3

Installation & Field Wiring Guidelines

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— Setting the Rear DIP Switches
— Inserting the Module in the Base
— Connecting the Wiring

Introduction

NOTE: It is advised that you read the previous chapter on "Defining Your I/O System " before you install your remote master and slave units. The decision making process explained in that chapter will help you understand the rotary switches and dip switches covered in this chapter. It will also help you with writing your ladder logic in the next chapter.

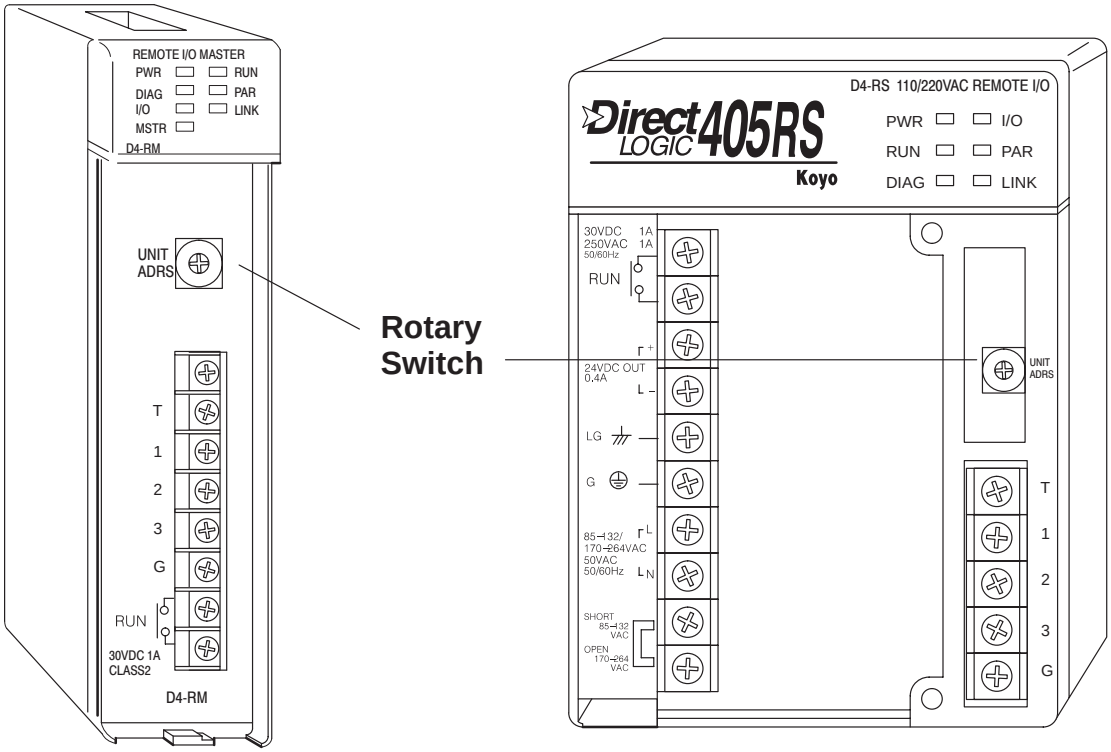
4 Easy Steps: There are four easy steps to install either a D4-RM, D4-RS or D4-RSDC module:

Step1 –	Set the address on the front rotary switch (i.e. 1 through 7).
Step2 –	Set the function code and baud rate on the rear DIP switch.
Step3 –	With no power applied, insert the module into the base.
Step 1	With no power applied, connect the wiring.

The text that follows will cover each of these steps in detail.

Step One: Setting the Front Rotary Switch

Both the remote master and slave have a small rotary switch on the front of their enclosure. It has the label, “UNIT ADRS” beside it. To access it you must remove the protective cover. This switch is easily rotated using a flathead screwdriver.



Align the arrow on the switch to 0 if you plan to use the module as a **master** (D4–RM only). Set it to any number 1–7 if you plan for it to be a **slave** (D4-RS, or D4-RSDC). Two slaves cannot have the same number if they are linked to the same master. **Always use consecutive numbers for slaves, starting with Address 1––don’t skip numbers**.

Step Two: Setting the Rear DIP Switches

On the rear of each module is an opening with a 4–position DIP switch. These switches must be set to indicate whether the module is a slave or a master and to specify the proper baud rate (either 38.4 kBaud or 19.2 kBaud).

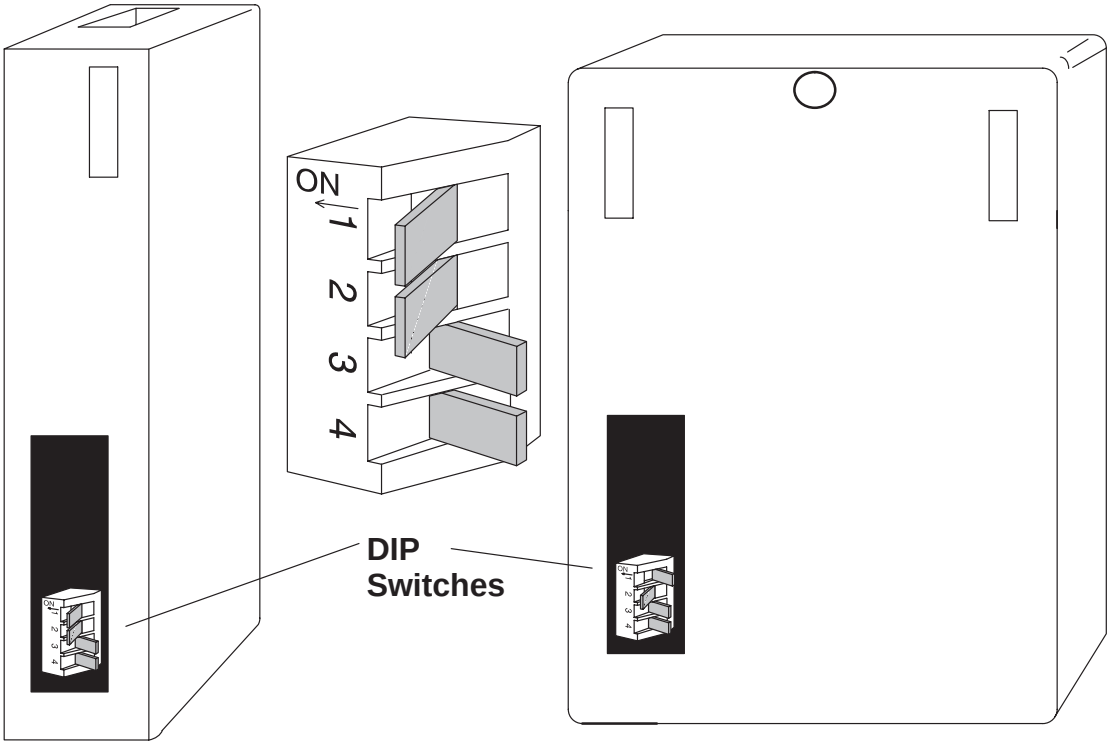


Chart for DIP Switch Settings

Position	1	2	3	4
Master	Always ON	ON=38.4 kBaud OFF=19.2 kBaud	Always OFF	Always OFF
Remote	Always OFF	ON=38.4 kBaud OFF=19.2 kBaud	Always OFF	Always OFF

An arrow showing the ON position is visible on the switch beside Position 1.

Position 1 is in the ON position for the DM4-RM. Postion 1 of the DIP switch for the D4-RS and D4-RSDC is always set to the OFF position. Remember, only the D4-RM can be used as a master.

Position 2 is ON if you want the faster baud rate, 38.4 kBaud. It is OFF if you want the slower 19.2 kBaud. Of course, Position 2 of the master and slaves have to be set to the same setting in order to communicate.

Positions 3 and 4 are not used and are always set in the OFF position.

Example Showing Proper Setting of Switches

Here's the way Steps 1 and 2 would be carried out for the example system we established in Chapter 2 if we decided to operate at 38.4 kBaud:

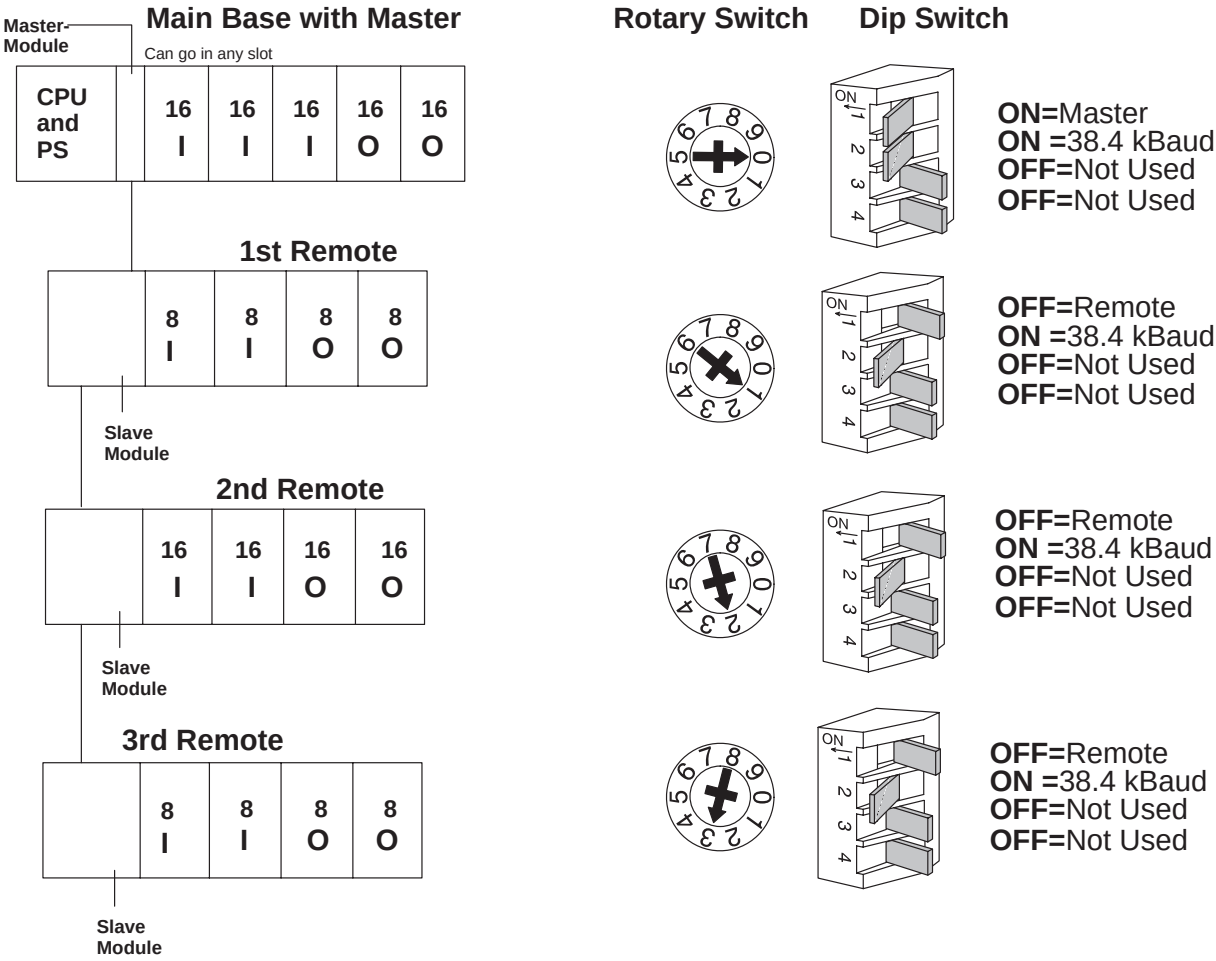


Chart for DIP Switch Settings

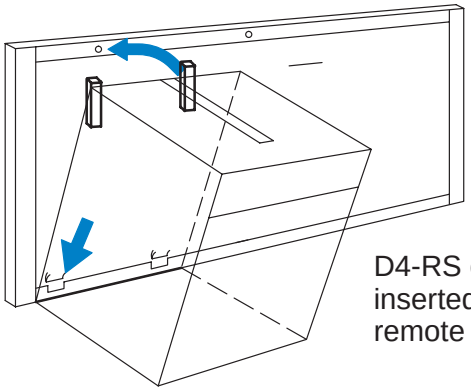
Position	1	2	3	4
Master	Always ON	ON=38.4 kBaud OFF=19.2 kBaud	Always OFF	Always OFF
Remote	Always OFF	ON=38.4 kBaud OFF=19.2 kBaud	Always OFF	Always OFF

Step Three: Inserting the Module in the Base

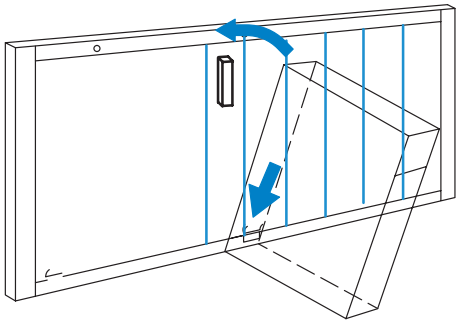
The D4-RM can go into any slot in the CPU base. The D4-RS or D4-RSDC must be inserted in the CPU slot of the remote base(s).

NOTE: Don't forget to check your total **"power budget"** and make sure your total current drawn by the remote modules and other I/O modules do not exceed the total amount allowable for the CPU you are using. See Chapter 2 of this manual or your DL405 User Manual for instructions on how to compute your power budget.

WARNING: To minimize the risk of electrical shock, personal injury, or equipment damage, always disconnect the system power before installing or removing any system component.



D4-RS or D4-RSDC must be inserted in the CPU slot of the remote base.



D4-RM can go into any slot in the local base except the CPU slot.

Notice the modules have plastic tabs at the bottom and a screw at the top. With the module tilted slightly forward, hook the plastic tab on the module into the notch on the base. Next, gently push the top of the module back toward the base until it is firmly seated into the base. Now tighten the screw at the top of the module to secure the module to the base.

Step Four: Connecting the Wiring

General Wiring Guidelines

You should consider the following wiring guidelines when wiring your system.

Step1 – There is a limit to the size of wire the modules can accept. 16 AWG to 24 AWG is recommended. Smaller AWG is acceptable.

Step2 – Always use a continuous length of wire, do not combine wires to attain a needed length.

Step3 – Use the shortest possible cable length.

Step4 – Where possible, use wire trays for routing.

Step5 – Avoid running wires near high energy wiring.

Step6 – Avoid running input wiring in close proximity to output wiring where possible.

Step7 – To minimize voltage drops when wires must run a long distance, consider using multiple wires for the return line.

Step8 – Where possible, avoid running DC wiring or communication cabling in close proximity to AC wiring.

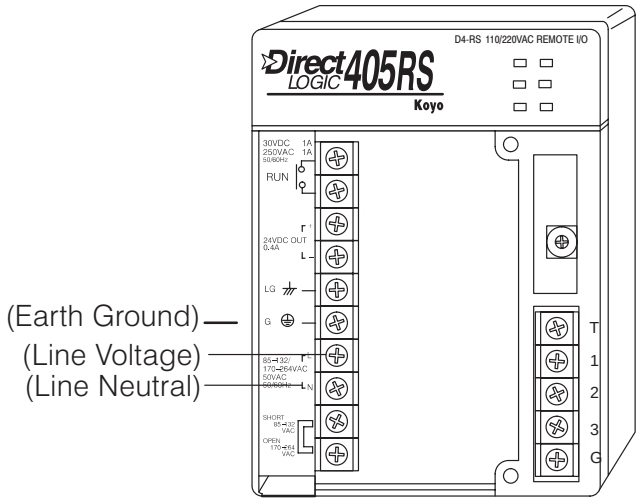
Step9 – Avoid creating sharp bends in the wires.

Step 1 Label all wires.

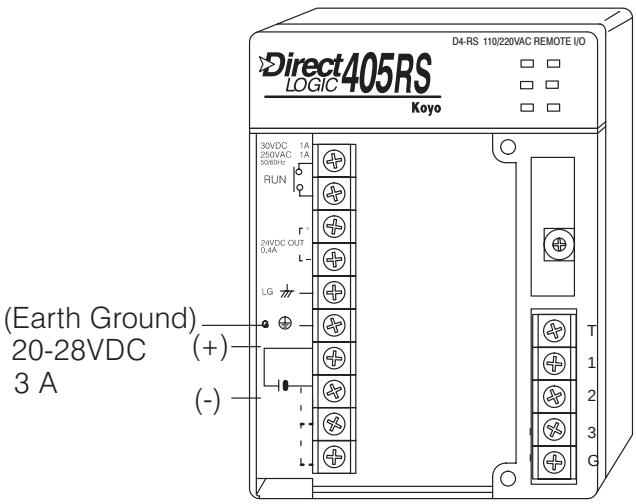
Power Connections for the D4-RS or D4-RSDC

To access the power terminals of the D4-RS or D-RSDC modules, you must first remove the large protective cover from the front of the enclosure. **Without power being applied**, connect the line voltage or DC power supply wires to the appropriate terminals. Also connect the safety earth ground.

D4-RS

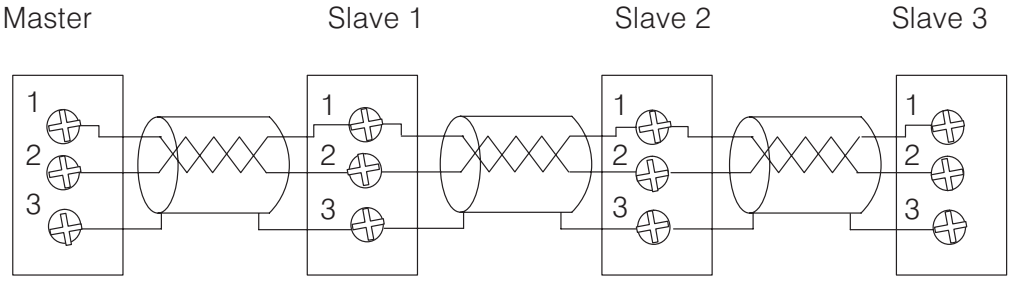


D4-RSDC



Cabling Between the Master and Slaves

The diagram shown below depicts the cabling between the master and its slaves. This is twisted pair cable. The two inner wires are connected to terminals 1 and 2 of each module. The shield wire is connected to terminal 3. *Do not connect the shield wire to the Ground terminal. Make sure the the connections between master and all slaves are always 1 to 1, 2 to 2 and 3 to 3*.

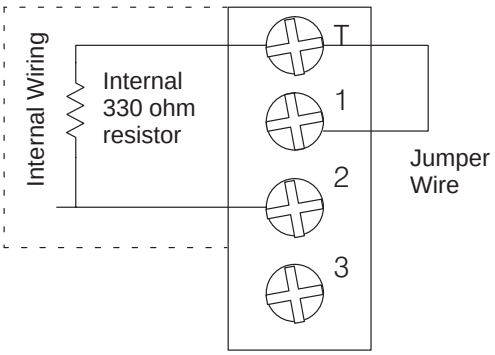


Termination Resistors

At each end of a master/slave system, it is necessary to have a "termination resistor" to prevent signal reflections from interferring with the communications. Although the modules have a 330 ohm resistor built in for this purpose, there are three options to be considered:

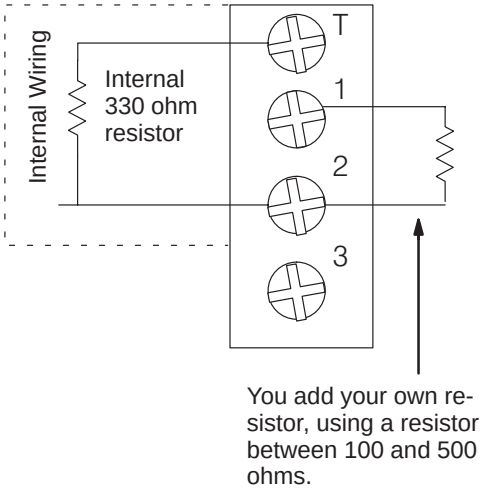
Option 1:
Use Internal Resistor Only

With this configuration, you use the internal resistor of the module to provide all the terminating resistance necessary. A jumper wire is placed between the terminating terminal and terminal 1.



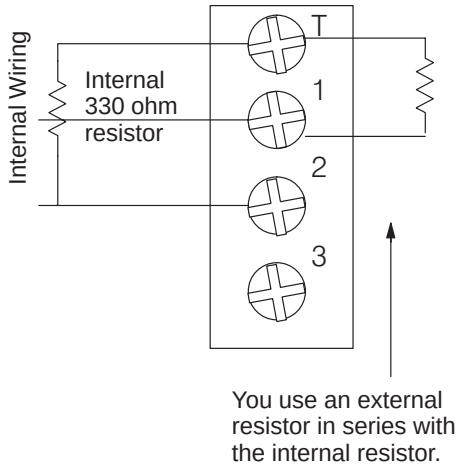
Option 2:
Use Internal Resistor and Balance Resistor

To better match the impedance of the cabling, you can elect not use the internal resistor; and instead, use a resistor of your choice externally. This is connected between terminals 1 and 2. You do not use the jumper wire in this case.



Option 3:
External Resistor in Series

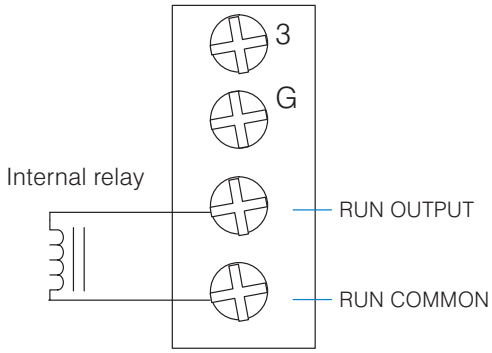
With this option, you use an external resisor in series with the internal resistor. The sum resistance should match the cabling impedance.



Connecting the Run Output Circuit

D4-RM, D4-RS, and D4-RSDC modules have a normally open relay that closes when communication is successfully made between the master and its slaves. Each module has its own LED indicator that glows when successful communication has been accomplished.

The Run Output relay can be wired to a 24 VDC sinking input module so that ladder logic can be written to monitor the communications link. The bottom two terminals for the terminal block are where the wires are connected from the input module.



If the RUN relay in the master goes OFF, then the RUN relay in all of the slaves will be taken off-line also.

If you choose to wire an input (say, X10) from the Run Output, it is very easy to include a rung of logic to sound an alarm or to stop a process when communication problem occurs: