# Serial Enclosure Series

Including ELK204-7T-MT, ELK204-7T-PL,
EGLK19264A-7T-MT, and EGLK19264A-7T-PL

## Technical Datasheet

**Revision 1.2**

## Revision History

| Revision | Date | Description | Author |
|---|---|---|---|
| 1.2 | March 5, 2014 | Correction to Current Draw of Backlights | Martino |
| 1.1 | October 7, 2013 | Added 6pin Header | Clark |
| 1.0 | November 29, 2012 | Initial Release | Clark |

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# Introduction

The Enclosure Series is complete display solution designed to decrease development time by integrating simple input, output, and display interfaces into a robust external enclosure. With serial communication speeds of up to 115.2kbps, $I^2C$ up to 100kbps, and a convenient rear mounting point, the Enclosure Series provides the perfect interface solution for any project.

The simple command structure permits easy software control of many settings including backlight brightness, screen contrast, and baud rate. User input on is available through a built-in, backlit seven key tactile keypad. Three bi-colour LEDs provide visual outputs on each model, a buzzer on the GLK model provides audio feedback, and the terminal block provides a flexible interface.

For the LK model, on board memory provides up to forty custom characters which can be saved within the unit and recalled for start screens, bar graphs or larger numbers. And the GLK provides a whopping 256KB for customizable fonts and bitmaps to enhance the graphical user experience.

The versatile Enclosure Series, with all the features mentioned above, is available in a variety of colour and material options to suit almost any application.

*Figure 1: ELK204-7T-MT*

*Figure 2: EGLK19264A-7T-PL*

# Hardware

## Drawing

**Metal Enclosure (-MT)**

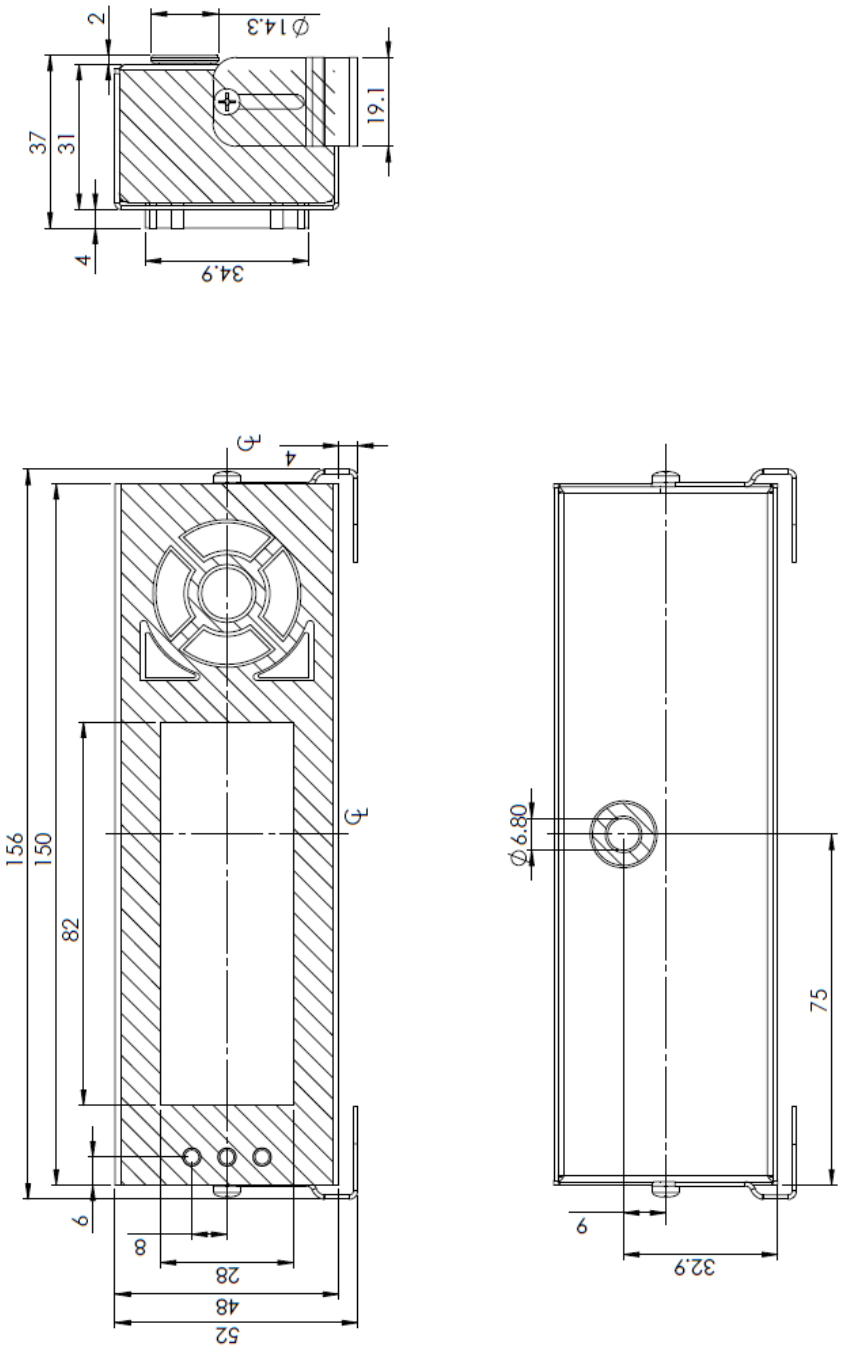


*Figure 3: -MT Drawing*

## Plastic Enclosure (-PL)

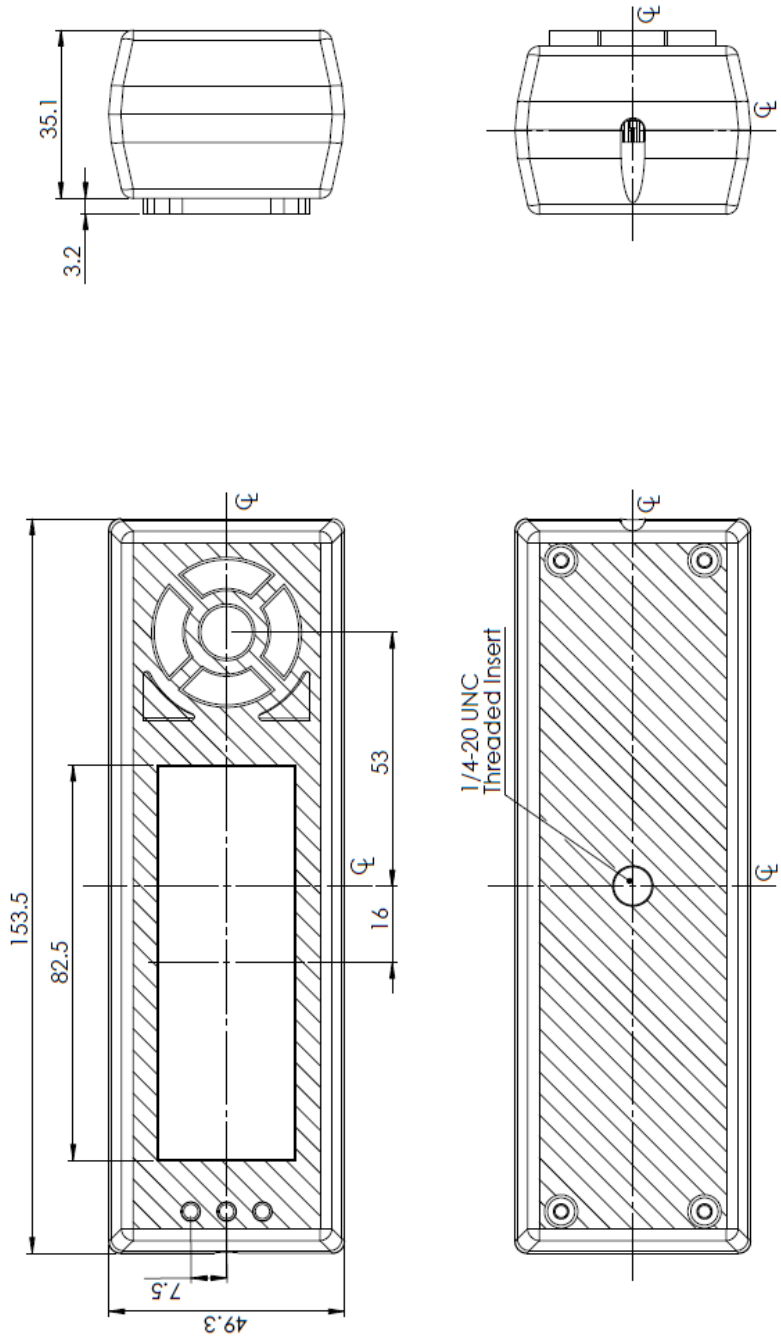


*Figure 4: -PL Drawing*

## Features

### Communication/Power Connector (ELK204-7T)

The ELK Series comes with a simple four pin TE 282834-4 style terminal block to fulfill both communication and power needs. Voltage is applied through pins one and four while pins two and three are reserved for serial or $I^2C$ transmission. This versatile header can be connected to a variety of cables for a simple interface to any host.

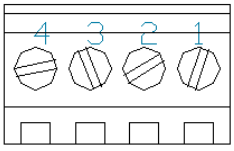


*Figure 5: Com/Power Connector*

*Table 1: Com/Power Pinout*

| Pin | Function |
|---|---|
| 1 | Gnd |
| 2 | Tx (SDA) |
| 3 | Rx (SCL) |
| 4 | Vcc |

### Extended Communication/Power Connector (EGLK19264A-7T)

The EGLK Series comes with a simple six pin TE 282834-6 style terminal block to fulfill both communication and power needs. Voltage is applied through pins one and four while pins two and three are reserved for serial or $I^2C$ transmission. Pins five and six can be used for optional hardware flow control using a serial protocol only.

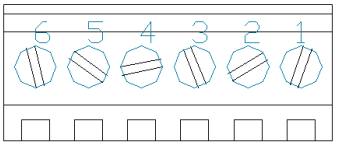


*Figure 6: Ext C/P Connector*

*Table 2: E C/P Pinout*

| Pin | Function |
|---|---|
| 1 | RTS |
| 2 | CTS |
| 3 | Gnd |
| 4 | Tx (SDA) |
| 5 | Rx (SCL) |
| 6 | Vcc |

### LED Indicators

The Enclosure Series has 6 General Purpose Outputs which control 3 bi-colour LEDs. Red, green, and orange-yellow colours can be created using these software controlled GPOs. Odd numbered GPOs control red while even numbers switch the green aspects of the LEDs, as shown in the table to the right.

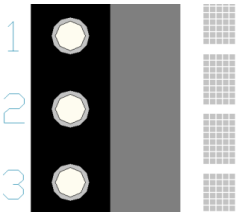


*Figure 7: LED Location*

*Table 3: LED Output*

| Colour | $GPO_O$ | $GPO_E$ |
|---|---|---|
| Yellow | 0 | 0 |
| Green | 0 | 1 |
| Red | 1 | 0 |
| Off | 1 | 1 |

### Keypad Input

The Enclosure Series includes a 7 key, matrix style, embedded keypad and may be configured to allow key presses to be automatically transmitted or polled. The keypad can also be configured for typematic or auto-repeating key presses. The keypad is scanned only when pressed to reduce electrical noise and decrease latency to ensure key input is received quickly and correctly every time.

| Rows | Columns 1 | 2 | 3 |
|---|---|---|---|
| 1 | A | B | C |
| 2 | D | E | N/A* |
| 3 | G | H | N/A* |

*Figure 8: Key Down Values*

| Rows | Columns 1 | 2 | 3 |
|---|---|---|---|
| 1 | a | b | c |
| 2 | d | e | N/A* |
| 3 | g | h | N/A* |

*Figure 9: Key Up Values*

### Manual Override

The Manual Override is provided to allow the Enclosure Series to be temporarily reset to factory defaults.

1. Disconnect power from your display.
2. Hold down the bottom left button.
3. Reconnect power and wait for the start screen before releasing the button.
4. Set and save all pertinent settings.

| Parameter | Value |
|---|---|
| Backlight | 255 |
| Contrast | 128 |
| Baud Rate | 19200 |

*Table 4: Manual Override Settings*

### Commands

An extensive list of commands and additional display information* can be found in the LK204-7T-1U and GLK19264A-7T-1U display manuals at www.matrixorbital.ca/manuals.

## Quick Connect

### Serial Connections

The serial interface provides a classic connection for RS232 or TTL development.

1. Set the Protocol Select jumpers.
   - RS232: Connect the three jumpers** in the 232 protocol box with the zero ohm jumper resistors provided or an alternate wire or solder solution.
   - TTL: Connect the two jumpers** in the TTL protocol box.
2. Make the connections.
   - Disassemble the enclosure by removing four Phillips screws at the corners of the case.
   - Locate the green Communication/Power terminal block, and insert cable wires**, up to 17 AWG solid or 18 AWG stranded, using the Com/Power Pinout.
   - Tighten the M1.6 screws of the terminal block to secure the wires and assemble the enclosure.
3. Create.
   - Use uProject or a terminal program to get started, and then move on with your own development. A number of application notes are available at www.matrixorbital.ca/appnotes.

### $I^2C$ Connections

A more advanced connection for micro-controller applications is provided by the $I^2C$ interface.

1. Set the Protocol Select switches.
   - $I^2C$: Ensure that the two $I^2C$ jumpers** in the corresponding protocol box are connected.
1. Make the connections.
   - Disassemble the enclosure by removing four Phillips screws at the corners of the case.
   - Locate the green Communication/Power terminal block, and insert cable wires***, up to 17 AWG solid or 18 AWG stranded, using the Com/Power Pinout.
   - Tighten the M1.6 screws of the terminal block to secure the wires and assemble the enclosure.
2. Create.
   - This time you're on your own. While there are many examples within the Matrix Orbital AppNote section, www.matrixorbital.ca/appnotes, too many controllers and languages exist to cover them all. If you get stuck in development, it is possible to switch over to another protocol on the standard board, and fellow developers are always on our forums for additional support.

***Note:** Internal headers other than the Comm/Power Connector are not available for the Enclosure Series.

****Note:** Jumpers must be removed from all protocol boxes save for the one in use.

*****Note:** Matrix Orbital can design a custom cable for your enclosure, please contact sales for information.

# Troubleshooting

## Display

If your display is powered successfully, the Matrix Orbital logo, or user created screen should display on start up. If this is not the case, check out these tips.

- Check that power to your device is wired correctly using the Com/Power Pinout.
- Ensure the contrast is not too high or too low and that the backlight is on. See the Manual Override section to reset these values to default.
- It is possible to overwrite the Matrix Orbital logo start screen, if this happens the screen may be blank. Try writing to the display to ensure it is functional, after checking the contrast above.

## Communication

When communication of either text or commands is interrupted, try the steps below.

- Check that the communication lines are wired correctly using the Com/Power Pinout.
- Ensure that the host system and display module are both communicating on the same serial baud rate or $I^2C$ address. The defaults are 19200bps and 0x50 respectively.
- Unlock the display. See the Set and Save Data Lock command for more info.
- Finally, the display can be reset to defaults using the Manual Override procedure above.

# Specifications

## Block Diagram

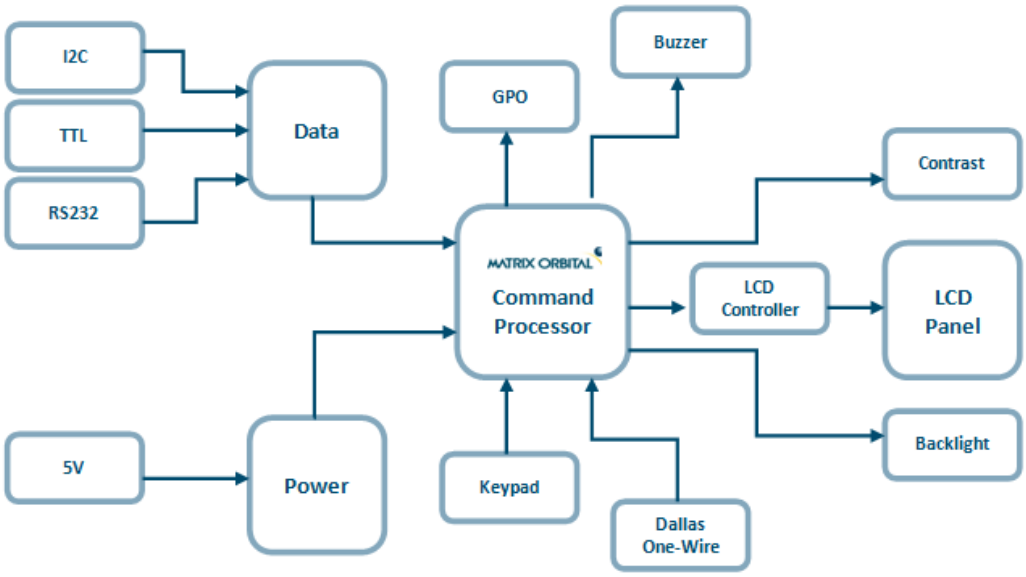


*Figure 10: Communication Diagram*

## Environmental

*Table 5: Environmental Specifications*

| | |
|---|---|
| **Operating Temperature** | 0°C to +50°C |
| **Storage Temperature** | -10°C to +60°C |
| **Operating Relative Humidity** | Maximum 90% non-condensing |

## Electrical

*Table 6: Voltage Specifications*

| ELK204-7T | | |
|---|---|---|
| **Min** | **Typical** | **Max** |
| 4.75V | 5.00V | 5.25V |

| EGLK19264A-7T | | |
|---|---|---|
| **Min** | **Typical** | **Max** |
| 4.75V | 5.00V | 5.25V |

| EGLK19264A-7T-VPT | | |
|---|---|---|
| **Min** | **Typical** | **Max** |
| 9.0V | 12.0V | 35.0V |

*Table 7: Current Consumption*

| Daughter Board | | Backlight | | | | GPOs |
|---|---|---|---|---|---|---|
| **Typical** | + | **YG** | **GW & WB** | **TCI** | + | **Max** |
| 60mA | | 100mA | 50mA | 200mA | | 20mA each |

| Daughter Board | | Backlight | | | | GPOs |
|---|---|---|---|---|---|---|
| **Typical** | + | **YG** | **FGW & WB** | **TCI** | + | **Max** |
| 165mA | | 50mA | 45mA | 65mA | | 20mA each |

| Daughter Board | | Backlight | | | | GPOs |
|---|---|---|---|---|---|---|
| **Typical** | + | **YG** | **FGW & WB** | **TCI** | + | **Max** |
| 165mA | | 50mA | 45mA | 65mA | | 20mA each |

## Optical

*Table 8: Optical Characteristics*

| | | |
|---|---|---|
| Module Size | 142.00 x 38.00 x 36.0 | mm |
| Viewing Area (-MT) | 82.0 x 28.0 | mm |
| Viewing Area (-PL) | 82.5 x 28.9 | mm |
| Character Size (LK) | 3.20 x 5.15 | mm |
| Character Pitch (LK) | 3.90 x 6.15 | mm |
| Pixel Size (GLK) | 0..36 x 0..36 | mm |
| Pixel Pitch (GLK) | 0..39 x 0.39 | mm |
| Viewing Direction | 12 | O'clock |
| Viewing Angle | -30 to +30 | ° |
| Contrast Ratio | 3 | |
| Backlight Half-Life (YG) | 50,000 | Hours |
| Backlight Half-Life (GW & WB) | 20,000 | Hours |
| Backlight Half-Life (TCI) | 10,000 | Hours |

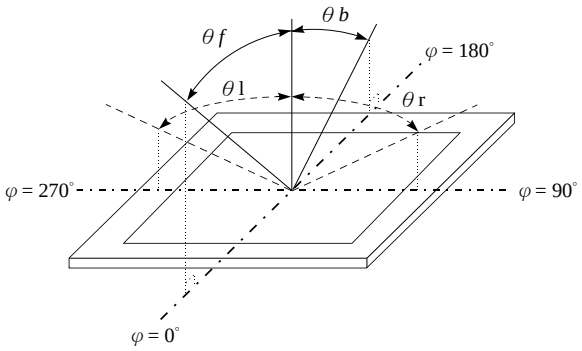


*Figure 11: Viewing Angle Definition*

# Ordering

## Part Numbering Scheme

*Table 9: Part Numbering Scheme*

| ELK | -204 | -7T | | -TCI | | -MT |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

## Options

*Table 10: Display Options*

| # | Designator | Options |
|---|---|---|
| 1 | Product Type | ELK: External Liquid Crystal Display with Keypad Input<br>EGLK: External Graphic Liquid Crystal Display with Keypad Input |
| 2 | Display Size | -204: 20 Character Columns by 4 Rows<br>-19264A: 192 Pixel Columns by 64 Rows |
| 3 | Keypad Size | -7T: Seven Integrated Tactile Keys |
| 4 | Protocol | *NP: Standard Model<br>-USB: USB Only Model |
| 5 | Colour | -YG: Grey Text with Yellow-Green Background<br>-GW: Grey Text with White Background<br>-WB: White Text with Blue Background<br>-TCI: Tricolour Text with Black Background |
| 6 | Voltage | *NP: Standard Voltage<br>**-VPT: Wide Voltage with Efficient Switching Power Supply |
| 7 | Enclosure Type | -MT: Metal Enclosure<br>-PL: Plastic Enclosure |

***Note:** NP means No Populate; skip this designator in the part number and move to the next option.

****Note:** The –VPT voltage option is only available for the -19264A display size.

# Contact


### Sales
Phone: 403.229.2737
Email: sales@matrixorbital.ca

### Support
Phone: 403.204.3750
Email: support@matrixorbital.ca

### Online
Purchasing: www.matrixorbital.com
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Телефон: 8 (812) 309-75-97 (многоканальный)
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Электронная почта: ocean@oceanchips.ru
Web: http://oceanchips.ru/
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А