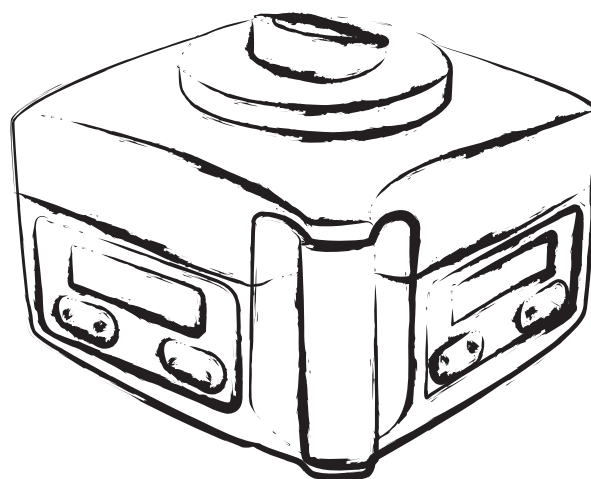




DLP
VERTICAL PLUMB LASER
- With Dual Axis Inclination

USER'S MANUAL



CONTENTS

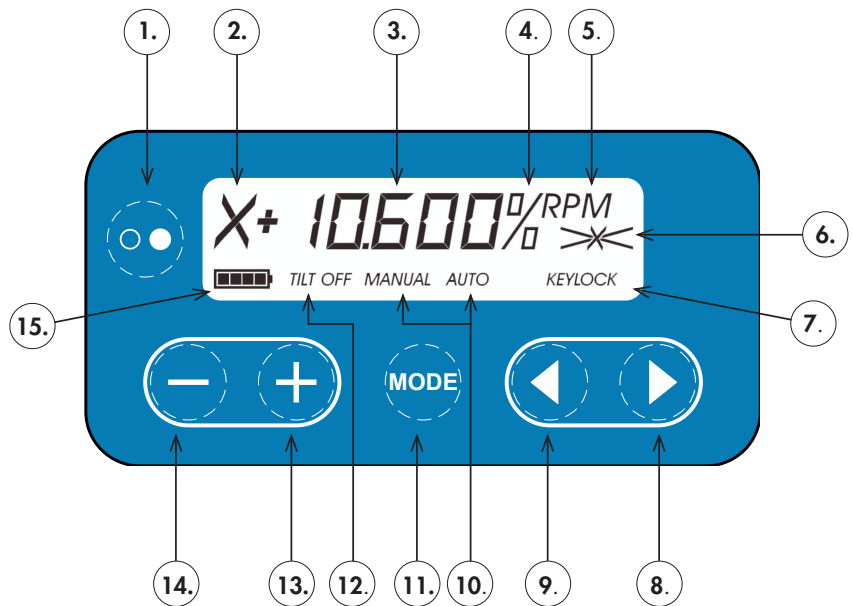
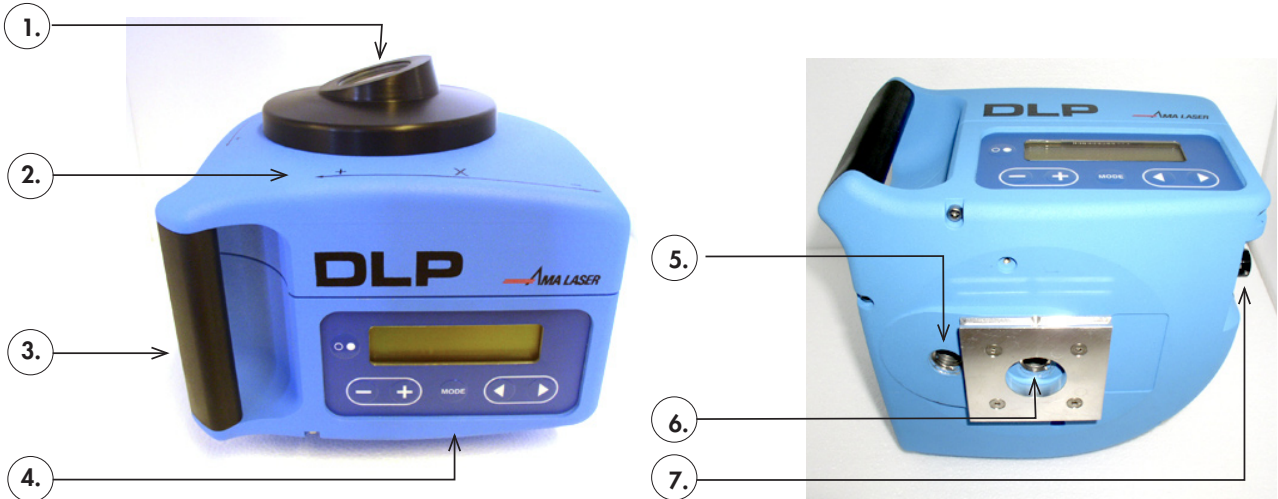
1. What's what
2. Operation
3. Calibration
4. Battery power
5. Planning for your DLP usage
6. Warranty
7. Technical specification

WARNING!

**Do not stare directly into the laser beam.
Follow the advise issued by your national
occupational safety agency.**

1. WHAT'S WHAT

1. Laser aperture with slanted protective glass
2. Direction legends, X and Y axis
3. Handle
4. Control panel
5. 5/8" thread for high X-grades
6. 5/8" thread for low X-grades
7. Charger connector



1. On/Off
2. Direction indicator
3. Value of grade or RPM
4. Percent/Promille indicator
5. RPM indicator
6. Cross axis grade indicator
7. Keylock indicator
8. ▶ Arrow – Move right on display
9. ◀ Arrow – Move left on display
10. Manual/Auto indicator
11. Mode – Switch to RPM or user configuration
12. Tilt function indicator
13. Plus – Increase grade or toggle function
14. Minus – Decrease grade or toggle function
15. Battery indicator

2. OPERATION

Turning the laser on

Mount the DLP on a tripod or fixture, align the housing. Turn the laser on with the ON/OFF button (1) on the laser key pad. If the housing is too tilted, the laser beam will blink, and the display will show a stylized level bubble to indicate the direction that the housing needs to be tilted.

Code lock

If the code lock function is enabled (by your dealer), you will be prompted to dial in your user code when the instrument is turned on. Dial it in by selecting the digit with the arrow buttons (6,7), and setting the digit with the +/- buttons (11,12). If you lose your user code, you have ten tries, then the laser is permanently locked and must be returned to your AMA dealer for unlocking.

Inclination setting

To set an inclination in the X direction, use the X control panel. Setting the Y inclination is done using the Y control panel. Look at the inclination symbols on the housing to see which direction positive inclination goes. Set the desired X inclination with the +/- buttons (11,12). Press once, and the inclination changes 0,0015% or 1,5mm/100m. By holding down the key, the inclination accelerates.

You can set the inclination directly to the desired value without scrolling. If you press + or - once, the lowest figure starts blinking on the display. As long as it blinks, you can select the next figure using the arrow buttons (6,7), and change its value with the +/- buttons. After a few seconds of inactivity, the blinking stops.

The self-levelling action is centered around the inclination you put in. This means that as you increase the inclination, the mechanism comes closer to the self levelling range limit. When you need an X inclination larger than 12%, you need to mount the laser using the second tilted 5/8" thread (no. 6 in What's what).

User configuration

On either control panel, press the MODE button (11) and keep it depressed for a few seconds. You can now see the user configuration screen on the display. In this mode you can control five functions: Tilt function, Auto/Manual, Keylock, Wind and Scope. Scroll through the functions with the arrow buttons, toggle the function with the +/- buttons.

Tilt function

With the tilt function activated, the laser will turn off and warn if it has accidentally moved since startup. To start again after tilted, press on/off. The Tilt function indicator (10) shows the status of the function.

Manual/Auto

By selecting Manual, you turn off the self levelling mechanism of the DLP. This enables you to set up manually, for instance to work on floating objects. The display shows Manual (8). Please be careful using this function, as the Tilt function will not work. The laser can be knocked out of position without warning you.

Keylock

To avoid accidental change of the inclination, you can disable all buttons except ON/OFF and MODE by activating Keylock. To turn this function off, press MODE. The display lights the Keylock indicator when the function is active.

Wind

The Wind function gives you a chance to work in windy or vibrating conditions, when the beam otherwise shuts off because of inaccuracy. It works with a time delay before a disturbance is acted upon by the automatic self levelling. Set Wind to 1-3 for increasing wind or vibration. Note that the accuracy gets less. Wind is always set to 0 (inactive) at startup.

Scope

With this function you calibrate any sight aid (sight grooves, diopter, scope etc.) mounted. The calibration is rotating the internal movement, you get the same result as if you are rotating the DLP housing. To calibrate, do the following. Find a place under a structure (bridge span, sky lift) at least 10m above the laser. Mount the DLP on a tripod with a level housing, set X and Y to 0. Mount a theodolite some 20m behind the laser (opposite side of the X control panel), and aim accurately at the beam aperture. Aim the DLP's X direction with the sight aid accurately at the theodolite optics. Just using the vertical tangent screw, aim the theodolite at the beam on the structure above. You should not have to use the horizontal tangent screw to be able to center on the beam. Set X to +10%. Aim the theodolite at the beam (or beam height), but only use the vertical tangent screw. Select SCOPE in the configuration menu. You will see an indicator showing an 8 in the center position. If the beam is left of where the theodolite is aiming, you should press

the right arrow for bringing the beam center. Keep pressing and the beam will continue to move. The display will indicate as you move away from the center position. When the indicator is full, you can still continue the calibration. With a beam to the right, use the left arrow. You can return to the center position by pressing both arrows at the same time. Press the **MODE** button to confirm when the calibration is right.

House

This function simulates externally mounted bubble vials for levelling the housing. You need to level the housing mainly to avoid errors when using sight aids (diopter, scope etc.) mounted on the housing roof of the instrument. Select **HOUSE** with the +/- keys. The displays will now show stylized bubble vials that show you if the housing is level in each direction. Adjust the position of the housing, and wait for the instrument to level to get a new reading on the vial symbol. The accuracy of the center bubble is approx. 0,5 degrees, which gives a maximum alignment error between the scope and the main axis of 1cm on 100m. Besides the center reading there are two positions of the bubble on either side. To exit the house function, press **MODE**.

3. CALIBRATION

Calibration checks should be done regularly to ensure good results. Ideally, use frequent total station checkups and compare to the ideal vertical line. A more low tech variation is to use a plumb line. Please note that the beam is **not** centered over any of the 5/8" threads, so you can not use the method of turning the laser half a turn unless you first measure the offset.

4. BATTERY POWER

The DLP is powered by an in-built battery pack. The battery life during operation is about 100 hours under normal conditions with a fresh battery pack. With a worn battery pack and in cold temperatures, the laser can still operate some 40 hours.

The battery indicator (**13**) on the display gives a rough indication of the remaining battery life. The display will show blinking battery indicator when the battery is low and close to power down. If the DLP shuts down due to low battery, the display will show "bA Lo". In this case, shut the laser off and charge.

Charge the battery for 7 hours for full charge. The first 4 hours will charge fast. The laser can be operated when charging. In emergency situations, as little as 15 minutes of charging will give several hours of battery life. A full charge over the weekend should give you more than a week's operation. If possible, stick to this charging scheme. If you charge more often, it will shorten the life of the battery. You need not worry about overcharging. The charger can be left connected to the instrument without risking battery damage.

The external power cable can be connected to a 12 V battery for long, uninterrupted operation. The DLP will not charge off the 12V cable. If the internal battery is drained when you connect the 12V cable, startup will not be permitted for a few minutes, while the internal battery gets trickle charged for protection against power cuts. If you run the DLP on external power for longer periods, the internal battery will be slowly depleted. If you rely on the safety backup of the internal battery, charge once every two weeks.

Longer periods of non-use without charging will drain the batteries, causing poor capacity. You will need to charge and discharge a couple of times to get the battery up to full capacity after a longer period on the shelf. This will however not cause noticeable permanent damage. For best performance, make a habit of maintenance charging once per month.

5. PLANNING FOR YOUR DLP USAGE

There are three main modes of operation for the DLP:

- › Self levelling plumb beam
- › Self levelling inclined beam
- › Manually adjusted beam.

Regardless of the mode of operation you select, keep in mind that any instrument can give false readings because of malfunction or mishandling. Make sure to always doublecheck the accuracy with frequent geodetic measurements or by process of elimination (i.e. using many lasers). This is particularly important in slipforming projects where there can be no doubt on the accuracy.

When deciding on the laser setup strategy, keep the following in mind:

- On high structures, keep the laser beam well away from curing concrete walls, preferably 1-2 meters. If too close, heat convection will cause errors because of "mirage"-style deviation of the laser beam.
- All instruments are sensitive to changing temperature. In hot, sun exposed, cold or changing conditions, consider covering the laser setup with a wooden housing.
- Make sure the laser is mounted on a rigid structure, that will not shift due to knocking, mud setting or heavy vibration.
- Take care to protect the laser against falling debris or concrete. If needed, consider covering the aperture with a replaceable optical parallel glass. Or cover the aperture between readings.
- For longer or critical setups, consider making a permanent, rock-solid setup point for a total station. This way the laser points can be regularly and reliably measured for accuracy checks.
- Consider the powering of the lasers. Please read carefully the power section in this manual. Consider keeping 12V batteries in store for power breaks.

Self-levelling plumb beam

This is the most common mode of operation, used for straight pylons, towers or any vertical structure built on solid ground. The instrument adjusts continuously for any shifts in setup. When setting up, please note that there may be a misalignment between the 5/8" thread and the laser beam. Set the inclination to 0% in both axes and let the beam stabilise for 15 minutes. Measure the beam close to the aperture for adjustment and reference. When the setup is complete, use the KEYLOCK function for added protection. Measure the laser point regularly. If the instrument goes out of accuracy as the distance increases, use the X and Y inclinations to correct the inaccuracy. Keep track of serial numbers and corrections for future reference. Instruments that display inaccuracy should be monitored closely. If the inaccuracy comes from a damaged level vial, the laser beam can drift over time.

Self-levelling inclined beam

This mode of operation is sometimes used for inclined pylons etc. The way of setting up and operating follows the above section on self-levelling plumb beam, with one addition: The laser needs to be set up accurately with regards to the X direction. To achieve this, a wide variety of sights and scopes can be used. Pay attention to the rotation alignment, as an error of 5 arc minutes at an inclination of 10% gives an error of 7mm on 50meter distance. There is a special function under the user configuration mode, that enables you to field calibrate the X-axis to the scope. Read more about the "SCOPE" function under 3. Operation. Use the X axis for inclination between -5% and 20%, use the second tilted 5/8" thread for inclinations above 12%.

Manually adjusted beam

This mode of operation is used when the structure is built floating, or when the structure can shift during construction. The beam is fixed with reference to its mounted housing, with no reference to the true verticality, no self levelling action. In this mode, mount the laser fixed to the structure so that it follows any movements the structure is doing. After mounting the laser, let it stabilise in the AUTO mode to achieve a vertical beam, then switch to MANUAL mode. Use the arrow buttons to move the beam to the desired position.

6. TECHNICAL SPECIFICATION

Laser source.....	Visible diode, 635nm, Class 3R
Range	200m
Accuracy at 0% inclination.....	+/- 5mm per 100m
Inclination range, X direction	-5% to +20%
Inclination range, Y direction	-7% to +7%
Self levelling range.....	+/-11%
Operating temperature range	-20°C to +50°C , -4°F to +120°F
Battery	In-built NiCd 5.7Ah, 12V
Charging time	7 hrs
Operating time per charge.....	100 hrs
Display	2 Custom Lcd displays, backlight
Sealing.....	Waterproof, nitrogen purged
Dimensions	Width 200mm, Height 200mm, Length 210mm
Weight	5.8Kg

7. WARRANTY

Products sold by AMA Laser Systems AB (AMA) are warranted by the company in the following manner to the following extent:

Subject to the succeeding provision hereof, AMA warrants products sold by AMA twenty-four (24) months after date of invoice from AMA. The manufacturer's liability under this warranty is limited to repairing or replacing any product returned to the factory or authorised service centre and judged, upon inspection to have been defective in material or workmanship.

This warranty covers the cost of labour as well as parts, but does not cover the cost of transportation to the factory or authorised service centre.

The forgoing states the entire liability of AMA to the owner of a registered AMA product. AMA shall not be held responsible for any consequential damages of any kind. The forgoing is in lieu of all other warranties expressed or implied.

In case of malfunction, contact your AMA dealer for shipping instructions.

To help us with our records we would very much appreciate if you fill out the warranty card and return it to your appointed AMA dealer. Alternatively, you can register on our home site www.amalaser.com.

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