



MODEL 3200 DDU

USER'S MANUAL

LAVERSAB, INC.

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Date: Nov. 22, 2012

WARRANTY

Laversab Inc., warrants its products to conform to or exceed the specifications as set forth in its catalogs in use at the time of sale and reserves the right, at its own discretion, but with prior authorization from the certifying body, without notice and without making similar changes in articles previously manufactured, to make changes in materials, designs, finish, or specifications. Laversab Inc. warrants products of its own factory against defects of material or workmanship for a period of one year from date of sale.

Liability of Laversab Inc. under this warranty shall be limited to replacing, free of charge (FOB Houston, Texas), any such parts proving defective within the period of this warranty, but Laversab Inc. will not be responsible for transportation charges, consequential or incidental damages. No liability is assumed by Laversab for damages that are caused by misuse or abuse of the product.

The warranty of Laversab Inc. is not made for products manufactured by others which are illustrated and described in Laversab catalogs or incorporated in Laversab products in essentially the same form as supplied by the original manufacturer. Warranties of the original manufacturers supplant the warranty of Laversab Inc., but, in applicable instances, Laversab, Inc. agrees to use its best efforts to have original suppliers make good their warranties.

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DISCLAIMER

No representations or warranties are made with respect to the contents of this user's manual. Further, Laversab Inc. reserves the right to revise this manual, with prior authorization from the certifying body, but without obligation to notify any other persons or organizations, of such revision.

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

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 -20⁰ C to +50⁰ 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

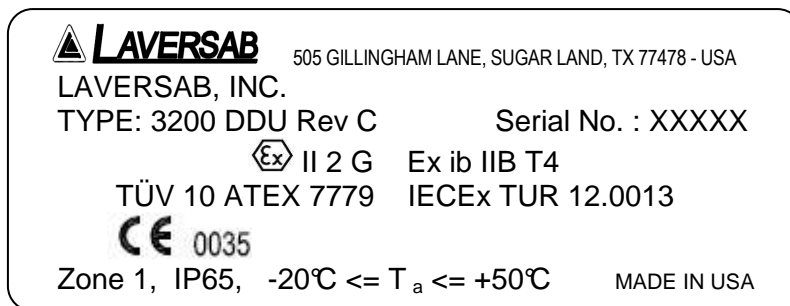
2.1 Standards:

The Model 3200 DDU conforms to the following standards:

| | |
|-------------------|--------------------|
| EN 60079-0: 2012 | IEC 60079-0: 2011 |
| EN 60079-11: 2012 | IEC 60079-11: 2011 |
| EN 61326-1: 2006 | CISPR 11: 2003 |

2.2 Marking:

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



The 1st line shows the manufacturer's logo and the manufacturer's address.

The 2nd line shows the manufacturer's name.

The 3rd line shows the device name (3200 DDU Rev C) that has been certified. The right side of the line shows the Serial No. of the unit.

The 4th line is the device classification (Ex II 2 G) per EC directive 94/9/EC, which indicates that the device is suitable for use in explosive gas atmospheres in Zone-1 hazardous locations. Further in line 4 is the device classification (Ex ib IIB T4) per EN 60079-0, EN 60079-11, IEC 60079-0, IEC 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 5th line shows the Certifying Body (TUV) and the Certificate number (10 ATEX 7779) for the ATEX certification. It also shows the Certifying Body (TUR) and the Certificate number (12.0013) for the IECEX certification.

The 6th 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 7th line indicates that the device is suitable for Zone 1 environments, has an ingress protection rating of IP65 and may be used at ambient temperatures ranging between -20°C and +50°C. It also indicates that the device is manufactured in USA.

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_i = 19.9 V
I_i = 780 mA
P_i = 3880.5 mW
C_i = 0.0 μF @ 19.9V ; 24.4 μF @ 9.6V
L_i = 0.1 μH

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

U_i = 19.9 V
I_i = 780 mA
P_i = 3880.5 mW
C_i = 1.11 μF
L_i = 0.1 μH

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

U_i = 19.9 V
I_i = 780 mA
P_i = 3880.5 mW
C_i = 0.0 μF
L_i = 0.1 μH

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

| | |
|------------------|--------|
| U _i = | 10.0 V |
| I _i = | 150 mA |
| P _i = | 375 mW |
| C _i = | 0.0 μF |
| L _i = | 0.1 μH |

2.4 Environmental conditions:

The 3200 DDU is suitable for use in locations where:

- The ambient temperature is between -20°C and +50°C.
- The location is classified as non-hazardous (safe area).
- The location is hazardous and classified as Zone-1 or Zone-2 where explosive gases of Group IIB may be present.
- Humidity is between 5% and 100%
- The device may be subjected to rain, snow, salt-fog or may be washed-down with water (at very low pressures).
- 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 :

- 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,

$$U_o \leq U_i$$

$$I_o \leq I_i$$

$$P_o \leq P_i$$

$$C_o \geq C_i$$

$$L_o \geq L_i$$

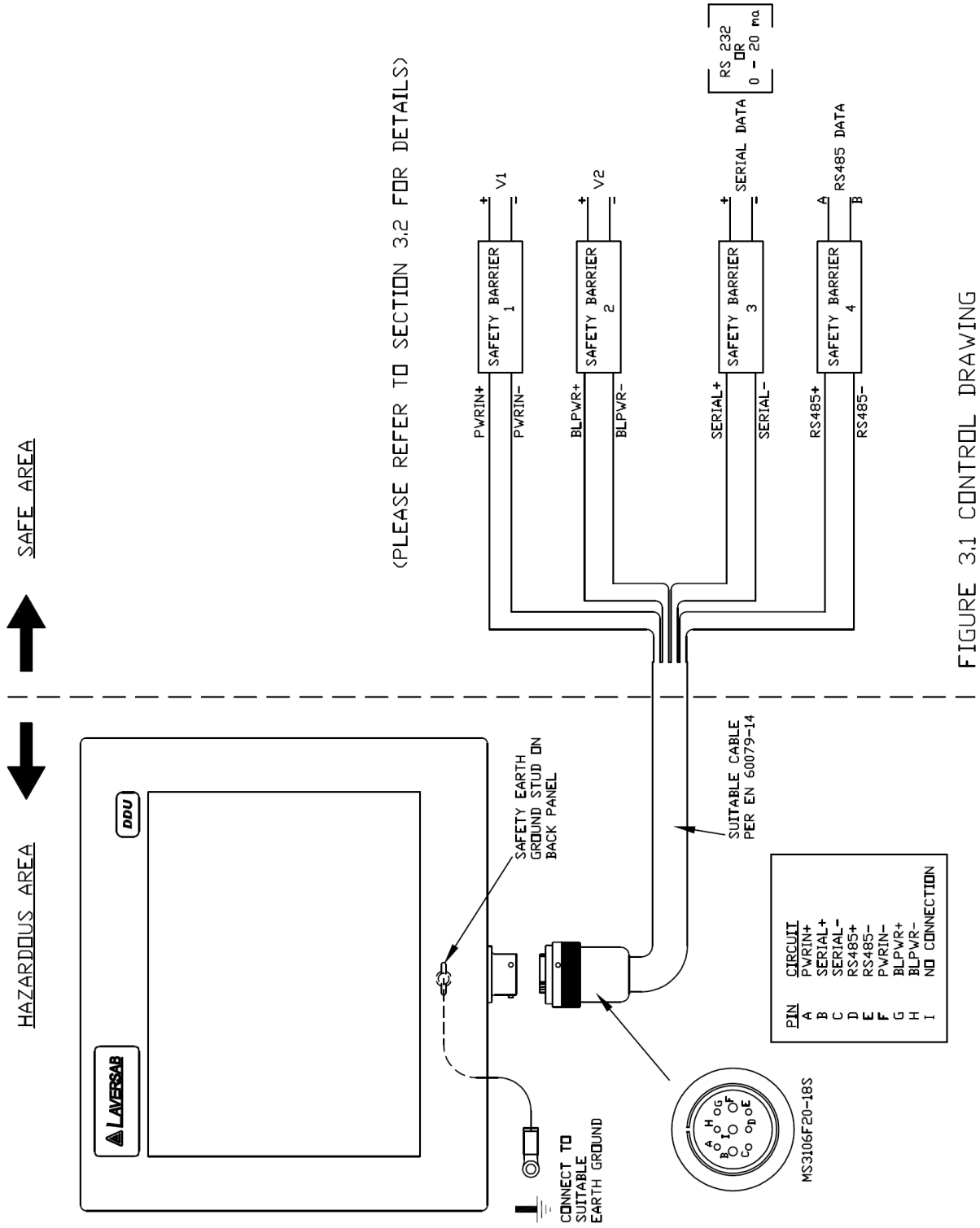


FIGURE 3.1 CONTROL DRAWING

- 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 L_i and C_i 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

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

d. Circuit 4: RS485

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

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.

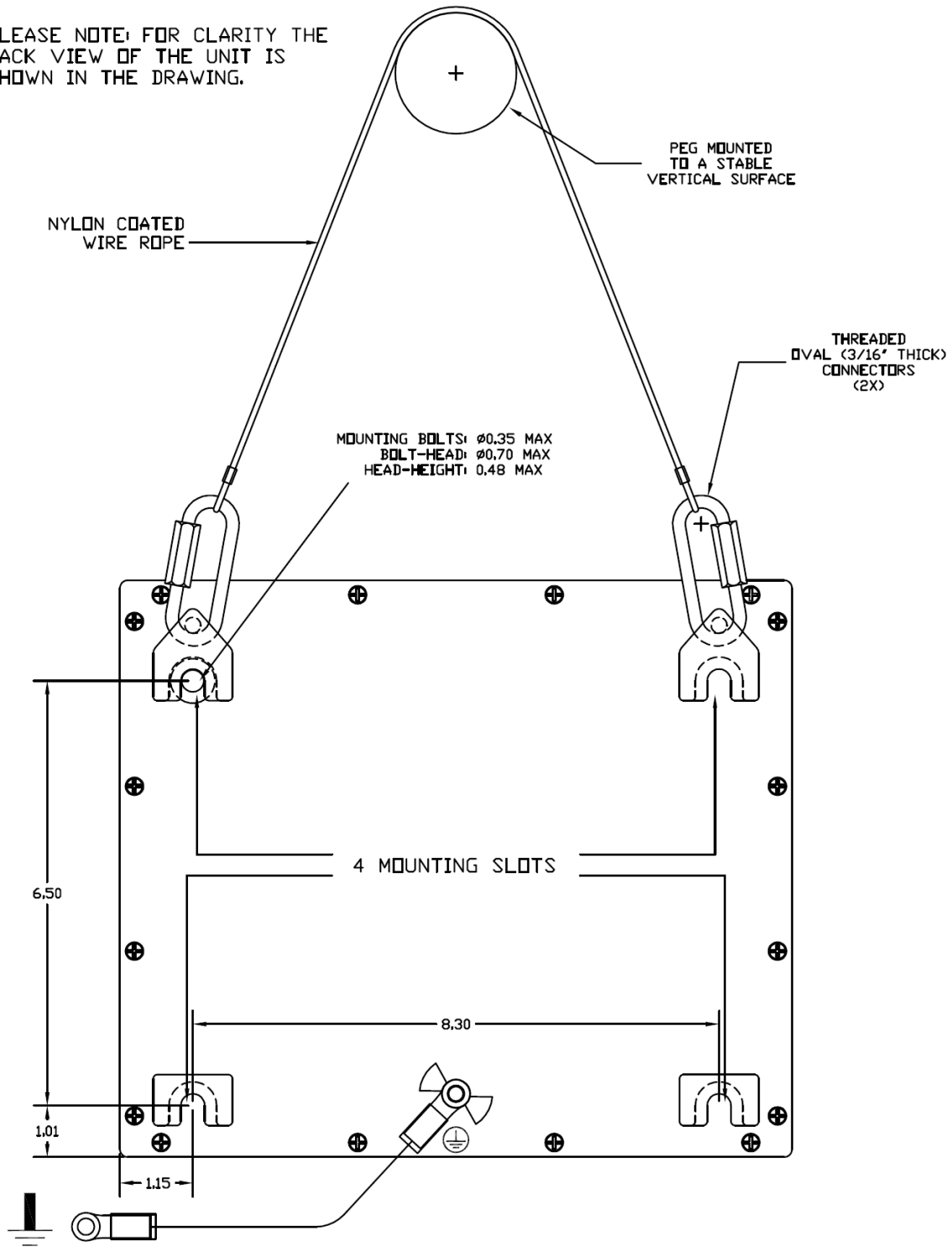
The second mounting method uses the nylon-coated wire-rope which is included with the unit. Using this wire-rope, the unit can simply be hung on a sturdy peg or hook that can sustain the weight (5 kg., 11 lbs) of the unit. Figure 3.2 shows this method of mounting.

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

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

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

- 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: -20⁰ C to 50⁰ C
- Storage Temperature: -40⁰ C to 75⁰ 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 & IECEx Zone 1, Ex ib IIB T4 (intrinsically safe)

APPENDIX B

REPAIR AND RETURN POLICIES

If it is determined that the product is defective, please call Laversab customer service department: (281) 325-8300 or e-mail <customerservice@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 <customerservice@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.

APPENDIX C
CERTIFICATES



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: 126-0483C

Supplier & Address:
Laversab, Inc.
505 Gillingham Lane
Sugar Land, Texas 77478
United States of America

European Representative:
Laversab, Inc.
505 Gillingham Lane
Sugar Land, Texas 77478
United States of America

Product: Model 3200 DDU

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) and the IEC Standard as per IECEx Scheme Rules as amended. The product also conforms to the Electromagnetic Compatibility Directive (EMC – 2004/108/EC) as amended.

Potentially Explosive Atmospheres Standards

| | |
|--------------------|---|
| EN 60079-0: 2012 | Electrical Apparatus for Explosive Gas Atmospheres. Part 0: General Requirements |
| EN 60079-11: 2012 | Electrical Apparatus for Explosive Gas Atmospheres. Part 11: Type of Protection “i” |
| IEC 60079-0: 2011 | Electrical Apparatus for Explosive Gas Atmospheres. Part 0: General Requirements |
| IEC 60079-11: 2011 | Electrical Apparatus for Explosive Gas Atmospheres. Part 11: Type of Protection “i” |


EMC Standards

| | | |
|----------------------------------|---------------------|---|
| EN 61326-1: 2006; CISPR 11: 2003 | | |
| | Conducted Emissions | Group 1, Class A |
| | Radiated Emissions | Group 1, Class A |
| IEC 61000-4-2: 2001 | Criterion A | Contact: 4 kV; Air: 8 kV |
| IEC 61000-4-3: 2002 | Criterion A | 10 V/m (80 MHz to 1 GHz), 3 V/m (1.4 GHz to 2 GHz), 1 V/m (2 GHz to 2.7 GHz) |
| IEC 61000-4-4: 2004 | Criterion B | AC: 2 kV, 5/50 ns, 5 kHz, I/O: 1 kV, 5/50 ns, 5 kHz |
| IEC 61000-4-5: 2001 | Criterion A | AC: 1 kV LL; 2 kV LE, I/O: 1 kV LE |
| IEC 61000-4-6: 2003 | Criterion A | 3 Vrms |
| IEC 61000-4-8: 1993, A1: 2000 | Criterion A | 30 A/m |
| IEC 61000-4-11: 2004 | Criterion A | Dips: 100% 1 Cycle, 60%: 10 Cycles, 30%: 25 Cycles |
| | Criterion B | Interruptions: 100% 250/300 Cycles |

Technical File Reference Number: 126-0482B

Date Issued: November 20, 2012
Sugar Land, Texas
United States of America

Authorized Signature:


Mr. Chandra Nilekani, Quality Manager

Laversab #: 126-0483C
Date: 2012/11/20
1 of 1



Certificate of Compliance

Applicant: Laversab
 Applicant's Address: 505 Gillingham Lane
 Sugar Land, Texas 77478

Model: 3200 DDU
 Project Number: 13504-10

The Laversab 3200 DDU was tested utilizing the following documents and found to be in compliance with the required criteria on the indicated test date.

| EN 61326-1: 2006; CISPR 11: 2003 | | | |
|----------------------------------|-------------|--|-----------------|
| Conducted Emissions | | Group 1, Class A | March 28, 2012 |
| Radiated Emissions | | Group 1, Class A | March 1, 2012 |
| IEC 61000-4-2: 2001 | Criterion A | Contact: 4 kV; Air: 8 kV | March 7, 2012 |
| IEC 61000-4-3: 2002 | Criterion A | 10 V/m (80 MHz to 1 GHz) 3 V/m (1.4 GHz to 2 GHz) 1 V/m (2 GHz to 2.7 GHz) | March 5, 2012 |
| IEC 61000-4-4: 2004 | Criterion B | AC: 2 kV, 5/50 ns, 5 kHz I/O: 1 kV, 5/50 ns, 5 kHz | March 6, 2012 |
| IEC 61000-4-5: 2001 | Criterion A | AC: 1 kV LL; 2 kV LE I/O: 1 kV LE | March 6-7, 2012 |
| IEC 61000-4-6: 2003 | Criterion A | 3 Vrms | March 1-2, 2012 |
| IEC 61000-4-8: 1993, A1: 2000 | Criterion A | 30 A/m | March 6, 2012 |
| IEC 61000-4-11: 2004 | Criterion A | Dips: 100% 1 Cycle 60%: 10 Cycles 30%: 25 Cycles | March 6, 2012 |
| | Criterion B | Interruptions: 100% 250/300 Cycles | |

I, Jeffrey A. Lenk, for Professional Testing (EMI), Inc., being familiar with the electromagnetic compatibility rules and test procedures, have reviewed the test setup, measured data, and this report. I believe them to be true and accurate.

Jeffrey A. Lenk
 President



Lab Code 2000820

This report has been reviewed and accepted by Laversab. The undersigned is responsible for ensuring that the Laversab 3200 DDU will continue to comply with the applicable rules.

Laversab Representative

(1) **EC-TYPE-EXAMINATION CERTIFICATE**

(2) Equipment and Protective Systems intended for use in Potentially Explosive Atmosphere - **Directive 94/9/EC**

(3) EC-Type-Examination Certificate Number



TÜV 10 ATEX 7779

(4) Equipment: **Model 3200 DDU Rev B**

(5) Manufacturer: **Laversab, Inc.**

(6) Address: **505 Gillingham Lane Sugar Land Texas 77478 United States of America**

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The TÜV Zertifizierungsstelle for ex-protected products of TÜV Rheinland Industrie Service GmbH, TÜV Rheinland Group, notified body No. 0035 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmosphere, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report 296/Ex779.00/10

Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule of this certificate, has been assessed by reference to:

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

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type-Examination Certificate relates only to the design and specification for construction of the equipment or protective system. It does not cover the process for actual manufacture or supply of the equipment or protective system, for which further requirements of the directive are applicable.

(12) The marking of the equipment shall include the following:

Ex II 2 G Ex ib IIB T4

TÜV Zertifizierungsstelle für Explosionsschutz

Cologne, 2010-05-26


Dipl.-Ing. K. Wettingfeld

This EC-type-Examination Certificate without signature and stamp shall not be valid.
This EC-type-examination Certificate may be circulated only without alteration. Extracts or alterations are subject to approval by the
TÜV Zertifizierungsstelle für Ex-Schutz-Produkte
TÜV Rheinland Industrie Service GmbH TÜV Rheinland Group Am Grauen Stein 51105 Köln
Tel. +49 (0) 221 806-0 Fax. + 49 (0) 221 806 114

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Genau. Richtig.

(13) Annex

(14) **EC-Type Examination Certificate**
TÜV 10 ATEX 7779

(15) Description of equipment

15.1 Equipment and type

Model 3200 DDU Rev B

15.2 Description of equipment

The 3200 DDU is an intrinsically safe device which can be installed close to the Driller on a Rig-Floor, in a Zone 1 or Zone 2 hazardous area. The DDU receives power and data from 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 or RS485 interface and made available to the Driller.

15.3 Data

15.3.1 Technical Data

Ambient temperature: $-20^{\circ}\text{C} \leq T_a \leq +50^{\circ}\text{C}$

Intrinsic safety classification: Ex ib IIB T4

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 entity are as follows:

Circuit 1: (PWRIN+, PWRIN-) (Primary Power input):

U_i = 19.9 V
I_i = 780 mA
P_i = 3880.5 mW
C_i = 0.0 μF at 19.9V; 24.4 μF at 9.6V
L_i = 0.1 μH

Circuit 2 (BLPWR+, BLPWR-) (Backlight Power input):

U_i = 19.9 V
I_i = 780 mA
P_i = 3880.5 mW
C_i = 1.11 µF
L_i = 0.1 µH

Circuit 3 (SERIAL+, SERIAL-) (RS232/ 0-20ma data input):

U_i = 19.9 V
I_i = 780 mA
P_i = 3880.5 mW
C_i = 0.0 µF
L_i = 0.1 µH


Circuit 4 (RS485+, RS485-) (RS485 data input):

U_i = 10.0 V
I_i = 150 mA
P_i = 375 mW
C_i = 0.0 µF
L_i = 0.1 µH

- (16) Test-Report No. 296 / Ex 779 / 00 / 10
- (17) Special Conditions for safe use
none
- (18) Basic Safety and Health Requirements
Covered by afore mentioned standards

TÜV CERT-Zertifizierungsstelle

Cologne, 10-05-26


Dipl.-Ing. Klaus Wettingfeld

1st Supplement

acc. to directive 94/9/EC, Appendix III, No 6
to the EC-Type Examination Certificate



TÜV 10 ATEX 7779

Device: Model 3200 DDU Rev C
Manufacturer: Laversab, Inc.
Address: 505 Gillingham Lane, Sugar Land, TX 77478, USA

Description of supplements and modifications:

The 3200 DDU is an intrinsically safe device which can be installed close to the Driller on a Rig-Floor, in a Zone 1 or Zone 2 hazardous area. The DDU receives power and data from 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 or RS485 interface and made available to the Driller.

(15) The following modifications are valid for this 1st supplement

Standard basis EN 60079-0:2012; EN 60079-11:2012

The topic of the 1st supplement to the certificate TÜV 10 ATEX 7779 is the redesign of Model 3200 DDU Rev B to Model 3200 DDU Rev C.

The device description of the Model 3200 DDU Rev C remains unchanged compared to the Model 3200 DDU Rev B. The redesign is based on some minor internal changes which have no influence on the intrinsic safe parameters. A list of the changes and the related assessments is provided within the document "Atex Analysis - Supplement: Model 3200 DDU Rev C".

Another topic of the 1st supplement is an upgrade of the standards. The assessment is based on the IECEx test report DE/TUR/ExTR12.0016/00

This 1st supplement to the EC-Type-Examination Certificate without signature and official stamp shall not be valid. The certificate may be circulated only without alteration. Extracts or alterations are subject to approval by TÜV Zertifizierungsgesellschaft of TÜV Rheinland Industrie Service GmbH
In case of dispute, the German text shall prevail
page 1 / 2

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Technical Data

Unchanged.

(16) Test Report No. 557 / Ex 779.01 / 12

(17) Special conditions for safe use

No special conditions.

(18) Basic Safety and Health Requirements

Covered by mentioned standards in the original certificate.

TÜV Rheinland Certification Body
for explosion protected equipment

Cologne, 27th November 2012


Dipl.-Ing. Klaus Peter Graffi





IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx TUR 12.0013 issue No.: 0 Certificate history:

Status: **Current**

Date of Issue: 2012-11-27 Page 1 of 3

Applicant: **Laversab**
505 Gillingham Lane
Sugar Land, TX 77478
USA
United States of America

Electrical Apparatus: **DDU**
Optional accessory:

Type of Protection: **Intrinsic safety**

Marking: **Ex ib IIB T4**


Approved for issue on behalf of the IECEx
Certification Body:

Klauspeter Graffi

Position:

Head of Certification Body

Signature:
(for printed version)


2012-11-28

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the [Official IECEx Website](http://www.iecex.com).

Certificate issued by:

TUV Rheinland Industrie Service GmbH
Am Grauen Stein
51105 Cologne
Germany





IECEX Certificate of Conformity

Certificate No.: IECEx TUR 12.0013
Date of Issue: 2012-11-27 Issue No.: 0
Page 2 of 3
Manufacturer: **Laversab**
505 Gillingham Lane
Sugar Land, TX 77478
USA
United States of America

Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:

The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2011 Explosive atmospheres - Part 0: General requirements
Edition: 6.0
IEC 60079-11 : 2011-06 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "I"
Edition: 6.0

This Certificate does not indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:
[DE/TUR/ExTR12.0016/00](#)

Quality Assessment Report:
[DE/TUR/QAR12.0007/00](#)



IECEX Certificate of Conformity

Certificate No.: IECEx TUR 12.0013

Date of Issue: 2012-11-27

Issue No.: 0

Page 3 of 3

Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

The 3200 DDU is an intrinsically safe device which can be installed close to the Driller on a Rig-Floor, in a Zone 1 or Zone 2 hazardous area. The DDU receives power and data from 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 or RS485 interface and made available to the Driller.

CONDITIONS OF CERTIFICATION: NO

Annexe: DE-IECEX-TUR-12.0013-00_Attachment_12-11-27.pdf



Attachment to Certificate
IECEX TUR 12.0013
Revision 0



Attachment to Certificate IECEX TUR 12.0013/00

Device: Driller's Display Unit, Model 3200 DDU Rev C
Manufacturer: Laversab, Inc.
Address: 505 Gillingham Lane, Sugar Land, TX 77478, USA

General product information:

The 3200 DDU is an intrinsically safe device which can be installed close to the Driller on a Rig-Floor, in a Zone 1 or Zone 2 hazardous area. The DDU receives power and data from 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 or RS485 interface and made available to the Driller.

Technical data:

Ambient temperature: $-20^{\circ}\text{C} \leq T_a \leq +50^{\circ}\text{C}$
Intrinsic safety classification: Ex ib IIB T4



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 entity are as follows:

Circuit 1: (PWRIN+, PWRIN-) (Primary Power input):

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P_i = 3880.5 mW
C_i = 0.0 µF at 19.9V ; 24.4 µF at 9.6V
L_i = 0.1 µH

Circuit 2 (BLPWR+, BLPWR-) (Backlight Power input):

U_i = 19.9 V
I_i = 780 mA
P_i = 3880.5 mW
C_i = 1.11 µF
L_i = 0.1 µH

Circuit 3 (SERIAL+, SERIAL-) (RS232/0-20ma data input):

U_i = 19.9 V
I_i = 780 mA
P_i = 3880.5 mW
C_i = 0.0 µF
L_i = 0.1 µH

Circuit 4 (RS485+, RS485-) (RS485 data input):

U_i = 10.0 V
I_i = 150 mA
P_i = 375 mW
C_i = 0.0 µF
L_i = 0.1 µH