

Inground 400 Series

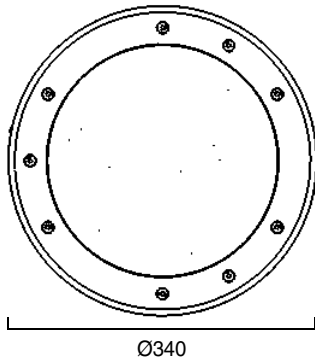
User Manual



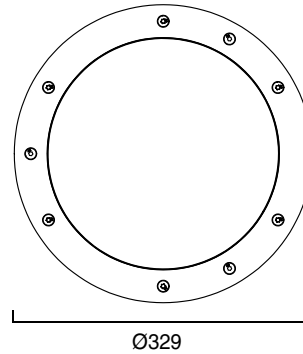
Dimensions

Top ring

Beveled top ring

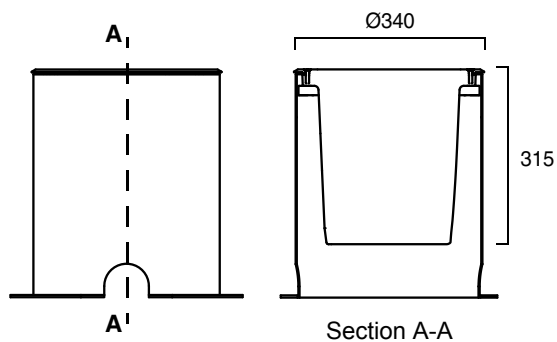


Flush top ring

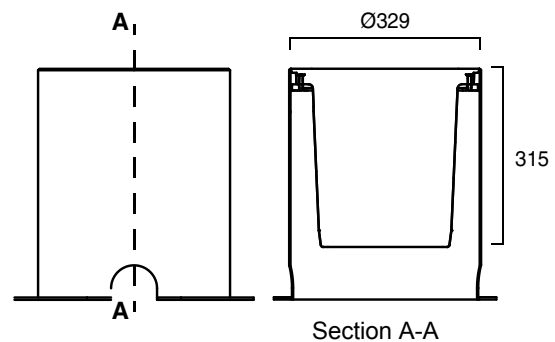


Fixture in installation sleeve

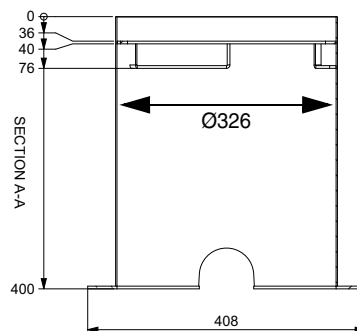
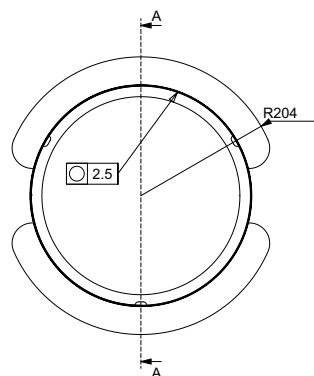
With beveled top ring



With flush top ring



Installation sleeve only



All dimensions are in millimeters

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Safety Information



WARNING!
Read the safety precautions in this section before installing, powering, operating or servicing this product.

The following symbols are used to identify important safety information on the product and in this manual:



WARNING!
Safety hazard.
Risk of severe injury or death.



WARNING!
Hazardous voltage. Risk of lethal or severe electric shock.



WARNING!
Fire hazard.



WARNING!
Refer to user manual.



This product is for professional use only and must be installed by a qualified technician. It is not for household use. It presents risks of injury or death due to fire hazards, electric shock and falls. It produces a powerful, concentrated beam of light that can create a fire hazard or a risk of eye injury if the safety precautions in this user manual are not followed.

Risk Group 1 (low risk) product according to EN 62471 on condition that the diffuser lens/sheet that the fixture is supplied with is not removed from the fixture.



Install, operate and service Martin® products only as directed in their user manuals, or you may create a safety hazard or cause damage that is not covered by product warranties. Follow the safety precautions listed below and observe all warnings in this manual and printed on the product. Before using this manual, please make sure that you have the latest revision of the manual. You can download the latest revisions of all the product's user documentation from the product's Tech Docs / Product Support page at www.martin.com.

If you have any questions or if you are in any doubt about how to install, operate or service this product correctly and safely, please contact your Martin® supplier or call the Martin® 24-hour service hotline on +45 8740 0000, or in the USA on 1-888-tech-180.

Respect all locally applicable laws, codes and regulations when installing, operating or servicing the fixture. Refer any operation not described in this manual to a qualified technician.



PROTECTION FROM ELECTRIC SHOCK

- Shut down power to the entire installation at the main power distribution board and lock out power (by removing the fuse for example) before carrying out any installation or maintenance work.
- Disconnect the fixture from AC power before removing or installing any cover or part and when not in use.
- Connect the fixture electrically to ground (earth).
- Use only a source of AC power that complies with local building and electrical codes and has both overload and ground-fault (earth-fault) protection.
- Connect the fixture to AC power using the supplied power cable only.
- If the external power cable of the fixture becomes damaged, you must replace the complete fixture.

- Connect the fixture's cable tails to AC power and data circuits inside junction boxes that are rated IP67 minimum. Fill junction boxes with two-component potting compound to protect connections from water and humidity.
- Before using the fixture, check that all power distribution equipment and cables are in perfect condition, are rated for the current requirements of all connected devices, are protected to IP67 or higher and are of suitable type for the location (including water, pollution, temperature and UV resistance).
- Isolate the fixture from power immediately if any cable, seal, cover or other component is damaged, cracked or deformed. Do not reapply power until repairs have been completed.
- Do not expose any part of the fixture to a high-pressure water jet.
- Do not immerse the fixture in water or any other fluid, or install it in a location where flooding may occur.
- Refer any service operation not described in this manual to an authorized Martin® Service partner.



PROTECTION FROM BURNS AND FIRE



- Do not operate the fixture if the ambient temperature (T_a) exceeds 45° C (113° F).
- The exterior of the fixture becomes hot, up to 90° C (194° F) during normal operation. Ensure that accidental physical contact with a hot fixture is impossible.
- Allow the fixture to cool for 20 minutes before cleaning or handling.
- Do not illuminate surfaces less than 0.2 m (8 in.) from the top surface of the fixture.
- Keep flammable materials well away from the fixture.
- Do not modify the fixture in any way not described in this manual or install other than genuine Martin® parts. Do not stick filters, masks or other materials directly onto LEDs or onto the top glass. Use only Martin®-approved optical configurations to mask or modify the light beam.
- Install the fixture:
 - In an installation sleeve from Martin® or in a similar recess. There must be free airflow in the sleeve or recess.
 - Outdoors or in a well-ventilated area.
 - At least 1 meter (40 inches) away from any combustible materials.
- Ensure that:
 - The top glass is free of litter, leaves, dirt and anything else that could reflect heat back into the fixture.
 - The installation sleeve is free of anything that could prevent free airflow around the fixture.
 - Vehicles or other potential fire risks cannot be positioned over or near the fixture. This is particularly important in situations where a vehicle (for example) may be left unattended over or near a fixture that is not switched on at the time, but where the fixture may be switched on later.



PROTECTION FROM INJURY

- Do not operate the fixture without its diffuser lens/sheet installed, or you may create a risk of eye injury.
- Do not look at the fixture with magnifiers or similar optical instruments that may concentrate the light output.
- Install the fixture:
 - In an area where accidental contact with the top glass is unlikely, since the fixture becomes hot during normal operation.
 - With an anti-skid top glass in pedestrian traffic areas (an anti-skid top glass with an engraved design is one of the configuration options available when ordering).
- Ensure that no fixtures or empty installation sleeves create a hazard that might result in falls or injuries. To avoid accidents during installation or service, restrict access to the site and place both warning notices and barriers around all work areas until work is completed and the site is safe.
- Fasten Martin® temporary installation lids into the tops of installation sleeves to protect pedestrians from injury until fixtures are installed in the sleeves. Restrict access so that it is impossible to drive a vehicle or position a heavy object over an installation lid.
- The insulation between the low voltage supply and the DMX cable is basic insulation only.

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Introduction

Thank you for selecting a product from the Inground 400 range of LED-based uplight fixtures from Martin Professional. The Exterior Inground 400 range is a range of uncomplicated, easy-to-use color-changing LED luminaires. Inground 400 fixtures combine the benefits of dynamic light and discreet installation. The recessed housing can be made to fit any type of surface with a top ring (trim ring) available in beveled and flush-mount versions. The range of beam angle options available includes asymmetric and directional models.

Configurations

When ordering products from the Inground 400 range, you can configure them to match your requirements by selecting from the following options (see "Ordering Information" on page 36):

Series

- Inground 400
Optimized for narrow beam angle configurations
56 x R, G, B and W LEDs
- Inground 410
Optimized for evenness of color mixing
22 x quadcolor LEDs
- Inground 420
Optimized for color temperature control
56 x cool white and warm white LEDs

Power cable

- EU cable
- US cable

Glare Shield

- No glare shield (Inground 410 only)
- Glare shield, 22 LEDs – for Inground 410
- Glare shield, 56 LEDs – standard (and required) for Inground 400 and 420

Diffuser

- No diffuser (the fixture can be ordered without a diffuser, but a diffuser must always be installed in the fixture during use)
- Narrow
- Medium
- Wide
- 8° Directional and asymmetric
- 20° Directional
- Asymmetric

Top glass

- Standard
- Anti-skid
- No top glass (the fixture can be ordered without a top glass, but a top glass must always be installed in the fixture during use)

Top ring

- Beveled
- Flush

All models feature:

- Auto-sensing power supply unit with 100 - 277 V nominal, 50/60 Hz operating range
- DMX 512 control
- Remote configuration and addressing over the DMX data link via RDM (Remote Device Management).

For the latest light output measurements, firmware updates, documentation, product specifications and other information about this and all Martin Professional products, please visit the Martin® website at <http://www.martin.com>

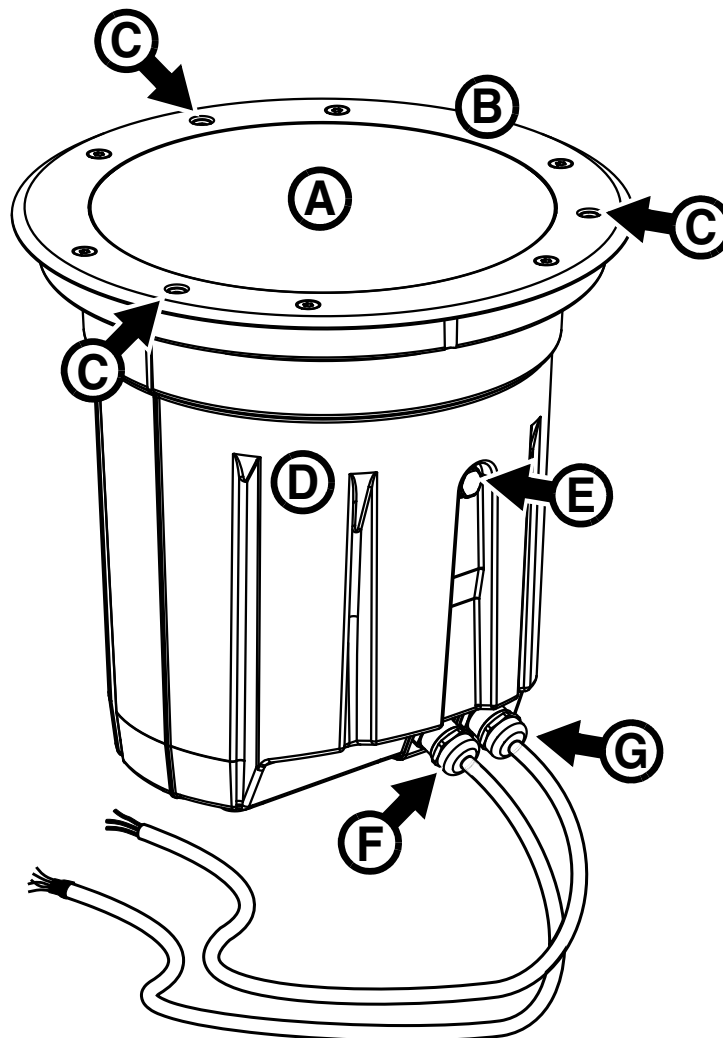
If you have any comments or suggestions regarding this user manual, please e-mail us at service@martin.dk.

Using for the first time

Before applying power to the fixture:

- Carefully review “Safety Information” on page 3.
- Check that the local AC power voltage is within the range listed on the fixture’s serial number label.
- Install the fixture as described in this user manual.

Fixture overview



- | | |
|---------------------------------|----------------------------------|
| A Top glass | E Gore-Tex pressure relief valve |
| B Top ring (beveled ring shown) | F Data cable entry |
| C Holes for installation bolts | G Power cable entry |
| D Fixture housing | |

Figure 1: Fixture overview

Physical installation

General guidelines



Warning! Read "Safety Information" on page 3 before installing a fixture in the Inground 400 range.

Warning! The safety and suitability of the installation location and electrical installation is the responsibility of the installer. All local safety regulations and legal requirements must be observed when installing and connecting fixtures. Installation must be carried out by qualified professionals only.

Warning! Contact your Martin® supplier for assistance if you have any questions about how to install this product safely.

Important! If the product is not installed as described in this user manual, performance may be unsatisfactory and damage may be caused that is not covered by the product warranty. Martin® will gladly provide assistance in planning and carrying out installation.

The installation location and method must be carefully chosen in order to avoid heat and moisture build-up and to ensure satisfactory performance over the product's lifetime.

Please first read the general guidelines below, then use the instructions later in this chapter to guide you while you install a fixture.

Installation sleeve



Warning! Empty installation sleeves present a hazard to any person walking at the installation site. Install a temporary lid as described below and/or prevent pedestrian access to the site until fixtures have been installed in all sleeves. Prevent vehicle access to the site until fixtures have been installed in all sleeves.

The fixture is designed to be installed in an installation sleeve or similar construction. We recommend using the rugged installation sleeve with a drive-over rating of 40 000 N (8800 lbs.) designed specifically for the Inground 400 range that is available from Martin®. The sleeve must be ordered separately.

In existing installations where Martin® Inground 200 fixtures are being removed and replaced with 'Retrofit' fixtures* from the Inground 400 range, existing Martin® installation sleeves can be re-used.

Customers can supply their own installation sleeves or similar constructions, but Martin® cannot take any responsibility for damage or loss of performance that occurs as a result of installing Inground 400 fixtures in any construction other than a Martin® sleeve.

*See "Ordering Information" on page 36.

Installation lids for installation sleeves



Warning! The temporary installation lids available from Martin® can support the weight of a pedestrian, but they are not designed to support the weight of a vehicle. Prevent vehicle access to the site until fixtures have been installed in all sleeves.

If an installation sleeve is installed in the ground but stands empty until an Inground fixture is installed in it, the open hole at the top of the sleeve can present a hazard to any person walking at the installation site. Rainwater, dirt and debris can also collect in the sleeve, making installing the fixture difficult. To avoid these problems, Martin® can supply temporary installation lids that fit into the tops of installation sleeves and cover the hole in the sleeve temporarily while waiting for fixtures to be installed or if fixtures are removed for service.

See Figure 2. Two types of lid are available: lid **A** is designed for flush top ring installations and lid **B** is designed for beveled top ring installations. The lids are designed to be fastened into the top of installation sleeves using three M6 bolts.

We recommend that you install lids during paving or tarmac work around installation sleeves. This will avoid damage to sleeves and prevent surfacing material falling into the sleeve. Finish tarmac or paving at the

same level as the top of the installation lid. See Figure 2. The different thicknesses of the two installation lids allow for the different thicknesses of the flush mount and beveled top rings available for the Inground 400 range.

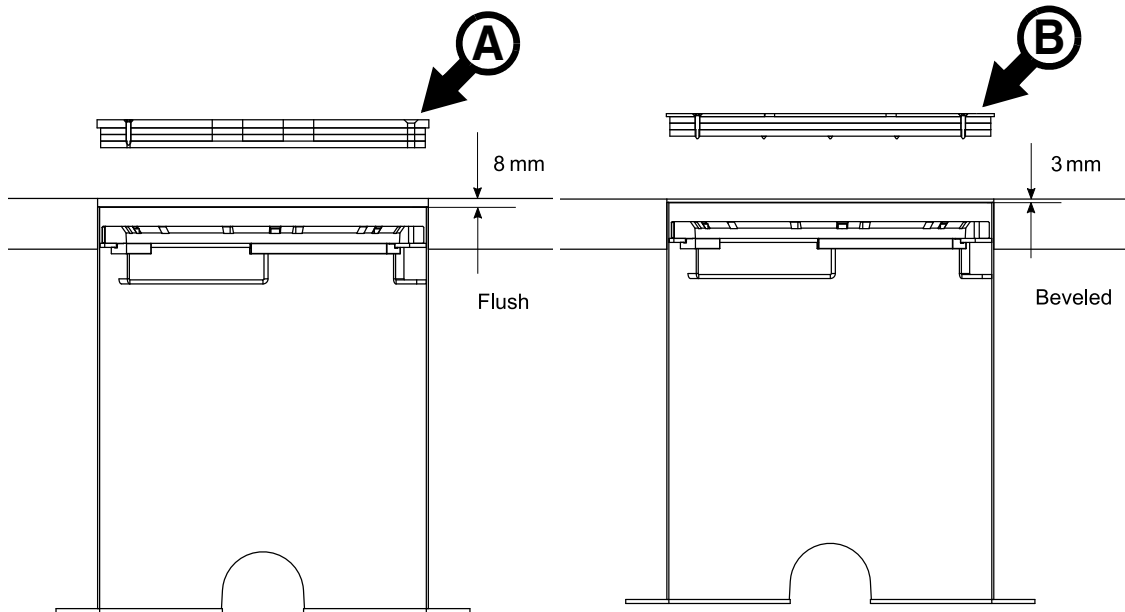


Figure 2: Installation lids for flush mount and beveled installation types

Avoiding humidity and condensation

Important! Do not open the top glass when installing the fixture.

The fixture is supplied as a factory-sealed, de-humidified unit. Opening the fixture will allow moisture to enter. Install the fixture in its installation sleeve using three bolts in the holes that pass through the top ring. Do not remove the top glass.

There is an exception to the above: if you are carrying out a retrofit installation and re-using the top glass and top ring from an existing fixture, your new fixture will be supplied open, with no top glass. In this case, follow the instructions on avoiding humidity given in “Retrofit install re-using existing parts” on page 19.

Avoiding corrosion

Do not scratch or damage the outer surface of the fixture. The housing is coated at the factory to protect it against corrosion, but if the coating is damaged this protection may be lost, invalidating the product warranty if corrosion should occur.

Cooling

The Inground 400 range regulates light output to control its internal temperature and ensure that all components operate within their thermal specification.

The fixture is cooled by the convection of air in the installation sleeve or recess in which it is installed and conduction to the surrounding material in the installation site. Do not install the sleeve in material with insulating properties.

Water resistance and drainage

The fixture has an ingress protection rating of IP67. This means that it can withstand immersion for 30 minutes and low-pressure water jets. However, it is not designed to withstand constant immersion, so take the following into account when planning the installation site:

- The base of Inground 400 fixtures must not be submerged in water other than for very short periods.
- Effective drainage that can prevent any buildup of water in the installation sleeve is absolutely essential and must be provided and tested before the fixture is installed. It must be possible for water from rain, melting snow, flooding or other sources to drain out of the installation sleeve *at least* as fast as it can enter it. If water is present in the installation well for extended periods, the product warranty will be invalidated.
- If in doubt about a particular site, consult a geotechnical engineer.

- See Figure 3. To minimize the risk of flooding or waterlogging, install the fixture in a location which is above the level of the surrounding area and/or make sure that drainage conditions are adequate.

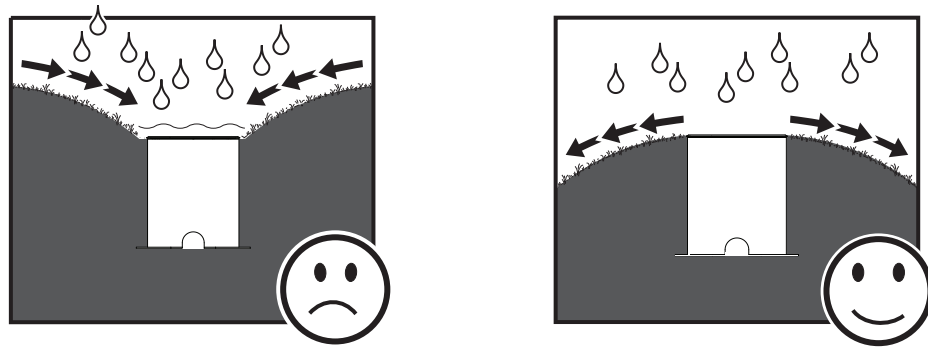


Figure 3: Avoiding flooding

Pressure equalization valves

A valve with a Gore-tex membrane in the housing equalizes pressure by allowing air to pass through it when the fixture heats up and cools down, but at the same time it acts as a barrier to water in liquid form. The expulsion of warm air (with a slightly higher water vapor content) and intake of cool air (with a slightly lower water vapor content) prevents humidity buildup over time, provided that the valve works correctly and that the fixture is correctly sealed.

If the valve is underwater while the fixture cools down and its internal pressure falls, the valve will not be able to let air enter the fixture. Water may then be sucked into the fixture past seals and even along cables.

Pressure equalization valves can also become blocked after an extended period of use if the micropores in the membrane fill up with dirt particles. Valves cannot be cleaned and must be replaced if they become blocked. Valve replacement intervals depend on the amount of dirt and dust in the installation location. We recommend that you consult your Martin® supplier about possible inspection intervals. Replacement valves must be installed by Martin® Service or its authorized agents.

Directional fixture orientation

When you install a fixture that has a directional filter, you must orient it so that its light output points in the intended direction.

See Figure 4. Note the position of the Martin® logo on the top glass. Directional filters are installed at the factory so that the light output points *away from the Martin® logo*.

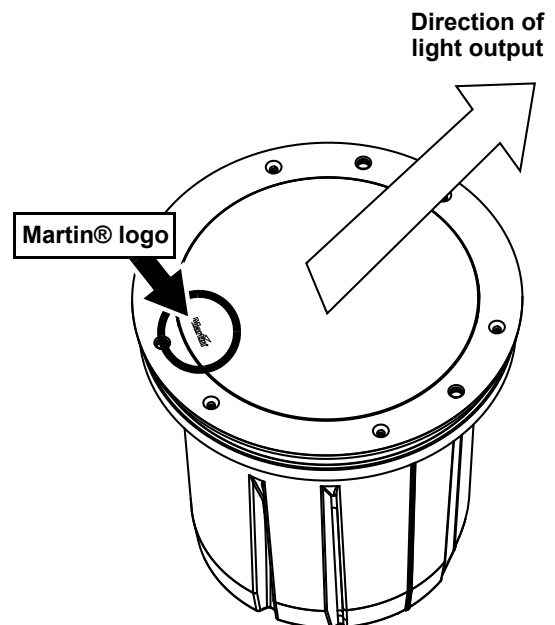


Figure 4: Light output with directional filters

Asymmetric beam angle orientation

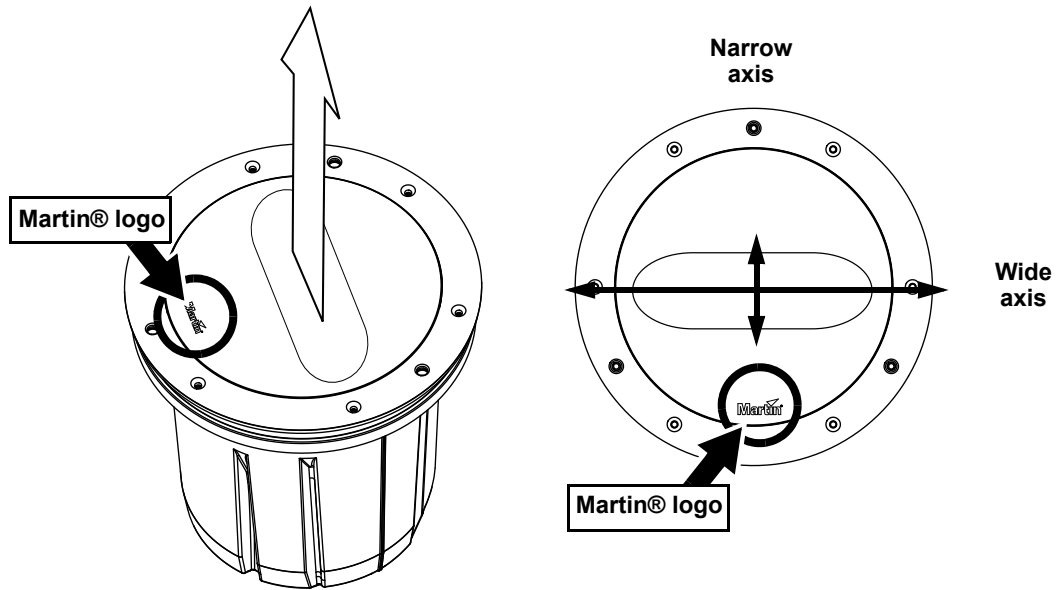


Figure 5: Orientation of asymmetric beam angle

When you install a fixture that has an asymmetric beam angle lens, you must orient it so that the wide and narrow axes in the light output are lined up as intended.

See Figure 5. Note the position of the Martin® logo on the top glass. Asymmetric lenses are installed at the factory so that the *wide-angled light output comes from the sides of the fixture* and the *narrow-angled light output comes from the front and back of the fixture* when the Martin® logo is at the front or back of the fixture.

Before you begin installing

Important! The fixture is sealed and vacuum tested at the factory to ensure that it is protected from humidity. Do not open the fixture, as this will allow humidity to enter. If you need to remove the top glass at any time, please contact Martin® Service for assistance and advice on eliminating humidity.

Before you install an Inground 400 range fixture, read "Safety Information" on page 3 and read this Physical Installation chapter from the beginning to familiarize yourself with general guidelines and installation hardware.

The procedure for installing a fixture from the Inground 400 range varies depending on whether the installation is:

- a **new install** with a new installation sleeve, or
- a **retrofit install**, where a new Inground 400 fixture replaces a Martin® Inground 200 fixture in an existing installation sleeve.

Instructions for these two different types of installation are given in separate sections in the rest of this chapter.

New installs

A 'new install' means installing a new Inground 400 fixture in a new Inground 400 installation sleeve. To carry out a new install, follow the procedure below.

Installing an installation sleeve

1. Make sure that the base of the installation well can bear the weight of the installation sleeve and fixture with the maximum required load without sinking. In a drive-over installation, this means that it should withstand a load of up to 40 000 N (8800 lbs.) plus fixture and sleeve.
2. Make sure that there is adequate drainage from the installation well as described earlier in this chapter.
3. See Figure 2 on page 10. We recommend that the top of the installation sleeve sits:
 - 8 mm below terrain in installations with flush-mount top rings, or
 - 3 mm below terrain in installations with beveled mount top rings.

4. Prepare conduit, cabling and junction boxes so that the fixture can be connected to AC power and to data circuits.

Make sure that all items are of a suitable type for their purpose and the environment, and that they have adequate IP ratings. Make sure that cables will not open into damp locations, otherwise expansion and contraction due to heat may suck moisture along cables into fixtures and cause condensation. Do not bury the power supply cable or data cable directly in the ground. Install all cables in conduit that is suitable for the installation environment. Make all connections inside junction boxes that are totally sealed against the entry of water.

5. Fix the installation sleeve in its well in whatever orientation is easiest (for cabling, for example).
6. If a fixture with a directional or asymmetric beam will be installed in the sleeve, first see "Directional fixture orientation" and "Asymmetric beam angle orientation" earlier in this chapter.
7. See Figure 6. There is an alignment mark **A** in the mounting ring **B**. Loosen the six screws shown in circles in the mounting ring. This loosens the clamps underneath the mounting ring and lets you rotate the mounting ring to adjust the position of the alignment mark.

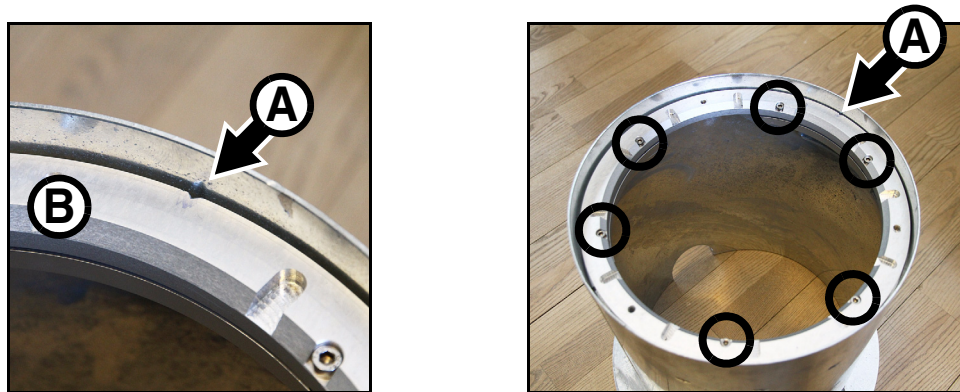


Figure 6: Orientation mark in mounting ring

8. Rotate the mounting ring **B** until the alignment mark **A** is:
 - pointing directly towards the surface to be illuminated if a directional beam fixture will be installed in the sleeve, or
 - pointing in the direction of the narrow beam angle (and therefore at 90° to the wide beam angle) if an asymmetric beam fixture will be installed in the sleeve.

In both cases, the alignment mark must be on the opposite side of the sleeve from the side with the Martin® logo on the fixture's top glass.

9. Retighten the six screws to fasten the mounting ring in its correct orientation.

Installing a fixture

1. Make sure that AC power to the installation is shut down and cannot be applied (by removing a fuse, for example).
2. Place the fixture next to the installation sleeve and connect it as described in the “AC power” and “DMX-RDM data” chapters later in this manual.
3. Lower the fixture into the sleeve and rotate it until you have aligned the fixture correctly as described under “Directional fixture orientation” and “Asymmetric beam angle orientation” earlier in this chapter, using the Martin® logo for reference. The three holes for fixture mounting bolts (arrowed in Figure 7) in the top ring of the fixture should line up with the threaded holes in the mounting ring in the installation sleeve (if necessary, you can adjust the mounting ring as described above).
4. See Figure 7. Fasten the fixture into the installation sleeve by passing the three supplied M6 bolts through the holes fixture's top ring and fastening them into the mounting ring in the sleeve. Use a torque driver and cross-tighten them to around 3 Nm.

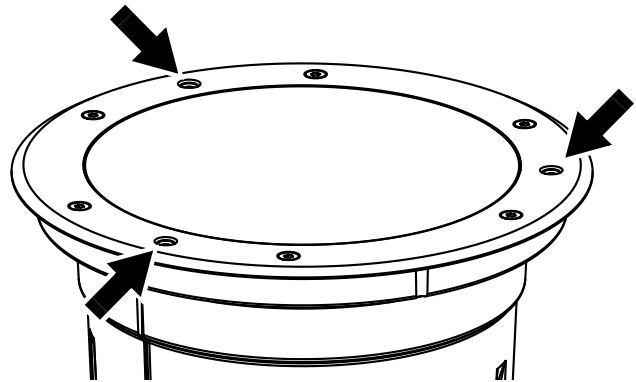
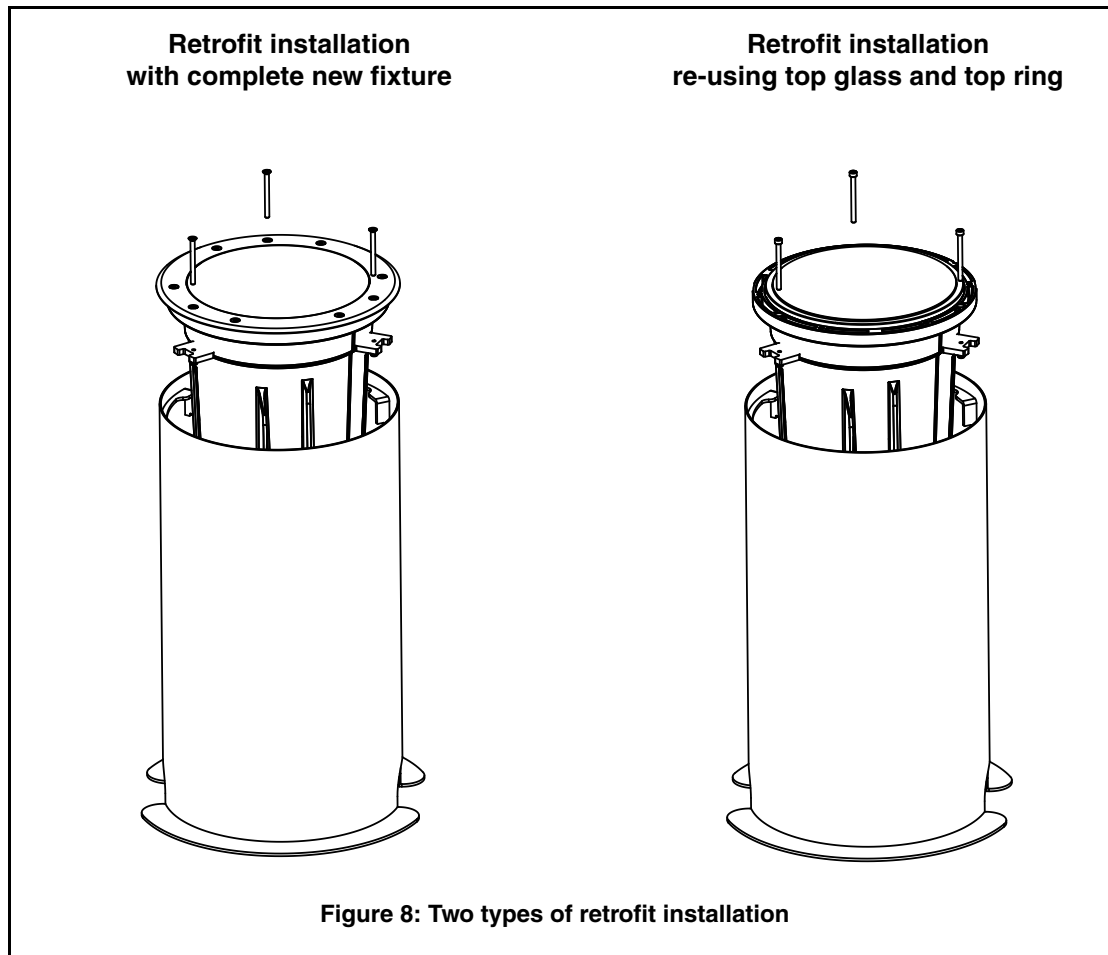


Figure 7: Inground 400 mounting bolts

Retrofit installs: general

A retrofit install involves installing a new Inground 400 fixture into an existing Inground 200 installation sleeve. See Figure 8. Retrofit installs fall into two types:

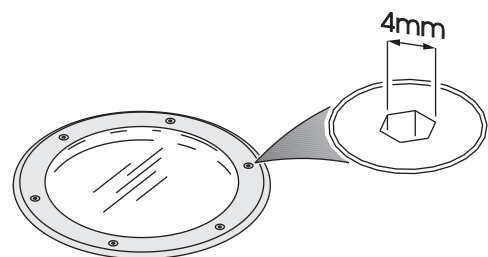
- Installing a *complete new fixture*
- Installing a *new fixture re-using the top ring and top glass from the existing Inground 200 fixture.*



To carry out a retrofit installation, follow the procedure below.

Removing the existing Inground 200 fixture

1. Make sure that AC power to the installation is shut down and cannot be applied (by removing a fuse, for example).
2. Check that the existing Inground 200 installation sleeve meets weight-bearing and drainage requirements.
3. See Figure 9. Remove the six screws from the Inground 200's top ring. If you are going to re-use the top ring and top glass, keep these six screws for re-use.
4. Lift the top glass off the Inground 200.



5. See Figure 10. Loosen the three fixture mounting bolts **A** to loosen the clamps **C**. Rotate the Inground 200 in the installation sleeve until the clamps **C** are clear of the fins inside the installation sleeve, then lift the Inground 200 out of the sleeve.
6. Disconnect the Inground 200 from power and data. Check that conduit and cabling are in perfect condition. Renew any items that are not suitable for reuse.
7. Place the new Inground 400 fixture next to the installation sleeve and connect it to power and data as described in the “AC power” and “DMX-RDM data” chapters later in this manual.
8. If a fixture with a directional or asymmetric beam will be installed in the sleeve, first see “Directional fixture orientation” and “Asymmetric beam angle orientation” earlier in this chapter.

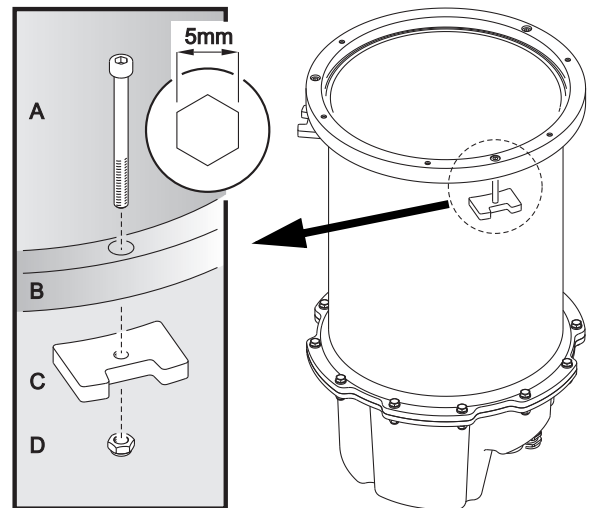


Figure 10: Removing an Inground 200 from its installation sleeve

The rest of the installation procedure

depends on whether the you are installing a complete new Inground 400 fixture or a new Inground 400 fixture without top ring and top glass in the existing Inground 200 installation sleeve:

- If you are installing a *complete new fixture*, go straight to the next section.
- If you are installing a *new fixture re-using the existing top ring and top glass from the Inground 200 fixture*, go to “Retrofit install re-using existing parts” on page 19.

Retrofit install with a complete new fixture

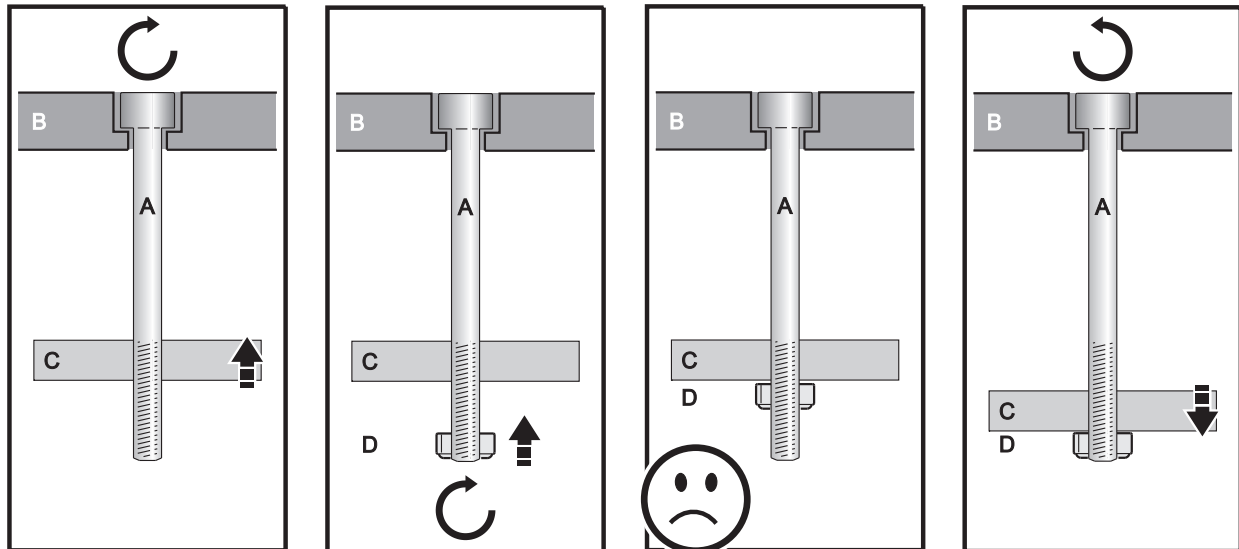
Important! *There is no need to open the new fixture when you carry out a retrofit install with a complete new Inground 400 fixture. Do not open the fixture, or you will allow humidity to enter.*

You will need to use the three new stainless steel M6 x 70 fixture mounting bolts supplied with the new fixture plus the original clamps and nuts (see Figure 10) from the Inground 200. Note that the three new bolts are countersunk and slightly longer than the original bolts from the Inground 200.

You will need new IP67-rated junction boxes and potting compound for connections to AC power and data.

To install a complete new fixture in an existing Inground 200 installation sleeve:

1. Make sure that AC power to the installation is shut down and cannot be applied (by removing a fuse, for example).
2. Place the fixture next to the installation sleeve and connect it as described in the “AC power” and “DMX-RDM data” chapters later in this manual.
3. Apply a small amount of grease or anti-seize compound to the threads of the three new mounting bolts to reduce galvanic corrosion.
4. Prepare the mounting clamps for the Inground 400 fixture as described below (the illustrations show a socket head cap bolt while the new bolts supplied are countersunk, but this does not affect the procedure):



Pass each of the three stainless steel countersunk M6 x 70 bolts (A) through one of the three holes in the top ring (B) and screw the bolt through a clamp block (C).

Screw a self-locking nut (D) onto the end of each bolt until the nut is flush with the end of the bolt.

Do not screw the nut any further up the bolt.

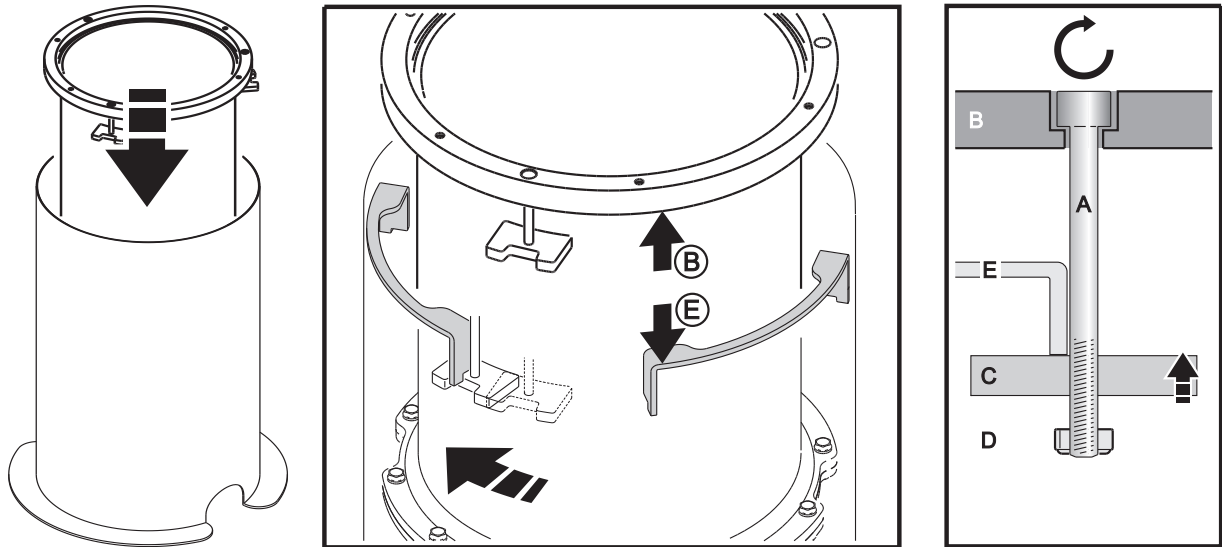
Unscrew each bolt (A) back up through the clamp block (C) until the retaining nut (D) touches the clamp block.

Figure 11: Preparing mounting clamps

5. Rotate the fixture until it is oriented as closely as possible to the optimum angle as described under “Directional fixture orientation” and “Asymmetric beam angle orientation” earlier in this chapter, using the Martin® logo for reference.

If this angle is not close enough to the desired beam angle, please contact your Martin® supplier for assistance. It only takes a minute or two to remove the top glass and adjust the diffuser or directional turning film, but you must follow the correct procedure and install a new silica gel anti-humidity bag on the side of the module inside the fixture. Your Martin® supplier or Martin® Service will be glad to help.

6. Clamp the fixture into the installation sleeve as shown below:



Holding the fixture by the inside rim of the housing, begin lowering it into its sleeve.

As you lower the fixture, ensure that the clamp blocks (C) pass between the fins in the sleeve so that the outer rim (B) sits on the fins (E). Then rotate the fixture so that the clamp blocks locate under the fins.

Tighten the three clamp bolts (A) finger-tight only.

Figure 12: Retrofit installation, fastening fixture into installation sleeve

7. With directional and asymmetric beam angle fixtures, check that the orientation of the beam is correct with reference to “Directional fixture orientation” on page 11 and “Asymmetric beam angle orientation” on page 12. Adjust if necessary by rotating the fixture in the sleeve.
8. Finally, tighten the clamp bolts to around 3 Nm.

Retrofit install re-using existing parts

In this type of retrofit installation, an Inground 400 range fixture is supplied with no top glass or top ring so that you can re-use the original top glass, top ring and fasteners from an existing Inground 200 installation.

You will need to re-use:

- the three stainless steel M6 x 70 fixture mounting bolts, clamps and nuts (see Figure 10 on page 15) that were used to fasten the Inground 200 into the installation sleeve,
- the six M6 x 25 top ring screws (see Figure 9 on page 14)
- the original top ring and top glass from the Inground 200.

You will need new IP67-rated junction boxes and potting compound for connections to AC power and data.

Check that the top ring and top glass from the Inground 200 are in perfect condition. Replace any items that are not fit for re-use. We recommend that you order a new top glass seal, but you can re-use the seal from the Inground 200 if it is in perfect condition.

Martin® supplies silica gel anti-humidity bags for use with Inground 400 fixtures that have been opened. One bag is supplied with each retrofit fixture that re-uses existing parts because these fixtures are supplied open. As soon as you remove a silica gel from its sealed foil wrap it will begin to absorb humidity, so close the fixture as soon as possible after you remove the silica gel bag from its wrap.

To install a new Inground 400 in an existing Inground 200 installation sleeve re-using the top glass and top ring from the Inground 200:

1. Carry out the installation in dry conditions only.
2. Make sure that AC power to the installation is shut down and cannot be applied (by removing a fuse, for example).
3. Lift the luminaire module out of the fixture housing (a service tool is available from Martin® that simplifies lifting the module out of the housing – please contact Martin® Service if you are interested). See Figure 13. Remove a silica gel bag from its wrap. Use a cable tie to fasten the bag behind the frame (arrowed) on the side of the module. Then lower the module back into the housing.
4. Place the fixture next to the installation sleeve and connect it as described in the “AC power” and “DMX-RDM data” chapters later in this manual.
5. Lower the fixture without the top glass and top ring into the installation sleeve.

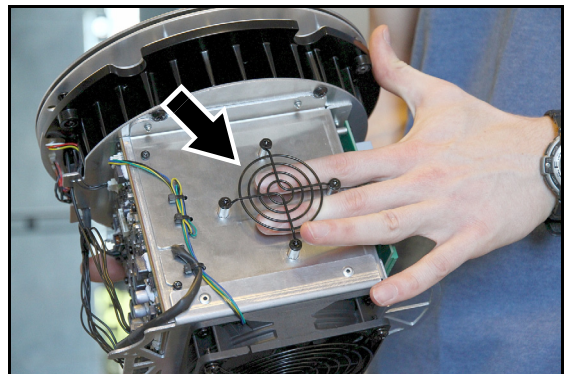


Figure 13: Frame for fastening silica gel bag

6. See Figure 14. The holders for diffusers and DTFs (directional turning films) have an orientation mark:
 - In fixtures with directional beam angles, this mark indicates the direction of the light output and must point towards the surface to be illuminated.
 - In fixtures with asymmetric beam angles, this mark indicates the axis of the narrow beam angle.
 If necessary, rotate the holder with the diffuser or directional turning film to adjust the beam aiming.

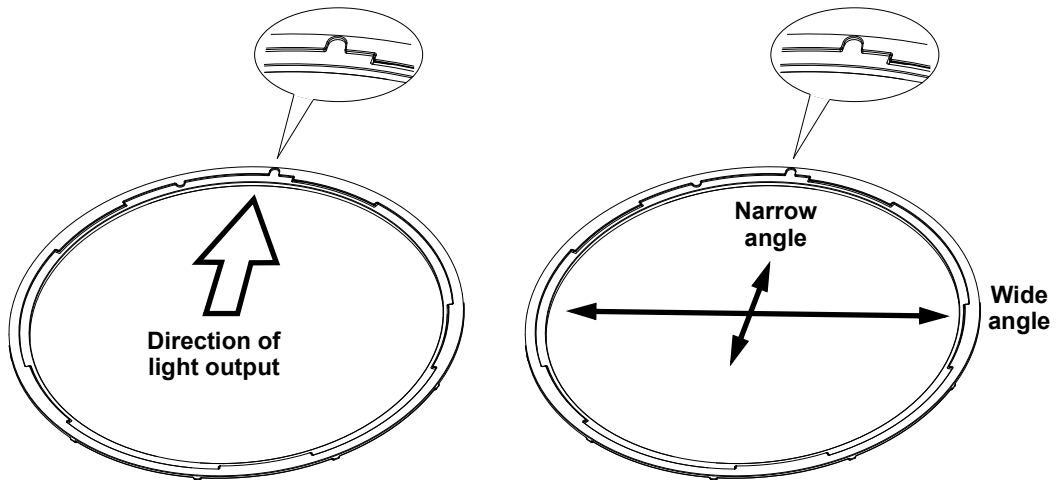
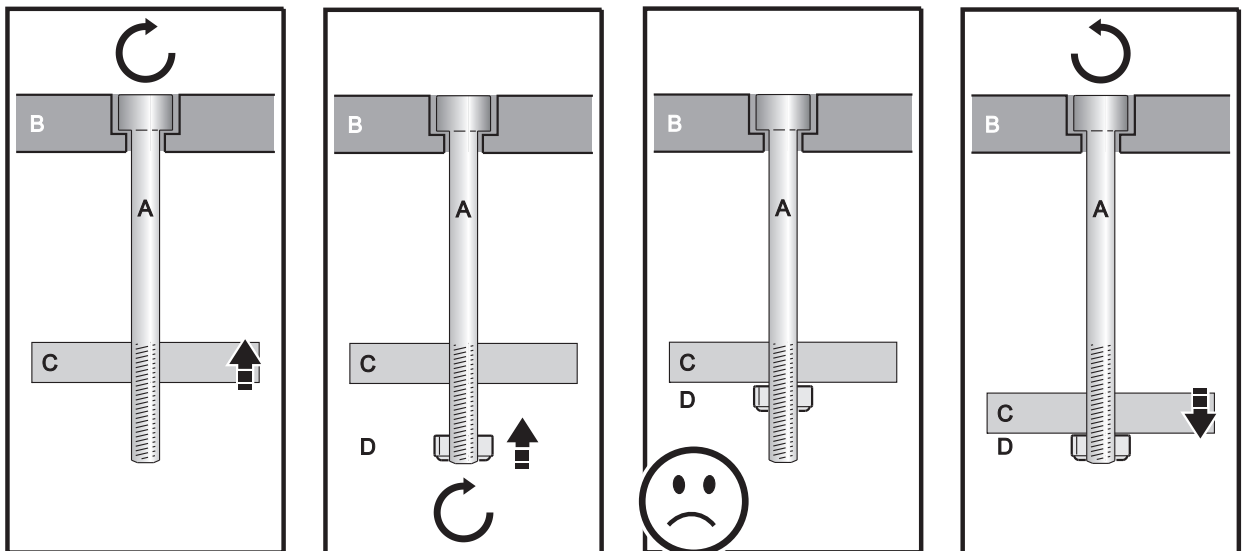


Figure 14: Orientation mark in diffuser holder

7. Place the fixture next to the installation sleeve and connect it as described in the “AC power” and “DMX-RDM data” chapters later in this manual.
8. Apply a small amount of grease or anti-seize compound to the threads of the three original mounting bolts from the Inground 200.
9. Prepare the mounting clamps for the Inground 400 fixture as described shown in Figure 15:



Pass each of the three mounting bolts (A) through one of the three holes in the top ring (B) and screw the bolt through a clamp block (C).

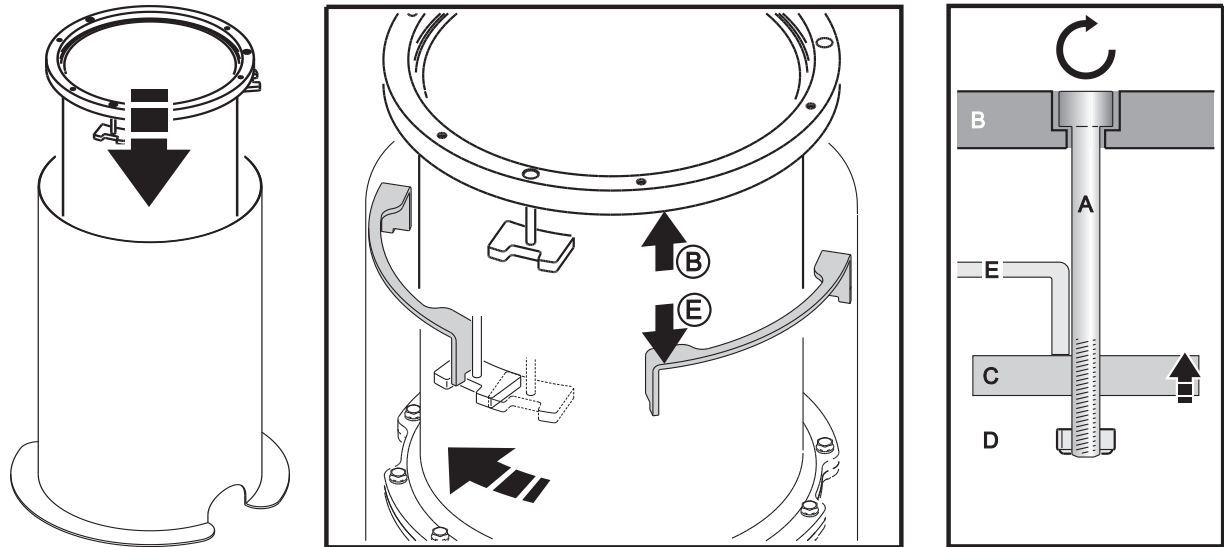
Screw a self-locking nut (D) onto the end of each bolt until the nut is flush with the end of the bolt.

Do not screw the nut any further up the bolt.

Unscrew each bolt (A) back up through the clamp block (C) until the retaining nut (D) touches the clamp block.

Figure 15: Preparing mounting clamps

10. Clamp the fixture into the installation sleeve as shown in Figure 16:



Holding the fixture by the inside rim of the housing, begin lowering it into its sleeve.

As you lower the fixture, ensure that the clamp blocks (C) pass between the fins in the sleeve so that the outer rim (B) sits on the fins (E). Then rotate the fixture so that the clamp blocks locate under the fins.

Tighten the three clamp bolts (A) to around 1 Nm.

Figure 16: Retrofit installation, fastening fixture into installation sleeve

11. With directional and asymmetric beam angle fixtures, check that the orientation of the diffuser holder is still correct (see Figure 14).
12. Use a torque driver to cross-tighten the clamp bolts to a torque of 6 Nm.
13. Apply a small amount of grease or anti-seize compound to the original six M6 x 25 top ring screws from the Inground 200 and use them to fasten the original top glass and top ring onto the new Inground 400. See Figure 17. Use a torque driver and cross-tighten the top rings screws gradually in at least three stages until you reach a torque of 9 Nm.

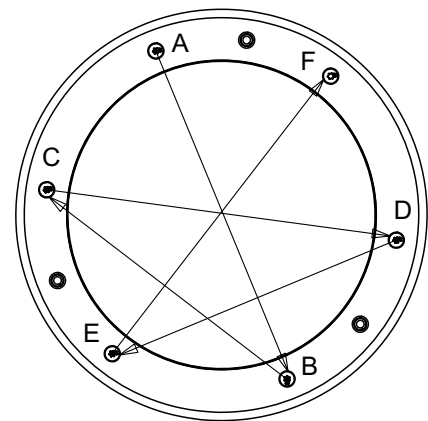


Figure 17: Top ring screw tightening sequence

Power and data cable layout

Figure 18 gives a schematic diagram of the cable layout in an Inground 400 installation.

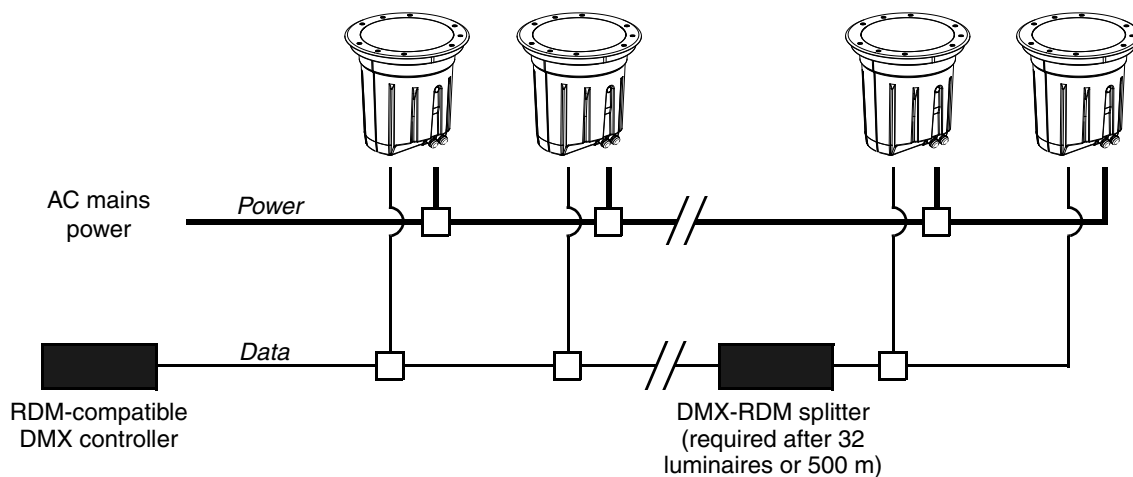


Figure 18: Schematic cable layout

Note the following points:

- You must add an RDM-compatible optically-isolated amplifier-splitter to the data link each time you reach 32 fixtures or 500 m (1640 ft.). You must also use this type of amplifier-splitter if you need to split the data link into two or more branches.
- Figure 18 shows one DMX universe only. If the fixtures on the data link occupy all of the 512 channels in one DMX universe, create a new DMX universe just like the one shown in Figure 18. The new DMX universe must have its own data link and its own DMX output from the controller.

Your Martin® supplier will be glad to help and advise on all aspects of system planning and cable layout.

AC power



Warning! Read “Safety Information” on page 3 before attempting to install a fixture. Lock out power to the entire installation before working on cables and connections or removing any cover.



Warning! Electrical installation must be carried out by qualified professionals only.

Warning! For protection from dangerous electric shock, the fixture must be grounded (earthed). The AC power distribution system must be fitted with current overload and ground-fault (earth-fault) circuit breakers as well as a means to isolate fixtures from power and lock out power during service.



Important! Do not connect a fixture to an electrical dimmer system. Doing so can damage the electronics.

See Figure 18 on page 22 for a schematic diagram of cable layout. If you require help in planning or dimensioning the power distribution system, please contact your Martin® supplier for assistance.

If there is a break or cut at any point in a cable (for example at a connection point), and if this is exposed to water, moisture can be drawn up the inside of the cable due to the vacuum effect of temperature fluctuations during operation. Ensure that the fixture is protected from the entry of water via the power cable by using IP67-rated junction boxes filled with two-component potting compound and by protecting connectors with weatherproof housings.

The Inground 400 range is supplied in EU and US models. Both models accept AC power at 100 - 277 V nominal, 50 or 60 Hz. Do not connect to power at any other voltage or frequency.

There is no power on/off switch. Power is applied to a fixture as soon as it is connected to power. Provide a means to disconnect from power or shut down power to fixtures that is easily accessible and is located close to the fixtures.

Connecting to power

The fixture is supplied with an integral power cable tail ready for connection to a single-phase 3-wire (live, neutral, ground/earth) power distribution system at 100 - 277 V nominal, 50/60 Hz.

Warning! If you have any other type of distribution system than the one listed above, contact your Martin® supplier for assistance.

When connecting the power cable to a power distribution circuit, use a terminal block with three screw terminals rated 300 volts, 5 amps minimum, inside an IP67-rated junction box. Use cable glands for cable entry. Twist the bare ends of the wires in the power cable before inserting in the terminals and make sure that no copper strands protrude from the terminals. Fill the junction box with two-component potting compound when you have made connections and before installing the junction box lid.

Making connections

To connect a fixture to a single-phase 3-wire (live, neutral, ground/earth) power system:

1. Lock out power to the installation.
2. Pass the power input and power output (throughput) cable and the fixture's power cable tail through cable glands into a new, unused IP67-rated junction box.

3. Connect the wires in the cable tail to the power input and output cables following the color code for US and EU models given in Table 1. Connect the conductors in the power cable to the distribution circuit as follows:
 - Connect the green wire (US models) or yellow/green wire (EU models) to ground (earth)
 - Connect the white wire (US models) or blue wire (EU models) to neutral
 - Connect the black wire (US models) or brown wire (EU models) to live.



Wire color (US models)	Wire color (EU models)	Conductor	Symbol	Screw (US)
black	brown	live	L	yellow or brass
white	blue	neutral	N	silver
green	yellow/green	ground (earth)	 or 	green

Table 1: Conductor identification

4. Fill the junction box with two-component potting compound to seal it.
5. Check that all installation work is completed and carry out appropriate tests and safety checks before applying AC mains power.

Power plug

For temporary use in a dry environment only, it is possible to install a plug (cord cap) that is suitable for your AC power outlets on the end of the supplied power cable. If you do this, install a grounding-type (earthed) plug with integral cable grip that is rated for the AC power voltage and 5 amps minimum, following the plug manufacturer's instructions. Table 1 on page 24 shows some possible pin identification schemes; if pins are not clearly identified, or if you have any doubts about proper installation, consult a qualified electrician.

DMX-RDM data

Fixtures must be connected via a data link for DMX and RDM communication. The following considerations must be taken into account when planning the data link:

- RS-485 data cable designed for exterior use is required for outdoor installations. RS-485 cable has low capacitance and a characteristic impedance of 85 to 150 Ohms. It is electrically shielded and has at least 1 twisted pair of conductors. The minimum recommended wire size is 0.25 mm² (24 AWG) for runs up to 300 meters (1000 ft.) and 0.32 mm² (22 AWG) for runs up to 500 meters (1640 ft.). You can use CAT 5 network cable designed for direct burial in outdoor installations, but we recommend that you run it inside conduit.
- The maximum permitted control data cable length before a control signal amplifier is required is 500 meters (1640 ft.).
- Fixtures must be 'daisy-chained', i.e. the data cable must be connected in one single chain of fixtures. If you want to split the chain into two or more branches, you must use an amplifier-splitter (see below).
- Each chain may connect a maximum of 32 fixtures.
- An optically isolated amplifier-splitter such as the Martin® DMX 5.3 Splitter (P/N 90758140) or the RDM-compatible Martin® RDM 5.5 Splitter (P/N 90758150) must be used to:
 - extend a link beyond 500 meters (1640 ft.)
 - extend the link to include a further maximum 32 fixtures, or
 - branch the link into further single chains, each containing 32 fixtures. The Martin® amplifier-splitters mentioned above allow a link to be branched into four new chains.
- Each chain on the link must be terminated by installing a 120 ohm resistor (available from Martin, P/N 04150308) across the data hot (+) and cold (-) conductors of the last fixture on the chain.
- Long parallel runs of AC power and control data cables may cause interference on the data link and must be avoided. Even if not required by law, use separate conduits for power and data cables.
- One DMX universe has 512 DMX control channels available. If individual control of the fixtures in an installation is required, each fixture must be given its own channels until the limit of 512 is reached. At this point, a new DMX universe must be created before more fixtures can be added.
- The number of fixtures that can be individually controlled in one DMX universe depends on the number of DMX channels they use. If an Inground 400 fixture is set to HSI mode, for example, that fixture will require 3 DMX channels (one channel for hue, one for saturation and one for intensity). The total number of fixtures set to HSI mode that can be linked in one DMX universe will therefore be $512/3 = 170$ (note that an amplifier-splitter must be used each time the limit of 32 devices on one branch is reached).

Connecting the data link



Warning! Lock out power to the entire installation before working on cables and connections.

Warning! Make sure that data connections are totally protected from water, or moisture may be drawn up the inside of the cable due to the vacuum effect from the heat generated during operation.

The fixture is supplied with a 1.8 meter (5.9 ft.) data cable tail for data connection. The cable contains both input and output conductors that are identified as follows:

- 1 x shield = data input and output common
- 2 x white wires = data input and output hot (+)
- 1 x green wire = data input cold (-)
- 1 x brown wire = data output cold (-)

To connect a fixture to the data link:

1. Pass the data input and data output (throughput) cable and the fixture's cable tail through cable glands into a new, unused IP67-rated junction box.
2. Connect the wires in the cable tail to the data input and output cables following the above color code.
3. Fill the junction box with two-component potting compound to seal it.

Installing data connectors

You will probably need to install input and output connectors on the data cable for connection to a DXM/RDM control device or a splitter-amplifier, for example. When you install a connector:

- Respect the pinouts given below.
- Use a male connector to accept data input and a female connector to give data output.
- Do not connect the shield conductor to ground (earth) or allow it to come into contact with a connector shell, as this may cause interference.
- If the connector is not installed in a dry location, protect it in a weatherproof housing if it is not totally weatherproof.

XLR connection

XLR connectors are suitable if DMX cable is used for the data link. XLR pin numbers are normally marked on connectors. Connectors must be wired using the standard XLR DMX pin-out:

- Pin 1: Cable shield
- Pin 2: DMX Data 1 - (cold)
- Pin 3: DMX Data 1 + (hot)

Pins 4 and 5 on 5-pin XLR connectors are not currently used but are available for additional connections in line with the USITT DMX-512A standard. The required pinout is:

- Pin 4: DMX Data 2 - (cold)
- Pin 5: DMX Data 2 + (hot)

To avoid ground loop / earth loop problems, ensure that the DMX cable shield does not come into contact with the shell or body of XLR connectors.

RJ-45 connection

RJ-45 connectors are suitable if CAT 5 cable is used for the data link. RJ-45 cable connector pins are numbered from the left looking at the face of the connector with the locking clip on top (see Figure 19). Connectors must be wired according to the 568-B system using the standard RJ-45 pin-out for DMX applications:

- Pin 1 (White/orange): DMX data hot (+)
- Pin 2 (Orange): DMX data cold (-)
- Pins 7 (White/brown) and 8 (Brown): Common

Pins 3 and 6 are available for Data 2 connections in DMX 512-A or similar systems. They must be wired as follows:

- Pin 3 (White/green): Available for Data 2 hot (+)
- Pin 6 (Green): Available for Data 2 cold (-)

Pins 4 and 5 are not used in currently available lighting control systems but can be wired as follows:

- Pin 4 (Blue)
- Pin 5 (White/blue)

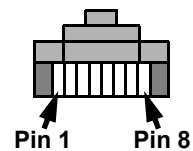


Figure 19: RJ-45 cable connector pins

Fixture setup

RDM (Remote Data Management) is required to set up fixtures in the Inground 400 range.

We recommend the use of Martin® M-PC to configure fixtures. M-PC is an RDM-compatible DMX controller application that runs on a Windows PC. See the Martin® M-PC user documentation for details of how to use RDM to set up fixtures.

DMX addresses

If individual control of fixtures is required, each fixture must be set up to receive instructions from the DMX controller on a group of DMX channels that are not used by any other device in its DMX universe. The DMX address, also known as the control address or start channel, is the first of these channels. Each fixture uses this channel and the channels immediately above it to receive instructions.

Fixtures use 2, 3 or 4 DMX channels, depending on model and DMX color control mode. For example, if a fixture's DMX address is set to 1 and the fixture is in RGB DMX mode, it will use channels 1 - 3. Channel 4 will be available as the DMX address for the next fixture.

If two or more identical fixtures are set up with the same DMX address and in the same DMX mode, they will receive the same instructions and behave identically. Setting up identical fixtures with the same address is a good tool for troubleshooting unexpected behavior and an easy way to achieve synchronized action.

Setting DMX addresses via RDM involves running a scan to identify the fixtures that are present on the data link and then allocating addresses either automatically or manually.

DMX control modes

The **DMX Mode** setting available via RDM allows you to set fixtures to various control modes.

Bear in mind that changing the DMX mode may affect the number of DMX channels the fixture uses.

The following DMX control modes are available:

Inground 400, Inground 410

- **RAW** (Individual control of red, green, blue and white LED groups - uncalibrated)
- **RGB** (red, green, blue - calibrated, all LEDs including white can be activated to optimize color and intensity)
- **HSI** (hue, saturation, intensity - calibrated)
- **HSIC** (hue, saturation, intensity, color temperature - calibrated)
- **ICMY** (intensity, cyan, magenta, yellow - calibrated)

Inground 420

- **RAW** (Individual control of warm white and cold white LED groups - uncalibrated)
- **CT** (intensity, color temperature - calibrated)

Operation

Inground 400 range fixtures can be operated using a DMX controller or programmed to run a standalone light show without DMX control.

Heat management

Ambient temperature

Fixtures can be operated at ambient temperatures from -30° C (-22° F) to 45° C (113° F).

At temperatures below 0° C (32° F), you can dim LEDs to zero if light output is not required but you should leave power constantly applied. The standby power will provide a low level of heat to help protect circuits and components from the effects of low temperature.

Temperature-regulated light output

Fixtures in the Inground 400 range regulate their internal temperature by gradually reducing light output as they approach maximum operating temperature. This feature gives the highest possible light output level at any given ambient temperature while keeping the product within thermal limits and thus ensuring optimum product lifetime. In fact, LEDs create far less heat than other light sources and the Inground 400 range is designed to ensure effective heat dissipation as well as maximum light output.

In a typical operation situation in temperate latitudes, i.e. 20° C (68° F) ambient temperature and sleeve mounted in moist soil, the fixture will operate at around 90% of full output when it has reached steady state.

You can expect light intensity to be higher than normal when the fixture is first powered on, especially if the fixture is operated in cold conditions. There will then usually be a reduction in light intensity, typically after 2 - 4 hours. The size of the reduction from cold start to steady state intensity will vary. In cold conditions and if colored light output is used rather than white output, the reduction can be zero or close to zero. In this case output intensity will be higher than the product is specified to. In high ambient temperatures and if full intensity white light is used, the reduction from cold start intensity level to the product's specified steady state level will be significant: LED power can be reduced by up to approximately 50% in extreme conditions. But even in this situation, the fixture will not reduce light output to below its specified steady state level if it is correctly installed and the front glass is kept clean.

DMX control

In DMX-controlled operation, the options available at the DMX controller depend on which DMX mode the fixture is set to (see "DMX control modes" on page 27).

"DMX protocols" on page 31 gives full details of the control options in the Inground 400 range.

Setup via RDM

The Inground 400 range is compatible with RDM (Remote Device Management). Using an RDM-compliant DMX controller, you can communicate with all the fixtures on a data link without needing to connect to each fixture individually. RDM lets you set the DMX addresses of all the fixtures on the link, carry out fixture configuration and retrieve fixture data including details of any error that has been logged.

To use RDM:

1. Obtain an RDM-compatible controller such as the Martin® M-PC application running on a Windows PC.
2. Use a USB cable to connect the PC to a USB/DMX interface box such as the Martin® M-DMX.
3. Connect the interface box to the data link.
4. Power the fixture on and carry out an RDM discovery / scan in M-PC or your RDM-compatible controller.
5. You can then configure or retrieve data from the fixtures on the data link.

Service and maintenance

Warning! *The light source contained in the fixture is not user-replaceable. If replacement is necessary, it must be carried out by Martin® or an authorized Martin® service agent.*

Important! *Please consult your Martin® supplier if a fixture requires any service other than cleaning or a firmware update.*

Fixtures require cleaning to maintain reliable operation and protect the investment it represents. Excessive dirt buildup on or around the top glass degrades performance, causes overheating and will damage the fixture. Damage caused by inadequate cleaning is not covered by the product warranty.

It is Martin® policy to use the best quality materials available to ensure optimum performance and the longest possible component lifetimes. However, optical components in all lighting fixtures are subject to wear and tear over the life of the fixture, resulting in gradual changes in color rendition, for example. The extent of wear and tear depends heavily on operating conditions, maintenance and environment, so it is impossible to specify precise lifetimes for optical components. However, you will eventually need to have LEDs replaced if their characteristics are affected by wear and tear after an extended period of use and if you require fixtures to perform within very precise optical and color parameters.

Opening the fixture

Fixtures in the Inground 400 range are supplied as sealed units. If service access inside the fixture is required, please consult your Martin® supplier.

Opening and closing fixtures requires care in order to avoid humidity inside the fixture that can cause condensation on the top glass. For example, you will need to order silica gel bags from Martin®. You must remove a bag from its sealed foil wrap and replace the bag inside the fixture (see Figure 13 on page 19), then close the fixture as soon as possible.

Cleaning

Regular cleaning is essential for fixture life and performance. Buildup of dust and dirt degrades the fixture's light output and cooling ability.

Cleaning schedules will vary greatly depending on the operating environment. It is therefore impossible to specify precise cleaning intervals. If in doubt, consult your Martin® dealer about a suitable maintenance schedule.

Do not use products that contain solvents, abrasives or caustic agents for cleaning, as they can cause surface damage to the fixture.



Warning! Do not use a high-pressure water jet for cleaning.

The top glass can be cleaned with mild detergents such as those for washing cars. To clean the glass:

1. Shut down AC power and allow the fixture to cool for 20 minutes.
2. Rinse off loose dirt with a hosepipe or low-pressure water spray. Check that the installation sleeve does not fill with water.
3. Wash the glass using warm water with a little mild detergent and a soft brush or sponge. Do not use abrasive cleaners.
4. Rinse with clean water and wipe dry.

Optical configurations

Various beam angle and beamshaper options are available for the Inground 400 range. Fixtures are ordered preconfigured with the required option. If you wish to change the configuration of a fixture, please contact your Martin® supplier.

The powerful LEDs in the Inground 400 range can present a risk of eye injury if they are not covered by a diffuser. Do not operate a fixture without a diffuser lens installed.

Status indicator

See Figure 20. A status LED is situated close to the edge of the main LED array under the top glass. To see the status LED, reduce light output to zero, then look directly down through the top glass from close to the fixture.

The LED gives the following information:

Fixture operating status

- LED green = normal status
- LED red = fixture reports error, please check fixture status via RDM
- LED yellow = fixture in boot mode for firmware update (Martin® Service use only).

As well as the above, the LED also shows DMX status by flashing or lighting constantly:

DMX signal status

- LED flashes = no valid DMX signal present
- LED lights constantly = fixture receiving valid DMX signal

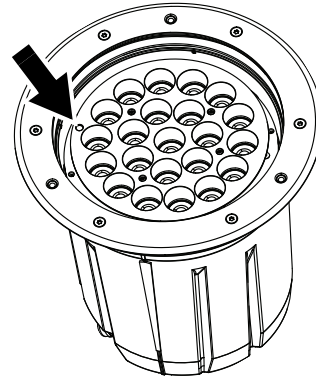


Figure 20: Status indicator LED

Updating fixture software

It may be necessary to upload new fixture software (firmware) to an Inground 400 range fixture if you believe that the product has a software-related fault or if you want to update to a newer version. Software updates are available from the Martin® website (<http://www.martin.com>) and can be installed via the DMX data link with the following items:

- The Martin® DMX Tools suite of Windows-based utilities. You can download Martin® DMX Tools free of charge from the Martin® website at www.martin.com.
- The fixture's main CPU software update file, downloadable free of charge from the Inground 400 range Tech Docs / Support area on the Martin® website (this file can be downloaded automatically from within the Martin® Uploader application)
- A Martin® M-DMX Interface or similar PC/fixture hardware interface and a Windows PC.

Installing software

1. Connect a Martin® M-DMX or similar USB/DMX interface device to the DMX data link that the fixtures are connected to. The fixture software will be uploaded to all the fixtures of the same type that are powered on and connected on the DMX link.
2. Using a USB cable, connect a Windows PC running Martin® DMX Tools to the USB/DMX interface device.
3. Open Fixture Uploader, one of the applications included in Martin® DMX Tools. Upload the fixture software as described in the Fixture Uploader application or user documentation.
4. Shut down Martin® DMX Tools.
5. Cycle power off and on. Check that the fixture resets and operates correctly.

DMX protocols

Inground 400, Inground 410

RAW mode, uncalibrated

Start code = 0			
Channel	Value	Percent	Function
1	0 - 255	0 - 100	Red Intensity 0 → 100%
2	0 - 255	0 - 100	Green Intensity 0 → 100%
3	0 - 255	0 - 100	Blue Intensity 0 → 100%
4	0 - 255	0 - 100	White Intensity 0 → 100%

RGB mode, calibrated

All LEDs – including white – can be activated to obtain the calibrated target color at maximum intensity.

Start code = 0			
Channel	Value	Percent	Function
1	0 - 255	0 - 100	Red Intensity 0 → 100%
2	0 - 255	0 - 100	Green Intensity 0 → 100%
3	0 - 255	0 - 100	Blue Intensity 0 → 100%

HSI mode, calibrated

Start code = 0			
Channel	Value	Percent	Function
1	0 - 255	0 - 100	Hue Red → Orange → Yellow → Green → Cyan → Blue → Indigo → Violet → Magenta → Red
2	0 - 255	0 - 100	Saturation Zero (white) → Full
3	0 - 255	0 - 100	Intensity Intensity 0 → 100%

HSIC mode, calibrated

Start code = 0

Channel	Value	Percent	Function
1	0 - 255	0 - 100	Hue Red → Orange → Yellow → Green → Cyan → Blue → Indigo → Violet → Magenta → Red
2	0 - 255	0 - 100	Saturation Zero (white) → Full saturation
3	0 - 255	0 - 100	Intensity Intensity 0 → 100%
4	0 - 255	0 - 100	Color Temperature Control Warm → cold

ICMY mode, calibrated

Start code = 0

Channel	Value	Percent	Function
1	0 - 255	0 - 100	Intensity Intensity 0 → 100%
2	0 - 255	0 - 100	Cyan Zero (white) → Full saturation
3	0 - 255	0 - 100	Magenta Zero (white) → Full saturation
4	0 - 255	0 - 100	Yellow Zero (white) → Full saturation

Inground 420

RAW mode, uncalibrated

Start code = 0

Channel	Value	Percent	Function
1	0 - 255	0 - 100	Warm white 2700 K Intensity 0 → 100%
2	0 - 255	0 - 100	Cool white 6500 K Intensity 0 → 100%

CT mode, calibrated

Start code = 0

Channel	Value	Percent	Function
1	0 - 255	0 - 100	Intensity Intensity 0 → 100%
2	0 - 255	0 - 100	Color temperature control 3000 K → 6500 K

Troubleshooting

Problem	Probable cause(s)	Remedy
Fixture is completely dead.	No power to fixture.	Check power and connections.
	Primary fuse blown.	Isolate fixture from power. Check fuse and replace.
One or more fixtures responds incorrectly to control or does not respond at all.	Fault on DMX link.	Inspect connections and cables. Correct poor connections. Repair or replace damaged cables.
	Incorrect fixture addressing.	Check fixture is set to correct DMX mode. Check number of channels required by fixture's DMX mode and check fixture addresses.
	Fixture defective.	Have faulty fixture serviced by Martin® service technician.
	Other device on DMX link defective.	Bypass devices on DMX link until the faulty device has been identified. Have faulty device tested and serviced by Martin® service technician or device supplier.
Light output intensity falls excessively.	Fixture is hot. Output intensity is temperature-regulated and has been reduced to keep fixture within optimum temperature range.	Check that ambient temperature does not exceed maximum permitted level. Check fixture temperature via RDM. Clean top glass. Contact Martin® for service.
One or more fixtures fails to restart or operate correctly after updating fixture software.	Fixture software not fully installed.	Cycle power off and on again.
	Data corrupted during upload.	Repeat fixture software upload procedure.

Table 2: Troubleshooting

If the fixture fails to reset or operate correctly, cycle power off and on again and try again. If the fixture still does not reset or operate correctly, repeat the software upload. You can also check to see whether it is sending an error message via RDM that may identify the cause of

Specifications

Physical

Fixture

Height without top ring	313 mm (12.4 in.)
Height with top ring installed	321 mm (12.7 in.)
Outer diameter at top of fixture	310 mm (12.2 in.)
Weight	14.7 kg (32.5 lbs.)

Top ring (trim ring)

Flush-mount top ring outer diameter	329 mm (13.0 in.)
Flush-mount top ring thickness	7 mm (0.3 in.)
Beveled top ring outer diameter	340 mm (13.4 in.)
Beveled top ring thickness	5 mm (0.2 in.)

Installation sleeve

Installation sleeve height	400 mm (15.8 in.)
Installation sleeve internal diameter	334 mm (13.2 in.)
Installation sleeve base flange external diameter	416 mm (16.4 in.)
Total height, installation sleeve with fixture and flush top ring	402 mm (15.9 in.)
Total height, installation sleeve with fixture and beveled top ring	408 mm (16.1 in.)

Dynamic Effects

Inground 400, Inground 410

Color mixing	RGBW
Red	0 - 100%
Green	0 - 100%
Blue	0 - 100%
White	0 - 100%

Inground 420

Color temperature control	2700 - 6500 K
Warm white (3000 K in Calibrated mode)	0 - 100%
Cool white (6500 K in Calibrated mode)	0 - 100%

Control and Programming

All models

Control options	DMX, RDM
DMX address setting and fixture setup	RDM
Fixture status monitoring	Multi-color status LED visible through top glass
Firmware update	Serial upload via DMX link
DMX compliance	USITT DMX512-A
RDM compliance	ANSI E1.20
Receiver	RS-485

Inground 400, Inground 410

Color control modes	RAW, RGB, HSI, HSIC, ICMY
DMX channels	3 or 4

Inground 420

Color temperature control modes	RAW, CTC
DMX channels	2

Optics

All models

Minimum LED lifetime	50 000 hours (to >70% luminous output)*
*Figure obtained under manufacturer's test conditions	

Exterior Inground 400

Light source	56 x R, G, B and W single-color LEDs
Beam angle options	7°, 14°, 31°, 57°, 10° x 60°

Exterior Inground 410

Light source	22 x RGBW quad-color LEDs
Beam angle options	19°, 22°, 29°, 50°, 20° x 61°

Exterior Inground 420

Light source	56 x 2700 K and 6500 K LEDs
Beam angle options	7°, 14°, 31°, 57°, 10° x 60°

Construction

Housing	Aluminum
Finish	Anodized, then black powder coated
Top ring	Stainless steel
Top glass	19 mm (0.75 in.), tempered
Ingress protection rating	IP67
Impact resistance	IK10
Corrosion resistance	C5-M (very high corrosivity / marine, ISO 12944)
Drive-over load resistance (in Martin® installation sleeve with stable groundwork)	40 000 N (8800 lbs.)
Installation sleeve	Hot-dip galvanized steel
RoHS compliant	

Installation

Installation method	In installation sleeve (ordered separately)
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Connections

Power cable entry	IP68/69 cable gland
Power connection	1.8 m (5.9 ft.) cable tail, bare ends
Data cable entry	IP68/69 cable gland
Data connection	1.8 m (5.9 ft.) combined input and output cable tail, bare ends

Electrical

AC power	100 - 277 V nominal, 50/60 Hz
Power supply unit	Integrated, auto-sensing multi-voltage
Power consumption, steady state, all LEDs at zero intensity	11 W

Typical Power and Current

100 V, 60 Hz	1.5 A, 149 W, PF 0.99
120 V, 60 Hz	1.3 A, 147 W, PF 0.99
208 V, 60 Hz	0.8 A, 145 W, PF 0.99
230 V, 50 Hz	0.7 A, 145 W, PF 0.98
277 V, 50 Hz	0.7 A, 145 W, PF 0.98

Measurements made at nominal voltage with all LEDs at full intensity. Allow for a deviation of +/- 10%.

Thermal

Cooling	Convection, internal fan
Maximum ambient temperature (Ta max.)	45° C (113° F)
Minimum ambient temperature (Ta min.)	-30° C (-22° F)
Maximum surface temperature, steady state, Ta=40° C	90° C (194° F)
Total heat dissipation (calculated, +/- 10%)	510 BTU/hr.

Approvals



EU safety	EN60958-2-13 (EN60598-1), EN62471, EN62493
EU EMC	EN55015, EN61547, EN61000-3-2, EN6100-3-3,
US safety (pending)	ANSI/UL 1598
US EMC	.47 CFR Part 15 Class A
Canadian safety (pending)	.CSA C.22.2 No. 250
Australia/NZ (pending)	.RCM

Related Items

Martin® M-PC 2U including Martin® M-DMX Hardware Interface	P/N 90737070
Martin® M-PC Pro-64 / LJ-4 Controller Kit incl. Martin® M-DMX Hardware Interface	P/N 90737060
Martin® USB Tools package including Software Uploader	Free download from www.martin.com

Please see www.martin.com for latest DMX/RDM controller and control interface product offers

Ordering Information

Fixtures in the Inground 400 range can be ordered online at www.martin.com or by contacting your Martin® supplier, selecting from the following configurations:

Series

- Inground 400 – 56 x R, G, B and W LEDs
- Inground 410 – 22 x quadcolor LEDs
- Inground 420 – 56 x cool white and warm white LEDs

Power

- EU – 220-240 VAC, 50 Hz
- US – 100-130 VAC, 60 Hz

Glare shield

- No glare shield
- Glare shield, 22 LEDs – for Inground 410
- Glare shield, 56 LEDs – standard (and required) for Inground 400 and 420

Beam shaper

- No diffuser
- Narrow diffuser
- Medium diffuser
- Wide diffuser
- 8° Directional and asymmetric
- 20° Directional
- Asymmetric

Top glass

- Standard
- Anti-skid
- No top glass

Top ring

A) New install:

- Beveled
- Flush

B) Retrofit, includes new top ring and glass, P/N 90507150HU, for existing Martin® Inground 200 installations:

- Old beveled (to match beveled top rings on existing Inground 200 fixtures)
- Old flush (to match flush mounting top rings on existing Martin® Inground 200 fixtures)

C) Retrofit, without top ring/glass, P/N 90507110HU, for existing Martin® Inground 200 installations:

- No top ring or front glass (re-use top rings and top glasses from existing Inground 200 fixtures)

Fixtures

The configuration options listed above are included under these part numbers:

Inground 4XX New Install	P/N 90507100HU
Inground 4XX Retrofit	P/N 90507150HU
Inground 4XX Retrofit, without Top Ring/Glass	P/N 90507110HU

Installation Sleeve

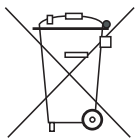
Installation Sleeve for Inground 400	P/N 91611841
Installation Lid for flush mount top ring installations	P/N 91616086
Installation Lid for beveled top ring installations	P/N 91616087

Installation sleeves are ordered separately from fixtures.

Specifications are subject to change without notice.

Data is valid for all models in range except where indicated.

See www.martin.com for latest specifications including full photometric data, etc.



Disposing of this product

Martin® products are supplied in compliance with Directive 2012/19/EC of the European Parliament and of the Council of the European Union on WEEE (Waste Electrical and Electronic Equipment), where applicable.



Help preserve the environment! Ensure that this product is recycled at the end of its life. Your supplier can give details of local arrangements for the disposal of Martin® products.



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