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Quick Start Example

Quick Start Example

This chapter provides guidelines to what is needed to set up and install a distributed ADAM-5000 network system. A quick hookup scheme is provided that lets you configure a single system before you install a network system.

Be sure to carefully plan the layout and configuration of your network before you start. Guidelines regarding layout are given in Appendix B: RS-485 Network.

A.1 System Requirements to Setup an ADAM-5000 System

Before you setup an ADAM-5000 system, you can follow the steps to install I/O modules into the ADAM-5000 base.

1. Align the module with the grooves on the top and bottom of the base.
2. Push the unit straight into the base until it is firmly seated in the backplane connector.
3. Push-in the retaining clips at the top and bottom of the unit to secure the module to the base.

The following list gives an overview of what is needed to setup, install and configure an ADAM-5000 environment.

- ADAM-5000/485 and I/O Modules
- A host computer, such as an IBM PC/AT compatible, that can output ASCII characters with an RS-232C or RS-485 port
- Power supply for the ADAM-5000 system (+10 to +30 V_{DC})
- ADAM Series Utility Software
- ADAM Isolated RS-232/RS-485 Converter (optional)
- ADAM Repeater (optional)

Host Computer

Any computer or terminal that can output in ASCII format over either RS-232 or RS-485 can be connected as the host computer. When only RS-232 is available, an ADAM RS-232/RS-485 Converter is required to transform the host signals to the correct RS-485 protocol. The converter also provides opto-isolation and transformer -based isolation to protect your equipment.

Power Supply

For the ease of use in industrial environments the ADAM-5000 systems designed to accept industry standard $+24 V_{DC}$ unregulated power. Operation is guaranteed when using any power supply between $+10$ and $+30 V_{DC}$. Power ripples must be limited to 100 mV peak to peak while the voltage in all cases must be maintained between $+10$ and $+30 V_{DC}$. When the systems are powered remotely the effects of line voltage drops must be considered.

All systems onboard switching regulators to sustain good efficiency over the 10-30 V input range, therefore, we can assume that the actual current draw is inversely proportional to the line voltage. The following example shows how to calculate the required current that a power supply should be able to provide.

Assume that a $+24 V_{DC}$ will be used to power an ADAM-5000/485 and four ADAM-5017 input modules. The distance from Power supply to modules is not so big that significant line voltage drop will occur. One ADAM-5000/485 system and one ADAM-5017 module consume a maximum of 1.0 W (ADAM-5000) and 1.2 W (ADAM-5017). The total required power will equal $1 W + 4 \times 1.2 W = 5.8$ Watts. A power supply of $+24 V_{DC}$ should, therefore, be able to supply a minimal current of $5.8 / 24 = 0.25$ Amps.

Small systems may be powered by using wall-mounted modular power supplies. Also when systems operate on long communication lines (>500 feet) it is often more reliable to power the systems locally with modular power supplies. These inexpensive units can easily be obtained from any electronics retail store.

The power cables should be selected according to the number of systems connected and the length of the power lines. When using a

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network with long cables, we advise the use of thicker wire to limit the line voltage drop. In addition to serious voltage drops, long voltage lines can also cause interference with communication wires.

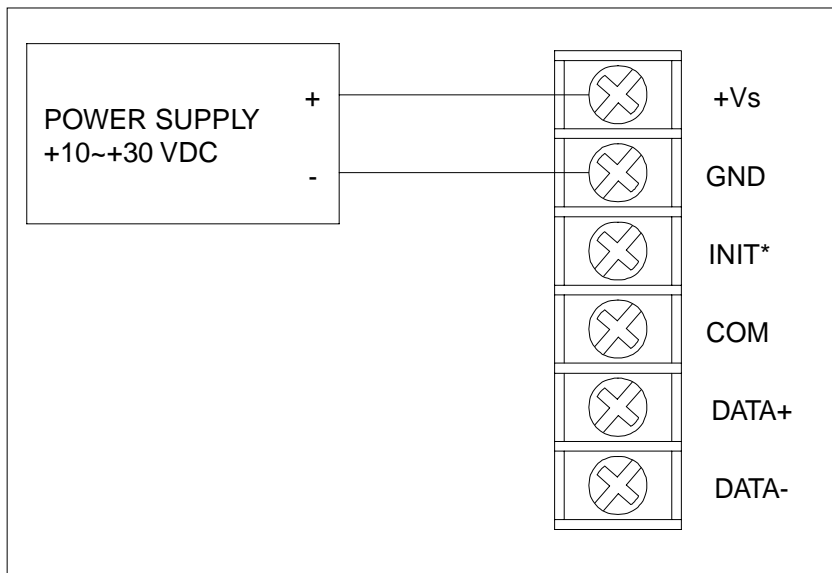


Figure A-1 Power supply connections

It is advisable to use standard coding colors for the power lines:

+Vs	(R)	Red
GND	(B)	Black

Communication Wiring

It is recommended that shielded, twisted-pair cables that comply with the EIA RS-485 standard be used with the ADAM-5000 network to reduce interference. Only one set of twisted-pair cables is required to

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transmit both DATA and RTS signals. It is advisable that the following standard colors be used for the communication lines:

DATA+ (Y) Yellow

DATA- (G) Green

ADAM Utility Software

A menu-driven utility program is provided for ADAM-5000 system configuration, monitoring and calibration. It also includes a terminal emulation program that lets you easily communicate through the ADAM command set. (See Chapter 5, Utility Software)

ADAM Isolated RS-232/RS-485 Converter (optional)

When the host computer or terminal has only a RS-232 port, an ADAM Isolated RS-232/RS-485 Converter, connected to the host's RS-232 port, is required. Since this module is not addressable by the host, the baud rate must be set using a switch inside the module. The factory default setting is 9600 baud.

ADAM Repeater (optional)

When communication lines exceed 4000ft (1200 meters) or the number of ADAM-5000 systems connected is more than 32, a repeater should be connected to expand the first segment. Up to 32 repeater modules can be connected allowing connection of up to 256 ADAM-5000 systems. As with the converter module, the repeater module is not addressable by the host and the baud rate must be set by changing the switch inside the module. The factory default setting is 9600 baud.

A.2 Basic Configuration Hook-up

Before placing the system in an existing network, the system should be configured properly. Though the system is initially configured at the factory, it is recommended you check that the baud rate is set correctly.

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Default Factory Settings

Baud rate: 9600 Bits/sec.

Address: 01 (hexadecimal)

The basic hook-up for system configuration is show below:

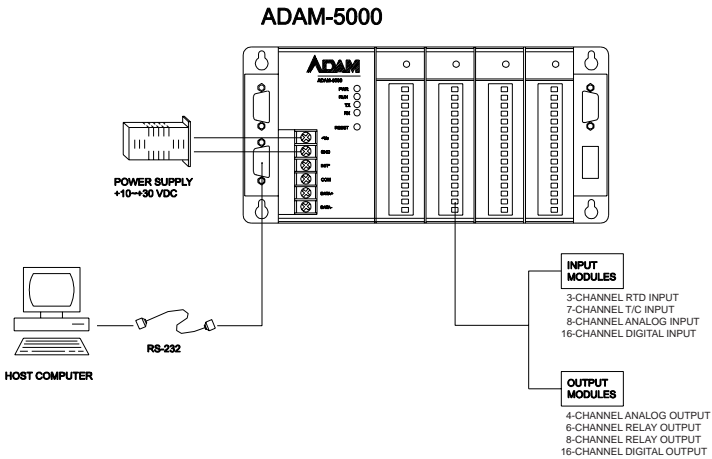


Figure A-2 ADAM-5000 system hook-up and configuration

The following items are required to configure an ADAM-5000 system: a personal computer with RS-232 port (baud rate sent to 9600) and the ADAM utility software.

Configuration with the ADAM Utility Software

The easiest way to configure the ADAM system is by using the ADAM utility software. The easy-to-use, menu driven software will guide you through every step of the configuration process. (See Chapter 5, Utility Software).

Configuration with the ADAM Command Set

ADAM systems can also be configured by issuing direct command from within the terminal emulation program that is included with the ADAM utility software.

The following example guides you through the setup of an analog input module. Assume that an ADAM-5018 Thermocouple Input module in slot 1 on an ADAM-5000/485 system still has its default settings (baud rate 9600 and address 01h). The system is first requested to send its default settings and then reconfigured.

Note: *An analog input module requires a maximum of 7 seconds to perform auto calibration and ranging after it is rebooted or powered on. During this time span, the module cannot be addressed to perform any other actions.*

Example:

Make sure that the module is properly connected as shown in Chapter 4, Figure 4-3. Power up all the connected devices, start the terminal emulation program, and issue the following command:

```
$01S1B(cr)
```

This command requests the module in slot 1 of the ADAM-5000 system at address 01h to send its configuration status

```
!010500
```

The module of the system at address 01h responds that it is configured for an input range of ± 2.5 V, integration time of 50 ms (60 Hz), format = engineering units and no checksum checking or generation.

To change the configuration setting of the analog input module, the following command is issued:

```
$01S1A0F00(cr)
```

\$ = change configuration

01 = target module at address 01

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0F = set input range to type K thermocouple

00 = set data format to engineering units, 50ms (60Hz)

(See Chapter 6, Command Set for a full description of the syntax of the configuration command for an analog input module)

When the module received the configuration command it will respond with its new address:

```
!01(cr)
```

Wait 7 seconds to let the new configuration settings take effect before issuing a new command to the module.

Note: *All reconfiguration except changing of baud rate and checksum values can be done dynamically, i.e. the modules need not be reset. When changing baud rate or checksum, these changes should be made for all connected devices. After reconfiguration, all modules should be powered down and then powered up to force a reboot and let the changes take effect. See the next section for a strategy for changing baud rate and or checksum for an entire network.*

A.3 Baud Rate and Checksum

ADAM-5000 systems contain an EEPROM to store configuration information and calibration constants. The ROM replaces the usual array of switches and pots required to specify baud rate, input/output range, etc. The ADAM-5000 system can be configured remotely through their communication ports, without having to physically alter pot or switch settings.

Since there is no visual indication of a system's configuration status, it is not possible to visually determine baud rate and other system settings. It might not be possible to establish communications with a system whose baud rate and address are unknown. To overcome this problem, every system has an input terminal labeled INIT*. By booting the system while connecting the INIT* terminal with the system's GND terminal, the system configuration is forced into a

known state. This state is called the INIT* state.

INIT* state defaults:

Baud rate: 9600

Address: 00h

Checksum: disabled

Forcing the system into the INIT* state does not change any parameters in the system's EEPROM. When the system is in the INIT* state with its INIT* and GND terminal shorted, all configuration settings can be changed and the system will respond to all other commands normally.

Changing Baud Rate and Checksum

Baud rate and checksum setting have several things in common:

- They should be the same for all systems and host computer.
- Their setting can only be changed by putting a system in the INIT* state.
- A changed setting can only take effect after a system is rebooted.

To alter baud rate or checksum settings you must perform the following steps:

1. Power on all components except the ADAM-5000 system
2. Power the ADAM-5000 system ON while shorting the INIT* and GND terminals as shown in Figure A-3.

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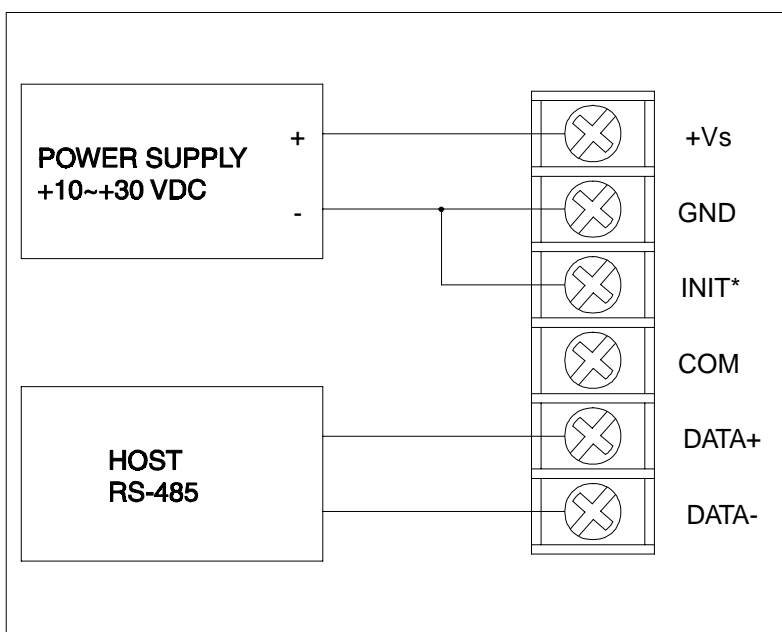


Figure A-3 Grounding the INIT* terminal

3. Wait at least 7 seconds to let self-calibration and ranging takeeffect.
4. Configure the baud rate and/or checksum status.
5. Switch the power to the ADAM-5000 system OFF.
6. Remove the grounding on the INIT* terminal and power the ADAM-5000 system ON.
7. Wait at least 7 seconds to let self-calibration and ranging takeeffect.
8. Check the settings. (If the baud rate has changed, the settings on the host computer should be changed accordingly)

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A.4 A Distributed ADAM-5000 Network System Hook-up

The figure below gives an example of how multiple ADAM systems should be connected:

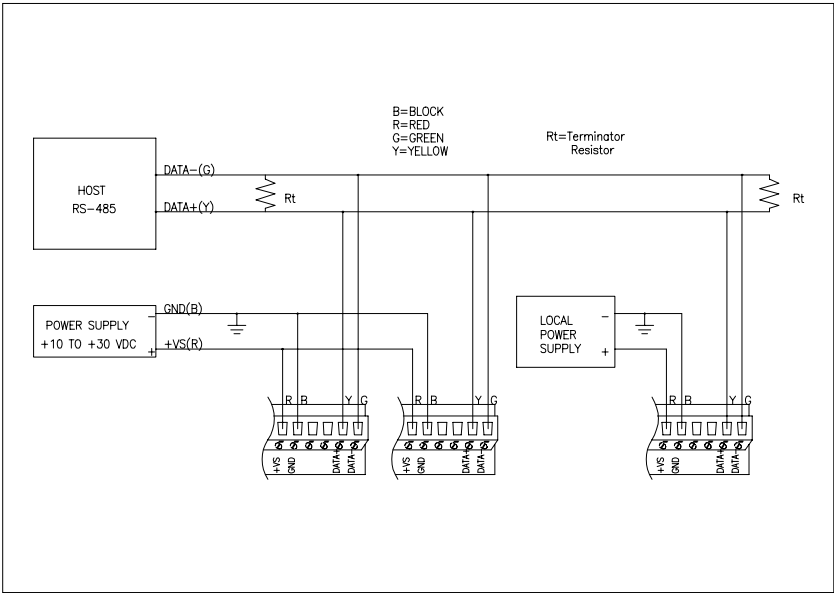


Figure A-4 ADAM-5000 network system hook-up

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