

**PL650 - Digital Grade Pipe Laser
Plumbers & Drainage Laser**



PL650

Instruction Manual



www.redbacklasers.com.au

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User Safety

- Laser output sign lies near the output aperture.
- Do not stare directly into laser beam.
- Do not disassemble the instrument or attempt to perform any internal servicing. Repairs and service should be performed only authorised service centres of Redback Lasers.
- This instrument complies with the safety Classification standards of laser radiation.



Max Output Power
<5mW @ 635-670nm
Laser Class 3R
DIN EN 60825-1:2003-10



CAUTION: Class 3R laser <5mW at
635-670nm.

Do NOT stare into laser beam or aim
at another person.

Follow relevant Australian Standards

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from CMI Industries Pty Ltd



PL650™ INTRODUCTION

Congratulations on purchasing the PL650™ an electronic self levelling pipe grade laser level built tough with full cast metal housing and sealed water tight (IP68).

The PL650™ has been designed and built specifically for plumbers and drainage contractors for levelling and grading pipes.

The PL650™ has fully automatic digital grade setting to 3 decimal places -20.000% to +40.000% range. Simply enter in the desired grade and the laser does the rest.

The PL650™ also features laser dot centering which can be accessed either by the control panel or remote control.

The PL650™ can be placed either on top of the pipe or inside and comes with a selection of feet allowing the laser to fit into pipes 150mm to 500mm diameter. The PL650 also comes with a heavy duty target and holder again designed for fitting within pipes 150mm to 500mm diameter. The PL650 is fitted with a rechargeable Ni-mh battery pack but can also use Std "D" Size batteries if needed and comes with a Two Year Redback Lasers Warranty. (See page 16)

PL650™ Included Accessories

- PL650™ Pipe Laser Unit
- Protective Carry Case
- Rechargeable Ni-mh Battery
- Charger
- "D" Cell Battery Pack
- Remote Control
- Targets and Holder (150mm-500mm)
- 5 Sets Feet (200mm-500mm)
- Handle Mount Foot Adaptor
- Instruction Manual



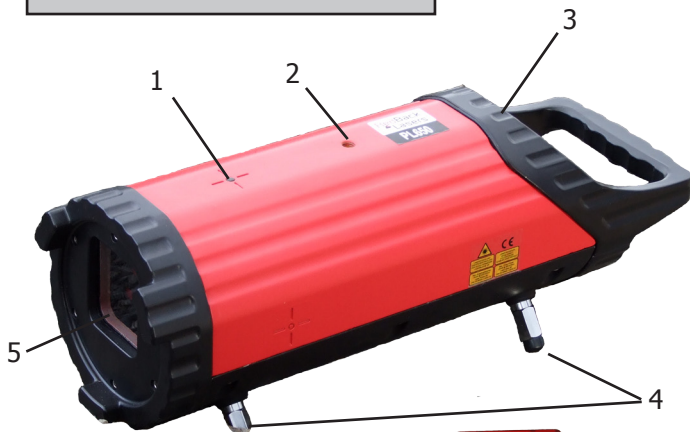
PL650™ DIAGRAMS

PL650™ Laser Unit

1. Alignment Guide Plumb Ref LED
2. Tripod Frame Mount (Optional)
3. Control Panel
4. Interchangeable Feet
5. Laser Dot Output



PL650



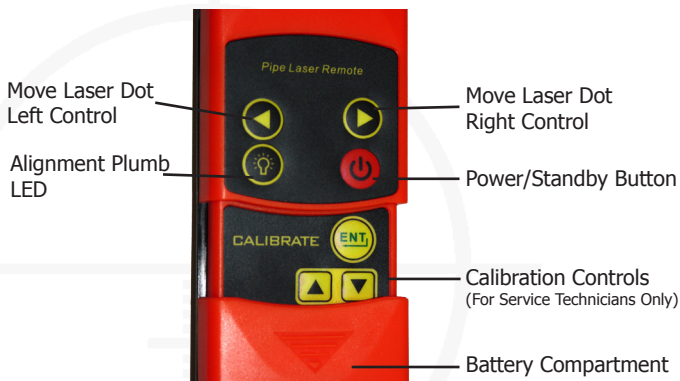
Laser Target



Control Panel



Remote Control



PL650™ OPERATING INSTRUCTIONS

Battery Instructions

The PL650 has two battery options either 4 x standard "D" size Alkaline or the Ni-mh rechargeable pack. For standard 4 x "D" alkaline operation simply insert into the battery holder in the direction indicated, insert into laser and tighten the locking screws.

To use the rechargeable battery pack, remove standard battery holder from laser if installed and place the rechargeable pack into the same recess and tightening locking screws.



To charge this battery pack simply inserting the charger plug into the charging socket found under the dust cover on the front of the battery pack. The LED on the charger is illuminated red during the charging process and will turn green once the battery pack is fully charged. The rechargeable battery pack can be charged either whilst inserted in the laser or separately.

When the power symbol on the LCD shows low or flashes, the rechargeable batteries needs recharging or standard batteries need replacing.

LCD Display Power Symbols



Battery Good




Flashing

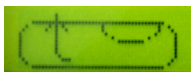
Battery Needs
Charging

Handy Hints

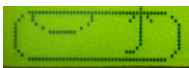
- Prior to initial use, charge the rechargeable battery for at least 10 hours.
- Running rechargeable batteries completely flat will increase battery life.
- The PL650™ can operate off mains by plugging the charger (for indoor use only) into the unit.
- Remember the PL650™ can operate using standard batteries when rechargeable pack is out of charge.

Turning Laser On

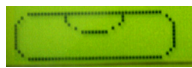
Press Power button  on the keypad to turn on the PL650™. Note the power button on the remote will not operate until the laser has been powered up from the keypad direct, the power button on the remote then acts as a standby button. The PL650™ will first have a flashing laser dot and flashing grade numerical display, when both of these stop flashing the laser is then level. On the bottom left of the LCD display screen is an electronic bubble vial and an arrow indicating the direction needed to twist the PL650 Housing, within or on top of the pipe, in order to get it level left to right. When the bubble is show in the center of the vial then it is level left to right and will ensure maximum accuracy for the laser dot.



Twist PL650
Clockwise
(when looking at display)






Twist PL650
Anti-Clockwise
(when looking at display)







PL650 level
left to right

Setting a Grade



Setting a grade on the PL650 tilts the laser dot either up for a +ve grade and down for a -ve grade. The grades are set as a percentage and the maximum grade that can be set is +40.000% to -20.000%. (see page 12 for conversion chart)

The required grade is entered using the center four buttons on the key pad, first press the "SET"  button the +/- symbol is flashing, use the up down arrow buttons   to select either a +ve or -ve grade.



Press "SET"  again and the first digit will flash, use the up and down arrow keys   to set the required number for this digit (leave as "0" if required). To move to the next digit press "SET" once more and again use the arrow keys. Once all the digits have been set to the required figure then press "ENT"  this enters the grade into the laser and it will begin to set that grade. When the laser dot stops flashing the grade is set. Note the PL650 remebers this grade the next time the laser is turned on.

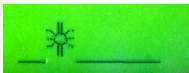
PL650™ OPERATING INSTRUCTIONS cont.

Adjusting the Dot Left to Right

The PL650^M Pipe Laser dot can be adjusted left and right in order to hit the target. This can be done with the use of either the Keypad or remote control by pressing the left and right arrow keys  . Single presses of the buttons move the dot by very small increments, by holding the button the dot will move faster and the longer the button is pressed the faster the dot will move.

On the bottom right side of the LCD display is a graphical representation of the position of the dot left to right, the display will flash when the dot has been moved to the maximum allowed position.

There is an auto center feature which is activated with a single press of both the left and right arrow buttons   at the same time (note this feature only works on the main keypad and not the remote). Whilst it is centering the display will flash, once centered it will return to normal.




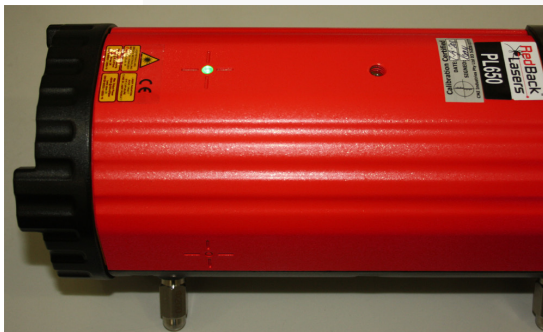
LCD Display showing the laser dot just left of the central position

Note that the PL650 Pipe Laser has a remote control receiving sensor both at the keypad and laser output ends of the unit making it easier to center the dot onto the target when standing at the target end of the pipe.



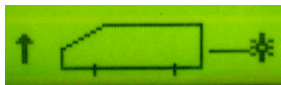
LED Alignment Guide Light

The PL650 has alignment marks on the side of the casing and an alignment LED light on the top to indicate the origin point of the laser and grade. To turn on this light simply press the light button  on either the key pad or the remote control.



Out of Levelling Range

There may be a situation where the laser has been set to do a large Grade which is outside the range of the laser mechanism. If this occurs a flashing graphic will be displayed on the LCD and this graphic will indicate to either raise or lower the control panel end of the PL650. This can be done by using different length feet or the handle mounted foot adaptor.



LCD Display graphic showing to raise control panel end



PL650™ OPERATING INSTRUCTIONS cont.

Using the Feet for Different Diameter Pipes

The PL650™ has 5 sets of feet of differing lengths and each set has a size printed on them which refers to the diameter size of the pipe you wish to use the laser inside of. The idea is that with the correct size feet the laser dot should be central to the pipe. The feet are interchanged by un-screwing them in anti-clockwise direction. Note that when the legs are removed the inbuilt threads are suitable for 150mm diameter pipe.

Using the Targets for Different Diameter Pipes

The PL650™ comes with a heavy duty target holder that can hold either the 15-300mm target plate or 400-500mm target plate. To change plates or to adjust the height of the plate simply unlock the locking knob on the right and slide plate up, the pointer above the knob indicates the diameter.

The Target is designed to fit either inside or on top of the pipe and can be levelled left to right with the help of the bubble vial.



LCD Display Light

The PL650™ has a back light for the LCD display this light activates when any of the keys are pressed on either the keypad itself or the remote control unit. To save battery, the light turns itself off after a few seconds of the keys not being pressed, to turn the light back on simply press any of the keys once more.

Optional Tripod Mount

The PL650™ has an optional tripod mount (PLT1) available that allows it to be mounted on a heavy duty tripod. The mount features height adjustment, and tilt front to back adjustment and fits onto any standard thread survey tripod. The PLT1 also features adjustment feet on its base which allows it to be also used inside or on top of very large diameter pipes without the use of a tripod.

The PLT1 can be ordered from your nearest RedBack Lasers stockist quoting part number PLT1.



GRADE CONVERSION CHART

RATIO	%	RATIO	%	RATIO	%	RATIO	%	RATIO	%	RATIO	%	RATIO	%
1:1	100.000	1:41	2.439	1:81	1.235	1:121	0.826	1:157	0.637	1:196	0.510	1:380	0.263
1:2	50.000	1:42	2.381	1:82	1.220	1:122	0.820	1:158	0.633	1:197	0.508	1:385	0.260
1:3	33.333	1:43	2.326	1:83	1.205	1:123	0.813	1:159	0.629	1:198	0.505	1:390	0.256
1:4	25.000	1:44	2.273	1:84	1.190	1:124	0.806	1:160	0.625	1:199	0.503	1:395	0.253
1:5	20.000	1:45	2.222	1:85	1.176	1:125	0.800	1:161	0.621	1:200	0.500	1:400	0.250
1:6	16.667	1:46	2.174	1:86	1.163	1:126	0.794	1:162	0.617	1:205	0.488	1:410	0.244
1:7	14.286	1:47	2.128	1:87	1.149	1:127	0.787	1:163	0.613	1:210	0.476	1:420	0.238
1:8	12.500	1:48	2.083	1:88	1.136	1:128	0.781	1:164	0.610	1:215	0.465	1:430	0.233
1:9	11.111	1:49	2.041	1:89	1.124	1:129	0.775	1:165	0.606	1:220	0.455	1:440	0.227
1:10	10.000	1:50	2.000	1:90	1.111	1:130	0.769	1:166	0.602	1:225	0.444	1:450	0.222
1:11	9.091	1:51	1.961	1:91	1.099	1:131	0.763	1:167	0.599	1:230	0.435	1:460	0.217
1:12	8.333	1:52	1.923	1:92	1.087	1:132	0.758	1:168	0.595	1:235	0.426	1:470	0.213
1:13	7.692	1:53	1.887	1:93	1.075	1:133	0.752	1:169	0.592	1:240	0.417	1:480	0.208
1:14	7.143	1:54	1.852	1:94	1.064	1:134	0.746	1:170	0.588	1:245	0.408	1:490	0.204
1:15	6.667	1:55	1.818	1:95	1.053	1:135	0.741	1:171	0.585	1:250	0.400	1:500	0.200
1:16	6.250	1:56	1.786	1:96	1.042	1:136	0.735	1:172	0.581	1:255	0.392	1:510	0.196
1:17	5.882	1:57	1.754	1:97	1.031	1:137	0.730	1:173	0.578	1:260	0.385	1:520	0.192
1:18	5.556	1:58	1.724	1:98	1.020	1:138	0.725	1:174	0.575	1:265	0.377	1:530	0.189
1:19	5.263	1:59	1.695	1:99	1.010	1:139	0.719	1:175	0.571	1:270	0.370	1:540	0.185
1:20	5.000	1:60	1.667	1:100	1.000	1:140	0.714	1:176	0.568	1:275	0.364	1:550	0.182
1:21	4.762	1:61	1.639	1:101	0.990	1:141	0.709	1:177	0.565	1:280	0.357	1:560	0.179
1:22	4.545	1:62	1.613	1:102	0.980	1:142	0.704	1:178	0.562	1:285	0.351	1:570	0.175
1:23	4.348	1:63	1.587	1:103	0.971	1:143	0.699	1:179	0.559	1:290	0.345	1:580	0.172
1:24	4.167	1:64	1.563	1:104	0.962	1:144	0.694	1:180	0.556	1:295	0.339	1:590	0.169
1:25	4.000	1:65	1.538	1:105	0.952	1:145	0.690	1:181	0.552	1:300	0.333	1:600	0.167
1:26	3.846	1:66	1.515	1:106	0.943	1:146	0.685	1:182	0.549	1:305	0.328	1:625	0.160
1:27	3.704	1:67	1.493	1:107	0.935	1:147	0.680	1:183	0.546	1:310	0.323	1:650	0.154
1:28	3.571	1:68	1.471	1:108	0.926	1:148	0.676	1:184	0.543	1:315	0.317	1:675	0.148
1:29	3.448	1:69	1.449	1:109	0.917	1:149	0.671	1:185	0.541	1:320	0.313	1:700	0.143
1:30	3.333	1:70	1.429	1:110	0.909	1:150	0.667	1:186	0.538	1:325	0.308	1:725	0.138
1:31	3.226	1:71	1.408	1:111	0.901	1:151	0.662	1:187	0.535	1:330	0.303	1:750	0.133
1:32	3.125	1:72	1.389	1:112	0.893	1:152	0.658	1:188	0.532	1:335	0.299	1:775	0.129
1:33	3.030	1:73	1.370	1:113	0.885	1:153	0.654	1:189	0.529	1:340	0.294	1:800	0.125
1:34	2.941	1:74	1.351	1:114	0.877	1:154	0.649	1:190	0.526	1:345	0.290	1:825	0.121
1:35	2.857	1:75	1.333	1:115	0.870	1:155	0.645	1:191	0.524	1:350	0.286	1:850	0.118
1:36	2.778	1:76	1.316	1:116	0.862	1:156	0.641	1:192	0.521	1:355	0.282	1:875	0.114
1:37	2.703	1:77	1.299	1:117	0.855	1:157	0.637	1:193	0.518	1:360	0.278	1:900	0.111
1:38	2.632	1:78	1.282	1:118	0.847	1:158	0.633	1:194	0.515	1:365	0.274	1:950	0.105
1:39	2.564	1:79	1.266	1:119	0.840	1:159	0.629	1:195	0.513	1:370	0.270	1:1000	0.100
1:40	2.500	1:80	1.250	1:120	0.833	1:160	0.625	1:196	0.510	1:375	0.267		

DEGREES	%
1.00	1.746
2.00	3.492
3.00	5.240
4.00	6.993
5.00	8.749
6.00	10.510
7.00	12.278
8.00	14.054
9.00	15.838
10.00	17.636

PL650™ TECHNICAL SPECIFICATIONS

Technical Specifications

Laser Wavelength	635-670nm <5mW
Laser Class	3R
Range	300m with Target
Horizontal Accuracy	±1mm/20m
Grade Accuracy	±0.15mm/m
Gradient Range	-20% to +40%
Self Levelling Range	±5°
Left and Right Incline Range	±1°
Left and Right Adjustment	±1.8°
Temperature Range	-20°C - 40°C
IP Dust Water Resistance	IP68
Power	4 x "D" Alkaline or Ni-mh pack
Low Power	LCD Display Graphic Flashes
Size	132x380mm
Weight	6Kg

Calibration & Self Check

All Redback Lasers have been checked for calibration and certified by one of our technicians here in Australia prior to despatch and should under normal conditions not go out of calibration. A calibration certified sticker with the date and name of technician is located on the laser itself. It is worth checking calibration from time to time particularly after any known knocks or drops. An easy way to continually check calibration is to always double check your work with the laser located in a different position. Various other methods for checking calibration can be found at **www.redbacklasers.com.au/downloads** or the laser can be returned to our service department for checking and re-calibration. We at Redback Lasers provide a once off free calibration and check within the duration of the warranty period see page 16 for details.

Care & Maintenance

- Keep laser and accessories stored in protective case.
- Make sure laser is stored dry, dry out before storage to prevent damage.
- Remove batteries when not used for an extended period of time to prevent leakage.
- The PL650™ is a precision instrument and should not be subjected to excessive knocks, drops or vibrations.
- Self check calibration from time to time. See page 13
- For service contact Redback Lasers. www.redbacklasers.com.au

Trouble Shooting - FAQ

Q. *I have difficulty using the remote control!*

A. *When you press a button each tone is equal to one press, so on a toggle button like the power button if you press and hold and hear 2 tones then it will have turned it on and then off again.*

Q. *The Laser does not power up!*

A. *Check the rechargeable batteries are charged and connected correctly and or replace standard "D" size Alkaline batteries and check they are inserted correctly and pack fully tightened up into recess.*

Q. *Laser fails to find level, continually flashing!*

A. *Check that the laser is on a stable location without vibration, check batteries and replace if necessary, check that the left to right bubble vial is central. If still not working whilst the laser is turned on tilt the laser vertically upwards (do not look into beam) hold for 10 seconds then place back onto ground, this will re-set the sensors without changing calibration.*

Notes

REDBACK LASERS WARRANTY

Duration of warranty is fixed and automatic, when we advertise 2 years on a particular model, its two years. No drop down to a lesser time if you forget to register, registration is NOT required just proof of purchase showing date.

Although the duration of our warranties are for a particular period it does not mean we will charge you for a genuine warranty failure a month or two outside that warranty period, we believe in a fair go.

Even though a product shows signs of accidental damage, scratches and the like, we will not automatically fail the warranty claim, if the fault is NOT caused by a drop or misuse and is a genuine warranty failure then we will cover it.

Calibration is not covered by warranty much the same as the wheel balance on your car is not covered by warranty, we do however offer a one off free re-calibration service during the period of warranty, conditions and details below.

CMI Industries Pty Ltd provides consumers with a warranty to our products, this is in addition to requirements of any relevant legislation such as the Competition and Consumer Act 2010. Definitions:

"CMI", "We" or "Our" refers to CMI Industries Pty Ltd (ABN 29 102 713 922) of 8 Autumn St, Geelong West, Victoria 3218 ph (03) 5228 0777

"You" or "Consumer" refers to the initial purchaser of the product.

"Product" refers to goods manufactured by or for CMI Industries Pty Ltd under the brands of RedBack Lasers, Level1Laser and CMI Lasers.

"Material" refers to material or component used in the construction and manufacture of the product.

"Workmanship" refers to handling, assembly and manufacturing processes done by or for CMI Industries Pty Ltd in order to manufacture the products.

"Warranty Period" For the PL650 Two Years. Warranty period is from original purchase date, no extension is made in the event of warranty replacement products supplied or time spent being repaired.

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure. Ni-Mh Battery & Charger have 1 Year Warranty.

CMI warrants that our products will be free from defects in material and workmanship for the warranty period.

CMI promises to repair or replace, free of charge, the product or part of product if found to be faulty due to defective workmanship or materials within the duration of the warranty as long as the following terms and conditions are met;

- Product must not have been misused or abused, must not have incurred accidental damage or had un-authorised repair or tampering that has caused or contributed to its fault or failure.
- You must contact CMI by phone, mail or email immediately when a fault or defect has become apparent and within the warranty period.
- Product must be returned to store of purchase or directly to CMI, we will cover cost of postage only when sent by our reply paid Australia Post service (Australian Main land and Tasmania only) details will be provided upon phone, post or email communications with us.
- CMI will cover cost of freight back of repaired or replaced product to original purchase store or you directly (depending on how it was sent Australian Main Land and Tasmania only).
- CMI will determine whether to repair or replace the product or part of product on a case by case basis.
- Further exclusions in this warranty include damage or defect caused by use of non-original accessories or parts, damage in transportation, normal wear and tear, damage through moisture, damage due to electric surge, failure due to neglect or damaged caused by adjustments not outlined in CMI's instructions.

Subject to the requirements of all applicable Australian Acts or legislation and to the extent permitted by law, CMI accepts no liability (whether expressed or implied) of any nature whatsoever for any loss of earnings, hiring of replacement equipment, Inaccurate work carried out by the consumer or agent, damage or injury arising as a result of any fault in the product. It is the consumers responsibility to maintain good working practices and regularly test their tools for accuracy and serviceability.

Calibration of the product is not covered by warranty subject to the requirement of all applicable Australian Acts or legislation and to the extent permitted by law, CMI does however offer a free re-calibration service (once within the period of the warranty) you are liable for the cost to send the product to us then we will recalibrate and return the product to you free of charge. Note this offer is invalid if the product shows signs of misuse or accidental damage that has caused it to go out of calibration.

A CMI product returned that fails to fall within the terms and conditions of this warranty will be quoted for repair.

RedBack Lasers™ distributed by CMI Industries Pty Ltd
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