



**MODEL 3200 DDU Rev B**  
**USER'S MANUAL**

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## WARRANTY

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## REVISION HISTORY

Laversab Document Number	Release Date	Description
125-9066A	07/28/2009	3200 User's Manual
125-9066B	05/21/2010	3200 DDU Rev B User's Manual

## **WARNING**

THE 3200 DDU IS AN INTRINSICALLY SAFE DEVICE WHICH REQUIRES TO BE INSTALLED AND OPERATED STRICTLY ACCORDING TO THE CONDITIONS SET FORTH IN THIS MANUAL. FAILURE TO ADHERE TO THESE REQUIREMENTS MAY IMPAIR THE INTRINSIC SAFETY OF THIS DEVICE, THEREBY MAKING IT UNSAFE TO USE IN THE HAZARDOUS ENVIRONMENT FOR WHICH IT IS CLASSIFIED.

THE 3200 DDU MAY ONLY BE OPENED AND SERVICED BY TRAINED LAVERSAB PERSONNEL. OPENING THE 3200 DDU, FOR ANY REASON, BY ANYONE OTHER THAN TRAINED LAVERSAB PERSONNEL, MAY IMPAIR ITS INTRINSIC SAFETY CLASSIFICATION, AND THEREFORE, IS STRICTLY FORBIDDEN.

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## SECTION 1

### INTRODUCTION

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The Model 3200 DDU (Driller's Display Unit) is an intrinsically safe device certified for use in Zone-1 or Zone-2 hazardous locations. The device is usually installed close to the Driller on a Drilling-Rig-Floor. The DDU receives power and data, through barriers located in a safe area. It displays this data, in a user-defined format, on a backlit color LCD display, such that it is clearly viewable by the Driller. Typically, data from an MWD system or other Rig-Floor monitoring system is sent via an RS232/current loop or RS485 interface and made available to the Driller. The DDU is environmentally rated as IP65 (NEMA-4X), making it suitable for use under all weather conditions, at ambient temperatures from -20<sup>0</sup> C to +50<sup>0</sup> C. The 3200 DDU is shown in Figure 1.1

This manual provides details on the following:

In Section 2: SAFETY

- a. Standards to which the device complies
- b. Explanation of the Marking plate.
- c. Input Parameters for the device.
- d. Environmental conditions in which the device may be used.
- e. Dielectric strength qualification of the device.
- f. Other safety-related information

In Section 3: INSTALLATION & REMOVAL

- a. Installation requirements including the use of external barriers
- b. Control Drawing for installation including cabling details
- c. Safety related issues pertaining to the installation and removal of the device.
- d. Acceptable environmental conditions

In Section 4: MAINTENANCE & SERVICING

- a. Recommended maintenance.
- b. Restrictions on maintenance.

In Section 5: TYPICAL USE

- a. Brief description of the typical operation of the device.

In Appendix A: SPECIFICATIONS & FEATURES

- a. A description of the specifications of the device and some of its unique features

In Appendix B: REPAIR & RETURN POLICIES

- a. Contact information of the manufacturer.
- b. Instructions on returning the device to the manufacturer for repair.



Figure 1.1



## SECTION 2

### SAFETY

---

#### 2.1 Standards:

The Model 3200 DDU conforms to the following standards:

EN 60079-0: 2006  
EN 60079-11: 2007

#### 2.2 Marking:

The Marking plate on the 3200 DDU has the following marking information:

LAVERSAB, INC.  
CE0035  
TYPE: 3200 DDU Rev B  
⊕ II 2 G  
Zone 1 Ex ib IIB T4  
IP65  
-20°C ≤ T<sub>a</sub> ≤ +50°C  
TÜV 10 ATEX 7779

The 1<sup>st</sup> line shows the manufacturer's name.

The 2<sup>nd</sup> line shows the identification number of the (0035) of the Certifying Body that performed the quality audit of the manufacturer's facility per CE requirements.

The 3<sup>rd</sup> line shows the device name that has been certified.

The 4<sup>th</sup> line is the device classification per EC directive 94/9/EC, which indicates that the device is suitable for use in explosive gas atmospheres in Zone-1 hazardous locations.

The 5<sup>th</sup> line is the device classification per EN 60079-0 (and EN 60079-11), which indicates that the device is intrinsically safe to level "ib" and is suitable for use in locations where explosive gases of Group IIB may be present. It also indicates that the surface temperature classification of the device is T4.

The 6<sup>th</sup> line indicates that the device has an ingress protection rating of IP65.

The 7<sup>th</sup> line indicates that the device may be used at ambient temperatures ranging between -20°C and +50°C.

The 8<sup>th</sup> line shows the Certifying Body (TUV) and the Certificate number (10 ATEX 7779).

**WARNING!** The Marking plate must always remain attached to the 3200 DDU and must not be removed. If the Marking plate is missing, the unit must be returned to the manufacturer to have a new Marking plate installed. Using the 3200 DDU without the Marking plate is strictly prohibited.

### 2.3 Input Parameters of the device:

The device has 4 independent, totally isolated, circuits which receive intrinsically safe power and data from the safe area, through a 9-pin, sealed circular connector.

The intrinsically safe input parameters for each circuit of the device are as follows:  
(The pin number on the 9-pin connector are shown for each circuit in “[ ]” below)

#### **Circuit 1: (PWRIN+ [pin A], PWRIN- [pin F]) (Primary Power input):**

U<sub>i</sub> = 19.9 V  
I<sub>i</sub> = 780 mA  
P<sub>i</sub> = 3880.5 mW  
C<sub>i</sub> = 0.0 μF @ 19.9V ; 24.4 μF @ 9.6V  
L<sub>i</sub> = 0.1 μH

#### **Circuit 2 (BLPWR+ [pin G], BLPWR- [pin H]) (Backlight Power input):**

U<sub>i</sub> = 19.9 V  
I<sub>i</sub> = 780 mA  
P<sub>i</sub> = 3880.5 mW  
C<sub>i</sub> = 1.11 μF  
L<sub>i</sub> = 0.1 μH

#### **Circuit 3 (SERIAL+ [pin B], SERIAL- [pin C]) (RS232/ 0-20ma data input):**

U<sub>i</sub> = 19.9 V  
I<sub>i</sub> = 780 mA  
P<sub>i</sub> = 3880.5 mW  
C<sub>i</sub> = 0.0 μF  
L<sub>i</sub> = 0.1 μH

#### **Circuit 4 (RS485+ [pin D], RS485- [pin E]) (RS485 data input):**

U<sub>i</sub> = 10.0 V  
I<sub>i</sub> = 150 mA  
P<sub>i</sub> = 375 mW  
C<sub>i</sub> = 0.0 μF  
L<sub>i</sub> = 0.1 μH

### 2.4 Environmental conditions:

The 3200 DDU is suitable for use in locations where:

- a. The ambient temperature is between -20°C and +50°C.
- b. The location is classified as non-hazardous (safe area).

- c. The location is hazardous and classified as Zone-1 or Zone-2 where explosive gases of Group IIB may be present.
- c. Humidity is between 5% and 100%
- d. The device may be subjected to rain, snow, salt-fog or may be washed-down with water (at very low pressures).
- e. There are no heat-generating devices in close proximity to the 3200 DDU that could cause the ambient temperature around the DDU to exceed +50°C.

**WARNING !** The 3200 DDU should not be subjected to high-pressure water-jets (pressure-washing) as it may impair the intrinsic safety rating of the device. The device is not designed to prevent ingress of water under high pressure.

**WARNING !** The 3200 DDU is not submersible.

## 2.5 Non-intrinsically safe circuits:

There are NO non-intrinsically safe circuits within the 3200 DDU. All circuits are intrinsically safe.

## 2.6 Dielectric strength:

The dielectric strength requirements as defined by clause 6.3.12 of EN 60079-11 have been satisfied :

- a. Between each intrinsically-safe circuit in the 3200 DDU and all other intrinsically-safe circuits within the 3200 DDU
- b. Between each intrinsically-safe circuit in the 3200 DDU and Earth Ground.

## 2.7 Earth Ground connection:

The enclosure of the 3200 DDU must be connected to a suitable Earth ground. This is a strict requirement to prevent the build-up of static charge on the glass surface in front of the LCD display. Please see Section 3 for more details.

**WARNING !** Failure to connect the enclosure of the 3200 DDU to a suitable Earth ground, may impair the intrinsic safety rating of the device and may result in a hazardous condition.

## 2.8 External barriers:

To maintain the isolation between the four intrinsically-safe circuits within the 3200 DDU, it is necessary that each circuit be connected to a separate, dedicated barrier in the safe area. Please see Section 3 for more details.

**WARNING !** Connecting power or signals to the circuits of the 3200 DDU, without using separate, dedicated barriers for each circuit, may impair the intrinsic safety rating of the 3200 DDU.

## 2.9 External cable:

The cable used to connect power and signals (through separate barriers) from the safe area to the 3200 DDU, must be compliant with the requirements of EN 60079-14 for use in a hazardous area.

**WARNING !** Connecting power or signals to the circuits of the 3200 DDU, without using a cable that is compliant with EN 60079-14, may impair the intrinsic safety rating of the 3200 DDU.

## 2.10 Pollution degree & over-voltage category:

The 3200 DDU has a pollution degree category of 2 and an over-voltage category of II.

## SECTION 3

### INSTALLATION & REMOVAL

---

#### 3.1 Important Notes on Installation:

- a. The 3200 DDU does not require any special tools for installation.
- b. The 3200 DDU does not require any adjustments as part of the installation process.
- c. The 3200 DDU must be installed in a location that meets the environmental conditions as defined in Section 2.4
- d. The 3200 DDU must be connected to the safe area by means of an external cable that meets the requirements of EN 60079-14 for use in a hazardous location. Other details of the connection are provided in Section 3.2
- e. External circuits must be connected to the 3200 DDU circuits through separate, dedicated barriers (located in the safe area) for each of the four circuits of the DDU. Further details are provided in Section 3.2.
- f. The enclosure of the 3200 DDU must be connected to a suitable Earth Ground using the earth-ground connection provided with the 3200 DDU.

#### 3.2 Installation details and Control Drawing:

Please refer to the Control Drawing shown in Figure 3.1.

##### 3.2.1 Selecting the appropriate Barriers:

Separate and dedicated barriers must be selected for each of the four circuits of the 3200 DDU.

When selecting a barrier for a specific circuit of the 3200 DDU, it is critical that:

- a. The parameters  $U_o$ ,  $I_o$  and  $P_o$  of the barrier are less than or equal to the parameters  $U_i$ ,  $I_i$  and  $P_i$  of the specific circuit on the 3200 DDU. Also, the parameters  $C_o$  and  $L_o$  of the barrier should be greater than the parameters  $C_i$  and  $L_i$  of the specific circuit. Specifically,

$$U_o \leq U_i$$

$$I_o \leq I_i$$

$$P_o \leq P_i$$

$$C_o \geq C_i$$

$$L_o \geq L_i$$

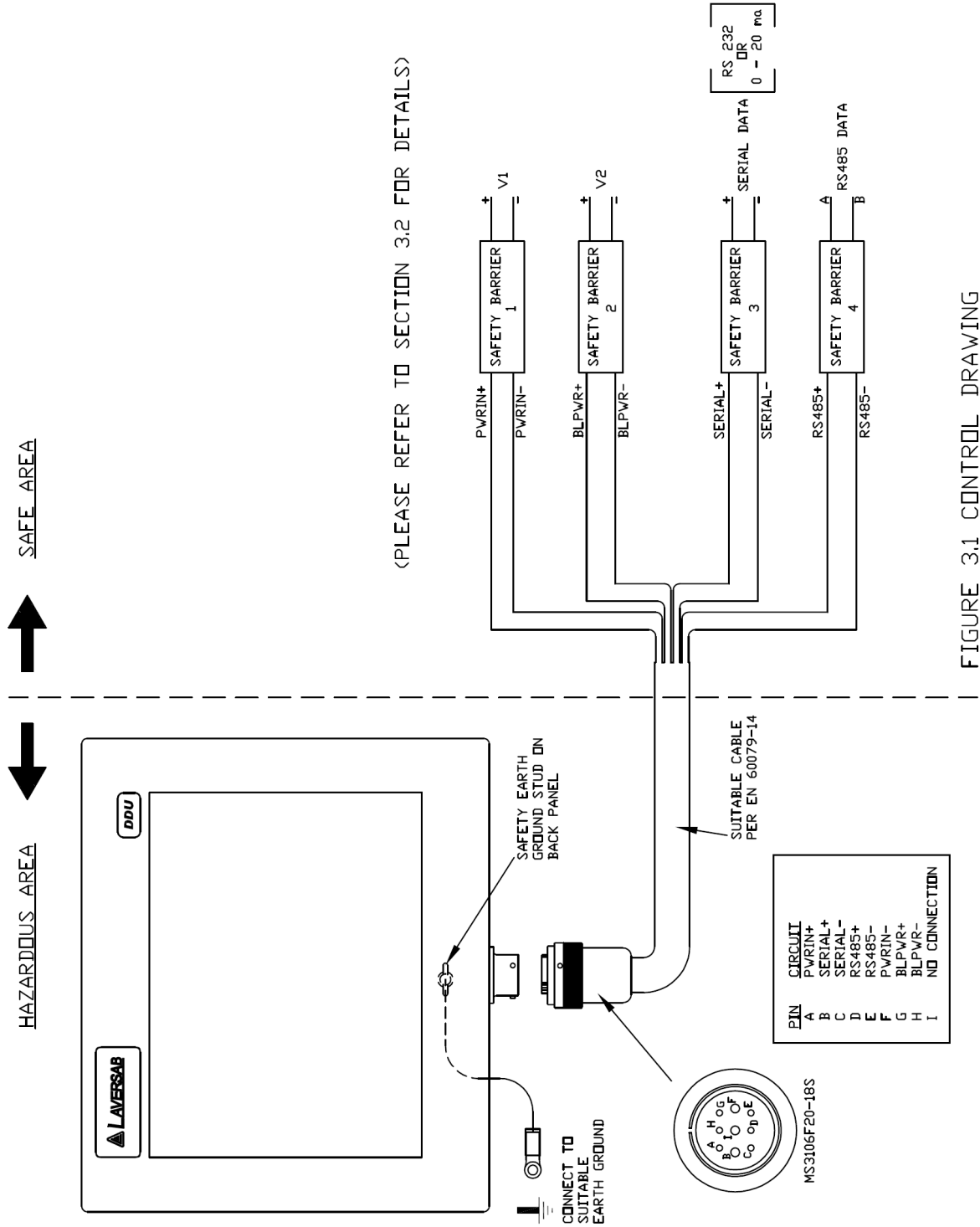


FIGURE 3.1 CONTROL DRAWING

- b.  $U_o$ ,  $I_o$  and  $P_o$  are greater than the minimum voltage, current and power requirement of the specific DDU circuit as defined in Section 3.2.2. Specifically,
  - $U_o > U_{min}$
  - $I_o > I_{min}$
  - $P_o > P_{min}$
- c. The inductance and capacitance of the connecting cable is added to the Li and Ci parameters before considering the requirements of “a” above.
- d. The maximum resistance ( $R_{max}$ ) of the barrier and the resistance of the connecting cable are taken into consideration, to determine the expected power losses in the barrier and the cable, when considering the requirements of 3.2.1.b above.
- e. If two barriers are needed to be connected in parallel to meet the requirements as stated above, then they should both have identical  $U_o$  parameters. The  $I_o$  and  $P_o$  values of each barrier must be added together and the resulting values must still meet the requirements of 3.2.1.a above.
- f. The input voltage ( $U_m$ ) to the barrier and the power available to the barrier must be such that it allows meeting the requirements of 3.2.1.b above after taking into consideration the losses that will take place in the connecting cable.

For assistance in selecting the appropriate barrier for each circuit, please contact the service department of Laversab, Inc.

### 3.2.2 Minimum Voltage, Current and Power requirements of each circuit:

The minimum requirements for the circuits in the 3200 DDU are as follows:

- a. Circuit 1: PWRIN

$$\begin{aligned}
 U_{min} &= 9 \text{ Volts} \\
 P_{min} &= 1.94 \text{ W} \\
 I_{min} &= 216 \text{ ma (@ } U_{min})
 \end{aligned}$$

- b. Circuit 2: BLPWR

$$\begin{aligned}
 U_{min} &= 5.3 \text{ Volts} \\
 P_{min} &= 1.9 \text{ W} \\
 I_{min} &= 360 \text{ ma (@ } U_{min})
 \end{aligned}$$

c. Circuit 3: SERIAL

$$U_{\min} = 3 \text{ Volts}$$
$$P_{\min} = 3 \text{ mW}$$
$$I_{\min} = 1 \text{ ma (@ } U_{\min})$$

d. Circuit 4: RS485

$$U_{\min} = 1.68 \text{ Volts}$$
$$P_{\min} = 1.68 \text{ mW}$$
$$I_{\min} = 1 \text{ ma (@ } U_{\min})$$

### 3.2.3 Selecting the appropriate external cable:

The external (connecting) cable must be selected such that:

- It meets the requirements of EN 60079-14 for hazardous locations.
- It minimizes the power losses due its DC resistance and allows the selection of suitable barriers to supply power and signals to the DDU.
- Its inductance and capacitance are taken into consideration while selecting the barrier for each circuit.

### 3.2.4 Connections:

Connections to the 3200 DDU should be made as shown in the Control Drawing in Figure 3.1. The connector at the end of the connecting cable that mates to the INPUT connector on the DDU is MS3106F20-18S. The pin-out of the connector is as follows:

<u>PIN</u>	<u>CIRCUIT</u>
A	PWRIN+
B	SERIAL+
C	SERIAL-
D	RS485+
E	RS485-
F	PWRIN-
G	BLPWR+
H	BLPWR-
I	No connection

As shown in the Control Drawing, each circuit must have its own dedicated barrier.

As shown in the Control Drawing, the connecting cable must be suitable for use in



hazardous locations as per EN 60079-14.

### **3.2.5 Earth Ground connection:**

As shown in the Control Drawing in Figure 3.1, the Safety Earth Ground connection must be securely made between the Safety Earth Ground stud on the back panel of the 3200 DDU and a suitable Earth Ground.

**WARNING !** It is critical that the enclosure of the 3200 DDU be securely connected to a proper Earth ground. Failure to do so can cause a static charge to build up on the glass surface in front of the LCD display. This static charge build-up will impair the intrinsic-safe rating of the 3200 DDU and may result in a safety hazard.

The Earth Ground connection must be made before connecting the external (connecting) cable to the 3200 DDU.

### **3.3 Mounting the 3200 DDU:**

Figure 3.2 shows two suggested mounting methods for the 3200 DDU.

The first method uses the four mounting slots on the back of the unit, two at the bottom and two at the top. These slots can be used to mount the unit onto four bolts securely fastened to a stable vertical surface. The distances between the bolts should match the pattern of the slots as shown in Figure 3.2. The dimensional requirements for the four mounting bolts is also shown in the Figure 3.2.

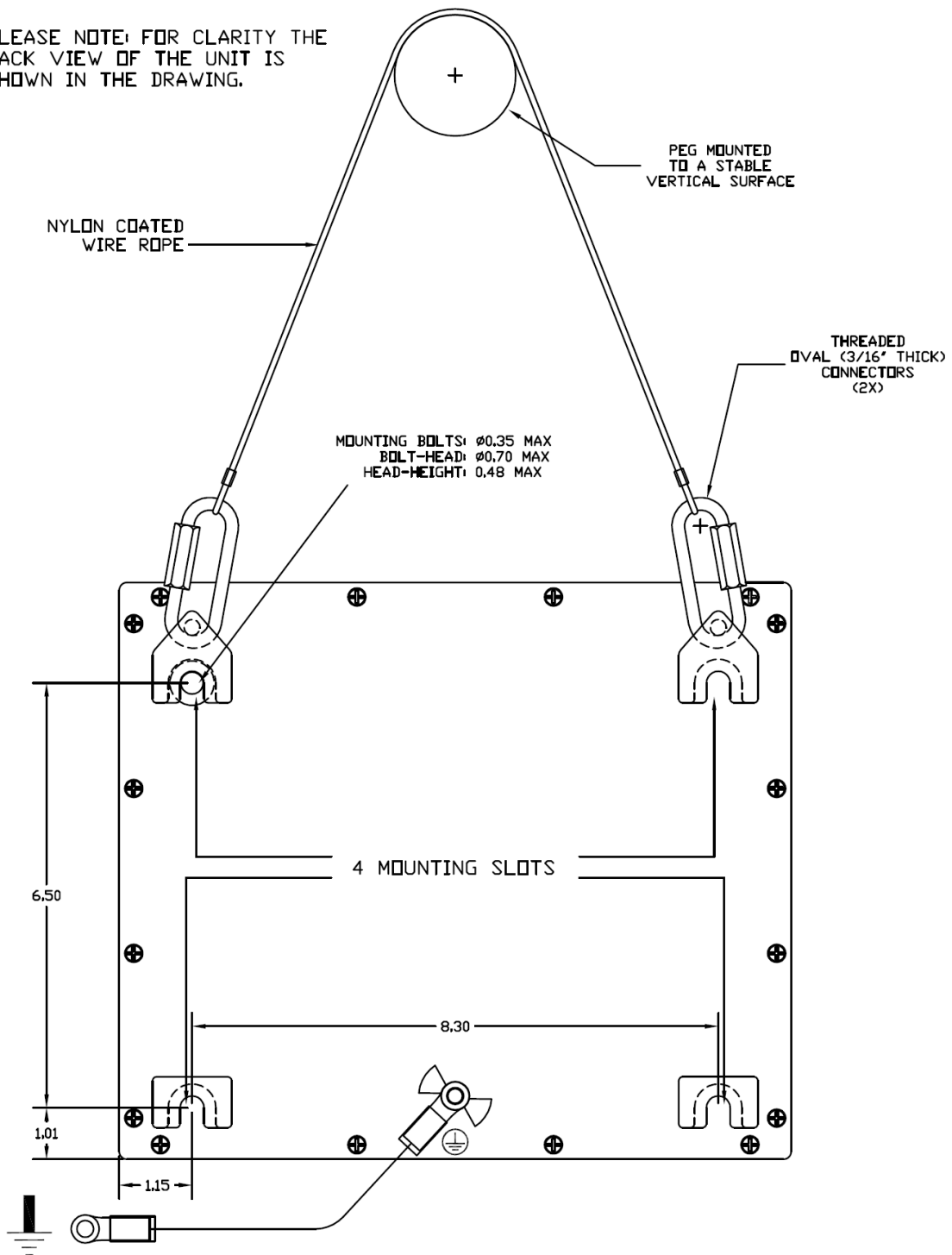
The second mounting method uses the nylon-coated wire-rope which is included with the unit. Using this wire-rope, the unit can simply be hung on a sturdy peg or hook that can sustain the weight (5 kg., 11 lbs) of the unit. Figure 3.2 shows this method of mounting.

### **3.4 Removing the 3200 DDU from service:**

When removing the 3200 DDU from service, the following sequence must be followed:

- a. Disconnect all external electrical connections to the 3200 DDU by unplugging the external cable from the INPUT connector.
- b. Only after step "a" has been completed, disconnect the Safety Earth Ground connection from the "suitable" Earth ground.
- c. Remove the 3200 DDU from its mounting position.

PLEASE NOTE: FOR CLARITY THE BACK VIEW OF THE UNIT IS SHOWN IN THE DRAWING.



**CAUTION: SAFETY EARTH GROUND CONNECTION MUST BE SECURELY CONNECTED TO A SUITABLE EARTH GROUND**

**FIGURE 3.2: TYPICAL MOUNTING**

## SECTION 4

### MAINTENANCE & SERVICING

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#### 4.1 MAINTENANCE

The only regular maintenance required on the 3200 is:

- a. Clean the display protective glass with water or any commercial window cleaner, using a clean, soft, lint-free cloth. Care must be taken not to leave residues into the edges of the screen during the cleaning process. Do not use any abrasive substance, or any organic solvents.
- b. Always use the protective cap when the INPUT connector is not in use.

**WARNING:** Do NOT pressure-wash the 3200 DDU.

#### 6.1 SERVICING

**WARNING:** The 3200 DDU must be returned to Laversab for any servicing and repair. There are no user-serviceable or user-replaceable components within the 3200 DDU. Any attempt to service the unit may severely impair the intrinsic-safe classification of the unit. Therefore, opening the unit for any reason is strictly prohibited.

## SECTION 5

### TYPICAL USE

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After the 3200 DDU has been installed as per the instructions provided in Section 3, the unit may be turned ON for operation. The 3200 DDU does not provide an On/Off switch, therefore the user should make provisions for an On/Off switch in the safe area.

During the boot up period, the backlight on the display will turn on and the display will be completely white for a period of about 5 to 10 seconds. Thereafter, the boot-up screen will be displayed. The DDU will then begin loading the application program. It is normal to expect a delay of up to 30 seconds between the boot-up screen being displayed and the application program becoming operational.

The 3200 DDU comes with a preloaded operating system and application program. The application program is configured based on the user's requirements. Any changes to the application program must be done with the assistance of Laversab personnel. For most applications, the 3200 DDU receives data, either through the SERIAL circuit or the RS485 circuit, and displays this data in a predefined format, on the LCD display. There is no means of operator input either through a keyboard or a touch-screen. The DDU simply performs as a rig-floor monitor.

**APPENDIX A**  
**SPECIFICATIONS & FEATURES**

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- ARM 9 Core Processor running at 190 MHz.
- 64 MB Flash Memory
- 64 MB SDRAM
- Up to 3 Serial Input Options (RS-232, RS-485 & Current Loop)
- 10.4" Transflective Sunlight Readable LCD 640 X 480 with LED Backlighting
- Linux Embedded or Windows CE Operating System
- Intrinsically Safe Design (Ex ib IIB T4 , Zone 1)
- Carrying Handle and Multiple Mounting Options
- Operating Power: 5 Watts Maximum (Please see section 3 for more details)
- Operating Temperature: -20<sup>0</sup> C to 50<sup>0</sup> C
- Storage Temperature: -40<sup>0</sup> C to 75<sup>0</sup> C
- Operating/Non-operating Shock: 50 G, 11 ms half-sine
- Operating/Non-operating Vibration: 1.5 G RMS, 5 to 500 Hz
- Humidity: 5% to 100%
- Sealing: IP65, NEMA-4X on all six sides
- Weight: 11 lbs
- Dimensions: 10.75" (w) X 9.25" (h) X 2.25" (d)
- Certification: ATEX Zone 1, Ex ib IIB T4 (intrinsically safe)

## APPENDIX B

### REPAIR AND RETURN POLICIES

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If it is determined that the product is defective, please call Laversab customer service department: (281) 325-8300 or e-mail <oservice@laversab.com> for further assistance.

Before shipping any equipment to Laversab for repair, please call the customer service department at (281) 325-8300 or e-mail to <oservice@laversab.com>. Please include a description of the problem that has been identified when returning defective equipment.

Ship equipment to:

LAVERSAB, INC.  
505 Gillingham Lane  
Sugar Land, Texas 77478  
U.S.A.



505 Gillingham Lane  
Sugar Land, TX 77478 USA  
Phone: (281) 325-8300  
Fax: (281) 325-8399

**DECLARATION OF CONFORMITY**  
(In accordance with ISO/IEC Guide 22)

**Document Number:** 126-0483B  
**Supplier:** Laversab, Inc.  
**Address:** 505 Gillingham Lane  
Sugar Land, Texas 77478  
United States of America  
**Product:** Model 3200 – DDU (Driller’s Display Unit)

The product described is in conformity with Essential Health and Safety Requirements of the Equipment and Protective Systems in Potentially Explosive Atmospheres (ATEX – 94/9/EC) as amended.

**ATEX Directive 94/9/EC**

EN 60079-0:2006 Electrical Apparatus for Explosive Gas Atmospheres. Part 0: General Requirements  
EN 60079-11:2007 Electrical Apparatus for Explosive Gas Atmospheres. Part 11: Type of Protection “i”

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