red lion
trust+innovation®

LDSS
Large Serial Slave Displays

Go To Market Kit

August 2007

To Our Distributors and Sales Team:

MARKET INTRODUCTION – LDSS SERIES

Red Lion is pleased to introduce new large digital serial slave displays. The LDSS series are 6 digit large displays that provide an excellent way to present data in a large, easy to read format. Models are available in either 2.25" or 4" high red LED digits, with user adjustable display intensities. The 2.25" high models are readable up to 130 feet, the 4" high models are readable up to 180 feet. Both versions offer RS232/RS485 serial communications. All versions are constructed in a NEMA 4X enclosure made of lightweight aluminum.

TARGET APPLICATIONS INCLUDE:

- Plant floor displays
- Remote monitoring
- Weigh scales
- Tank level
- Operation timing
- Storage/process temperature

HOW TO USE THE LDSS GO TO MARKET KIT:

All files are available for download from the Distributor Section of our website. To get there, go to www.redlion.net and click on the Distributor Login link in the upper left corner of the page.

- For direct mail campaigns
    - Download and customize the news release with your header and contact info where indicated.
    - Red Lion has free direct mail postcards that are blank on the back for your company's custom message. Request part number ADLD0087 from your customer service representative, or download the artwork for the card.

- For quick email campaigns
    - Copy and paste the email introduction template into your email system. Add your company name or graphics header and links to your website and email contact.

- To update your company website
    - Add the press release, product photo and description, and link to the product bulletin.

- For seminars, lunch and learns, and sales calls
    - Download the available PowerPoint® presentation.
    - Download and print the included application solutions.

[company logo]

Contact: [company contact info]

[company address]

[company email]

FOR IMMEDIATE RELEASE:

New Large Serial Slave Display Delivers Data in an Easy to Read Format and Offers Secondary Display Option

[Location]—[Date]—Presenting important data to the plant production floor is now easily accomplished with the introduction of a new large serial slave display. [Company] announces the new LDSS, Large Serial Slave Display from Red Lion. The LDSS provides an excellent way to display data in a large, easy to read format. Available in display heights of 2.25 inches and 4 inches—with readability up to 130 feet and 180 feet, respectively—the LDSS 6 digit display can be viewed from virtually anywhere on the plant floor. The LDSS accepts serial ASCII data from meters, controllers, computers, PLCs and other back-of-panel devices. It can also be used as a remote display to show product counts, target numbers, cycle time, production rate and other pertinent data.

With its dual display buffer, the LDSS delivers advanced data monitoring capabilities. The buffer can be programmed to automatically alternate between the main and secondary displays, or users can switch displays by sending a serial string command. Its excellent visibility and ability to display data as a remote or slave display, even in harsh industrial environments, make the LDSS the perfect solution for viewing stored data in industrial applications.

"Successful plant operations rely upon the transmission of accurate, easily visible data, and the LDSS does just that," said Jeff Thornton, Red Lion product manager. "By projecting collected serial ASCII data from a wide range of host devices, the LDSS provides a large display for critical production data, including temperature, operation time, pressure, weight, and media levels." Thornton adds, "In addition, the LDSS's secondary display option supplies manufacturers with a multitude of monitoring possibilities."

The LDSS is enclosed in a sealed NEMA 4X enclosure made of lightweight aluminum, and the display offers selectable RS232 or RS485 serial interface ports. Additional features include complete numeric and extensive alphabetic capability, adjustable display intensity, decimal point transmission with acquired data, and various reset options.

For additional information on the LDSS or other digital display solutions, please contact [contact name] at [phone] or by e-mail at [email].

_____

[company description]

LDSS Postcard

Large Industrial Displays

New!
Large Serial
Slave Displays

- Accept Serial ASCII Data
- 2.25" and 4" High Red LEDs
- Selectable RS232 or RS485
- Dual Display Buffer
- NEMA 4X Sealed Enclosure

Other models include Counters, Rate Meters, Timers and Analog Input Displays

red lion
trust+innovation®

ADLD0087

LDSS E-mail Template

Your Company Name or Header Here

New Large Serial Slave Display from Red Lion

Presenting important data to the plant production floor is now easily accomplished with the introduction of a new large serial slave display. The new LDSS, (Large Serial Slave Display) provides an excellent way to display data in a large, easy to read format. Available in display heights of 2.25 inches and 4 inches—with readability up to 130 feet and 180 feet, respectively—the LDSS 6 digit display can be viewed from virtually anywhere on the plant floor. The LDSS accepts serial ASCII data from meters, controllers, computers, PLCs and other back-of-panel devices. It can also be used as a remote display to show product counts, target numbers, cycle time, production rate and other pertinent data.

The LDSS is enclosed in a sealed NEMA 4X enclosure made of lightweight aluminum, and the display offers selectable RS232 or RS485 serial interface ports. Additional features include complete numeric and extensive alphabetic capability, adjustable display intensity, decimal point transmission with acquired data, and various reset options.

LDSS - Large Serial Slave Display

- 2.25" & 4" High Red LED Digits
- Displays up to 6 Digits of Serial ASCII Data
- Dual Display Buffer Allows Alternating Displays
- Selectable RS232 or RS485 Serial Interface
- Connects Directly to Red Lion Products with Serial
- Programmable User Input
- AC or DC Powered
- Aluminum NEMA 4X Case Construction

Download Data Sheet

The new LDSS is just one of the many industrial display and control solutions offered by Red Lion and <Your Company Name Here>.

Do you have questions or need to discuss a particular application for the LDSS? Please contact <Your Email Address Here>.

We look forward to working with you.

<Your Company Name Here>
<Address>
<City, State Zip>
<Phone>
<Fax>
<Email>

Be sure to visit our web site at:
<www.YourWebSiteHere.com>

<Your Company Name Here> is an Authorized Red Lion Distributor:
www.redlion.net

LDSS Large Display
for Serial Inputs

red lion

Agenda

- What is the LDSS?
- Easy programming
- About the input
- Display capability
- Display selections
- Other features
- Packaging
- Applications

red lion

LDSS Large Display

The new LDSS, Large Digital Display for Serial Inputs, is the perfect solution to display a value that is currently stored in a register and displaying it on the plant floor.

It is capable of accepting RS232 or RS485 as the input and displaying it as a remote or slave display.

Two models are available with display heights of 2.25" readable to 130' or the 4" readable to 180'.

red lion

Easy Programming

- Two simple programming menus
- CUB5 style programming
- Easy-to-follow push button entry
- Crimson Software

red lion

About the Input

- Accepts serial ASCII data from a host device
- Selectable for RS232 or RS485 serial interface
- 38.4 K max. baud rate
- Adjustable data receive delay time

red lion

Display Capability

- Complete numeric capability
- Limited alphabetic, missing M, W and X
- Decimal point transmitted with the value

red lion

Display Selections

- Secondary display capability
- Display scroll option
- Display intensity adjustment
- Various reset options
- Leading zero blanking

red lion

Other Features

- AC or DC powered
- Programmable user input
- Programming lock-out

red lion

Packaging

DIMENSIONS In inches (mm)

AIR PRESSURE STABILIZATION VENT

2.25
(57.15)
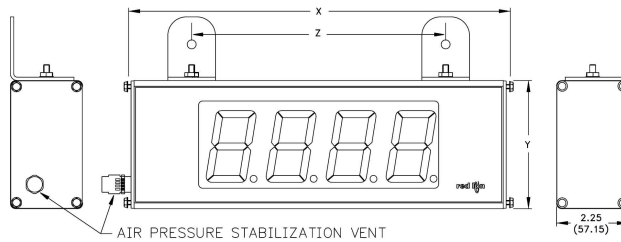
- 2.25" high, red LED
- 4" high, red LED
- Aluminum case
- NEMA 4X rated enclosure
- Air pressure stabilizer

red lion

Applications

- Plant floor displays
- Remote monitoring
- Weigh scales
- Tank level
- Operation timing
- Storage/process temperature

red lion

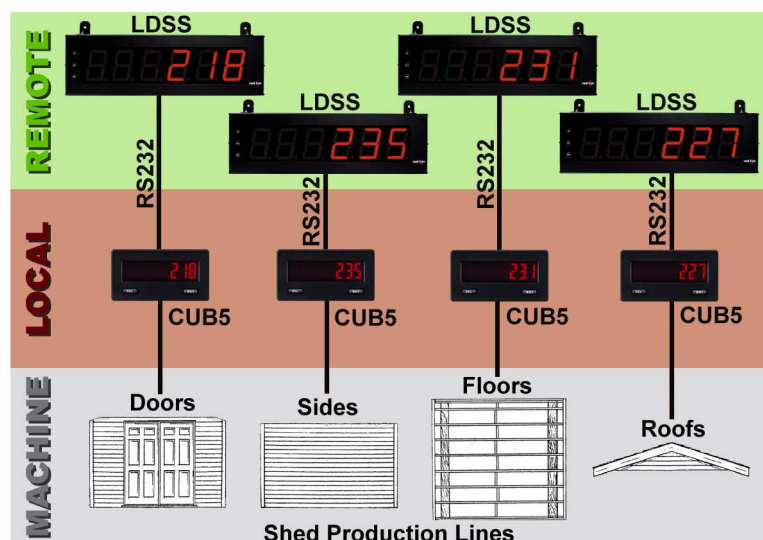# APPLICATION SOLUTION

Title: Production Line Monitoring

Product(s): LD4SS6P0, CUB5R

An outdoor shed manufacturer is presently using CUB5R000 to count product on their manufacturing lines. Each of the four lines makes a component of the shed, which are doors, sides, floors and roofs. Ideally, the lines would run in sync, however that is rarely the case. Installing a large display for each line will increase the visibility of the production counts. This allows management and more importantly, the workers to see the current piece count of their production line.

To accomplish this, the following steps were taken. Due to the CUB5's modular design, an RS232 communication card was easily added to the CUB5 on each product line. Directly wiring this output to a LD4SS6P0 (4-inch high red LED, Large Digit Serial Slave Display) provided a large view of that line's count. The displays were positioned, so the members of the other lines could see all the counts up to 180 feet away.

The CUB5 was programmed for the User Input to initiate a print request. By wiring the CUB5 User Input permanently low, it continued to initiate a print request, providing the LDS with the current count information. No programming in the LDS was needed.

The result was quite surprising. After the displays were installed, management noticed the lines were running much closer to sync. In addition, the placement of the display allowed the other lines to see each other's progress. This created a bit of competition between the lines. Overall, they received about a 10% increase in production across the board.

APPLICATION SOLUTION

## Title: Temperature Zone Monitoring on the Plant Floor

Product(s): LD2SS6P0, G3 HMI, Modular Controller

A plastic manufacturer is using our Modular Controller and HMI to control his molding operations. While the main machine operator has viewing access of all the line parameters from his station, the line operators do not. The line operators also need to track the temperature at various zones along the line, including a separate processing/drying room.

To satisfy this requirement, add a couple of LD2SS6P0, Large Serial Slave Displays to offer a remote display of the temperature. The 2.25-inch high red LED display made it easy for the line operators to view the temperature up to 130 feet.

Using the RS485 port on the HMI and configuring the LD2SS6P0 displays for RS485, send the data to both of the slave displays. Program the HMI to gather the temperature and send the information through an ASCII string to the large displays. A unique unit LD2S address allowed the option of sending specific data to a specific display.

The LD Large Serial Slave Display series has an additional feature of a secondary display. When the "#" sign is used in the serial string, characters are sent to the secondary display. (The LD2SS6P0 can be programmed to automatically alternate between the main and secondary displays or a serial string command can be sent to change the display.) For this application, the secondary display feature was used to identify which temperature zone was being displayed.

red lion

Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net
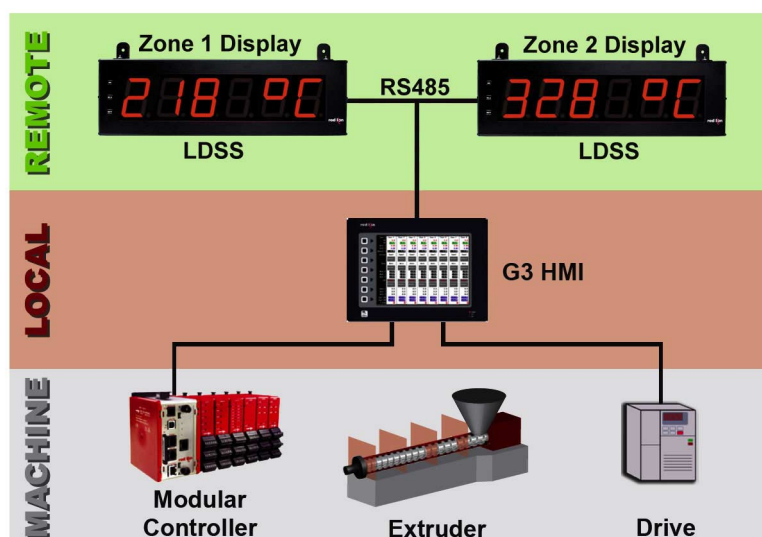
MODEL LD - LARGE SERIAL SLAVE DISPLAY

- 2.25" or 4" HIGH RED LED DIGITS
- DISPLAYS UP TO 6 DIGITS OF SERIAL ASCII DATA
- DUAL DISPLAY BUFFER ALLOWS ALTERNATING DISPLAYS
- SELECTABLE RS232 OR RS485 SERIAL INTERFACE
- CONNECTS DIRECTLY TO RED LION PRODUCTS WITH SERIAL
- PROGRAMMABLE USER INPUT
- AC OR DC POWERED
- ALUMINUM NEMA 4X/IP65 CASE CONSTRUCTION

CE

GENERAL DESCRIPTION

The Large Serial Slave Display is a versatile display that accepts serial ASCII data from a host device and displays the received characters. The displayable data includes numeric, 7-segment alphabetic and certain punctuation characters.

The 6-digit displays are available in either 2.25" or 4" high red LED digits with adjustable display intensity. The 2.25" high models are readable up to 130 feet. The 4" high models are readable up to 180 feet. Both versions are constructed of a NEMA 4X/IP65 enclosure in light weight aluminum.

The Serial Slave has two internal display buffers, allowing two separate display values or messages to be viewed. The main (primary) display typically shows dynamic data (count, rate, process, etc.), usually received directly from another meter. The secondary display typically shows a fixed message or value, such as a system or machine identifier, or a target production value. The main and secondary displays can be toggled either manually or automatically at a user selected toggle speed. Both displays are retained in memory when power is removed from the unit.

For single meter remote display applications, the Serial Slave can be connected directly to a Red Lion (or compatible) meter with RS232 or RS485 serial communications. The slave can display the meter value on its main display without requiring a PC or other serial interface.

Multiple slaves are connected using an RS485 serial bus. If unique meter addresses are assigned, specific data can be displayed by a single slave on the bus. When multiple slaves are assigned the same address, common data can be displayed by multiple units in different locations.

The serial interface is plug jumper selectable for RS232 or RS485 connections. Serial communications parameters are fully programmable, with baud rates up to 38.4Kbps. Special command characters allow display selection and display intensity adjustment through the serial input. In addition to the serial input, a programmable User Input is provided to perform a variety of meter functions.

CAUTION: Risk of Danger.
Read complete instructions prior to installation and operation of the unit.

CAUTION: Risk of electric shock.

SAFETY SUMMARY

All safety regulations, local codes and instructions that appear in this and corresponding literature, or on equipment, must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

The protective conductor terminal is bonded to conductive parts of the equipment for safety purposes and must be connected to an external protective earthing system.
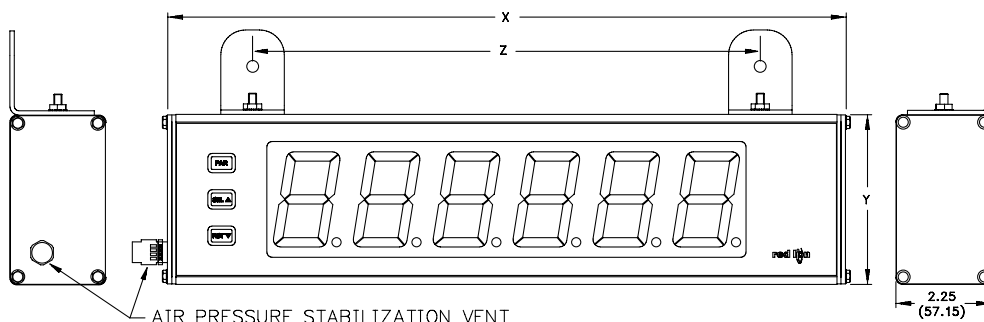
SPECIFICATIONS

1. **DISPLAY**: 6-digit 2.25" (57 mm) or 4" (101 mm) adjustable intensity Red LED
2. **POWER REQUIREMENTS**:
   AC Power:
      AC Input: 85 to 250 VAC 50/60 Hz, 14 VA
      DC Out: 11 to 16 VDC @ 50 mA
   DC Power:
      DC Input: 11 to 16 VDC @ 400 mA max, 7 W
3. **SERIAL INPUT:** (Jumper Selectable RS232 or RS485):
   RS485 SERIAL COMMUNICATIONS
      Type: Multi-point balanced interface (non-isolated)
      Baud Rate: 300 to 38400
      Data Format: 7/8 bits; odd, even, or no parity
      Bus Address: 0 to 99; max 32 meters per line
   RS232 SERIAL COMMUNICATIONS
      Type: Half duplex (non-isolated)
      Baud Rate: 300 to 38400
      Data Format: 7/8 bits; odd, even, or no parity
4. **USER INPUT** (Programmable Function Input):
   Active low logic, internal 7.8 KΩ pull-up resistor to +12V.
   Trigger levels: $V_{IL} = 1.0$ V max; $V_{IH} = 2.4$ V min; $V_{MAX} = 28$ VDC
   Response time: 5 msec typ; 100 msec debounce (activation & release)

DIMENSIONS In inches (mm)

AIR PRESSURE STABILIZATION VENT

2.25 (57.15)

PART NUMBER	X (Length)	Y (Height)	Z (Center)
LD2SS6P0	16 (406.4)	4 (101.6)	12 (304.8)
LD4SS6P0	26 (660.4)	7.875 (200)	22 (558.8)

5. **MEMORY**: Nonvolatile E^{2}PROM retains all programming parameters, main and secondary displays when power is removed.

6. **CERTIFICATIONS AND COMPLIANCES**:
   SAFETY
   IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
   IP65 Enclosure rating (Face only), IEC 529
   Type 4X Enclosure rating (Face only), UL50
   ELECTROMAGNETIC COMPATIBILITY
   Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.
   Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion A 4 kV contact discharge 8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion A 10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion A^2 2 kV power 1 kV signal
Surge	EN 61000-4-5	Criterion A^2 1 kV L-L, 2 kV L&N-E power
RF conducted interference	EN 61000-4-6	Criterion A 3 V/rms

   Emissions:

Emissions	EN 55011	Class B

   Notes:
   1. Criterion A: Normal operation within specified limits.
   2. DC Power: Shaffner FN610-1/07 line filter instaled on DC power cable to comply.

7. **CONNECTIONS**:
   Internal removable terminal blocks used for power and signal wiring.
   Remove end plates with ¼" nut driver.
   For LD2 and LD4 versions, all wiring is on the right side of the unit.
   Wire Strip Length: 0.4" (10 mm)
   Wire Gage: 24-12 AWG copper wire
   Torque: 5.3 inch-lbs (0.6 N-m) max

8. **ENVIRONMENTAL CONDITIONS**:
   Operating temperature: 0 to 50 °C
   Storage temperature: -40 to 70 °C
   Operating and storage humidity: 0 to 85% max. RH (non-condensing)
   Altitude: Up to 2,000 meters

9. **CONSTRUCTION**: Aluminum enclosure, and steel side panels with textured black polyurethane paint for scratch and corrosion resistance protection. Sealed front panel meets NEMA 4X/IP65 specifications. Installation Category II, Pollution Degree 2.

10. **WEIGHT**:
    LD2SS6P0 - 4.5 lbs (2.04 kg)
    LD4SS6P0 - 10.5 lbs (4.76 kg)

ORDERING INFORMATION

| MODEL NO.	DESCRIPTION	PART NUMBER
LD	2.25" High 6-Digit Red LED Serial Slave Display, RS232/RS485 Serial Communications	LD2SS6P0
	4" High 6-Digit Red LED Serial Slave Display, RS232/RS485 Serial Communications	LD4SS6P0

1.0 INSTALLING THE METER

INSTALLATION
The meter meets NEMA 4X/IP65 requirements when properly installed.

INSTALLATION ENVIRONMENT
The unit should be installed in a location that does not exceed the operating temperature. Placing the unit near devices that generate excessive heat should be avoided.

The unit should only be cleaned with a soft cloth and neutral soap product. Do NOT use solvents.

Continuous exposure to direct sunlight may accelerate the aging process of the front overlay. Do not use tools of any kind (screwdrivers, pens, pencils, etc.) to operate the keypad of the unit.

CONNECT THIS STUD TO A PROTECTIVE EARTHING SYSTEM ⏚
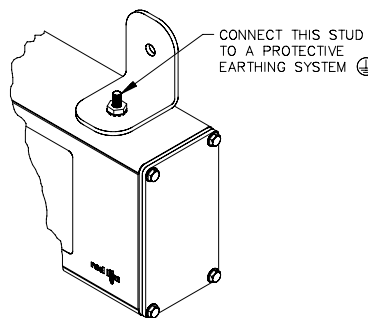
2.0 WIRING THE METER

EMC INSTALLATION GUIDELINES
Although this meter is designed with a high degree of immunity to Electro-Magnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into the meter may be different for various installations. The meter becomes more immune to EMI with fewer I/O connections. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed below are some EMC guidelines for successful installation in an industrial environment.

1. The meter should be properly connected to protective earth.
2. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application.

Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield only at the panel where the unit is mounted to earth ground (protective earth).
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is above 1 MHz.
   c. Connect the shield to common of the meter and leave the other end of the shield unconnected and insulated from earth ground.

3. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be ran in metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter.

4. Signal or Control cables within an enclosure should be routed as far as possible from contactors, control relays, transformers, and other noisy components.

5. In extremely high EMI environments, the use of external EMI suppression devices, such as ferrite suppression cores, is effective. Install them on Signal and Control cables as close to the unit as possible. Loop the cable through the core several times or use multiple cores on each cable for additional protection. Install line filters on the power input cable to the unit to suppress power line interference. Install them near the power entry point of the enclosure. The following EMI suppression devices (or equivalent) are recommended:

    Ferrite Suppression Cores for signal and control cables:
        Fair-Rite # 0443167251 (RLC# FCOR0000)
        TDK # ZCAT3035-1330A
        Steward # 28B2029-0A0
    Line Filters for input power cables:
        Schaffner # FN610-1/07 (RLC# LFIL0000)
        Schaffner # FN670-1.8/07
        Corcom # 1 VR3
Note: Reference manufacturer's instructions when installing a line filter.

6. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.

7. Switching of inductive loads produces high EMI. Use of snubbers across inductive loads suppresses EMI.
Snubber: RLC# SNUB0000.

WIRING OVERVIEW

Electrical connections are made via pluggable terminal blocks located inside the meter. All conductors should conform to the meter's voltage and current ratings. All cabling should conform to appropriate standards of good installation, local codes and regulations. It is recommended that the power supplied to the meter (DC or AC) be protected by a fuse or circuit breaker. When wiring the meter, compare the numbers on the label on the back of the meter case against those shown in wiring drawings for proper wire position. Strip the wire, leaving approximately 0.4" (10 mm) bare lead exposed (stranded wires should be tinned with solder.) Insert the lead under the correct screw clamp terminal and tighten until the wire is secure. (Pull wire to verify tightness.) Each terminal can accept up to one #14 AWG (2.55 mm) wire, two #18 AWG (1.02 mm), or four #20 AWG (0.61 mm).

Model LD4SS6P0 is shown.
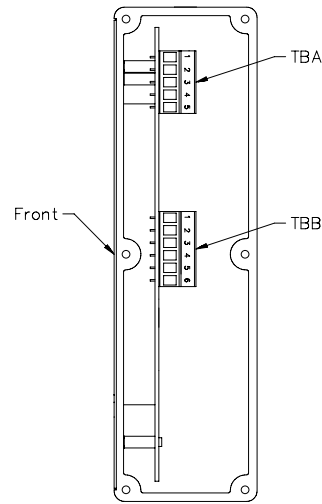
RIGHT SIDE VIEW

2.1 POWER WIRING

The power wiring is made via the 5 position terminal block (TBA) located inside unit (right side).
Do not power unit from both AC & DC at the same time.
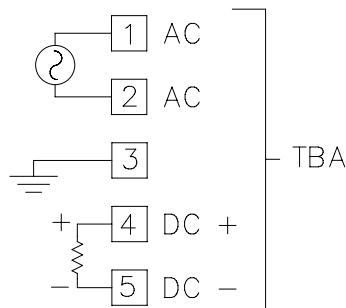
AC Power
Terminal 1: VAC
Terminal 2: VAC
Terminal 3: Earth Ground
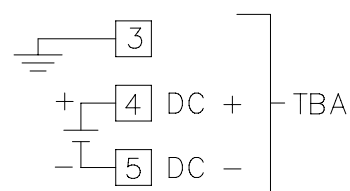Terminal 4: +DC Out
Terminal 5: DC Common

DC Power
Terminal 3: Earth Ground
Terminal 4: +DC Input
Terminal 5: DC Common

2.2 USER INPUT WIRING

The User Input is wired to Terminals 3 and 4 of TBB as shown.
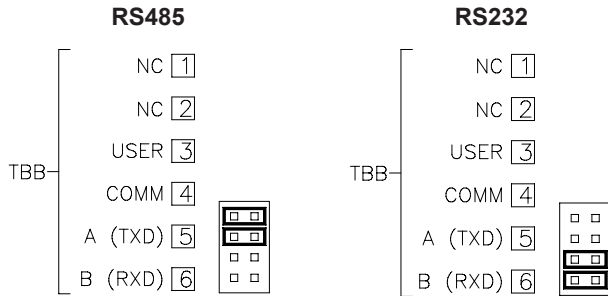
Terminal 3: User Input
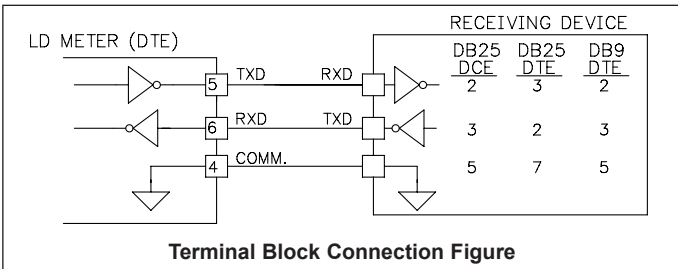Terminal 4: Common

Sinking Logic

2.3 SERIAL WIRING

Serial communications is jumper selectable for RS485 or RS232. From the factory, the unit is defaulted to RS485 communications. If RS232 is desired, both serial jumpers will need changed to the RS232 positions before wiring.


RS485

```
      NC  1
      NC  2
    USER  3
    COMM  4
 A (TXD)  5
 B (RXD)  6
```
TBB

RS232

```
      NC  1
      NC  2
    USER  3
    COMM  4
 A (TXD)  5
 B (RXD)  6
```
TBB

RS232 Communications

Terminal Block Connection Figure

RS232 is intended to allow two devices to communicate over distances up to 50 feet. Data Terminal Equipment (DTE) transmits data on the Transmitted Data (TXD) line and receives data on the Received Data (RXD) line. Data Computer Equipment (DCE) receives data on the TXD line and transmits data on the RXD line. The LD emulates a DTE. If the other device connected to the meter also emulates a DTE, the TXD and RXD lines must be interchanged for communications to take place. This is known as a null modem connection. Most computers emulate a DTE device.

RS485 Communications

The RS485 communication standard allows the connection of up to 32 devices on a single pair of wires, distances up to 4,000 ft. and data rates as high as 10M baud (the LD is limited to 38.4k baud). The same pair of wires is used to both transmit and receive data. RS485 is therefore always half-duplex, that is, data cannot be received and transmitted simultaneously.

Terminal Block Connection Figure
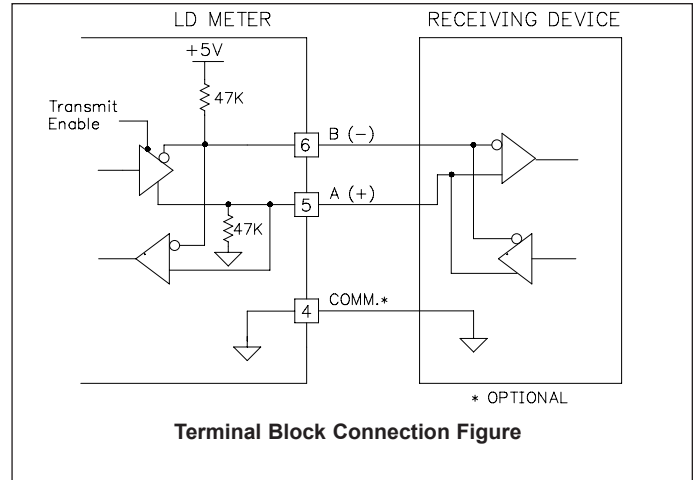
3.0 REVIEWING THE FRONT PANEL KEYS AND DISPLAY
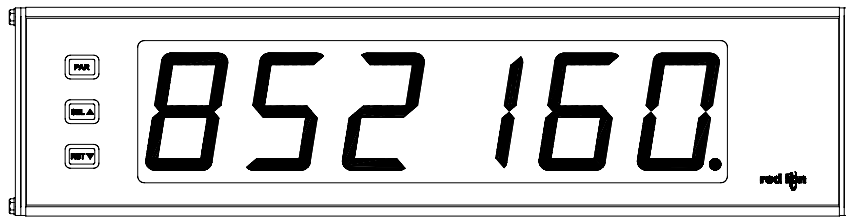
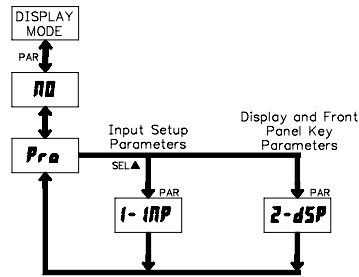| KEY	DISPLAY MODE OPERATION	PROGRAMMING MODE OPERATION
PAR	Access Programming Mode	Store selected parameter and index to next parameter
SEL▲	Select display (main or secondary)	Advance through selection list/select digit position in parameter value
RST▼	Reset display(s) per front panel reset setting	Increment selected digit of parameter value

DISPLAY DESIGNATOR

" . " - Decimal point to the far right of the display indicates the secondary display is shown.

If display scroll is enabled, the display will toggle automatically between the main and secondary display at the selected scroll interval.

4.0 PROGRAMMING THE METER

PROGRAMMING MENU

PROGRAMMING MODE ENTRY (PAR KEY)

It is recommended all programming changes be made off line, or before installation. The meter normally operates in the Display Mode. No parameters can be programmed in this mode. The Programming Mode is entered by pressing the **PAR** key. If it is not accessible, then it is locked by either a security code or a hardware lock (See Module 2).

MODULE ENTRY (SEL▲ & PAR KEYS)

The Programming Menu is organized into two modules. These modules group together parameters that are related in function. The display will alternate between *Pro* and the present module. The **SEL▲** key is used to select the desired module. The displayed module is entered by pressing the **PAR** key.

MODULE MENU (PAR KEY)

Each module has a separate module menu (which is shown at the start of each module discussion). The **PAR** key is pressed to advance to a particular parameter to be changed, without changing the programming of preceding parameters. After completing a module, the display will return to *Pro NO*. Programming may continue by accessing additional modules.

SELECTION / VALUE ENTRY

For each parameter, the display alternates between the present parameter and the selections/value for that parameter. The **SEL▲** and **RST▼** keys are used to move through the selections/values for that parameter. Pressing the **PAR** key, stores and activates the displayed selection/value. This also advances the meter to the next parameter.

For numeric values, the value is displayed with one digit flashing (initially the right most digit). Pressing the **RST▼** key increments the digit by one or the user can hold the **RST▼** key and the digit will automatically scroll. The **SEL▲** key will select the next digit to the left. Pressing the **PAR** key will enter the value and move to the next parameter.

PROGRAMMING MODE EXIT (PAR KEY)

The Programming Mode is exited by pressing the **PAR** key with *Pro NO* displayed. This will commit any stored parameter changes to memory and return the meter to the Display Mode. (If power loss occurs before returning to the Display Mode, verify recent parameter changes.)
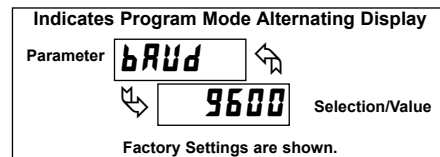
PROGRAMMING TIPS

It is recommended to start with Module 1 and proceed through each module in sequence. When programming is complete, it is recommended to record the parameter programming and lock out parameter programming with the user input or programming security code.

FACTORY SETTINGS

Factory Settings may be completely restored in Module 2. This is useful when encountering programming problems or in the event of corrupted program data.

ALTERNATING SELECTION DISPLAY

In the explanation of the modules, the following dual display with arrows will appear. This is used to illustrate the display alternating between the parameter on top and the parameter's Factory Setting on the bottom. In most cases, selections and values for the parameter will be listed on the right.

4.1 MODULE 1 - INPUT SETUP PARAMETERS (1-INP)

PARAMETER MENU
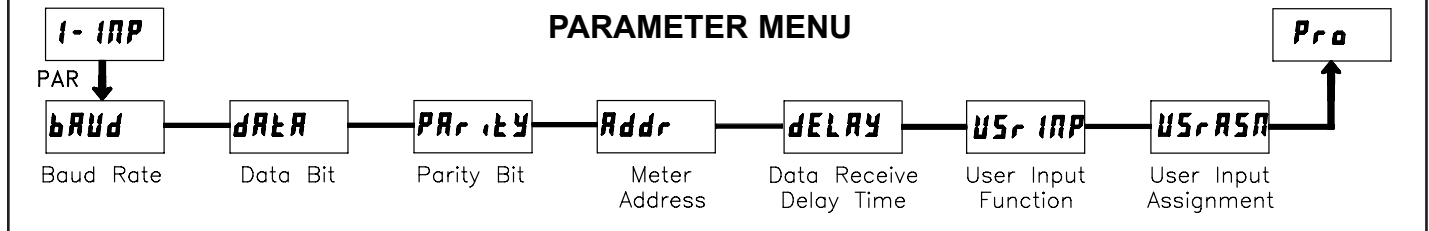
Module 1 is the programming module for the Input Setup Parameters. This includes the Serial Input setup parameters and the User Input function. Set the Serial Input parameters to match the settings of the host device.

BAUD RATE

| 300 | 1200 | 4800 | 19200 |
| 600 | 2400 | 9600 | 38400 |

Set the baud rate to match that of the host device. Normally, the baud rate is set to the highest value that all the serial communications equipment is capable of transmitting and receiving.

DATA BIT

7-bit   8-bit

Select either 7- or 8-bit data word length to match that of the host device.

PARITY BIT

PAr itY ⤶
⤷ **Odd**

Odd   EUEN   NO

This parameter only appears when the Data Bit parameter is set to 7-bit. Set the parity bit to match that of the host device. If parity is set to **NO**, an additional stop bit is used to force the frame size to 10 bits.

METER ADDRESS

Addr ⤶
⤷ **00**

0 to 99

Enter the meter (node) address. With a single slave unit, an address is not required and a value of zero should be used. This is the case with an RS232 connection, where only one Serial Slave is connected to the host.

With multiple Serial Slaves connected on an RS485 bus, a unique address number must be assigned to each unit in order to send data to a specific slave on the bus. If multiple slaves are assigned the same address (including zero), common data can be sent to, and displayed by multiple slave units on the bus.

DATA RECEIVE DELAY TIME

dELAY ⤶
⤷ **00.05**

00.01 to 59.99

Upon receiving a terminator character <CR>, the Serial Slave disables serial data reception for the time duration entered in this parameter. Using a delay allows the Serial Slave to ignore additional characters such as a <LF> or second <CR>, which often follow a serial data string. This value is entered in seconds and hundredths of seconds format, with a 10 msec minimum delay time.

(See "Data Receive Delay Timing" in the Communications section for additional timing details.)

USER INPUT FUNCTION

USr INP ⤶
⤷ **NO**

NO

DISPLAY	MODE	DESCRIPTION
NO	No Function	User Input disabled.
ProLoc	Program Mode Lock-out	See Programming Mode Access chart (Module 2).
rSt-E	Momentary Reset (Edge triggered)	Momentary reset of the assigned display(s).
rSt-L	Maintained Reset	Level active reset of the assigned display(s).
d-HOLd	Display Hold	Freeze the assigned display(s) as long as the input is active.
d-SEL	Display Select (Edge triggered)	Toggle between main and secondary display (if enabled).
d-LEU	Display Intensity Level (Edge triggered)	Increase intensity one level for each activation.

USER INPUT ASSIGNMENT
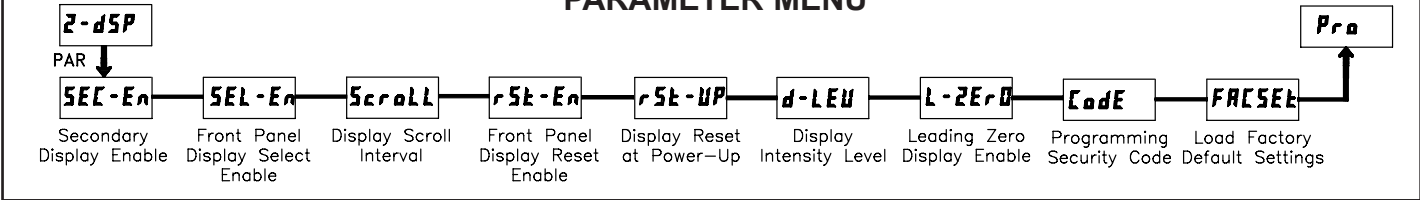
USrASN ⤶
⤷ **dSP**

Pri   both
SEC   dSP

Select the display to which the User Input Function applies. The User Input Assignment only appears if the secondary display is enabled and a selection of reset or display hold is chosen for the User Input Function.

Assignment choices include the main (primary) and/or secondary display, or the display which is shown at the moment the User Input is activated (**dSP**).

Note: For reset selection, main display resets to zero. Secondary display resets to all blanks.

4.2 MODULE 2 - DISPLAY AND FRONT PANEL KEY PARAMETERS (2-dSP)

PARAMETER MENU

2-dSP
PAR ↓

SEC-En — **SEL-En** — **ScroLL** — **rSt-En** — **rSt-UP** — **d-LEU** — **L-2ErO** — **CodE** — **FACSEt** → **Pro**

| Secondary Display Enable | Front Panel Display Select Enable | Display Scroll Interval | Front Panel Display Reset Enable | Display Reset at Power–Up | Display Intensity Level | Leading Zero Display Enable | Programming Security Code | Load Factory Default Settings |

SECONDARY DISPLAY ENABLE

SEC-En ⤶
⤷ **YES**

NO   YES

Select **YES** to enable the secondary display. The decimal point in the far right digit always appears when the secondary display is shown.

FRONT PANEL DISPLAY SELECT ENABLE (SEL▲)

SEL-En ⤶
⤷ **YES**

NO   YES

Select **YES** to allow the **SEL▲** key to toggle between the main and secondary displays. This parameter only appears if the secondary display is enabled.

DISPLAY SCROLL INTERVAL

ScroLL ⤶
⤷ **NO**

NO   4-SEC   8-SEC
2-SEC   6-SEC   10-SEC

Select the time interval at which the display automatically toggles between the main and secondary displays. Select **NO** to disable automatic scrolling. This parameter only appears if the secondary display is enabled.

FRONT PANEL DISPLAY RESET ENABLE (RST▼)

rSt-En ⤶
⤷ **dSP**

NO   SEC   dSP
Pri   both

This parameter allows the **RST▼** key to reset the main (primary) and/or secondary display (if enabled), or the display which is currently shown (**dSP**). Select **NO** to disable the **RST▼** key.

Note: Main display resets to zero. Secondary display resets to all blanks.

DISPLAY RESET AT POWER-UP

```
rSt-UP  ⇗
   ⇘      NO
```
NO   SEC
Pri both

This parameter allows the Main and/or Secondary display (if enabled) to automatically reset when power is applied to the unit.

DISPLAY INTENSITY LEVEL

```
d-LEU  ⇗
   ⇘      5
```
1 to 5

Enter the desired display intensity level. The display will actively brighten or dim as the level is changed.

LEADING ZERO DISPLAY ENABLE

```
L-2ErO  ⇗
   ⇘      NO
```
NO   YES

Select **NO** to insert blanks in place of any leading zeros received in a serial data string. This is typical when sending numeric values to the slave. Select **YES** to enable display of any leading zeros in the string. This parameter setting only applies to the Main display.

PROGRAMMING SECURITY CODE

```
CodE  ⇗
  ⇘     000
```
000 to 999
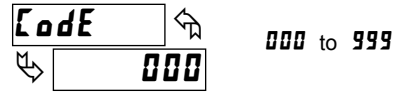
The Security Code determines the user access to Programming mode. This code can be used independently or along with the Program Mode Lock-out (**ProLoc**) selection in the User Input Function parameter (Module 1).

Programming a Security Code other than 0, requires this code to be entered at the **CodE** prompt in order to access Programming mode.

USER INPUT FUNCTION	USER INPUT STATE	SECURITY CODE	PROGRAMMING ACCESS WHEN "PAR" PRESSED
not **ProLoc**	——	0	Immediate Access
	——	1-999	With correct code entry at **CodE** prompt *
ProLoc	Active	0	Programming Locked No Access
	Active	1-999	With correct code entry at **CodE** prompt *
	Not Active	0-999	Immediate Access

Entering Code 222 allows access regardless of security code.

LOAD FACTORY DEFAULT SETTINGS

```
FACSEt  ⇗
   ⇘      NO
```
NO   YES

The **YES** selection returns the slave to the factory default settings. The unit will displays **rESEt** and returns to **Pro**, with the factory settings loaded.

Serial Slave Communications

Displayable Characters

The ASCII characters that the Serial Slave can display are as follows:

Numeric: 0 to 9

Alphabetic (7-segment): A, b, C, c, d, E, e, F, G, g, H, h, I, i, J, K, L, l, N, n, O, o, P, q, r, S, t, U, u, V, v, Y, Z

Non-displayable alphabetic characters will be replaced with a blank if received. These include M, W and X.

Note: Both uppercase and lowercase ASCII characters are accepted. If a displayable difference exists, characters will be shown in the case received.

Punctuation: period, comma, and colon (all displayed as decimal point); minus (dash), blank

Display and Serial Buffer Capacity

The Serial Slave display is right aligned and has the capacity of displaying six characters. When less than six characters are received, blank spaces are placed in front of the characters. If more than six characters are received, only the last six are displayed.

The unit has two internal display buffers, allowing two separate values or messages to be viewed. The main display is always enabled and viewable. The secondary display may be enabled or disabled through programming. When enabled, this display is indicated by a decimal point in the far right digit. The main and secondary displays can be toggled either manually or automatically at a user selectable toggle speed. A serial command can also be sent to select which display is shown. Both displays are retained in memory when power is removed from the unit.

The Serial Slave has an internal 64 character buffer for received data. If more than 64 characters are sent, the additional characters are discarded until a string terminator <CR> is received. At that point, the last six characters at the end of the buffer are displayed.

A carriage return <CR> is the only valid string terminator for the Serial Slave. However, if an <*> or <$> is received, the slave will empty and reset its internal character buffer without processing the string. These characters are used as valid command terminators for serial commands sent to other Red Lion meters. Since these commands are not applicable to the Serial Slave, the slave discards the command and prepares its character buffer for a new data string.

Data and Command String Formatting

Data sent to the Serial Slave must be formatted as either main display data, secondary display data or command strings sent to perform specific display functions. The format for sending data is shown below:

N xx I d6 d5 d4 d3 d2 d1 <CR>

N - Required to address a specific slave unit in a multiple unit loop.

xx - Two-digit meter address. Single digit address requires leading zero.

I - Format identifier character (see below). Omit for main display data.

d6-d1 - The last 6 characters before the <CR> will be shown, if displayable.

<CR> - Carriage Return (0DH) used as string terminator character.

The format identifier character <I> dictates how the Serial Slave interprets a data string as follows:

(omit) - No character indicates main display data

  # - Indicates secondary display data

  @ - Display select command, followed by display identifier character main <1> or secondary <2> (ex: @1<CR> select main display)

  % - Display intensity command, followed by intensity level character <1> to <5> (ex: %3<CR> set display intensity level to 3)

Data Receive Delay Timing

Upon receiving a string terminator character <CR>, the Serial Slave requires a delay time to process the received data and prepare for the next string. During this delay, the meter disables serial data reception.
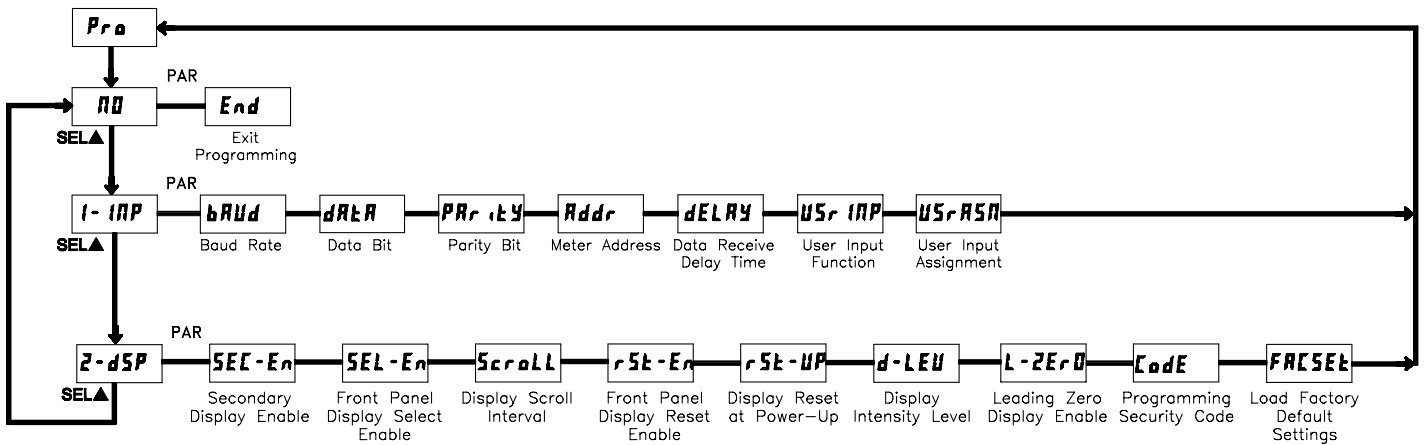
The Data Receive Delay Time is programmable in Module 1, with a minimum delay of 10 mSec. By extending this delay, the Serial Slave can ignore data sent by the host which is not intended for display. This data includes additional characters such as a <LF> or redundant <CR>, which might follow a serial data string. This could also include additional data strings sent as part of a data block, where only the first string is intended for the Serial Slave display. In this case, the delay time should be programmed to exceed the total transmission time for the entire data block. This results in the Serial Slave displaying the first string of the data block and disabling data reception during transmission of the additional strings.

The Receive Delay Time must be set to expire at a point where no data is being sent to the Serial Slave. This prevents the unit from enabling data reception in the middle of a character or data string, which could result in an incorrect display when the string is processed.

Timing Diagram for Data Reception
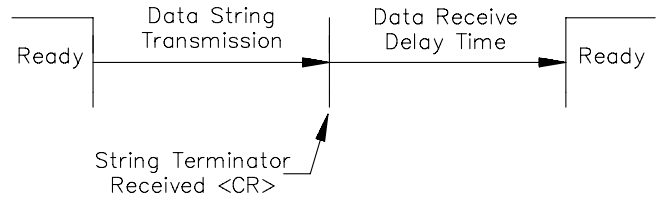
LD SERIAL SLAVE PROGRAMMING QUICK OVERVIEW