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- Before using this product, read and understand the instructions.
- Save these instructions for future reference.
- All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of equipment and/or systems in accordance with all applicable codes and ordinances.
- Failure to follow the instructions set forth in this publication could result in property damage, personal injury, or death from fire and/or explosion, or other hazards that may be associated with this type of equipment.
LectroCount FlightConnect LCR 600 Overview

GENERAL INFORMATION
This manual provides instructions for the initial setup, the calibration, and operation of the LectroCount LCR 600s with FlightConnect application software.

The Liquid Controls LectroCount LCR 600 is a microprocessor-based electronic flowmeter register. Its primary functions consist of configuring the flowmeter system to the properties of the liquids to be measured, interfacing with the electronic components of the flowmeter system components (and external components such as pumps, injectors, and shutdown devices), and performing Weights & Measures approved custody transfer actions.

The LCR 600 controls a flowmeter system as a stand-alone unit and is well-suited for mobile and fixed installations.

The LCR 600 is a self-contained unit. All operation, setup, and configuration functions can be entered using the LCR 600’s red selector switch and the alphanumeric keypad. No lap pads, laptops, or other data entry devices are required; however, a Windows®-based interface, EZCommand, is available to save and distribute settings and updates to all of the LCR 600s in a FlightConnect system.

FlightConnect LCR 600 is an automated data capture and data management system for into-plane fueling operations. FlightConnect collects the details of each fueling and wirelessly transmits the fueling data to the office.

FlightConnect limits fuelers to aviation-specific data entry and fueling screens. Data entry screens are configured during setup.

Fueler functions can be limited to: log on, log off, manual and/or scheduled fueling, and send/receive data. By limiting the fuelers to these basic functions, operating FlightConnect is simple. Commands are entered using the LCR 600 keypad or red selector switch. Other devices, such as handheld and in-cab equipment, are not needed.

LCR 600 BASIC FUNCTIONS
• Calibration (single and multipoint)
• Weights & Measures custody transfer (product fueling and ticket generation)
• Metrological data collection
• Security settings
• Valve control (with proper accessories)
• Electronic temperature volume compensation (ETVC) (with proper accessories)
• Differential pressure (ΔP) shutdown (with proper accessories)

FLIGHTCONNECT LCR 600 FUNCTIONS
• Wireless transmission of fueling data
• Scheduled (dispatch) fueling data entry (fueling data transmitted wirelessly from central dispatcher to LCR 600)
• Manual fueling data entry
• Fueling data in .csv or .xml data formats
• Data fields available
  • Additive
  • Airport Codes (origin and destination)
  • Aircraft Type
  • Comment
  • Customer
  • Flight Number
  • Fueling Location
  • Fuel Type
  • Load Location
  • Tail Number
  • Transaction Type
  • 3 Miscellaneous Text Screens (user setup and defined)

FLIGHTCONNECT OFFICE AND DBMANAGER
FlightConnect LCR 600 works in conjunction with two software packages, FlightConnect Office and DBManager. Both software packages are installed on an office computer. FlightConnect Office includes Flight Connect Read, a file conversion program; FlightConnect Edit, a database management interface; and FlightConnect Dispatch, an interface that configures and wirelessly dispatches scheduled fueling assignments to LCR 600s on the tarmac. DBManager includes LCP Setup, a program for configuring communication settings, and DBManager, a program that identifies LCR 600s, prepares file paths, schedules data transmissions and transmits data between the office and the LCR 600s.
Red Selector Switch
The LCR 600 red selector switch, located at the bottom left of the LectroCount LCR 600, has five positions. The selector switch’s primary purpose is to control everyday fueling and print functions. Functions include opening and closing the control valve (via the deadman) in order to start and stop fuelings and prompting the printer to print fueling tickets.

THE FIVE POSITIONS ON THE SELECTOR SWITCH
RUN - activates the Deadman and opens the control valve to begin a fueling
STOP - deactivates the Deadman and closes the control valve to pause a fueling
PRINT - ends a fueling and prints a fueling ticket
SHIFT PRINT - this position is not used in FlightConnect LCR 600. Shift information is automatically printed and sent to the office at fueler log off.
Calibration Position - allows access to calibration configuration settings.

CALIBRATION POSITION
The red selector switch also provides a secure calibration position. When in the calibration position, the LCR 600 may be used to calibrate the flowmeter and enter sensitive Weights & Measures data.

To turn the selector switch into the six o’clock calibration position, the LCR 600’s switchplate must be removed. To take off the switchplate, remove the four screws holding it in place. If the LCR 600 has been previously calibrated and approved by Weights & Measures, you will need to remove the lead seal and the wire threaded through the switchplate screws.
Alphanumeric Keypad
The alphanumeric keypad is the navigation and data entry tool of the LCR 600. The four larger buttons on the right side of the keypad are used primarily for navigating to fields on the display screen and navigating from one display screen to the next. The ten smaller buttons on the left side are used to enter numbers, characters, and text when changing the value of a field.

Display Screens
LCR 600 display screens can contain up to 16 fields. The values of most LCR 600 fields can be edited; however, some fields are shown for data monitoring and informational purposes only and can not be edited.

SELECTING FIELDS
To navigate to a field, there is a pointer that scrolls up and down along the left side of the LCR 600 display screens. If a field is not editable, the pointer will skip over it.

To select a field on a display screen:
1. Move the pointer on the far left of the display to the desired field using the and buttons.
2. Press the ENTER button to open a list box or a text box.

After a field is selected, the LCR 600 will bring up a list box or a text box, depending on the field, where the value of the field can be changed.
**LIST BOXES**

Some LCR 600 fields only have a predetermined or limited number of possible values. When one of these fields is selected, a list box, displaying all possible values, will open.

**To select a value in a list box:**

1. Move the pointer ▶ to your desired value using the ↑ and ↓ buttons.
2. Press the **ENTER** button to accept the value.

**TEXT BOXES**

Some LCR 600 fields require a specific alphanumeric entry. For these fields, the LCR 600 will open a box in the bottom half of the screen where text, numbers, and characters can be entered using the keypad.

**To enter a value in a text box:**

1. Enter text, numbers, or characters using the multitap functionality of the keypad’s 10 alphanumeric buttons.
2. Press the **ENTER** button to accept the value.
MULTITAP FUNCTIONALITY
While a text box is open, characters can be entered into the field using the alphanumeric buttons (and the down button). The character entered into the text box depends on the number of times the button is pressed successively.

<table>
<thead>
<tr>
<th>V</th>
<th>W</th>
<th>X</th>
<th>TAPS</th>
<th>CHARACTER</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>V</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>W</td>
<td></td>
<td></td>
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<tr>
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<td>X</td>
<td></td>
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<th>↓</th>
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<tbody>
<tr>
<td>1</td>
<td>.</td>
</tr>
<tr>
<td>2</td>
<td>—</td>
</tr>
</tbody>
</table>

Fn BOX
The Fn command (on the up arrow button) provides a set of commands and additional characters that can be used while a text box is open.

To activate an Fn command or insert an Fn character:
1. Tap the Fn button twice to bring up the Fn box.
2. Press the alphanumeric button that corresponds to the command (pictured below) to initiate command.
3. Press the Sym (9) button to open the symbols menu.
4. Press the ↑ and ↓ buttons to scroll through the symbols.
5. Press the ENTER button to accept the highlighted command or character.
The LCR 600 contains eight groups of screens: FlightConnect Screens, General Setup, System Setup, Calibration Setup, Diagnostics, Security, File System, and Machine Status. Once a group of screens is opened, you can rotate through the screens in the group by selecting the Next/Previous Screen field at the bottom of the screen.

The Configuration Menu serves as a hub for opening a screen group (excluding the FlightConnect Screens). The Configuration Menu is included in the rotation of each group of screens. It can also be opened by turning the red selector switch to the calibration position or by selecting Configuration Menu in the FlightConnect Fueler Menu.

To move from one screen to another:

1. Move the pointer to the bottom line of the screen: Next/Previous Screen
2. Press the NEXT or the PREV button to navigate to the next screen or the previous screen.

OR

1. Move the pointer to any field in the Configuration Menu screen.
2. Press the ENTER button to open the screen.
FlightConnect will page through a series of preconfigured fueling screens. See page 30.

The PRO6 button (R=Reject) will delete the displayed Dispatch Record from the LCR 600’s memory.
## LCR 600 Navigation - Introduction

### FlightConnect Screens

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<th>Fueler Menu</th>
<th>Options</th>
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**Scheduled Fueling**

**Manual Fueling**

**Fueler Logoff**

**Database Management**

**Configuration Menu**

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<th>Screen</th>
<th>Gallons</th>
<th>Fueler Menu</th>
<th>Options</th>
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<td></td>
<td></td>
<td>Scheduled Fueling, Manual Fueling, Fueler Logoff, Database Management, Configuration Menu</td>
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**Send Transactions to Office**

**Retrieve Database Updates from Office**

**Database Management**

**Configuration Menu**

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<th>Gallons</th>
<th>Fueler Menu</th>
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<td>Scheduled Fueling, Manual Fueling, Fueler Logoff, Database Management, Configuration Menu</td>
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**Fueler ID**

**Fueler Password**

**Next/Previous Screen**
Calibration Setup Screens

CONFIGURATION MENU
- General Setup
- System Setup
- Calibration Setup
- Diagnostics
- Security
- Setup FlightConnect
- File System
- Machine Status

NEXT
ENTER

PREV
ESC

NEXT
ENTER

PREV
ESC

CALIBRATION SETUP 1
- Calibration #: 1
- Calibration Code: Gallons
- Calibration Name:
- Calibration Type: Aviation
- Linearization Mode: Setup
- Pulses/Unit: 20.0000
- Prover Quantity: 00.0000
- BEGIN CALIBRATION DELIVERY
- S1 Close: 2.0 Gallons
- Net Totalizer: 0.0 Gallons
- Gross Totalizer: 141.7 Gallons

CALIBRATION SETUP 2
- Calibration #: 1
- Compensation Type: None
- Comp Parameter: ---
- Base Temperature: ---
- Gross Quantity: 11.5 Gallons
- Gross Preset: 0.0 Gallons
- Temperature: 74.7
- Net Quantity: 11.2
- Auxilliary Multi: 0.000
- Auxilliary Quantity: 0
- Auxilliary Unit/Measure: Litres

CALIBRATION SETUP 3
- Calibration #: 1
- Linearization Mode: Applied
- Linearization Prover Qty: 50.12
- BEGIN CALIBRATION DELIVERY
- Point # 1: Flow Rate: 88.00 Percent Error: -0.030
- Point # 2: Flow Rate: 11.00 Percent Error: -0.108
- Point # 3: Flow Rate: 38.00 Percent Error: -0.138
- Point # 4: Flow Rate: 22.00 Percent Error: -0.171
- Point # 5: Flow Rate: 30.00 Percent Error: -0.149
- Point # 6: Flow Rate: 63.00 Percent Error: -0.084
- Point # 7: Flow Rate: 75.00 Percent Error: 0.020
- Point # 8: Flow Rate: 0.00 Percent Error: 0.000
- Point # 9: Flow Rate: 0.00 Percent Error: 0.000
- Point # 10: Flow Rate: 0.00 Percent Error: 0.000

Diagnostics Screen

CONFIGURATION MENU
- General Setup
- System Setup
- Calibration Setup
- Diagnostics
- Security
- Setup FlightConnect
- File System
- Machine Status

NEXT
ENTER

PREV
ESC

NEXT
ENTER

PREV
ESC

DIAGNOSTICS
- Gross Count: 270.1 GALLONS
- Flow Rate: 0.0 PER MINUTE
- Pulser Reversal: 0
- Supply Voltage: 14.6
- Software Revision: SR600v2.16
- Ticket Revision: ST600v1.04
- Loader Revision: SR002v1.07
- Display Board Revision: SR600v2.00
- Last Calib Date: 06/24/13 19:55:39
- Calibration #: 177
- Calib Event #: 3
- Config Event #: 2

Security Screen

CONFIGURATION MENU
- General Setup
- System Setup
- Calibration Setup
- Diagnostics
- Security
- Setup Aviation
- File System
- Machine Status

NEXT
ENTER

PREV
ESC

NEXT
ENTER

PREV
ESC

SECURITY
- Date Format: MM/DD/YY
- LCR Date: 06/24/13
- Calibration #: 27
- User Key: Security: LOCKED
- Factory Key: ---
- Application Online? Yes
- Serial ID: 2951050

Next/Previous Screen
INTRODUCTION - LCR 600 NAVIGATION

FlightConnect Setup Screen

**CONFIGURATION MENU**
- General Setup
- System Setup
- Calibration Setup
- Diagnostics
- Security
- Setup FlightConnect
- File System
- Machine Status

**FlightConnect Setup**
- Enable Auto Logoff?: No
- Fueler Menu?: Both
- Office Path: C:\DMS

**DATABASE MANAGEMENT**
- Send Transactions to Office
- Retrieve Database Updates from Office

**FILE DIRECTORY LISTING**
- Size: 196608
- Avail: 105948
- File Name    Date            Size
  AppInfo.601  01/01/2020 08:00  158
  C000L000.lng 01/01/2020 08:01  2015
  C001L000.lng 01/01/2020 08:02  6105
  C002L000.lng 01/01/2020 08:03  8154
  C003L000.lng 01/01/2020 08:04  951
  C004L000.lng 01/01/2020 08:05  3254
  C026L000.lng 01/01/2020 08:06  19815
  C600L000.lng 01/01/2020 08:07  25981
  C601L000.lng 01/01/2020 08:08  2681
  CR501201.trn 01/01/2020 08:09  516

**File System Screens**

**CONFIGURATION MENU**
- General Setup
- System Setup
- Calibration Setup
- Diagnostics
- Security
- Setup FlightConnect
- File System
- Machine Status

**VIEW NVRAM MEMORY**
- Starting Dump Address: 000000
- 0000 4C 43 46 53-01 01 02 LCF.
- 0008 50 45 5F 00 00 00 00 00 00 OF
- 0010 00 00 00 00 00 00 00 00 00
- 0020 00 00 00 00 00 00 00 00 00
- 0030 00 00 00 00 00 00 00 00 00
- 0038 2F 00 00 00 00 01 52 43 C

Press NEXT/PREV KEY to Page

**File Explorer**
- Drive: A
- File Name    Date            Size
  AppInfo.601  01/01/2020 08:00  158
  C000L000.lng 01/01/2020 08:01  2015
  C001L000.lng 01/01/2020 08:02  6105
  C002L000.lng 01/01/2020 08:03  8154
  C003L000.lng 01/01/2020 08:04  951
  C004L000.lng 01/01/2020 08:05  3254
  C026L000.lng 01/01/2020 08:06  19815
  C600L000.lng 01/01/2020 08:07  25981
  C601L000.lng 01/01/2020 08:08  2681
  CR501201.trn 01/01/2020 08:09  516

Press NEXT/PREV KEY to Page
LEVELS OF SECURITY

Many LCR 600 fields are accessible only while certain security levels are accessed. The security levels provide the safeguards essential for Weights & Measures approval, and they give owners and operators a means of restricting drivers and fuelers access to certain functions. There are five levels of security on the LCR 600: Locked, Unlocked, Weights & Measures Calibration, Stop/Pause, and Factory.

LOCKED
An owner/office security setting that limits the access of drivers to a small number of fueling, system, and FlightConnect fields.

To lock the LCR 600
1. Select the Security screen from the Configuration Menu.
2. Move the pointer ▶ to User Key: field and press the ENTER button.
3. Enter an alphanumeric password in the text box and press the ENTER button.
4. Move the pointer ▶ to the Security: field and press the ENTER button.
5. Move the pointer ▶ to Locked in the list box and press the ENTER button.

WEIGHTS & MEASURES CALIBRATION
The Weights & Measures Calibration security setting allows access to all fields and functions necessary for Weights & Measures approval and the complete configuration of the LCR 600 for service.

To enter the Weights & Measures Calibration mode
1. Remove the faceplate around the red selector switch. If the LCR 600 was Weights & Measures approved beforehand, you will need to remove the lead seal and wire threaded through the switchplate screws.
2. Turn the selector switch to the six o'clock position.

UNLOCKED
An owner/office security setting that allows drivers access to a large number of fueling, system, and POS fields.

To unlock the LCR 600
1. Select the Security screen from the Configuration Menu.
2. Move the pointer ▶ to User Key: field and press the ENTER button.
3. Enter the same alphanumeric password that was entered when the LCR 600 was locked. The value of the Security: field will change to UNLOCKED.

FACTORY
A security setting restricted to LC factory personnel.

Throughout this manual, each LCR 600 field definition specifies the security levels that allow access to the field. The abbreviation for each security level is as follows:

- L - Locked
- U - Unlocked
- C - Weights & Measures Calibration
- P - Stop/Pause
- F - Factory

LCR 600 units are shipped from the factory locked.

To unlock a factory shipped LCR 600:
1. Open the User Key: field in the Security screen
2. Press ENTER (do not enter any characters)
3. Press ENTER again.
SECURITY

Date Format: (LB) C-U
The format in which the date will be displayed and printed.
- MM/DD/YY • DD/MM/YY

Date: (TB) C-U
The date according to the selected date format. Enter two digits for the day or month, a period (or backslash), two digits for the month or day, a period (or backslash), and two digits for the year.

Calibration #: Display only
The number of times the calibration switch position has been used.

User Key: (TB) C-U-L
The owner/office password. The password is required to unlock the system in order to gain access to secured menu and data entry fields. The Security: field specifies if the system is locked or unlocked. If the system is locked, the Gross Preset, Net Preset, Product Code, Product Code, and No-Flow Timer are unaccessible.

Security: (LB) C-U
Locks the system.
- Locked • Unlocked

Factory Key: (TB) C-U-P-L
The pass key required for factory configurations.

Application OnLine: (LB) C-U-P-L
Turns FlightConnect on and off, if the application has been activated. Turning FlightConnect off is typically only necessary during system operation prior to FlightConnect setup or in case of emergency when a pump and print is required.
- Yes • No
FlightConnect LCR 600 Setup Overview
Before using the LCR 600 to deliver fuel, it must be setup to fit its specific application requirements. The FlightConnect application settings are the same as many of the LCR 600 base settings; however, there are settings that are required or preferred for FlightConnect. FlightConnect required and preferred settings will be noted with a banner throughout this manual.

A COMPLETE LCR 600 SETUP
1. Configure the LCR 600 to all existing input and output components.
2. Calibrate the flowmeter system for Weights and Measures approval.
3. Enter user information and preferences.

LCR 600 Setup - Simple & Comprehensive Method
The simplest and most comprehensive LCR 600 setup method is to open every setup screen, review each field, and select a setting. Start with the General Setup and move down the Configuration Menu list through the System Setup, Calibration Setup, and Setup FlightConnect screens. The following pages provide an explanation of each field, calibration instructions, and FlightConnect setup instructions.

GENERAL SETUP 1

**Unit ID:** (TB) C-U
A number used to identify a truck or piece of fueling equipment designated to the LCR 600. In FlightConnect, this field identifies the unit on the network when the fueler logs into the FlightConnect. This field requires a matching Unit ID number in the Truck records of FlightConnect Edit software.

**Date Format:** (LB) C-U
The format in which the date will be displayed and printed.

- MM/DD/YY • DD/MM/YY

**Date:** (TB) C-U
The date in the selected date format. Enter two digits for the day or month, a period (or backslash), two digits for the month or day, a period (or backslash), and two digits for the year.

**Time:** (TB) C-U
The time of LCR 600’s internal clock. The time is kept by the LCR 600 and printed on the fueling tickets. Enter the current hour, minutes, and seconds in military time, for example 13:01:15 for 1:01:15 PM.

**Presets Allowed:** (LB) C-U-L
Limits or allows preset options in the Fueling Screens. None is the preferred FlightConnect setting. Aviation flowmeter systems are typically not equipped with a two-stage valve, which is required for presetting.

- None: disables all presetting
- Gross: enables only gross presetting
- Net: enables only net presetting
- Both: enables gross and net presetting

**Sale #:** (TB) C
The number of transactions processed by the LCR 600. Any number entered in this field will restart the count and begin at the entered number. 0-999999 range.

**Ticket #:** (TB) C
The number of tickets printed by the LCR 600, including multiple and duplicate tickets. Any number entered will restart the count and begin at the entered number. 1-999999 range. If a 0 is entered, the ticket # will not print on the fueling ticket and the value will not increment. 0 is the preferred FlightConnect setting.
Print Gross and Parameter? (LB) C
Determines if the gross volume and compensation parameter is printed on the ticket. Applies to temperature compensated products only. No is the preferred FlightConnect setting.

Volume Corrected Message? (LB) C
Determines if the message noting that the fueling volume has been corrected to a base temperature is printed on the ticket, for example "Gallons corrected to 60.0ºF". No is the preferred FlightConnect setting, unless temperature compensation is active.

Pulse Output Edge: (LB) C
Determines the signal of the calibrated pulse output waveform. Some external components function on rising pulse edges, others on falling pulse edges. Refer to the technical manual of the external component receiving the pulse to determine requirements.

   Falling • Rising

Pulse Output Freq: (TB) C
Determines the frequency of the pulse output per unit of measure sent by the Auxiliary Output 3 on terminal 42 of the J12 terminal block. Common components that are connected to Auxiliary Output 3 include external counters and injection systems. This field is a multiplier of the calibrated pulse output. If 10 is the field value, the Auxiliary Output 3 will be 10 pulses (10 x 1) per the least significant digit of the calibrated pulse output. If .1 is the field value, the Auxiliary Output 3 will be 1 pulses (.1 x 1) per every 10 least significant digits of the calibrated pulse output. The default value is 1. At the default value, the output will be 1 pulse per each least significant digit counted on the display.

GENERAL SETUP 2

No-Flow Timer: (TB) U-L
The amount of time until the LCR 600 ends a fueling and prints a ticket after it senses that no product is flowing through the meter. The time can be set from 0 to 3600 seconds. 0 is the preferred FlightConnect setting. A 0 setting will keep the transaction active until a print or end of fueling command is generated.

Ticket Header Text: (TB) C-U (Lines 11 and 12 C only)
Supplies 12 lines where you can enter text for the ticket header. Every fueling ticket printed by the LCR 600 will print this text at the top of every ticket. FlightConnect ticket headers are created in FlightConnect Edit. The preferred FlightConnect setting is to leave these fields blank.

Field Type
TB - Text Box
LB - List Box
System Setup 1

Meter ID: (TB) C
The identification number of the flowmeter the LCR 600 is mounted on. If the LCR 600 is installed in a multiple-meter system, it is important this number be unique. The number is printed on the calibration/diagnostic ticket. LC recommends entering the flowmeter’s serial number to ensure identification.

Unit of Measure: (LB) C
The unit of flow measurement.
- Gallons • Litres • Cubic M • Lbs (pounds) • Kgs • Barrels • Other

Decimal Digit: (LB) C
The decimal place of volume measurements shown on the display and printed tickets. Whole is the preferred FlightConnect setting.
- Hundredths • Tenths • Whole

Residual Processing: (LB) C
The treatment of excess decimal places when displaying and printing volume measurements. Round is the preferred FlightConnect setting.
- Round: according to one half of the least significant digit
- Truncate: disregards the excess digits

Flow Rate Base: (LB) C
The time unit of the measured flow rate. Per Minute is the preferred FlightConnect setting.
- Per Second • Per Minute • Per Hour

Flow Direction: (LB) C
The direction of flow through the flowmeter. If the LCR 600 is counting in reverse (decreasing numbers), select the opposite Flow Direction.
- <- • ->

Printer: (LB) C
The type of printer connected to the LCR 600.
- EPSON NewFontB EPSON 200 Roll and EPSON 220 Roll
- EPSON NewFontA EPSON TM-T88iii
- EPSON OldFontA EPSON 290 Slip and EPSON 295 Slip
- EPSON OldFontB EPSON 300 Roll
- OKIDATA ML184T OKIDATA ML184T
- BLASTER Cognitive Solutions Thermal Printer

Ticket Required: (LB) C
Determine if the printer is required to be online and ready to print in order to start a fueling. Most Weights & Measures governed truck applications require a ticket. Yes is the preferred FlightConnect setting.
- Yes: fuelings disabled unless a ticket is in the printer, the previous fueling ticket is completed, and the printer is operational.
- Skip: fuelings enabled without printer. Tickets will not print even if the printer is online and has paper.
- No: fuelings enabled without printer. Tickets will print if the printer is online and has paper.

dP Shutdown Value: (TB) C
The differential pressure amount that will shut down an active fueling. This feature pertains to flowmeter systems with a differential pressure transducer and requires a shutdown device. If the value is set to 0, the feature is disabled.
- 0-59.9 range.

Security Clearance
- L: Locked
- U: Unlocked
- C: Weights & Measures Calibration
- P: Stop/Pause
- F: Factory
LCR Node Address: (TB) C-U
Designates the LCR 600 as a single or dual node unit. If the fueling vehicle has one LCR 600 installed, this field should be set to 1. If the fueling vehicle has two LCR 600s installed, one LCR 600 should be designated as Node 1 and the other LCR 600 should be designated as node 2 in this field. The value of this field will be reflected in the invoice number generated by FlightConnect.

Delivery Screen: (TB) C
The format of the active delivery screen, four predefined. Aviation is the preferred FlightConnect setting.

User Defined • Detailed Pump & Print • Volume and Preset • Aviation • Detailed POS

SYSTEM SETUP 2

Temperature: (TB) C
The current temperature reading of the RTD temperature probe. To calibrate, simply enter the Weights & Measures thermometer reading. If the LCR 600 does not have an ETVC Kit, this field will read "--".

Temperature Offset: (TB) C
The difference between the official Weights & Measures reading and the LCR 600 RTD reading. The offset is automatically calculated if an entry is made in the Temperature field. ±0.3 °C (±0.54 °F) range.

Temperature Unit/Measure: (LB) C
The unit of temperature measured, displayed, and printed.

Deg. C • Deg. F

RTD Slope: F
Factory calibration setting only.

RTD Offset: F
Factory calibration setting only.

DBM Node Address: (TB) C
This field is for configuring LCR 600 data transmission
The address of DBManager, Liquid Controls’ database management office software. This node aligns wireless communication between the office and fueling vehicle. Nearly all installations will use the default setting of 255.

File Server Parameters

Node Address: (TB) C
This field is for configuring LCR 600 data transmission
A unique node address for the LCR 600, used by DBManager (Liquid Controls’ database management software for the office computer) to identify the LCR 600 unit in the wireless network. This field value must be unique among LCR 600 units in the wireless network and have a matching Node # in the Registered Files Server Nodes of the DBManager.

File Server Port: (LB) C
This field is for configuring LCR 600 data transmission
The LCR 600 CPU port designated for serial communication to a wireless device. J3 is the default and the standard LCR 600 communication port for data transfer output.

J1 • J2 • J3

Baud Rate: (LB) C
This field is for configuring LCR 600 data transmission
The communication speed. This value should match the wireless device connected to the LCR 600. 57600 is the standard communication speed, but check your wireless device specifications to ensure the proper selection.

115200 • 57600 • 19200 • 4800 • 2400

Retries: (TB) C
This field is for configuring LCR 600 data transmission
After a failed initial attempt, the number of attempts the LCR 600 will try to make a serial connection with the wireless communication network before timing out. 1 is the preferred FlightConnect setting.

Timeout: (TB) C
This field is for configuring LCR 600 data transmission
The amount of time, in milliseconds, the LCR 600 will wait for a response, once a serial signal is sent to a wireless network, before timing out.

TX enable: (LB) C This field is for configuring LCR 600 data transmission
The setting for the serial signal transmit and receive handshake technique to the wireless device. None is the default setting.

None • !RTS • RTS • !DTR • DTR • !RTS!DTR
Preparing for Calibration
Before the LCR 600 is put into daily operation, the register must be defined and proved according to the liquid that the flowmeter will be measuring. This is done in the Calibration Setup screens. Although the LCR 600 can hold a total of 16 different calibrations simultaneously, FlightConnect is designed for only one calibration (Calibration #1). In FlightConnect, the primary purpose of the Calibration Setup screens is to calibrate Product 1 of the LCR 600.

To calibrate an LCR 600
1. Remove the switchplate and move the selector switch to the calibration position.
2. Enter the proper settings in Calibration Setup 1 and Calibration Setup 2.
3. Prove the flowmeter system with single-point or multi-point calibration.

**CALIBRATION SETUP 1**

**Calibration #: (LB) C-U-L**
The active calibration of 16 possible calibrations. The fields shown on the Calibration Setup 1 screen represent the values of the Calibration # shown. Any edits made to the fields are attributed to the Calibration # shown. FlightConnect only uses Calibration #1.

**Calibration Code: (TB) C-U**
The code assigned to the active calibration. This code can be used to correspond with an office code. A value in this field is not required for FlightConnect.

**Calibration Name: (TB) C-U**
The text designation of the active calibration. A value in this field is not required for FlightConnect.

**Calibration Type: (LB) C**
The product type of the active calibration. Aviation is the preferred FlightConnect setting.

- Ammonia
- Aviation
- Distillate
- Gasoline
- Methanol
- LPG
- Lube Oil
- blank

**Linearization Mode: (LB) C**
Disables and enables single and multi-point calibration.
- Setup allows the setting of single and multi-point calibration. Enables single and multi-point calibration settings in fuelings.
- Applied enables multi-point calibration settings in fueling.

**Pulses/Unit <k-Factor>: (TB) C**
The number of pulse edges per unit of measure. Applies only to gross volume. This number scales the prover quantity. A unit of 20.0000 is entered on all factory shipments. Changing the k-factor moves the entire flowmeter accuracy curve either up or down. See table on page 26.

**Prover Quantity: (TB) C**
The metered volume of the prover after a calibration fueling. When the prover volume is entered, the LCR 600 adjusts the k-factor to calibrate the pulses/unit. See calibration instructions.

BEGIN CALIBRATION DELIVERY
Starts a calibration fueling. See page 25.

**S1 Close: (TB) C**
The point during a preset fueling when the valve switches from full flow to a dwell flow. The LCR 600 will switch the valve to dwell flow when the volume remaining in the preset fueling reaches the value of this field. 0 to 500 range. 0 is the preferred FlightConnect setting (aviation flowmeter systems typically do not have two-stage valves, which are required for this feature).

**Net Totalizer: Display only C**
Total accumulated net (temperature compensated) volume delivered by the LCR 600. In the calibration position, this field can be set to any positive value. The value resets after a clear all.

**Gross Totalizer: Display only C**
Total accumulated gross volume delivered by the LCR 600. In the calibration position, this field can be set to any positive value. The value resets after a clear all.
Calibration Setup 2

Calibration #: (LB) **C-U-L** FlightConnect

The active calibration of 16 possible calibrations. The fields shown on the Calibration Setup 2 screen represent the values of the Calibration # shown. Any edits made to the fields are attributed to the Calibration # shown. FlightConnect only uses Calibration #1.

Compensation Type: (LB) **C**
The type of temperature volume compensation applied to the active Calibration #. Refer to the Compensation Types and Parameters table on page 27 to find the correct compensation. If **NONE** is selected, fuelings will be in gross quantities only.

Linear F • Linear C • API Table 24 • API Table 54 • API Table 6B • API Table 54B • API Table 54C • API Table 54D • NH3 • NONE

Compensation Parameter: (tB) **C**
The coefficient of expansion, the standard density, API gravity, or the specific gravity applied to the Compensation Type. This field has default values that are set when Compensation Type changes. Ensure the default value is correct. Refer to the Compensation Types and Parameters table on page 27 for ranges.

Base Temperature: (tB) **C**
The base temperature for temperature compensated fuelings. Although this field is editable for some Compensation Type values, it defaults to 60°F or 15°C according to the selected Compensation Type.

Gross Quantity: **Display only**
The gross volume of the latest calibration fueling.

Gross Preset: (TB) **C-U-L-P**
The gross preset for the next calibration fueling.

Temperature: **Display only**
The current temperature reading of the RTD temperature probe.

Net Quantity: **Display only**
The net volume of the latest calibration fueling.

Auxiliary Multiplier: (TB) **C**
The factor used to convert the measured volume of a fueling to an alternate volume or mass unit. If this field is 0, it will not print on the fueling ticket. Users must furnish a conversion factor.

**EXAMPLE** Auxiliary Multiplier = (SpGr) x (8.345 lbs/gal)

SpGr = specific gravity

Auxiliary Quantity: (TB) **C**
The alternate volume or mass delivered using the Auxiliary Multiplier.

Auxiliary Unit of Measure: (LB) **C**
The auxiliary unit of measure printed on the fueling ticket.

Gallons • Litres • Cubic M • LBS • KGS • Barrels • Other

FlightConnect & Temperature Compensation

The fields on the Calibration Setup 2 screen are used to define temperature compensation parameters for flowmeter systems with ETVC kits installed. Fields should be left blank for systems without ETVC.

Security Clearance

L - Locked
U - Unlocked
C - Weights & Measures Calibration
P - Stop/Pause
F - Factory
CALIBRATION SETUP 3

Calibration #: (LB) C - U - L

The active calibration of 16 possible calibrations. The fields shown on the Calibration Setup 3 screen represent the values of the Calibration # shown. Any edits made to the fields are attributed to the Calibration # shown. FlightConnect only uses Calibration #1.

Linearization Mode: (LB) C
Disables and enables multi-point calibration.

Setup disables multi-point calibration during normal fuelings. Used when proving and setting multi-point calibrations.

Applied enables multi-point calibration.

Linearization Prover Qty: (TB) C
The metered volume of the prover after a calibration fueling. When the prover volume is entered, the LCR 600 will prompt you to select a linearization point number and a flow rate. After these values are entered, the LCR 600 will assign the error accordingly.

BEGIN CALIBRATION DELIVERY
Starts a calibration fueling.

Point #: (TB) C
The fields under Point #: are used to calibrate the flowmeter/register at up to 10 different flow rates for each product type/calibration.

Flow Rate: (TB) C
The flow rate at which the calibration point was measured.

Percent Error: (TB) C
This field contains the percent difference between the register volume and the prover volume.

\[\text{Percent Error} = \left(\frac{\text{Prover Qty.} - \text{Meter Qty.}}{\text{Prover Qty.}}\right) \times 100\]

Single Point or Multi-Point Calibration
The LCR 600 provides two means of calibration, single point or multi-point calibration. A "point" corresponds to a particular flow rate along the flowmeter’s accuracy curve. Single point calibration adjusts one point along the accuracy curve to zero percent error—typically the standard flow rate of a normal fueling. Multi-point calibration zeroes the percent error at multiple flow rates in order to flatten out the accuracy curve across the flowmeter’s range of flow rates. Multi-point calibration is ideal for applications in which fuelings are made at many different flow rates, while single point calibration is appropriate for applications where a high flow rate is typical for most fuelings.

Single Point and Multi-Point Calibration Accuracy Curves

**Single Point Calibration Accuracy Curve**

**Multi-point Calibration Accuracy Curve**
Packing the Hose
If you are proving the flowmeter with a hose and a nozzle, you will want to make sure the hose is packed before beginning the proving fueling. This will ensure the same shut off point at the beginning and end of the fueling.

To pack the hose:
1. In the Calibration Setup 1 screen, move the pointer ► to the BEGIN CALIBRATION DELIVERY field and press the ENTER button—do not open the hose nozzle.
2. When the hose is packed and stabilized, move the pointer ► on the END CALIBRATION DELIVERY field (in the Calibration Fueling Screen) and press the ENTER button.
3. The Calibration Setup 1 screen will reappear, and a new calibration delivery will start at “0”.

Single Point Calibration Proving
To single point calibrate a product, the LCR 600 must make a fueling into a volumetric prover. The measurement indicated by the volumetric prover is then entered into the LCR 600. This sets the k-factor (pulses/unit). The new k-factor establishes the number of pulses the LCR 600’s internal pulser registers for each unit of measurement that passes through the flowmeter (for example, 205.8 pulses for every gallon). When proving for use in Weights and Measures applications, a qualified Weights and Measures technician must prove the flowmeter.

To prove a flowmeter system with single point calibration:
1. With the selector switch in the calibration position, navigate to the Calibration Setup 1 screen.
2. Move the pointer ► to Calibration #: and select a number. This should be Calibration #1 for FlightConnect.
3. Move the pointer ► to Linearization Mode: and select Setup.
4. Move the pointer ► to Pulses/Unit: and enter a k-Factor that approximates the size of the flowmeter being calibrated. See table on page 26.
5. Move the pointer ► to the BEGIN CALIBRATION DELIVERY field.
6. Press the ENTER button to begin the calibration fueling into a volumetric prover. A fueling screen will appear that shows the gross volume and flow rate.
7. When the calibration run is complete, move the pointer ► to END CALIBRATION DELIVERY, at the bottom of the calibration fueling screen, and press ENTER to end the fueling.
8. Move the pointer ► to Prover Quantity: and enter the quantity indicated by the volumetric prover. The LCR 600 will automatically adjust the value in the Pulses/Unit <k-Factor> field to the correct value.
9. Repeat step 5 through 8. Check the prover volume and the LCR 600 volume. If they are not within tolerance limits, reprove the flowmeter until the meter system is within the tolerance.

Proving can only be done in gross volume.
Multi-Point Calibration Proving

Multi-point calibration improves overall flowmeter accuracy by flattening out the accuracy curve across flow rates. Although accuracy tends to lessen at lower flow rates, the repeatability of Liquid Controls’ flowmeters remains consistent. The flowmeter might not be perfectly accurate at low flow rates, but it is inaccurate the same amount each time. Multi-point calibration takes advantage of the steadfast repeatability of a Liquid Controls flowmeter by identifying the amount of inaccuracy and correcting it with a linearizing algorithm during fuelings. In order to apply the linearizing algorithm, the degree of error for points along the accuracy curve must be identified by making a number of fuelings at different flow rates into a volumetric prover. Multi-point calibration is very beneficial for flowmeter systems that experience a wide range of flow rates (for example, trucks that fill tanks of varying sizes) and for flowmeter systems that have recently undergone maintenance or other alterations that could change the accuracy curve itself.

To prove a flowmeter system to a product with multi-point calibration:

1. With the selector switch in the calibration position, navigate to the Calibration Setup 1 screen.
2. Use the instructions on the page 25 to run a single point calibration.
4. Move the pointer to the BEGIN CALIBRATION DELIVERY field.
5. Press the ENTER button to begin the calibration fueling into a volumetric prover. A fueling screen will appear that shows the gross volume and flow rate.
6. To end the fueling, move the pointer to the END CALIBRATION DELIVERY field at the bottom of the calibration fueling screen.
7. Move the pointer to the Prover Quantity: and enter the quantity indicated by the volumetric prover.
8. The LCR 600 will automatically display a Point #: list box with the numbers 1-10. Select a number.
9. The LCR 600 will then display a Linearization Flow Rate text box. Enter the flow rate of the proving run. The percent error is calculated automatically.

Multi-Point Calibration Tip

For the first two proving runs, one should be near the maximum flow rate and one near the minimum flow rate of the flowmeter. When choosing flow rates after the initial two proving runs, split the difference until all points are within 0.25% of each other.

Keep Flow Rates Even

Run the first multi-point calibration fueling at the same flow rate used in step 2.

Proving runs are in gross volume only.
Multi-Point Calibration Proving - continued

To prove a flowmeter system to a product with multi-point calibration (cont’d):

10. Repeat steps 4 through 10 using a new flow rate for the next Point #: until all the points between the lowest flow rate and the maximum flow rate are within 0.25% of each other.

11. Navigate to Calibration Setup 1. Move the pointer ▶ to **Linearization Mode**: and select **Applied**.

The LCR 600 will not allow you to enter the Applied setting of the Linearization Mode: until all adjacent calibration points are within 0.25% of each other.

The linearization points on Calibration Setup 3 will automatically sort by flow rate after the Applied setting is selected.

Compensation Types and Parameters

<table>
<thead>
<tr>
<th>Product</th>
<th>VCF Type</th>
<th>Parameter Coefficient</th>
<th>Range</th>
<th>°Celsius/°Fahrenheit</th>
<th>Tbase</th>
<th>Tmin</th>
<th>Thold</th>
<th>Tmax</th>
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</thead>
<tbody>
<tr>
<td>General</td>
<td>Linear</td>
<td>Linear</td>
<td>0 to 0.003</td>
<td>15</td>
<td>-90</td>
<td>N/A</td>
<td>+100</td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>Linear</td>
<td>Linear</td>
<td>0 to 0.005</td>
<td>60</td>
<td>-130</td>
<td>N/A</td>
<td>+212</td>
<td></td>
</tr>
<tr>
<td>LPG USA</td>
<td>Linear</td>
<td>Linear</td>
<td>0.5 to 0.550</td>
<td>60</td>
<td>-50</td>
<td>-50</td>
<td>+140</td>
<td></td>
</tr>
<tr>
<td>LPG Europe &amp; Canada</td>
<td>Specific Gravity</td>
<td>API Table 24</td>
<td>0.5 to 0.600</td>
<td>15</td>
<td>-46</td>
<td>-46</td>
<td>+60</td>
<td></td>
</tr>
<tr>
<td>Refined Petroleum Products Europe &amp; Canada</td>
<td>Density kg/L</td>
<td>API Table 54B</td>
<td>653.0 to 1075.0</td>
<td>15</td>
<td>-50</td>
<td>-40</td>
<td>+95</td>
<td></td>
</tr>
<tr>
<td>Refined Petroleum Products USA</td>
<td>API Gravity</td>
<td>API Table 6B</td>
<td>0 to 85</td>
<td>60</td>
<td>-50</td>
<td>-40</td>
<td>+200</td>
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<tr>
<td>General</td>
<td>Coefficient</td>
<td>API Table 54C</td>
<td>0.000486 to 0.001674</td>
<td>15</td>
<td>-50</td>
<td>-40</td>
<td>+95</td>
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</tr>
<tr>
<td>Lube Oil Europe &amp; Canada</td>
<td>Density kg/m3</td>
<td>API Table 54D</td>
<td>800 to 1164</td>
<td>15</td>
<td>-50</td>
<td>-40</td>
<td>+95</td>
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<tr>
<td>Ammonia Canada</td>
<td>N/A</td>
<td>NH3</td>
<td>N/A</td>
<td>15</td>
<td>-30</td>
<td>-30</td>
<td>+40</td>
<td></td>
</tr>
</tbody>
</table>
FlightConnect Setup Screen

**FLIGHTCONNECT SETUP**

Enable Auto Logoff? (LB)  C - U - L
Logs off active fueler when system is powered down. This field is typically configured in FlightConnect Edit.

**Fueler Menu:** (LB)  C - U - L
Determines the FlightConnect fueling screens available to the fueler.
- Scheduled • Manual • Both

**Office Path:** (TB)  C - U - L
The path on the office computer where FlightConnect transaction are sent.

File System Screens

**DATABASE MANAGEMENT**

Send Transactions to Office (LB)  C - U - L
Sends stored transaction data of the LCR 600 to the office computer.

Retrieve Database Updates from Office (LB)  C - U - L
Retrieves updated database files from office computer. This function can be used during setup to load database files and settings from the FlightConnect Office software.

**FILE EXPLORER**  C - U - L

Press NEXT/PREV key to Page
Lists the files loaded onto the LCR 600. Consult factory before opening and editing any data in this screen.

**NVRAM MAINTENANCE**  C - U - L

Press NEXT/PREV key to Page
The contents of the memory on the LCR 600. Consult factory before opening and editing any data in this screen.

Security Clearance
- L  - Locked
- U  - Unlocked
- C  - Weights & Measures Calibration
- P  - Stop/Pause
- F  - Factory

Field Type
- TB - Text Box
- LB - List Box
Operation Overview
After setting up the LCR 600 to your specifications, the selector switch faceplate must be fastened and sealed before the LCR 600 is ready for everyday use. While the faceplate is on, the calibration position is not accessible. Still, the LCR 600 performs all necessary fueling functions including: starting fuelings, pausing fuelings, ending and printing fueling tickets, printing duplicate tickets, printing diagnostic tickets, ending shifts, and printing shift tickets.

FlightConnect LCR 600 Navigation
The FlightConnect LCR 600 interface consists of screens with list boxes and text boxes, similar to those in LCR 600 setup.

LIST BOXES
List boxes consist of a header and a list of options. Small arrows, located on the far right of the screen beside the first or last option, indicate the presence of more options available above or below those visible. Users can also navigate through the list quickly by entering the first letter or number of the desired option into the alphanumeric keypad.

To select an option in a FlightConnect LCR 600 list box:
1a. Use the ↑ and ↓ buttons to move the highlighted bar to the desired option.
1b. Enter the first letter (or number) of the desired option. The highlighted bar will move to that option.
2. Press the ENTER button to select the option.

TEXT BOXES
Text boxes consist of a header and a space where alphanumeric characters can be entered. The amount of characters is limited, according to the FlightConnect LCR 600 option open on the screen.

To enter a value in a FlightConnect LCR 600 text box:
1. Enter text, numbers, or characters using the multitap functionality of the keypad’s 10 alphanumeric buttons.
2. Press the ENTER button to select the value.
**Fueler Logon**

Upon powering up the LCR 600, after FlightConnect setup is complete, the Fueler ID screen will appear. After entering a valid Fueler ID and a password (if required), the Fueler Menu will appear. If the previous fueler did not logoff before the LCR 600 powered down, the Fueler Menu will be the first screen to appear.

**To logon to FlightConnect:**

1. Enter the fueler’s Fueler ID.
2. Press the ENTER button to accept the value.
3. Enter the fueler’s Fueler Password. The password screen only appears if a password was entered into the FlightConnect database.
4. Press the ENTER button to accept the value.

**Fueler Logoff**

The Fueler Logoff command logs off the active fueler and prints a shift ticket. FlightConnect will continue adding fuelings to the shift until the active fueler is logged off.

**To logoff FlightConnect:**

1. From the Fueler Menu, move the highlighted bar to Fueler Logoff and press the ENTER button.
2. Select Yes and press the ENTER button.

**Fueler Menu**

The Fueler Menu is the hub for all FlightConnect operational functions. From the Fueler Menu, fuelers can start scheduled and manual deliveries, logoff, send and retrieve data wirelessly from the office, and enter the Configuration Menu. To select a function, use the arrow buttons to scroll move the highlighted bar and the ENTER button to select the highlighted function. An indicator arrow will appear on the right side of the black header bar when fueling transactions are available to send to the office.

**Scheduled and Manual Fueling**

Before FlightConnect will allow a fueling, details about the aircraft and the pending fueling must be entered into FlightConnect. FlightConnect combines these details with the metrological data of the fueling, prints them on the ticket, saves them as a data record, sends them to the office where they can be recorded in the company books.

There are two methods of entering aircraft and fueling details into FlightConnect, a scheduled fueling and a manual fueling. The details of a scheduled fueling are defined in the office using FlightConnect Dispatch software and then wirelessly sent to the LCR 600. The details of a manual fueling are defined by the fueler through a series of preconfigured FlightConnect data field screens.

After the fueler accepts a scheduled fueling or completes the series of FlightConnect data field screens, FlightConnect will display the New Fueling screen. The New Fueling screen displays a list of the fueling details—defined in FlightConnect Dispatch or by the fueler in FlightConnect 600. From the New Fueling screen, fuelers can start fueling, or they can scroll through the list, select a field, reenter a new value, and then start fueling.
Scheduled and Manual Fueling (cont'd)

SCHEDULED FUELING

Scheduled fuelings are fueling assignments (or Dispatch Records) defined in the office (by FlightConnect Dispatch) and wirelessly sent to the LCR 600. Typically, dispatched fueling assignments are received automatically when the LCR 600 communicates with the office server during power on, logon, logoff, after fuelings, and/or periodically at a set time span. These automatic communications are setup in FlightConnect Edit. Dispatch Records can also be retrieved by a fueler manually by selecting Retrieve Database Updates from Office in the Database Management screen. See Database Management on page 35 for instructions.

The fueler can scroll through numerous dispatch records on the LCR 600 and select the correct record before fueling. The fueler also has the option of editing data fields in the dispatch record before fueling.

MANUAL FUELING

Manual fuelings allow the fueler to define the data fields before the fueling. When a manual fueling is selected in the Fueler Menu, FlightConnect LCR 600 will display a series of data field screens in which the fueler can enter specific details of the next fueling. Which data field screens and the number of screens that appear in the series is configured in FlightConnect Edit on the office computer.

To complete a Scheduled Fueling:
1. Move the highlighted bar to Scheduled Fueling and press the ENTER button.
2. If more than one dispatch record is available, use the ‽ and ‽ buttons to page through the dispatch records. Arrows in the bottom right corner of the screen indicate additional dispatch records are available.
3. To accept the dispatch record displayed on the screen, press the ENTER button to open the New Fueling screen.
4. To edit a fueling data fields in the New Fueling screen, move the highlighted bar to a data field, press the ENTER button, enter the new value, and press ENTER to accept.
5. Turn the LCR 600 selector switch to RUN.
6. Take the nozzle to the fueling point and fuel the tank.
7. Turn the LCR 600 selector switch to PRINT to print a record of the fueling.

To complete a Manual Fueling:
1. In the Fueler Menu, Move the highlighted bar to Manual Fueling and press the ENTER button.
2. Enter the correct values into the series of fueling screens until the New Fueling screen appears.
3. To edit a fueling data fields in the New Fueling screen, move the highlighted bar to a data field, press the ENTER button, enter the new value, and press ENTER to accept.
4. Turn the LCR 600 selector switch to RUN.
5. Take the nozzle to the fueling point and fuel the tank.
6. Turn the LCR 600 selector switch to PRINT to print a record of the fueling.
DATA FIELD SCREENS

New Fueling (LB)
Appears after a scheduled fueling is accepted and, in a manual fueling, after the fueler has completed the series of fueling screens. This is a list box, and the fields in this screen are editable.

Transaction (LB)
A list of transactions types. List items are configured in the Transaction Type tab of the FlightConnect Edit software. Examples of transaction types include FUEL, DEFUEL, RECIRCULATE, SUMP, or any other transfers of fuel. Unlike other FlightConnect LCR 600 list boxes that default to the last option selected, Transaction Type can either be set to default to the last option selected or to default to a specific option such as FUEL. This option is very useful since the primary function of the register will be FUEL. This option displays both the name of the transaction type as well as a related code for that transaction type.

Customer (LB)
A list of customers. List items are configured in the Customer tab of the FlightConnect Edit software. This option displays both the name of the customer as well as a related code for that customer.

Tail # (TB)
A text box where fuelers enter the tail number of the aircraft to be fueled. This field has a maximum of 7 characters available.

Fuel Location (LB)
A list of fuel locations. List items are configured in the Fueling Location tab of the FlightConnect Edit software. Fuel location examples can include gate numbers, ramp locations, terminals, or any other location. This option displays both the name of the fuel location as well as a related code for that fuel location.

Flight # (TB)
A text box where fuelers enter the flight number assigned to the aircraft to be fueled. This field has a maximum of 6 characters available.
DATA FIELD SCREENS (CONT’D)

Aircraft Type (LB)
A list of aircraft. List items are configured in the Aircraft Type tab of the FlightConnect Edit software. Aircraft types can be specific aircraft or general descriptions of aircraft to be fueled. This option displays both the name of the aircraft as well as the related code for that aircraft.

Destination (TB)
A text box where fuelers enter the destination (outbound) code of the aircraft to be fueled. This field has a maximum of 4 characters available.

Requested Volume (TB)
A text box where fuelers enter a preset fuel volume requested for the aircraft. If presetting is enabled on the LCR600, an entry in the requested volume field will trigger the valve closed or shut off the deadman once the requested volume is reached. This field has a maximum of 11 characters available.

Miscellaneous Prompts 1-3 (TB)
Three screens with a text box where fuelers can enter text into the custom data fields. Titles for each prompt can be customized in FlightConnect Edit. This field has a maximum of 14 characters available.

Fuel Type (LB)
A list of fuels. List items are configured in the Fuel Type tab of the FlightConnect Edit software. If only one fuel type is available, FlightConnect LCR 600 will default to the only available fuel type.

Additive (LB)
A yes or no list box where fuelers confirm or deny the use of an additive. When enabled both auxiliary outputs will be on during fueling.

Comment (TB)
A text box where fuelers can enter notes that will be printed.

FLIGHTCONNECT IN-FUELING SCREEN
This screen is displayed during fuelings. Data fields can be edited during a fueling.

To edit data fields during a fueling:
1. Turn the selector switch STOP to pause the fueling and open the New Fueling screen.
2. Use the ↑ and ↓ buttons to move the highlighted bar to the desired data field.
3. Press the ENTER button to open the data field, enter the new value, and press the ENTER button to accept.
4. Turn the LCR 600 selector switch to RUN to continue the fueling.

\( \Delta P: \) Display only
The current differential pressure. Field only shown if the LCR 600 is connected to a \( \Delta P \) transducer.
PRINTERs
FlightConnect Fueling Systems typically include an Epson Roll Printer; however, Epson Slip Printers can be used as well. Slip printers can prevent fuelers from starting a fueling if a ticket is not engaged in the printer. Keys to the indicator lights and button functions are shown below.

**To engage a ticket in an Epson Slip Printer:**

1. Press RELEASE on the printer. Insert a blank fueling ticket.
2. Press FORWARD on the printer to engage the ticket.

The LCR 600 will not begin a fueling without a ticket engaged in the slip printer.

**SLIP PRINTER BUTTONS AND INDICATOR LIGHTS**

- **POWER light** - light indicates power is on
- **RELEASE light** - light indicates ticket can be removed
- **PAPER OUT light** - light indicates no paper in printer
- **FORWARD button** - moves paper forward
- **REVERSE button** - moves paper backward
- **RELEASE button** - release ticket for removal

**DBManager & ACRead**

DBManager & ACRead must be running on the office computer to send and retrieve data from the LCR 600.

**Database Management**
The Database Management screen provides commands for sending and receiving data from the office.

The **Send Transactions to Office** command sends fueling data from the LCR 600 to the office. After the LCR 600 records the fueling data, an indicator arrow will appear on the Fueler Menu bar until the transaction data is sent to the office.

**To send updates to the office:**

1. From the Fueler Menu, move the highlighted bar to **Database Management** and press the **ENTER** button.
2. Move the pointer ▶ to **Send Transactions to Office**, press the **ENTER** button, move the highlighted bar to **Yes**, and press the **ENTER** button.

**Processing transaction records...**

This message is displayed when the LCR 600 is attempting to send data to the office. It is not a confirmation that the data has been sent. If the indicator arrow still appears in the Fueler Menu, there are transactions that haven’t been sent to the office.

**Automatic Data Transmission**

*In the System Definitions tab of FlightConnect Edit, data transmissions between the LCR 600 and the office can be set to transmit automatically at LCR 600 power on, fueler logon, fueler logoff, and after fuelings.*
Database Management (cont’d)
The Retrieve Database Updates from Office command retrieves data from the office, including database updates from the FlightConnect Edit and scheduled fuelings from FlightConnect Dispatch.

To retrieve updates from the office:
1. From the Fueler Menu, move the highlighted bar to Database Management and press the ENTER button.
2. Move the pointer ▶ to Retrieve Database Updates from Office, press the ENTER button, move the highlighted bar to Yes, and press the ENTER button.

Configuration Menu
The Configuration Menu option in the Fueler Menu opens the Configuration Menu screen. Fuelers will have access to fields that are not locked by the security settings. If a database user key is set up in the System Definitions database file, the Fuelers will not have access to the fields in System configuration screens. It is recommended that this user key be set up to limit user access to system setup. If a user key code is setup and required, the user will see a User Key option after selecting the system configuration option.
**Duplicate Fueling Tickets**

To print a duplicate fueling ticket:

1. Turn the LCR 600 selector switch to PRINT and then to STOP.

**Logoff (Shift) Tickets**

To print a logoff (shift) ticket:

1. From the Fueler Menu, move the highlighted bar to Fueler Logoff and press the **ENTER** button.

Logoff (shift) tickets can run over the length of a standard slip printer ticket. Two tickets may be required. When the printer stops printing, replace the ticket and press **ENTER** on the LCR 600.
Diagnostics and Troubleshooting Overview
The LCR 600 provides tools for diagnosing and troubleshooting itself as well as other aspects of the flowmeter system. The three main diagnostic tools are error messages, diagnostic and status screens, and diagnostic tickets. The LCR 600 will display an error message when the register can not execute a command or can not continue functioning until the error is corrected or the settings are modified. The diagnostic and status screens provide a detailed account of the status of the LCR 600. Diagnostic tickets are a summary of calibration data, system identification information, temperature probe data, error messages, and other useful bits of information.

Error Messages
The LCR 600 notifies users of entry errors and system errors as soon as they occur. When an error occurs, a shaded box with a short description of the error will appear on the display. Many error messages include additional instructions and options. If necessary, the additional options will lead to the diagnostic screens, where the status of the LCR 600's status can be investigated. In many cases, printing a diagnostic ticket is helpful in diagnosing the cause of the error. See page 44.

The following list of LCR 600's error messages provides an explanation of each error and possible corrective actions. If the corrective actions are not successful, consult the troubleshooting section. If problem persists after following the troubleshooting tips, call an authorized Liquid Controls service provider.

FUELING ERROR MESSAGES
These messages may be displayed when the LCR 600 is attempting to start, in the midst of, or finishing a fueling.

Delivery ticket pending
A new fueling was attempted but the previous fueling ticket was not printed in its entirety. Turn the selector switch to the PRINT position. Once the previous fueling ticket is printed, a new fueling can begin.

Check printer and cable
The printer is not responding. The most common cause is the absence of a ticket in the slip printer. Epson slip printers have a built in photo eye to detect if a ticket is in position. If there is a ticket in the printer and the “Paper Out” light is still illuminated, adjust the ticket in the printed until the light is off. Other causes include faulty data cable or power cable and LCR 600 circuit board failure.

Warning: Data storage full. Continue fueling, save tickets. Notify Manager
The LCR 600 memory is full and no more transactions can be recorded. Typically, this is a sign that communication with the office is not functioning. The office should be notified and the fueler should save all fueling tickets until communication is reestablished.

ROM CHECKSUM ERROR
The program memory space of the LCR 600 has been corrupted. If this error occurs, the unit must be reflashed with the control software before any fuelings can be made. Contact a LC service provider to reflash the LCR 600.

TEMPERATURE ERROR
The temperature circuit returned an error or the temperature calibration data is in error. Check the temperature probe and its connections. A broken temperature probe wire is the most common cause of this error. See the troubleshooting section for more information. See page 46.

VCF DOMAIN ERROR
The calculated temperature falls outside the allowable range for the current compensation parameter. Verify that the product compensation type is correct on the Calibration Setup 2 screen. See page 23.

PULSER FAILURE
The number of pulser faults exceeds the allowable amount. Pulser faults typically occur in high vibration environments or when the flow rate is highly throttled. The LCR 600 allows a maximum of five times the number of pulses required for the least significant displayed digit or 0.1% of the pulses generated for the current fueling. This equation can not be altered. Liquid Controls is not responsible for pulser failures caused by excessive system vibrations. See the troubleshooting section for more information. See page 47.

METER CALIB ERROR
The product selected for fueling has not been calibrated. Setup and calibrate the product, or if the product has already been calibrated, select the calibrated product.

NO FLOW STOP ERROR
The no-flow timer expired and terminated the fueling. This is not an error condition. See General Setup 2 to edit.
**DIAGNOSTICS - ERROR MESSAGES**

**POWER FAIL ERROR**
The fueling ended due to a loss of input voltage greater than 15 seconds. This message is displayed if power is removed during a fueling. Ensure that power was not turned off manually, then check the power supply, the wiring and the in-line fuse. See the troubleshooting section for more information. See page 45.

**PRESET ERROR**
When accessing a preset field, a flash memory error was detected. If this error persists, contact a LC service provider.

**DATA ACCESS ERROR**
A flash memory error occurred. If this error persists, contact a LC service provider.

**INIT WARNING**
This message appears when the No-Flow Timer or the Ticket Required? field return an error. If this error occurs, the fueling can continue but default values 180 and Yes are used. If this error persists, contact a LC service provider.

**RUN TIME ERROR MESSAGES**

These messages may be displayed if an error occurs while the system is running.

- **Invalid entry or value out of specified range**
The value entered into the text box is outside of the range specified for the field. Reenter the value.

- **FLASH CRC FAILURE**
The CRC stored with an LCR 600 data block indicates the data or CRC has been corrupted. A rebuild operation could possibly fix the problem. If not, try a clear all (contact a LC service provider). If that does not work, hardware may be at fault and the unit should be returned to Liquid Controls for more analysis. Before starting a clear all operation, print a calibration ticket.

- **FLASH WRITE FAILURE**
A failure detected while a data block was being written to the flash memory. See Flash CRC Failure above for corrective actions.

- **FLASH NOT INITIALIZED**
The selector switch was not in the CALIBRATION position when a Clear All or Rebuild was attempted.

- **Duplicate flow rates not allowed**
This message only appears when setting up multi-point calibration. When calibrating a multi-point flowmeter, each linearization point must have a unique flow rate. This message is displayed if a duplicate flow rate is entered.

- **Adjacent linearization points out of 0.25% range**
This message only appears when setting up multi-point calibration. When calibrating a multi-point flowmeter, adjacent linearization points must be within a 0.25% correction of each other. To avoid this error, select an additional flow rate and correction factor between the two points. More than one additional point may be required.

- **Invalid logon parameters**
The Fueler ID and/or password entered does not exist in FlightConnect’s Fueler database. Enter a valid Fueler ID.

- **Invalid parameter**
A RUN command was issued and a required parameter (fueling detail) is missing. Enter the required parameter. Then, FlightConnect will allow the fueling to start.

- **Invalid entry**
The value entered does not meet the requirements of the field. This error often appears when a required field is left blank. Enter the proper data.

- **There was no response from the LCP device.**
The LCR 600 attempted to retrieve data from the office, but can not connect. Retry. If the error persists, check the transmission device on the vehicle. If the error still persists, check the office computer and office transmission device. If the problem still persists, make sure that DBManager and FlightConnect Read are running and configured properly.
DIAGNOSTICS

Gross Count: Display Only
The gross volume of the active fueling.

Flow Rate: Display Only
The current flow rate of the active fueling.

Flow Rate Base: (LB) C
The time unit of the flow rate.

Pulser Reversals: Display Only
The number of pulser reversal occurrences during the current or last active fueling.

Supply Voltage: Display Only
The current voltage being supplied to the LCR 600.

Software Revision: Display Only
The current version of LCR 600 software installed.

Ticket Revision: Display Only
The current version of ticket revision software installed on the LCR 600.

Loader Revision: Display Only
The current version of boot loader software installed on the LCR 600.

Display Board Revision: Display Only
The current version of display board software installed on the LCR 600.

Last Calibration Date: Display Only
The most recent calibration completed on the LCR 600.

Calibration #: Display Only
The number of times the calibration position has been entered. For Weights & Measures use only.

Calibration Event #: Display Only
The number of times the calibration has been changed. For Weights & Measures use only. Calibration events include the following: Pulses Per Unit (k-Factor) • Linearization Flow Rate • Linearization Percent Error • Activating Linearization

Configuration Event #: Display Only
The number of times the configuration has been changed. For Weights & Measures use only. Configuration events include the following: Sale Number • Gross Totalizer • Net Totalizer • Product Type • Compensation Type • Compensation Parameter • Base Temperature • Auxiliary Multiplier • Auxiliary Unit of Measure • S1 Close • Temperature Offset • Temperature Scale • Quantity Unit of Measure • Decimal Setting • Flow Rate Unit of Measure • Printer Type • Ticket Required Flag • Flow Direction • Meter ID • Ticket Number • Residual Processing • Print Gross and Parameter Flag • Print Volume Corrected Message Flag
MACHINE STATUS

Security:  *Display Only*
A description of the current active security level.

- Idle • Unlocked Idle • Delivery Paused • Delivery Active • W&M Idle • Factory Idle

Switch:  *Display Only*
The current position of the selector switch.

- Run • Stop • Print • Shift Print • Calibrate

State:  *Display Only*
The current processing activity of the LCR 600.

- Run • Stop • End Delivery • Auxiliary • Shift • Calibrate • Waiting for No-Flow • Unknown

Printing?  *Display Only*
Is the printer currently printing?

Other Errors?  *Display Only*
Are there any other errors being reported by the LCR?

Printer Status  **C-U-L-P**
Select this field to open the Printer Status screen. Pg. 58.

Delivery Status  **C-U-L-P**
Select this field to open the Delivery Status screen. Pg. 59.

Delivery Code  **C-U-L-P**
Select this field to open the Delivery Code screen. Pg. 60.

Security Clearance

- L - Locked
- U - Unlocked
- C - Weights & Measures Calibration
- P - Stop/Pause
- F - Factory
**PRINTER STATUS**

A series of yes/no questions about the current status of the printer and any possible issues printing tickets.

**Delivery Ticket? Display Only**
Has a fueling ticket been requested?

**Shift Ticket? Display Only**
Has a shift ticket been requested?

**Diagnostic Ticket? Display Only**
Has a diagnostic ticket been requested?

**Pass-Through Print? Display Only**
Is text from the host in the LCR print buffer?

**Printer Error? Display Only**
Has an error been detected with the printer?

**Printer Busy? Display Only**
Has the print processor began to print a ticket?

---

**PRINTER STATUS**

<table>
<thead>
<tr>
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<th>NO</th>
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<tbody>
<tr>
<td>Delivery Ticket?</td>
<td>NO</td>
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<tr>
<td>Shift Ticket?</td>
<td>NO</td>
</tr>
<tr>
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<td>Printer Busy?</td>
<td>NO</td>
</tr>
</tbody>
</table>

Next/Previous Screen
**DIAGNOSTICS - DELIVERY STATUS**

**DELIVERY STATUS**
A series of yes/no questions to help diagnose any errors occurring on the LCR 600.

**ROM Check Sum?**  
Display Only
Has a fueling not started due to the checksum of the LectroCount program code space failing?

**Temperature?**  
Display Only
Has the current fueling not started (or was terminated) due to an error with the temperature reading hardware?

**Watchdog?**  
Display Only
Was the processor reset due to a LectroCount watchdog time out error?

**VCF Setup?**  
Display Only
Was there an error setting up the volume compensation factor for the current product?

**VCF Domain?**  
Display Only
Did the temperature of the product go outside the valid range for the compensation type of the product?

**Meter Calibration?**  
Display Only
Did an error occur while setting up the flowmeter calibration for the current fueling?

**Pulser Failure?**  
Display Only
Did the current fueling terminate due to too many pulser faults?

**Preset Stop?**  
Display Only
Was the gross or net preset volume reached?

**No-Flow Stop?**  
Display Only
Was the current fueling stopped due to no-flow being detected through the flowmeter for a specified amount of time?

**Stop/Pause Request?**  
Display Only
Was a stop activated by the selector switch during an active fueling?

**Print/End Request?**  
Display Only
Was a print activated by the selector switch during an active fueling?

**Power Failure?**  
Display Only
Did a fueling end due to a power fail condition for more than 15 seconds?

**Preset Error?**  
Display Only
Did a fueling end due to an error condition while attempting to set up a gross or net preset?

**Printer?**  
Display Only
Does the current fueling require a printed ticket but the printer is off-line or busy?

**Data Access?**  
Display Only
Did a data access error occur during the fueling which was critical to the fueling?
DELIVERY CODE
A series of yes/no questions to help diagnose any errors occurring on the LCR 600.

Delivery Ticket? Display Only
Is a fueling ticket is pending?
A new fueling cannot be started until this field is cleared by successfully printing the last fueling ticket.

Shift Ticket? Display Only
Has a shift ticket been requested and waiting to be printed?

Flow Active? Display Only
Is the flow active during a fueling?
This field changes with the Delivery Active? field, but it also turns off when a fueling is paused and turned on when the fueling is resumed.

Delivery Active? Display Only
Is a fueling active?

Gross Preset Active? Display Only
Is the current fueling a gross preset?

Net Preset Active? Display Only
Is the current fueling a net preset?

Stop/Gross Preset? Display Only
Has the current fueling been stopped by reaching a gross preset value?

Stop/Net Preset? Display Only
Has the current fueling been stopped by reaching a net preset value?

VCF Active? Display Only
Is the volume of the current fueling compensated according to temperature?

S1 Closed? Display Only
Is the S1 solenoid closed?
During preset fuelings, the S1 solenoid should be open at full product flow and closed at dwell flow.

Delivery Beginning? Display Only
Is a fueling in the process of being started?

New Delivery Queued? Display Only
Has a new fueling has been queued in the LCR 600?
Diagnostic Ticket

To print a diagnostic ticket:

1. Turn the LCR 600 selector switch to STOP.
2. Turn the selector switch to SHIFT PRINT for less than 2 seconds and turn the switch to PRINT.

Diagnostic tickets can run over the length of a standard slip printer ticket. Two tickets may be required. When the printer stops printing, replace the ticket and press ENTER on the LCR 600.
Troubleshooting the LCR 600
The troubleshooting section of this manual covers common problem situations. Call your local authorized Liquid Controls service provider or the Liquid Controls electronics service department if the troubleshooting section does not address the situation.

When troubleshooting the LCR 600 follow these guidelines:

- Check for proper operating voltages before changing the circuit board. If the circuit board needs to be changed, be sure to remove all power to the LCR 600.
- The error message or a diagnostic ticket will contain an error message that can be useful in troubleshooting. Examine the diagnostic screens on the LCR 600 or the diagnostic ticket to make sure all set-up fields are accurate, e.g. pulses per unit volume, temperature coefficient and base temperature. Print a diagnostic ticket by moving the red selector switch to “SHIFT PRINT” for less than two seconds.
- Never remove a terminal block or jumper with the power on.
- Never install a terminal block or jumper with the power on.
- Never force a terminal block into its location.
- Never exchange or reposition terminal blocks on the circuit board.
- In case of a major problem such as a burned or water-damaged circuit board, evaluate possible causes before replacing it and turning the power back on.
- Isolate the problem before changing the circuit board.
- Return faulty circuit boards with the proper forms, concisely completed, to a LC service provider.

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>PROBABLE CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
</table>
| Unit will not power up or no display. | 1. Inadequate supply voltage. 9 to 28 VDC is required for operation.   | 1. With the key in the accessory position, check the battery voltage to the circuit board at J6. Use terminal #11 as positive and terminal #12 as DC ground. While the LCR 600 will power-up at 9 VDC, it is recommended that the input be at least 12.6 VDC. Voltage less than 12 VDC may cause failures in equipment connected to the LCR 600, such as valves or external displays.  
2. Check the 7.5 A, in-line fuse (PN 70985) for continuity. It is located on the accessory power line. Replace if necessary. |
| Unit blows 7.5 A fuse.            | 1. 12 VDC Battery line is shorted to ground.                          | 1. For safety reasons, remove the 7.5 A in-line fuse from the accessory power cable.  
2. Remove the J6 terminal block. Inspect for stray wire stands and visible shorts.  
3. Using a multimeter, take a reading across terminal 11 and terminal 12 on the J6 terminal block. The terminals should be open. If the multimeter shows a short, replace the power cable (PN 81512).  
4. Inspect the length of the power cable for damaged insulation that could cause a short between the wire and the chassis (or other nearby metal). If the cable is damaged, replace it.  
5. Replace the 7.5 A fuse (PN 70985) and re-install the J6 connector.  
6. If the 7.5 A fuse blows again, replace the LCR 600 circuit board. |
<table>
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<tr>
<th>PROBLEM</th>
<th>PROBABLE CAUSE</th>
<th>SOLUTION</th>
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</table>
| “Power Failure” appears on diagnostic ticket or LCR 600 shuts down unexpectedly. | 1. Power to LCR 600 interrupted during fueling. 2. Static discharge.          | 1. Ensure the LCR 600 was not manually turned off during an active fueling.  
2. Check accessory power cable for damage. Ensure that the power, common and ground wires (11, 12 and 13) on power connector J6 are secure.  
3. Turn on all truck accessories (head lamps, 2-way radio, heater, etc.). Engage the hose reel and monitor the DV voltage at J6 using terminal 11 as positive and terminal 12 as ground. If the voltage drops below 10 VDC, the truck electrical system may not support the LCR 600.  
4. Verify proper grounding of the LCR 600. Refer to the installation manual for proper grounding procedures. |
| Epson printer release light flashes.                                  | 1. Low voltage to the Epson printer.                                           | 1. Check the battery voltage for a minimum of 12.6 VDC.  
2. Under extreme cold conditions, the printer may not operate. Warm up the cab of the vehicle.  
3. If the release light continues to flash, replace the Epson 295 Printer (PN E49001) with a functional printer.  
4. If the light still flashes, replace the 825001 printer power cable. |
| No power indicator lights to the Epson printer.                      | 1. No power to the Epson printer.                                              | 1. Verify that the power switch is in the ON position. This switch is located on the left-hand side of the Epson 295 printer.  
2. Check the printer power cable (PN 825001) to ensure that it is seated in the port properly. If the problem persists, replace the power cable.  
3. If the problem continues replace the Epson printer (PN E49001) with a functional printer. |
| “Temperature Error” appears on diagnostic ticket or on the LCR 600.  | 1. Open or shorted circuit between the RTD probe and LCR 600.                  | 1. Remove terminal block J14 from the circuit board. On the terminal block, measure and record the resistance between the following pins:  

<table>
<thead>
<tr>
<th>TERMINAL #</th>
<th>CONTINUITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>J14 #20 to #22</td>
<td>100 Ω ±20 Ω</td>
</tr>
<tr>
<td>J14 #20 to #23</td>
<td>100 Ω ±20 Ω</td>
</tr>
<tr>
<td>J14 #21 to #22</td>
<td>100 Ω ±20 Ω</td>
</tr>
<tr>
<td>J14 #21 to #23</td>
<td>100 Ω ±20 Ω</td>
</tr>
</tbody>
</table>

2. If the readings are not within the above tolerances, replace the RTD probe (PN 71130). |
| Product flow does not register on LCR 600 display.                  | 1. Pulser shaft is not turning with product flow. 2. Pulser failure.         | 1. Manually spin the pulser shaft and monitor the LCR 600 display.  
2. If the LCR 600 display counter increments, this may indicate a mechanical problem. Contact your local Liquid Controls distributor or the Liquid Controls service department for assistance.  
3. If the LCR 600 display counter does not increment, see “Pulser Failure” in the following troubleshooting section. |
###Troubleshooting

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>PROBABLE CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Pulser Failure” appears on the diagnostic ticket or on the LCR 600 display.</td>
<td>1. Missing pulse counts.  2. Excessive reversals.</td>
<td>1. Using a multimeter, measure the following DC voltages on terminal block J8, while J8 is connected to the circuit board. Use terminal 37 as ground reference. <strong>TERMINAL #</strong></td>
</tr>
<tr>
<td>These instructions apply to LCR 600’s with internal pulsers only. POD pulser may have different readings.</td>
<td></td>
<td>J8 #32</td>
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<tr>
<td></td>
<td></td>
<td>J8 #33</td>
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<tr>
<td></td>
<td></td>
<td>J8 #34</td>
</tr>
<tr>
<td>Pulser faults generally occur in a high vibration environment. Liquid Controls is not responsible for pulser failures caused by excessive system vibrations.</td>
<td>2. If the terminals show the preceding voltages, check for loose pulser wiring connections. If no loose connections are found, replace the encoder harness. <strong>TERMINAL #</strong></td>
<td><strong>VOLTAGE</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>J8 #32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>J8 #33</td>
</tr>
<tr>
<td></td>
<td></td>
<td>J8 #34</td>
</tr>
<tr>
<td></td>
<td>4. If the LCR 600 still shows a pulser failure, insert a ticket into the Epson printer and begin a fueling. With product flowing through the flowmeter, measure the following DC voltages on the terminal block. <strong>TERMINAL #</strong></td>
<td><strong>VOLTAGE</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>J8 #32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>J8 #33</td>
</tr>
<tr>
<td></td>
<td></td>
<td>J8 #34</td>
</tr>
<tr>
<td></td>
<td>5. If the voltages shown below are observed, ensure that the pulser shaft is rotating. Look for any mechanical problems that may cause either the flowmeter or the pulser shaft to lock up. If the Lap Pad continues to indicate a pulser failure, replace the pulser (PN 82597) <strong>TERMINAL #</strong></td>
<td><strong>VOLTAGE</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>J8 #32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>J8 #33</td>
</tr>
<tr>
<td></td>
<td></td>
<td>J8 #34</td>
</tr>
</tbody>
</table>
## TROUBLESHOOTING

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>PROBABLE CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve will not open.</td>
<td>1. Solenoids are inactive or inoperative.</td>
<td>1. Insert a fueling ticket into the Epson printer and start a fueling.</td>
</tr>
<tr>
<td></td>
<td>2. Foreign debris in system.</td>
<td>2. Move the selector switch from RUN to STOP and back to RUN. Listen for an audible clicking sound from the solenoids.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. If there is an audible click from the solenoid (but still no flow), this may be an indication of a mechanical problem with the main valve or its associated components. Contact your local Liquid Controls distributor or the Liquid Controls service department for assistance.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. If there is no audible click from the solenoid, check the voltage to pin #s 14, 15, 17 and 18 of terminal block J13. While still in RUN mode, use a multimeter to measure the following DC voltages on the circuit board. Use J8 pin #38 as a ground.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TERMINAL #</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>J13 #14</td>
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<tr>
<td></td>
<td></td>
<td>J13 #15</td>
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<td></td>
<td></td>
<td>J13 #17</td>
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<tr>
<td></td>
<td></td>
<td>J13 #18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. If the above voltages are correct, this may be an indication of a problem with the valve or its associated components. Contact your local Liquid Controls distributor or the Liquid Controls service department for assistance.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. If the above voltage are incorrect, replace the solenoids (PN varies depending on system). If the valve problem persists, replace the LCR 600 circuit board (PN 84040).</td>
</tr>
</tbody>
</table>
**LectroCount LCR 600 Inputs and Outputs**
The LCR 600 can communicate with a number of components on a Liquid Controls flowmeter system. The following pages provide a brief description of the components, a drawing identifying these components on the flowmeter system, and a list of the LCR 600 commands and fields that correspond to each component.

**INTERNAL PULSER**
Typically, an internal pulser is mounted to the bottom of the LCR 600 housing. A small shaft extends from the bottom of the internal pulser through the LCR 600 housing where it attaches to a drive shaft. The drive shaft turns directly off of the rotors inside the Liquid Controls flowmeter. When the internal pulser shaft spins, the pulser manufactures a two channel quadrature pulse output. The LCR 600 uses the pulse output to calculate flow measurements. The number of pulses equal to a unit of measurement is set during calibration and proving in the **Pulse/Unit <k-Factor>:** field.

**TEMPERATURE PROBE**
The optional temperature probe, part of the Electronic Temperature Volume Compensation (ETVC) kit, monitors the temperature of the product being measured. Because the volume of many products expand and constrict considerably according to temperature fluctuations, the LCR 600 corrects the volume measurement to a base temperature (60º F for example).

**PRINTER**
Together, the LCR 600 and the Epson printer can print out four types of tickets (fueling, duplicate fueling, shift, and diagnostic). With the FlightConnect LCR 600 application, the fueling ticket is configured at set up and only prints data specific to the fueling options selected. The LCR 600 provides a “require ticket feature” to meet Weights & Measures standards and prevent unrecorded fuelings.

**S1 SOLENOID**
When energized by the LCR 600, the S1 solenoid-operated valve opens the control valve on the outlet side of the flowmeter, allowing product to flow through the valve. When the S1 is deenergized, the control valve shuts off the product flow. The LCR 600 switches the S1 solenoid via the selector switch (RUN and STOP positions) and during two stage preset fuelings (according to the **S1 Close:** value).

**ΔP TRANSDUCER**
The differential pressure transducer, common in aviation applications, monitors the differential pressure (pressure drop) across a full flow fuel monitor/water coalescer. The highest differential pressure reached during the custody transfer is printed on the fueling ticket and displayed on the screen. If the differential pressure reaches a dangerous level, the LCR 600 can shut down the fueling. To set up a differential pressure shutdown value, a shutdown device (such as a valve or a dead-man) must be connected to the LCR 600, and a differential pressure shutdown value must be entered into the **ΔP Shutdown Value:** field.

**AUXILIARY OUTPUTS**
The LCR 600 provides three open drain transistor auxiliary outputs for different external devices such as pump controls and additive injectors. Two of the outputs have settings that can be set in the **Auxiliary 1 Output:** (Off, On, On During Delivery, and Monitor Flowrate) and **Auxiliary 2 Output:** (Off, On, On During Delivery, and Flow Direction) fields. The LCR 600 also provides auxiliary output connections for the LectroCount Remote Display (other types of displays are usually compatible). Signals from these outputs duplicate the volume data sent to the LCR 600 display. The FlightConnect additive field, if activated, will override these fields.
# LCR 600 Inputs and Outputs

## LectroCount LCR 600 Fields for Inputs/Outputs

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<thead>
<tr>
<th>Input/Output Component</th>
<th>Related Settings and Fields</th>
<th>Screen Locations</th>
<th>Selector Switch Commands</th>
</tr>
</thead>
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<tr>
<td><strong>ETVC Probe</strong></td>
<td>Temperature:</td>
<td>System Setup 2</td>
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<td>Temperature Offset:</td>
<td>System Setup 2</td>
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<td>Compensation Type:</td>
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<td></td>
<td>Compensation Parameter:</td>
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<td></td>
<td>Base Temperature:</td>
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<tr>
<td><strong>S1 Solenoid</strong></td>
<td>Net Preset:</td>
<td>Calibration Setup 1</td>
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<td>Gross Preset:</td>
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<td>Price Preset:</td>
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<td><strong>DP Transducer</strong></td>
<td>dP Shutdown Value:</td>
<td>System Setup 1</td>
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<tr>
<td><strong>Injector, Pump, Shutdown Device, etc..</strong></td>
<td>Auxiliary 1 Output:</td>
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<td>Auxiliary 2 Output:</td>
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<td>Toggle Flow Rate:</td>
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<td><strong>Internal Pulser</strong></td>
<td>Flow Rate:</td>
<td>Fueling</td>
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<td>Pulse Output Edge:</td>
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<td>Pulse Output Freq:</td>
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<td>Pulses/Unit &lt;k-Factor&gt;:</td>
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<td>Prover Quantity:</td>
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## LectroCount LCR 600 Input and Output Devices

- DP Transducer
- Printer
- Auxiliary Outputs
- Internal Pulser
- Additive Injectors
- Pumps
- Shutdown Devices
- Other Auxiliary Devices
### LectroCount LCR 600 Fields for Inputs/Outputs

<table>
<thead>
<tr>
<th>Input/Output Component</th>
<th>Related Settings and Fields</th>
<th>Screen Locations</th>
<th>Selector Switch Commands</th>
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<tbody>
<tr>
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<td>Fueling - Calibration Setup 1 -</td>
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<td><strong>Compensation Parameter:</strong></td>
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<td><strong>Base Temperature:</strong></td>
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