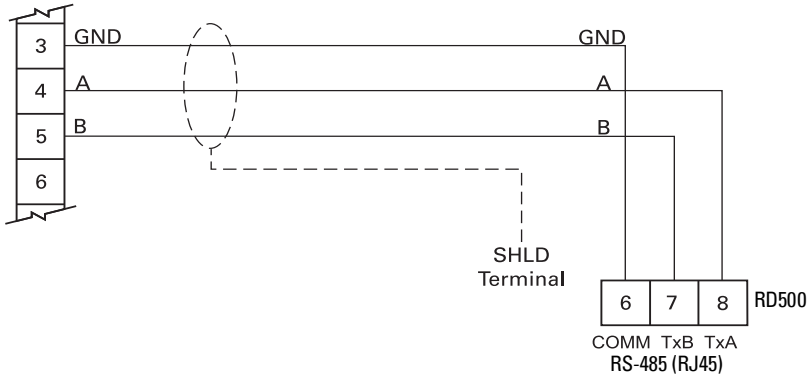


Port 1 setup parameters:

Parameter	Description
P751 = 3	baud rate selectable
P752 = 0	no parity
P753 = 1	address 1 to 247
P758 = 0	interframe spacing = 0 ms

Wiring Diagram to Connect to SITRANS LU with SmartLinx® Modbus RTU Card

Connecting the communication cable to the SITRANS LU.



MultiRanger 100/200, HydroRanger 200

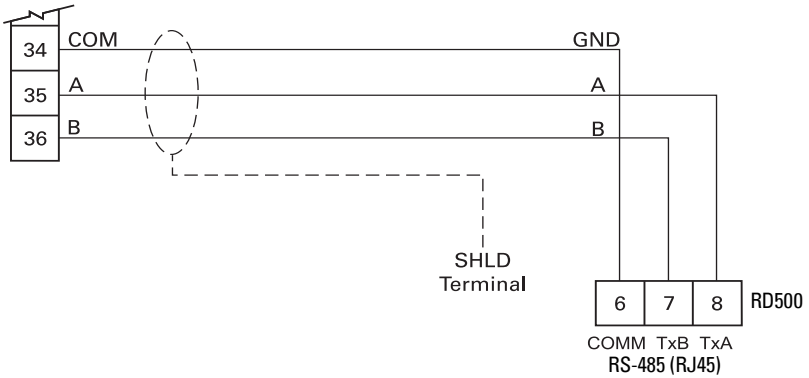
Port 2 setup parameters:

Parameter	Description
P770 (2)* = 3	Modbus RTU slave
P771 (2) = 1	address 1 to 247
P772 (2) = 9.6	baud rate selectable
P773 (2) = 0	no parity
P774 (2) = 8	8 data bits
P775 (2) = 1	1 stop bit
P778 (2) = 0	modem not attached

*(2) refers to the primary index (secondary index 0).

Wiring Diagram to Connect to MultiRanger 100/200 and the HydroRanger 200

Connecting the communication cable to the MultiRanger 100/200 or HydroRanger 200.



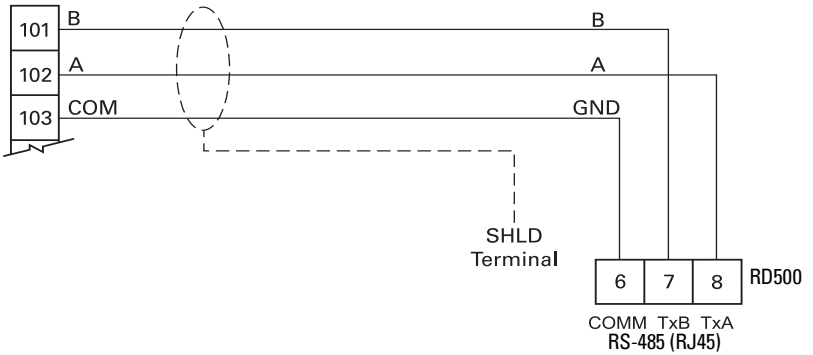
SITRANS LUC500

Port 3 setup parameters for the SITRANS LUC500

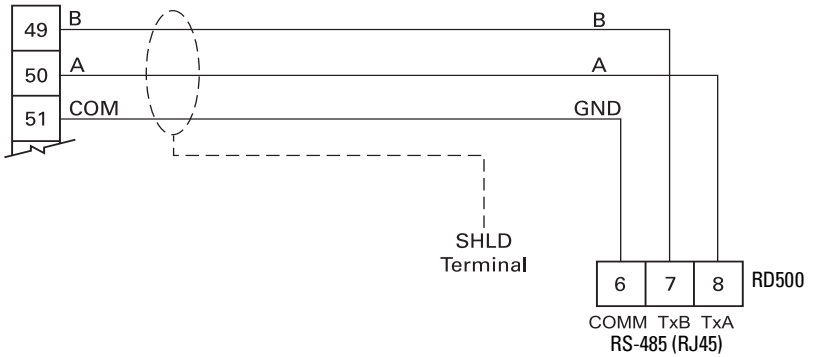
Parameter	Description
P770 (3) = 3	Modbus RTU slave
P771 (3) = 1	address 1 to 247
P772 (3) = 9.6	baud rate selectable
P773 (3) = 0	no parity
P774 (3) = 8	8 data bits
P775 (3) = 1	1 stop bit
P776 (3) = 0	no flow control
P777 (3) = 0	no key-up delay
P778 (3) = 0	modem not attached

Wiring Diagram to Connect to SITRANS LUC500

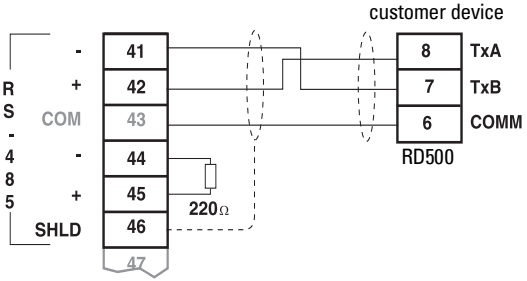
Connecting the communications cable to the SITRANS LUC500 wall mount:



Connecting the communications cable to the SITRANS LUC500 Rack Mount



Wiring Diagram to Connect to Milltronics BW500



Milltronics BW500

Port 2 setup parameters:

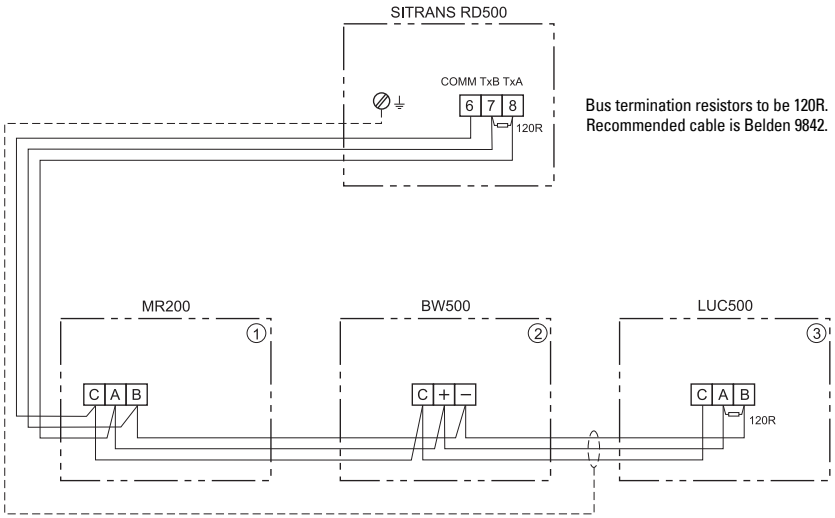
Parameter	Description
P770 (2)* = 3	Modbus RTU slave
P771 (2) = 1	address 1 to 247
P772 (2) = 9.6	baud rate selectable
P773 (2) = 0	no parity
P774 (2) = 8	8 data bits
P775 (2) = 1	1 stop bit
P778 (2) = 0	modem not attached

*(2) refers to the primary index (secondary index 0).

Temination

It is important to use a terminating resistor at the extreme ends of your RS-485 network. A terminating resistor needs to be connected across the A and B conductors of the last device at each end of the network.

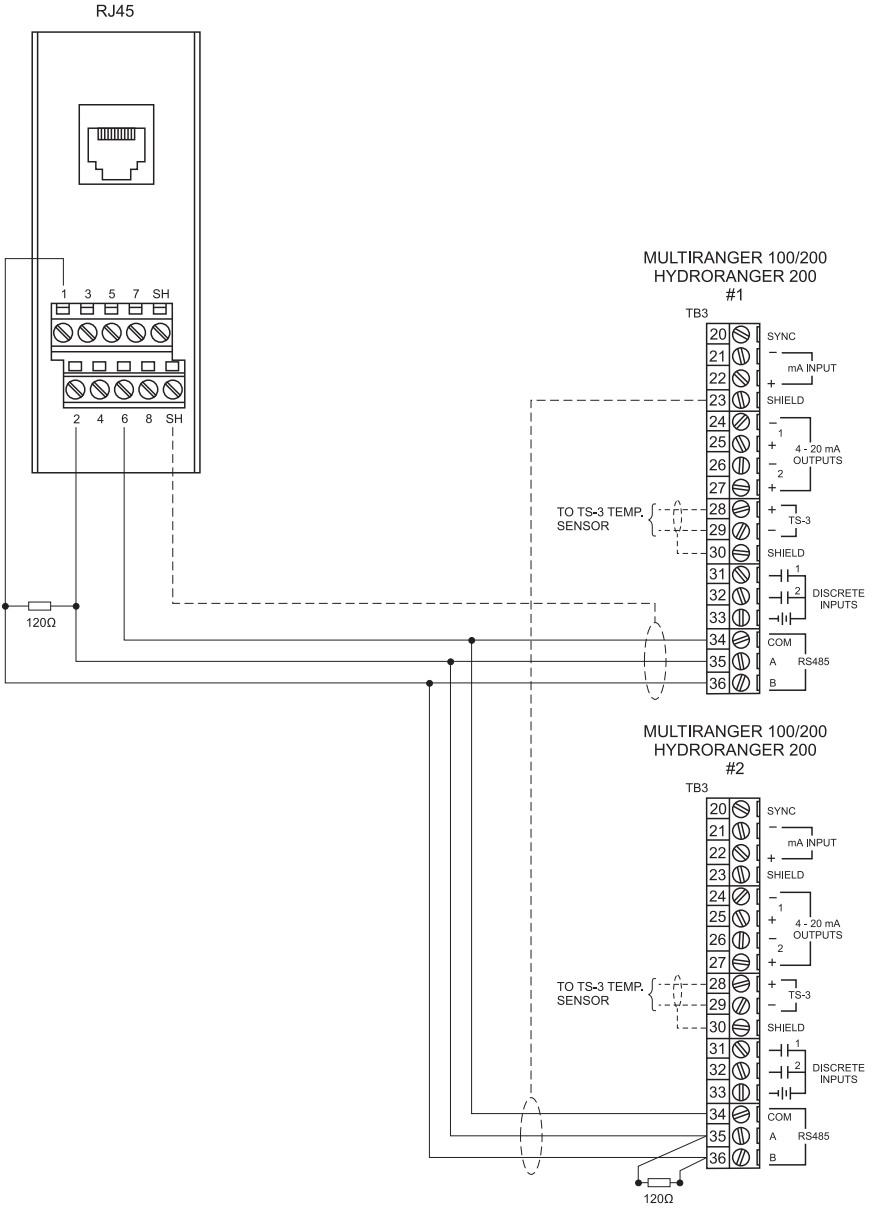
If you are using Belden 9842 cable, the value for termination is 120R, 0.5 W resistor.



Optional Connector Wiring

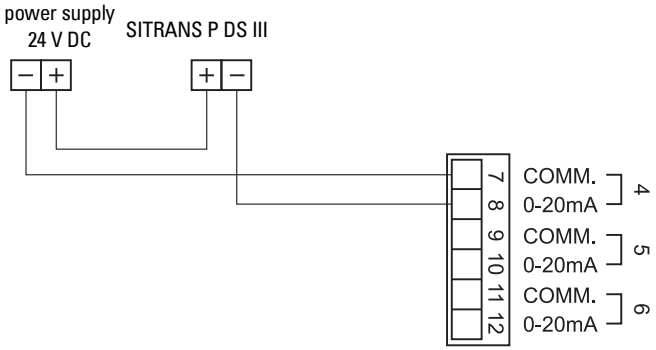
RJ45 Serial to Terminal Block RS-485 (7ML1930-1FE)

RJ45 serial to terminal block
RS-485 (7ML1930-1FE)

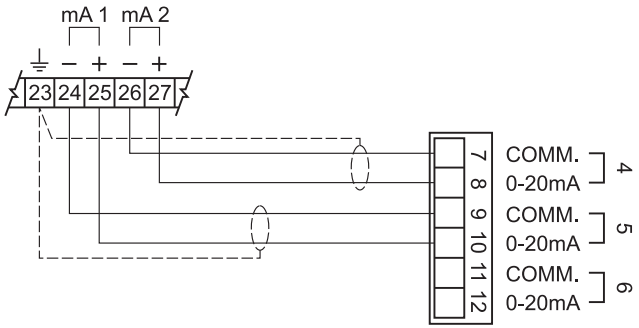


0 (4) to 20 mA Connections

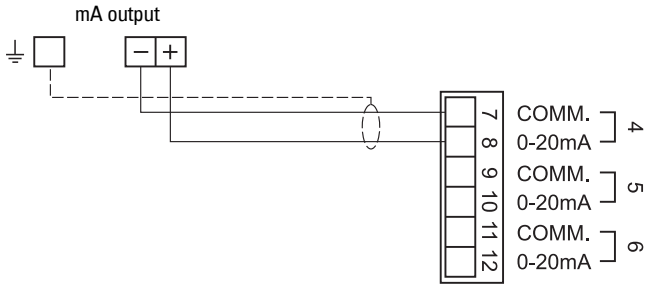
Wiring Diagram to SITRANS P DSIII via 4-20 mA connection



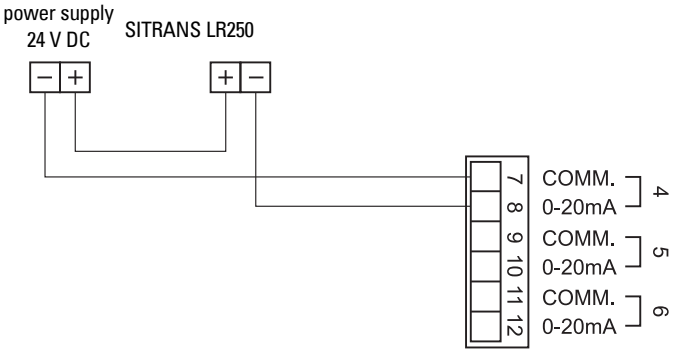
Wiring Diagram to MultiRanger 100/200 via 4-20 mA connection



Wiring Diagram to SITRANS LR460 via 4-20 mA connection

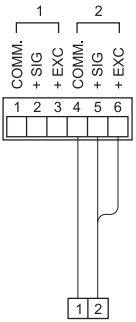


Wiring Diagram to SITRANS LR250 via 4-20 mA connection



RTD

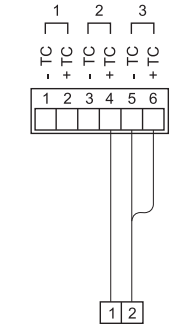
PT100 wiring



PT100

Thermocouple

TC module wiring for J Type Thermocouple



J Type Thermocouple

For more information

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