Operator Interface

Message Displays

MODEL ADI - INTELLIGENT ALPHANUMERIC DISPLAY

- 2X20, 0.45" (11.4 mm) HIGH TRANSMISSIVE LCD, NEGATIVE IMAGE WITH RED, OR POSITIVE IMAGE WITH YELLOW/GREEN OR TRI-COLOR LED BACKLIGHTING
- 153 DIFFERENT DISPLAYABLE CHARACTERS (Including 96 Standard ASCII Characters)
- SCROLLING AND/OR BLINKING CHARACTERS
- PERIODIC AND/OR CHAINED MESSAGES
- PRIORITIZED MESSAGES
- TIME AND DATE FUNCTIONS
- 256 MESSAGE CAPACITY
- REAL TIME CLOCK/CALENDAR
- MESSAGE QUEUE (Holds Up To Thirty-two Requested Messages)
- OUTPUT/BUSY TERMINAL (NPN Open Collector Output)
- PARALLEL COMMUNICATIONS
- EMBEDDED DATA

Product Features

The Alphanumeric Display Intelligent (ADI) unit is a simple-to-use, yet versatile and powerful message center. The broad flexibility and functionality of the ADI make it particularly adaptable to a wide variety of applications, including:
- Display and Monitoring of Measured Values
- Indication of Warning, Error, and Alarm Conditions
- Monitoring of Manufacturing Processes
- Display of Machine Start-Up and Operation Procedures

The ADI is capable of storing and displaying up to 256 separate messages. A message can contain up to 250 characters of text and can display any of the 153 customizable characters, including the standard 96 character ASCII set. Individual lines of the message text can be programmed to scroll in a block or character fashion. Individual characters, blocks, and lines of text can be programmed to blink.

The ADI can assemble and transmit message text to one or more Message Display Slave (MDS) units for remote display of messages. For interfacing with serial printers and ASCII terminals, the message text can be assembled and transmitted in any format the user desires. In this case, the appropriate lower ASCII control characters can be inserted in the message text where necessary.

Messages can also display the Current Time and Date and any of the ADI’s sixteen Elapsed Timer values. A message can also collect and display multiple Embedded Data items.

Messages can be requested via the ADI’s Serial and Parallel ports, which the user can configure to meet the needs of most applications. The Parallel Port can also be configured to issue Automatic Message Requests based on changing port values.

The ADI contains functions for requesting messages on a Periodic basis, and for processing requests based on Elapsed Time and Embedded Data values, as well as for executing Chained and Linked message lists.

Any programmed message can be designated for automatic request on Unit Power-Up and Reset. A separate message can be designated for display when the ADI’s Display would be blank.

RLC offers PC compatible software for configuring and programming the ADI. The Message Display User software (SPMD), with its easy-to-use menus, extensive prompts, on-line Help functions, message simulator, and terminal emulator, greatly assists the user in fitting the ADI to the application at hand.

DIMENSIONS “In inches (mm)”

Red Lion
**Message Displays**

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**Product Features Continued**

The user can easily create and save multiple Configuration, Character, and Message files with the SFMD software. Extensive file handling features are included, such as uploading, downloading, and printing of files. Message simulation and terminal emulation functions also come with the software.

A powerful feature of the ADI is the Message Queue. With the Queue function disabled, the ADI processes messages on a first-come, first-served basis. Once the message is processed, higher priority or equal priorities go to the display, while lower priority messages are discarded. However, with the Queue function enabled, after the message is processed, high priority messages are placed on the Display while lower priority messages are placed on the Queue for later display in priority order.

The ADI display features a transmissive LCD with LED backlighting. The unit is available in positive or negative image LCD versions with a choice of backlight colors. The display consists of two lines of 5x7 dot-matrix characters, with 20 characters per line. A large 0.45” (11.4 mm) character height makes the ADI display readable to 15 feet (4.5 meters). An on-board pot allows for adjustment of the display viewing angle to accommodate various mounting heights.

The sealed front panel of the ADI meets NEMA 4/IP65 requirements, allowing for wash-down when properly installed. Modern surface-mount technology and extensive testing make the unit extremely reliable in industrial environments. Connections are made on rear panel removable terminal blocks, that accept solid or stranded wire in the range of 12 to 24 AWG.

**BASIC OPERATION**

The ADI performs two basic functions; it processes Messages and executes Commands. The ADI begins processing a Message in response to a request for that Message. In processing the Message, the ADI performs the functions the user has specified for that Message. A Message may specify any combination of the following functions:

1. Display Text Locally: The ADI displays the Message Text, which can include the Current Time and Date, Elapsed Timer values, and Embedded Data items.

2. Display Text Remotely: The ADI transmits the Message Text to an RLC Message Display Slave (MDS) unit for Display.

3. Transmit Text: The ADI transmits the Message Text, which can also include ASCII control codes, over the serial port to a computer, serial printer, or ASCII terminal.

4. Configure Elapsed Timers: The Message can access one or more of the ADI’s sixteen Elapsed Timers.

5. Collect Embedded Data: The Message can collect up to fifteen Embedded Data items.

6. Configure the Output Pin: The Message can access the ADI’s Output Pin function.

Several sources are available to the user for requesting Messages. The ADI constantly monitors the following sources for pending Message requests:

1. The Serial Port: A computer, ASCII terminal, or PLC issues the request over the Serial Port.

2. The Parallel Port: A PLC, thumb-wheel switch, push-button, or relay contact issues the request over the Parallel Port.

3. A Chained Message List: The requested Message is part of a programmed Message sequence.

4. The Link Function: The requested Command Message is linked to any other Message.

5. The Periodic Function: The Message is designated for request on a regular interval.

6. The Reset Function: The Message is designated for request on Unit Power-Up or Reset.

7. The Default Function: The Message is designated for request when there is no other pending message request.

8. The Queue Function: The Message was previously requested, and placed on the Queue because a higher Priority Message was on the Display at that time.

9. An Elapsed Timer: The Message is designated for request at a predetermined Elapsed Timer value.

10. A Test Condition: The Message request is generated based on the results of an Index Embedded Data Item comparison.

**General Specifications**

1. **POWER:**

   AC Version: Switch selectable 115/230 VAC ±10%, 50/60 Hz, 10 VA max.

   DC Version: Switch selectable, 12/24 VDC ±10%, 450 mA max. Power supplies must be Class 2 or SELV rated.

2. **DISPLAY:**

   2 X 20: 0.45” (11.4 mm) high characters, readable to 15 feet (4.5 meters).

   Transmissive SBE LCD: Negative Image with Red LED backlighting. OR Positive Image with Yellow-Green or Tri-color LED backlighting.

   The brightness of the LED backlight is software adjustable through seventeen levels for the single color units. For the Tri-color unit, the color can be adjusted across 17 shades from Full Red to Orange to Full Yellow-Green. On-board pots separately adjust the intensity of the red and green backlight.

   The optimal viewing angle of the display may also be adjusted through an on-board pot.

3. **REAL-TIME CLOCK:** Non-volatile Date and Time, accurate to ±1 minute/month.

4. **MEMORY:** 32 K bytes of non-volatile memory retains all programmed Configuration, Message, and Character settings when power is removed or interrupted.

   Provides space for 256 Messages of 100 bytes each while capable of storing 4 K bytes of Embedded Data. The actual amount of embedded data storage space is determined by the size of the message file.

5. **ENVIRONMENTAL CONDITIONS:**

   Operating Temperature: 0 to 50°C

   Storage Temperature: -20 to 60°C

   Operating and Storage Humidity: 85% max. (non-condensing) from 0°C to 50°C.

   Altitude: Up to 2000 meters

6. **CERTIFICATIONS AND COMPLIANCES:**

   **SAFETY:**

   EN 61010-1, IEC 1010-1

   UL Recognized Component, File #E171375

   Recognized to U.S. and Canadian requirements under the Component Recognition Program of Underwriters Laboratories, Inc.

   **ELECTROMAGNETIC COMPATIBILITY**

   Immunity to EN 50082-2

   Emissions to EN 50081-2

7. **MOUNTING REQUIREMENTS:** Maximum panel thickness is 0.375” (9.5 mm). Minimum panel thickness for NEMA 4/IP65 sealing is 0.060” (1.57 mm).

8. **CONSTRUCTION:** Steel construction with textured black polyurethane paint for scratch and corrosion resistance. Sealed front panel meets NEMA 4/IP65 specifications for indoor use when properly installed. Installation Category II, Pollution Degree 2. (panel gasket and keps nuts included).

9. **CONNECTIONS:** Rear panel removable terminal blocks.

10. **WEIGHT:** 3.4 lb. (1.5 Kg).
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Input Specifications

1. OUTPUT/BUSY PIN:
   Solid State: NPN open collector, current sinking, \( V_{OH} = 30 \) VDC max., \( I_{SNK} = 100 \) mA max. @ \( V_{OL} = 1 \) VDC max.
   Busy Mode: Indicates the Ready/Busy status of the unit.
   Output Mode: Output is activated from a Command or Message for a specified time out value.
   Time Out: 10 msec to 63 mins or Latched.

Output Specifications

1. PARALLEL COMMUNICATIONS:
   Message Request Format:
   - Binary: 4 or 8 bits.
   - BCD: 4, 8, or 9 bits.
   Embedded Data Format:
   - Binary: 4 or 8 bits.
   - BCD: 4 or 8 bits.
   ASCII: 4 or 8 bits.
   PARALLEL PORT INPUTS:
   - Data Inputs (D0 - D7) & Control Inputs (Strobe & Message/Data): VMAX = 30 VDC max.
   - Data Lo/Hi Bias: 5 V or 12 V compatible logic levels, switch selectable.
   - Lo Bias: \( V_H = 3.5 \) VDC min., \( V_L = 1.5 \) VDC max.
   - Hi Bias: \( V_H = 8 \) VDC min., \( V_L = 4 \) VDC max.
   - Control Lo/Hi Bias: 5 V or 12 V compatible logic levels, switch selectable.
   - Lo Bias: \( V_H = 3.5 \) VDC min., \( V_L = 1.5 \) VDC max.
   - Hi Bias: \( V_H = 8 \) VDC min., \( V_L = 4 \) VDC max.
   - Data SNK/SRC: Sink or Source, switch selectable.
   - Control SNK/SRC: Sink or Source, switch selectable.
   - Data Logic Level: Positive or negative, switch selectable.
   - Control Logic Level: Positive or negative, switch selectable.
   - Current Sinking: Internal 10 K\( \Omega \) pull-up, \( I_{SNK} = 1.2 \) mA typ.
   - Current Sourcing: Internal 10 K\( \Omega \) pull-down, \( I_{SRC} = 5.6 \) mA max. @ 30 VDC.
   - Debounce Time: 0.01 to 2.55 seconds (programmable).
   - Strobe Time: 3 to 255 msec (programmable).

2. SERIAL COMMUNICATIONS:
   RS-232 Port:
   - 9-Pin D-type female connector (DCE)
   - Pin 2 (TXD): Transmit Data (From the ADI to the host computer)
   - Pin 3 (RXD): Receive Data (From the host computer to the ADI)
   - Pin 5: Signal Common
   - Data Format: Four types available, switch selectable.

   11 bits: 1 start bit, 8 data bits, 1 parity bit, 1 stop bit.
   10 bits: 1 start bit, 8 data bits, 1 stop bit.
   10 bits: 1 start bit, 7 data bits, 1 parity bit, 1 stop bit.
   9 bits: 1 start bit, 7 data bits, 1 stop bit.

   Data Code: ASCII
   Unit Address: Programmable from 0 to 99. (The number of units in a single loop is limited by the hardware specifications.)
   Baud Rate: 300 to 19200, switch selectable.
   Parity: Enabled or Disabled, switch selectable.
   Even/Odd: Selects parity type, switch selectable.
   7/8 BIT: Data Bits, switch selectable.

   Serial Hardware:
   - 20 mA Current Loop: Terminal block connections
     +20mA SRC: Provides 20 mA nominal @ 12 VDC.
     -20mA SRC: Loop return for +20 mA SRC.
   - Output Transistor Rating: \( V_{CE} = 30 \) VDC max., \( V_{SAT} = 1 \) VDC max. @ 20 mA.
   - Note: Transistor rating allows for up to 28 units in a loop.
   - Input Diode Rating: \( V_F = 1.25 \) VDC typ.; 1.5 VDC max. @ 20 mA.
   - Note: The compliance voltage rating of the source must be greater than the sum of the diode voltage drops around the loop. Typically a 30 VDC source (with adequate current capability) is capable of operating between 18 and 22 units in a loop.

   RS-232 Port:
   - 9-Pin D-type female connector (DCE)
   - Pin 2 (TXD): Transmit Data (From the ADI to the host computer)
   - Pin 3 (RXD): Receive Data (From the host computer to the ADI)
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Ordering Information

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<tr>
<th>MODEL NO.</th>
<th>DESCRIPTION</th>
<th>PART NUMBERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADI2R11D</td>
<td>Red, Negative Image</td>
<td>ADI2R11D, ADI2R11A</td>
</tr>
<tr>
<td>ADI4Y11D</td>
<td>Yel-Grn, Positive Image</td>
<td>ADI4Y11D, ADI4Y11A</td>
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<tr>
<td>ADI4T11D</td>
<td>Tri-color (Red, Orange, Green), Positive Image</td>
<td>ADI4T11D, ADI4T11A</td>
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<tr>
<td>SFMD0</td>
<td>Apollo Message Display User Software (3 1/2&quot;, 1.44 M)</td>
<td>SFMD0</td>
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Note: Only one copy of software is required for multiple units.