



a division of GLBH Group Manufacturing Ltd.

Operating Manual

Safety Level II

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Overview



As its name implies the Safety Level II is a device with the purpose of making certain jobs safer.

You must always keep in mind that there is no single device that can absolutely, guarantee your safety. The Safety Level II is no exception to this rule. In matters of safety, there is no substitute for taking all necessary precautions, using the right equipment in a safe way, and following every safety procedure at all times.

This having been stated, the Safety Level II was designed to assist you, wherever possible, to work in a safer environment. The Safety Level II does this by acting as a silent sentry, always on guard,* and letting you know by sounding an alarm when a certain situation may have become unsafe or unwanted. For more information on how the Safety Level II accomplishes this, refer to page 3.

(* Assuming, of course, that the unit has been properly deployed, has been activated, and is with sufficient battery power.)

Quick Start

This QUICK START section will provide you with the minimum amount of information for using the Safety Level II.

Before using the Safety Level II for the first time connect the supplied AC wall charger adapter to the charging jack on the left side. The unit is fully charged when the green LED beside the jack turns off.

To use the Safety Level II:

1. Take the Safety Level II from its storage container.
2. Place the unit on or magnetically attach to the platform (railcar, vehicle) that the Safety Level II is being used for.
3. Turn the unit ON by pressing the POWER button. The unit will do a self diagnostic and turn on all the LEDs in the display window to do a battery load test. If the battery voltage is too low the two outside columns of LEDs will flash alternately and an alarm will sound. If this happens plug the charger into the charging jack to recharge the battery. If the battery voltage is good the red LEDs will turn off leaving only the two columns of green LEDs lit.
4. The unit is now ready for level monitoring. The unit must be armed by pressing the ARM button. A reference level measurement is taken and the two green center columns of LEDs will flash indicating that the unit is armed and taking continuous level measurements and comparing them to the reference measurement.

How does the Safety Level II work?

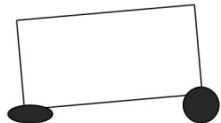
The Safety Level II was designed for use in situations where having something "level" - and staying that way - is a very important safety concern.

The word "level" (above) is put between quotes because what the Safety Level II does is to establish as a reference the initial position of the platform* whether that position is level to the ground or not.

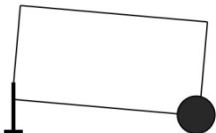
(*PLATFORM means whatever object the Safety Level II is attached to; a railcar, an automobile, a barge, an RV or any other applicable object that the Safety Level II was designed for.)

The following example will clearly illustrate what this means:

An automobile with a flat tire is no longer level with the road. For example, with the left rear tire flat, the car sort of looks like this:



What is usually done is to jack the car so the flat tire may be removed and replaced with the spare tire. This looks like this:



While the tire is being changed, as long as the automobile remains in this exact position everything is all right (and safe!).

However, if the base of this jack happened to be on some soft soil, or if the jack was not properly positioned (for instance, the base was crooked), then the jack may start slipping, just a little at a time, until finally the car may come off the jack. This could result in a scare (in the best case) or, in the worst case, a fatality.

Now let's use the Safety Level II in this situation for an added measure of safety. With the Safety Level II properly attached to the automobile, as soon as the car is jacked up the Safety Level II would be activated and armed.

When this is done, the sensor in the Safety Level II detects the starting position which is clearly not level and uses this starting position as its reference.

Suppose that the jack is very slowly tilting so slowly that the person does not notice. Fortunately the Safety Level II has been put on alert. Once the threshold in the Safety Level II has been exceeded a loud alarm would warn the person that "*an unsafe situation may occur*". This person could then back away from the vehicle and examine the situation.

This example illustrates the basic principle of operation behind the Safety Level II.

Summarizing how the Safety Level II works: when armed a sensor in the Safety Level II first establishes a baseline reference, in other words, a starting position. If, for whatever reason, the platform that this Safety Level II unit has been placed on departs from this reference position by more than a certain amount, then the Safety Level II indicates this by signaling with color LED lights. If the deviation from the reference level is greater than the alarm amount the unit emits a loud warning sound.

In the example given earlier, the alarm was triggered because the initial angle of the automobile (its starting point) had changed enough for this alarm to be set off. Clearly the idea is to warn people before any mishap occurs if this is at all possible.

Using the Safety Level II

The Safety Level II was designed to be extremely easy to use.

The two rows of holes are the "speaker" holes for the alarm sound.

In the center of the unit you will find the display area. There are two columns of green LEDs in the center and five columns of red LEDs on each side.

To the right of the display are two switches labeled POWER and ARM.

The charging jack and associated indicator LEDs on the left side of the unit.

Attaching the unit to the platform

There are two methods to attach the Safety Level II to a platform. (Recall that a "platform" means any applicable object that the Safety Level II has been designed to attach to).

One method is magnetic attachment. On the back of the Safety Level II there are two round permanent magnets attached to the case. If the platform has an adequate metal surface, the Safety Level II can simply be attached to this platform by magnetically "clamping" on to this surface. For example, most railcars will have such a surface for magnetic attachment.

The other method is by simply placing the Safety Level II on a flat surface. The bottom of the Safety Level II has rubber feet on each corner. Simply place the Safety Level II securely on the platform surface and it is ready for operation.

Regardless of the method of attachment employed the Safety Level II should be placed "fairly level" to the ground; within ± 30 degrees will be fine.

After the Safety Level II has been attached to the platform, then it is ready for power and operation.

Turning The Unit ON

Press the POWER button to power up the unit. The entire array of LED lights (green and red) will light up and remain lit for several seconds while the unit is conducting a lamp test and measuring the battery voltage under load. If the measured battery voltage is too low the two outside columns of red LEDs will flash alternately and an audible alarm will sound. The unit will not operate until the battery has been charged. If the battery voltage is within the acceptable range the red LEDs go out and the green LEDs stay on to indicate that the unit is powered. At this point the unit is ready for operation.

Arming The Unit

The Safety Level II was designed to serve as an alarm for situations where the platform (for example, the railcar) has shifted from its original position by more than the tolerance level built into the unit. To monitor the level of the platform the unit must be ARMED. Do this by pressing the ARM switch. When this is done the unit takes a measurement of the current angle and uses it as a reference for future measurements. The green LEDs will flash continuously to indicate that the unit is ARMED.

While ARMED the unit is taking continuous measurements and comparing them to the reference measurement. If the new measurement changes from the reference measurement by more than 0.1 degrees it will display this by lighting up the first column of red LEDs. The side that is lit is the low side. For each additional tenth of a degree that the level changes another column of LEDs will be lit. There are five columns on each side so the total change capable of being displayed is 0.5 degrees either way.

The Alarm On The Unit

When the total change reaches 0.3 degrees an audible alarm will sound to warn anyone working near or under the platform that there may be an unsafe situation that should be investigated before work should continue. The alarm can only be reset by turning off the power and turning it back on. If the situation is investigated and determined to be safe the Safety Level II can be ARMED again to take a new reference measurement and begin monitoring the level.

0.3 degrees may seem like a small amount but referring to the Conversion Table located in Section 6 of this manual will show that this represents a change of .63 inches on a 10 foot railcar.

The point that must be clear is that the Safety Level II will let you know whether the left or right side of the railcar is becoming low as compared to the other side. Action can then be taken to stop this from continuing thus possibly preventing a railcar "tip-over".

The Low Battery signal

When the Safety Level II is powered ON a battery load test is performed to ensure that there is enough battery power for reliable operation. If the battery voltage is too low the unit will indicate this by alternately flashing the two outside columns of red LEDs and sounding the Low Battery audible alarm. During operation the unit continuously monitors the battery voltage and will give the Low Battery warning anytime the voltage drops below the preset level.

Very low temperatures will shorten battery life considerably.

When the Low Battery warning indicates that the battery is low, simply use the wall adapter (or the optional cigarette lighter adapter) to recharge the unit. A full recharging cycle takes approximately 3 hours.

There are two LED indicators beside the Charging Jack on the left side of the unit. The red LED will light up when charging power is applied. The green LED will be on when charging and turn off when charging is complete. The green LED will flash to indicate a battery fault condition. This can be caused when either the battery is disconnected or the battery voltage is too low. If the green LED flashes the battery pack needs to be replaced. Replacing the battery may be accomplished as follows:

- (1) Your own repair shop can do it or,
- (2) You can call Hydra-Tech at 403-720-7740 to send the unit to us for our Battery Replacement Service.

We strongly recommend employing Hydra-Tech's Battery Replacement Service. Replacing the battery in the Safety Level II is not particularly difficult but if done incorrectly the unit could be damaged. More importantly, our warranty policy dictates that if someone other than a Hydra-Tech technician opens the Safety Level II unit, then we cannot be held responsible for any damage or malfunction of the unit following the procedure.

If you decide to proceed, then do so as follows:

To open up the unit for battery replacement, make certain that it is OFF. Remove the four black screws that are at the back edge of the top and bottom surfaces. Gently remove the back of the unit being careful not to put stress on the wiring between the charging jack & LEDs and the circuit board. Unplug the two connectors **keeping track of their orientation.**

Reconnecting the Charging Jack connector incorrectly will cause damage to the unit.

Once the unit is disassembled remove the battery connector from the circuit board **keeping track of its orientation** then remove the battery pack which is attached with adhesive Velcro being sure not to remove the Velcro attached to the enclosure. Gently inserting a blunt object like a pen or a flat blade screwdriver between the two pieces of Velcro attached to the front of the enclosure while rotating the top of the battery pack backwards will make the job much easier.

To install the new battery pack tilt the pack so that the bottom is closest to the front of the unit. When the front of the pack is almost touching the front Velcro push the pack down onto the Velcro on the bottom of the enclosure then rotate the pack so the front Velcro is engaged. Wiggle the pack several times to seat the Velcro is securely. Reconnect the battery connector being sure to use the correct orientation.

Reconnecting the Battery Pack connector incorrectly will cause damage to the unit.

Reassemble the unit reversing the previous steps. Be sure to reconnect the connectors to the circuit board in the correct orientation.

Conversion Table

NOTE: Distance is the length of the side that the Safety Level II is attached to.

Length of the platform side that
Safety Level II is attached to (FT) Degrees of deviation
from starting point

	0.1	0.2	0.3	0.4	0.5
8	.17	.34	.50	.67	.84
9	.19	.38	.57	.75	.94
10	.21	.42	.63	.84	1.05
10 1/2	.22	.44	.66	.88	1.10
11	.23	.46	.69	.92	1.15
12	.25	.50	.75	1.01	1.26
20	.42	.84	1.26	1.68	2.09
24	.50	1.01	1.51	2.01	2.51
30	.63	1.26	1.89	2.51	3.14
40	.84	1.68	2.51	3.35	4.19

EXAMPLE: If the deviation is 0.2 degrees, it is low on the left side, and the length of the railcar with Safety Level II is 10 feet then raise the left side is low by .42 inches.

Specifications

LED Sensitivity	1/10 (0. 10) of a degree per LED column
Alarm Trigger Point	3/10 (0.30) of a degree Refer to Section 6 for conversion from degrees to distance
Response Time	1/10 of a second (0.10 sec)
Temperature Range	-40 C (-40 F) to 54 C (130 F)
Power	7.2V NiMH 2500mAHr rechargeable Battery Battery life is at least 10 hours Complete recharging cycle is 3 hours or less
Wall Adapter	12-volt DC input current
Size	25cm X 7.6cm X 7.6cm (10" X 3" X 3")
Weight	1.6Kg (3.5 lbs)

Temperature Drift

If the unit is moved from one temperature to another, it will require some time to stabilize (example: moving from a heated vehicle to outside cold). The amount of drift depends on how extreme the temperature variation was. A unit will drift more and take longer to stabilize as the temperature variation becomes larger

To minimize **drift** during operation allow the unit to temperature stabilize at least 20 minutes on location prior to arming the unit for the intended application.

Maintenance

The Safety Level II was designed to be rugged and nearly maintenance free. The only item of the Safety Level II that needs routine attention is the battery (recharging and replacement). For a discussion on battery matters, refer to Section 4.6.

As with all electronic devices, care should be taken when operating and storing the Safety Level II. Although it was designed to be quite rugged, it should be handled with reasonable care.

Service Centres

Please contact Hydra-Tech International for current information on the closest service center to you. Contact information for Hydra-Tech International follows:

6060 – 86th Avenue SE, Calgary, Alberta, Canada T2C 4L7
 Telephone (403) – 720 – 7740 Fax (403) – 720 – 7758
 Website: www.hydra-tech.net

Parts List

192350050 – Safety Level II unit

192350051 – Wall charger 120vAC – 12DC

192350052 – Car charger

117110035 – Sun hood

STANDARD WARRANTY

1. **WARRANTY POLICY.** Subject to those terms and conditions contained herein, Seller warrants that all Seller products conform in all material respects to the description identified in the quotation, proposal or offer made by Seller to Buyer for the sale of its products (collectively, "**Quotation**") and will be free from defects in material and workmanship for two (2) years from the date of shipment to Buyer (except for spare parts which Seller warrants for one (1) year from the date of shipment to Buyer). Products manufactured by manufacturers other than Seller and/or its affiliates ("**Other Manufacturer's Products**") supplied by Seller to Buyer are not warranted by Seller. Other Manufacturer's Products may be warranted separately by their respective manufacturers and Seller shall, to the extent possible, assign to Buyer whatever rights Seller may obtain under any such warranties.

THE FOREGOING REPRESENTS THE SOLE AND EXCLUSIVE WARRANTY GIVEN BY SELLER TO BUYER AND IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW (INCLUDING BY STATUTE) OR OTHERWISE, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

2. **WARRANTY REMEDIES.** Buyer's sole and exclusive remedy for Seller's breach of the foregoing warranties during the warranty period shall be, at Seller's sole discretion, the repair and/or replacement of any defective products (or component parts thereof) pursuant to the terms of and conditioned upon Buyer's compliance with the procedure identified in Section 5 hereof.
3. **LIMITATION OF DAMAGES. SELLER SHALL HAVE NO LIABILITY TO BUYER OR ANY END USER OF PRODUCTS OR SERVICES WITH RESPECT TO THE SALE OF PRODUCTS OR PROVISION OF SERVICES UNDER THE QUOTATION FOR LOST PROFITS OR FOR SPECIAL, CONSEQUENTIAL, EXEMPLARY, OR INCIDENTAL DAMAGES OF ANY KIND WHETHER ARISING IN CONTRACT, TORT, PRODUCT LIABILITY, STRICT LIABILITY OR OTHERWISE, EVEN IF SELLER WAS ADVISED OF THE POSSIBILITY OF SUCH LOST PROFITS OR DAMAGES. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY DAMAGES WHATSOEVER IN EXCESS OF THE TOTAL PRICE PAID BY BUYER FOR PRODUCTS AND/OR SERVICES REFERENCED IN THE QUOTATION.**
4. **INAPPLICABILITY OF, AND VOIDING OF THE WARRANTY.** This Standard Warranty does not cover defects in Seller products which are not defects in material and workmanship and may be attributed to other causes including but not limited to failure to operate and/or maintain Seller products in accordance with the applicable Seller installation and/or operator's manuals, owner's manuals, maintenance manuals, manufacturer's recommendations, and any other manuals, guidelines or recommendations of Seller concerning the maintenance and operation of Seller products that may be communicated to Buyer from time to time, side-pulling of load, shock loading, excessive jogging, eccentric loading, overloading, accidental occurrence, improper repair, improper handling or storage of products, chemical exposure and/or abnormal operating conditions not identified to and expressly and specifically accepted by Seller in writing prior to Seller's issuance of a Quotation, or any other cause that in Seller's sole discretion is not attributable to defects in material and workmanship. Failure of products to meet published performance specifications due to abnormal operating conditions beyond Seller's knowledge or control shall not be considered defects in either workmanship and/or material.

Modification of Seller products and/or incorporation of Other Manufacturer's Products into Seller products by individuals and/or organizations other than Seller shall void this Standard Warranty.

Buyer's failure to pay in full when due for the products and services provided for in a Quotation shall void this Standard Warranty.

5. **WARRANTY PROCEDURE.** To obtain warranty remedies pursuant to this Standard Warranty, Buyer must strictly adhere to the following procedure. Buyer's failure to comply with the terms of this procedure shall void this Standard Warranty.

- (a) Buyer shall, within seventy-two (72) hours of any claimed non-conformance or defect in Seller products, notify Seller's Warranty Administrator in writing of the alleged non-conformance or defect.
- (b) Seller shall, within a reasonable time, advise Buyer of its intention to initially accept or deny the warranty claim pursuant to the terms of this Standard Warranty. If Seller elects to initially accept the warranty claim, it shall advise Buyer of its intention to replace, repair, or otherwise further inspect the allegedly nonconforming or defective products (or component parts thereof) ("**Initial Acceptance**").
 - (i) **Replacement of allegedly nonconforming or defective products.** Should Seller provide Initial Acceptance of Buyer's warranty claim and elect to replace the allegedly nonconforming or defective products (or component parts thereof), or should Seller elect to provide Initial Acceptance of Buyer's warranty claim through notification to Buyer that Seller elects to inspect the allegedly nonconforming or defective products (or component parts thereof) and then subsequently elect to replace the allegedly nonconforming or defective products (or component parts thereof), Seller shall within a reasonable time, ship new, comparable, replacement products to Buyer F.C.A. Seller's plant, warehouse or dock, as defined by Incoterms 2010, via the lowest cost method available.
 - (ii) **Repair of allegedly nonconforming or defective products.** Should Seller provide Initial Acceptance of Buyer's warranty claim and elect to repair and/or permit the repair of the allegedly nonconforming or defective products (or component parts thereof) by approved third parties, or should Seller elect to provide Initial Acceptance of Buyer's warranty claim through notification to Buyer that Seller elects to inspect the allegedly nonconforming or defective products (or component parts thereof) and then subsequently elects to repair the allegedly nonconforming or defective products, Seller shall, unless otherwise agreed in writing by the Warranty Administrator, pay only those direct labor costs incurred to effectuate the repair and the cost of Seller replacement products consumed during said repair provided that the costs for all products and/or services are approved in advance in writing by Seller's Warranty Administrator.
 - (iii) **Inspection of allegedly nonconforming or defective products.** Should Seller provide Initial Acceptance of Buyer's warranty claim through notification to Buyer that Seller elects to inspect the allegedly nonconforming or defective products (or component parts thereof) and then subsequently determine that the alleged nonconformity or defect is not covered under this Standard Warranty, Seller shall bill Buyer, and Buyer shall pay Seller any and all costs associated

- (iv) with the performance of inspection of allegedly nonconforming or defective products.

WAIVER. BUYER HEREBY WAIVES ANY CLAIM THAT THE EXCLUSIONS OR LIMITATIONS IDENTIFIED HEREIN DEPRIVE IT OF AN ADEQUATE REMEDY. BUYER SHALL BE ENTITLED TO NO OTHER REMEDY OTHER THAN THOSE IDENTIFIED IN SECTION 2 HEREOF WITH RESPECT TO THE PROVISION OF PRODUCTS AND/OR SERVICES BY SELLER REGARDLESS OF THE FORM OF CLAIM OR CAUSE OF ACTION, WHETHER BASED IN CONTRACT, TORT INCLUDING NEGLIGENCE, STRICT LIABILITY OR OTHERWISE.