



***Enclosures
ENC 8/10, ENC 10/12, ENC 12/14,
ENC 14/16, ENC 16/18
and AM-ENC/ENCT***



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PLEASE READ FIRST

About this manual

Some useful conversion factors:

Area: 1 in² (square inch) = 645 mm²

Length: 1 in. (inch) = 25.4 mm
1 ft (foot) = 304.8 mm
1 yard = 0.914 m
1 mile = 1.609 km

Mass: 1 oz. (ounce) = 28.35 g
1 lb (pound weight) = 0.454 kg

Pressure: 1 psi (lb/in²) = 68.95 mb

Volume: 1 UK pint = 568.3 ml
1 UK gallon = 4.546 litres
1 US gallon = 3.785 litres

Recycling information



At the end of this product's life it should not be put in commercial or domestic refuse but sent for recycling. Any batteries contained within the product or used during the products life should be removed from the product and also be sent to an appropriate recycling facility.

Campbell Scientific Ltd can advise on the recycling of the equipment and in some cases arrange collection and the correct disposal of it, although charges may apply for some items or territories.

For further advice or support, please contact Campbell Scientific Ltd, or your local agent.



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Precautions

DANGER — MANY HAZARDS ARE ASSOCIATED WITH INSTALLING, USING, MAINTAINING, AND WORKING ON OR AROUND TRIPODS, TOWERS, AND ANY ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC. FAILURE TO PROPERLY AND COMPLETELY ASSEMBLE, INSTALL, OPERATE, USE, AND MAINTAIN TRIPODS, TOWERS, AND ATTACHMENTS, AND FAILURE TO HEED WARNINGS, INCREASES THE RISK OF DEATH, ACCIDENT, SERIOUS INJURY, PROPERTY DAMAGE, AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO AVOID THESE HAZARDS. CHECK WITH YOUR ORGANIZATION'S SAFETY COORDINATOR (OR POLICY) FOR PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT PRIOR TO PERFORMING ANY WORK.

Use tripods, towers, and attachments to tripods and towers only for purposes for which they are designed. Do not exceed design limits. Be familiar and comply with all instructions provided in product manuals. Manuals are available at www.campbellsci.eu or by telephoning +44(0) 1509 828 888 (UK). You are responsible for conformance with governing codes and regulations, including safety regulations, and the integrity and location of structures or land to which towers, tripods, and any attachments are attached. Installation sites should be evaluated and approved by a qualified engineer. If questions or concerns arise regarding installation, use, or maintenance of tripods, towers, attachments, or electrical connections, consult with a licensed and qualified engineer or electrician.

General

- Prior to performing site or installation work, obtain required approvals and permits. Comply with all governing structure-height regulations, such as those of the FAA in the USA.
- Use only qualified personnel for installation, use, and maintenance of tripods and towers, and any attachments to tripods and towers. The use of licensed and qualified contractors is highly recommended.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- Wear a **hardhat** and **eye protection**, and take **other appropriate safety precautions** while working on or around tripods and towers.
- **Do not climb** tripods or towers at any time, and prohibit climbing by other persons. Take reasonable precautions to secure tripod and tower sites from trespassers.
- Use only manufacturer recommended parts, materials, and tools.

Utility and Electrical

- **You can be killed** or sustain serious bodily injury if the tripod, tower, or attachments you are installing, constructing, using, or maintaining, or a tool, stake, or anchor, come in **contact with overhead or underground utility lines**.
- Maintain a distance of at least one-and-one-half times structure height, or 20 feet, or the distance required by applicable law, **whichever is greater**, between overhead utility lines and the structure (tripod, tower, attachments, or tools).
- Prior to performing site or installation work, inform all utility companies and have all underground utilities marked.
- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.

Elevated Work and Weather

- Exercise extreme caution when performing elevated work.
- Use appropriate equipment and safety practices.
- During installation and maintenance, keep tower and tripod sites clear of un-trained or non-essential personnel. Take precautions to prevent elevated tools and objects from dropping.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.

Maintenance

- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

WHILE EVERY ATTEMPT IS MADE TO EMBODY THE HIGHEST DEGREE OF SAFETY IN ALL CAMPBELL SCIENTIFIC PRODUCTS, THE CUSTOMER ASSUMES ALL RISK FROM ANY INJURY RESULTING FROM IMPROPER INSTALLATION, USE, OR MAINTENANCE OF TRIPODS, TOWERS, OR ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.

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ENC 8/10, ENC 10/12, ENC 12/14, ENC 14/16, ENC 16/18 and AM-ENC/ENCT Enclosures

This manual describes Campbell Scientific's ENC 8/10, ENC 10/12, ENC 12/14, ENC 14/16, ENC 16/18 and AM-ENC/ENCT enclosures. This information should be used in conjunction with other information given in the datalogger or weather station manuals.

1. Description

These enclosures are made of white fibreglass-reinforced polyester. The colour of the enclosure and the environmental sealing mean that there is no need for a conventional radiation/rain shield. The enclosures can be wall mounted as supplied, or pole mounted using the optional enclosure mounting brackets. The door is fitted with a catch which can accept a padlock if required.

The enclosure is fitted with an anodised aluminium chassis plate which is punched with an array of holes. The holes accept plastic inserts for accepting screws for the attachment of power supplies, dataloggers and peripherals. These plastic fittings can easily be inserted by hand allowing the rapid mounting of components inside the enclosure.

A small cable gland is fitted to the base of the enclosure and a venting plug is fitted to this gland. The plug allows pressure equalisation between the inside and outside of the enclosure (which is required when using barometric or gauge pressure transducers) and also prevents pressure build-up in the enclosure in the event of a system failure when charging lead-acid batteries. A blanking plug is supplied which can replace the porous venting plug, if this is not required.

We recommend that sealed environmental connectors are used for the entry of sensor leads into the enclosure. However, a large cable gland is also fitted which can be used for the direct entry of one or more cables into the enclosure.

An earthing boss is also provided for the connection of an external earth lead. Internally an earth wire is fitted which should be taken to the main earth point inside the enclosure (normally on the datalogger).

Four bags of desiccant are supplied with the enclosure and are used to maintain a dry atmosphere inside the enclosure.

2. Installing Components in the Enclosure

When the enclosure is bought as a configured system, the components will be pre-fitted. If they are not fitted the convention is that the power supply (normally a PS100E) is mounted in the top of the enclosure (this is the end opposite to that where the cable glands are fitted). The datalogger is fitted next from the top and then any peripherals at the bottom.

To fit the components, first work out exactly which holes are to be used and then push the nylon inserts into the holes in the chassis plate. A 3.5mm or 6-32 thread screw can then be screwed into the insert. Normally enough inserts and screws are supplied with each datalogger or enclosure to cater for all peripherals.

NOTE

Some peripherals need adaptor plates for these enclosures. The adaptor plates are not always supplied with the peripheral. Please contact Campbell Scientific if you experience any problems.

Only one small peripheral can be fitted into the ENC 10/12 enclosure. The ENC 12/14 will take the majority of peripherals including an AM16/32, for which there are two extra mounting holes in the lower half of the grid of holes.

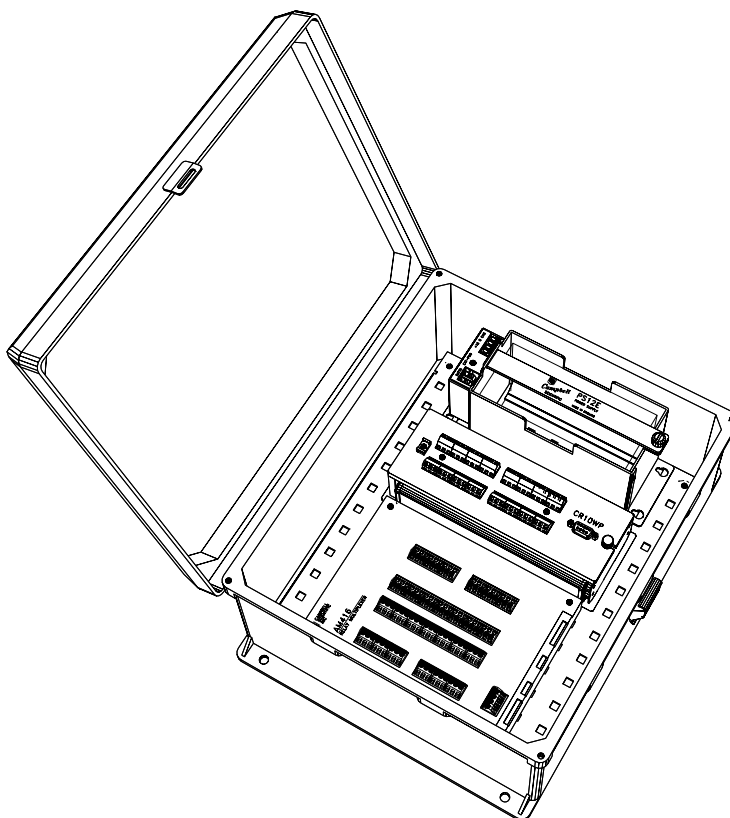


Figure 2-1 ENC 12/14 fitted with a power supply, logger and multiplexer

The AM-ENC enclosure will accept up to two AM16/32s or one older (now superseded) AM416 multiplexer.

If installing the DIN-Rail Terminal Kit (010211), follow the procedure described in Appendix A. The 006706-002 kit facilitates wiring when many wires need to be connected to one terminal.

3. Power Supplies

The enclosures are designed to accept the PS100E, PS17E or PS24E power supplies. These should be mounted as described above.

CAUTION

Do not ship the enclosure with the large lead acid batteries installed inside without adequate internal packing, as there is a risk that the batteries might break loose and cause serious damage to other peripherals.

4. Earth Connections

Connect the earth boss on the base of the enclosure externally to a good earth point, e.g. an array of ground spikes, using a large diameter copper cable (approx. 16mm², similar to that supplied by Campbell Scientific with weather stations, etc.). Internally the earth wire should be connected to the main earth point in the enclosure, which is usually the datalogger wiring panel.

In installations where additional lightning protection devices are fitted inside the enclosure, e.g. a RAD-SP spark arrester, it may be more applicable to route a separate earth wire from the boss to the arrester, in addition to the wire to the datalogger.

NOTE

Because the chassis plate is anodised and plastic panel inserts are used, do not rely on the chassis plate as a way of connecting the earth points of different peripherals. Instead, run additional wires back to one common earth point to ensure good connection.

5. Sealing the Enclosure

If supplied with environmental connectors, the enclosure is fully weatherproof when all the connectors are plugged in and the blanking plug is fitted to the large cable gland. If any connector is not plugged in the chassis socket should be fitted with a protective cap to prevent moisture entry. If the large cable gland is being used for cable entry any gaps around the cables should be filled with a suitable mastic compound such as 'Plumbers Mate' or silicone rubber compound.

CAUTION

Do *not* use bath or tile sealant, which gives off corrosive fumes that can damage circuit boards. Use proper electronic grade silicone rubber or plumber's putty.

6. Desiccant

NOTE

The desiccant bags should be removed from the plastic bags in which they are shipped before placing them inside the enclosure.

Four 100g bags of desiccant are supplied with each enclosure. Desiccant use depends on your application (see below) but for use in average UK conditions place only two bags into the enclosure and re-seal the other two bags in the plastic shipping bag as replacements for when the initial bags need to be dried out. The bags can be rotated in this way many times. Desiccant bags can be dried out by the following method:

1. Arrange the bags on a wire tray in a single layer to allow for adequate air flow around the bags during the drying process. The oven's inside temperature should be room or ambient temperature (25°C - 30°C). A CONVECTION, CIRCULATING, FORCED AIR TYPE OVEN IS RECOMMENDED FOR THIS REGENERATION PROCESS. SEAL FAILURES MAY OCCUR IF ANY OTHER TYPE OF HEATING UNIT OR APPLIANCE IS USED.
2. When placed in a forced air, circulating air, or convection oven, allow a minimum of 4 to 5 cm of air space between the top of the bags and the next metal tray above the bags. If placed in a radiating exposed infrared element type oven, shield the bags from direct exposure to the heating element, giving

the closest bags a minimum of 40 cm clearance from the heat shield. Excessive surface film temperature due to infrared radiation will cause the Tyvek material to melt and/or the seals to fail.

Seal failure may also occur if the temperature is allowed to increase rapidly. This is due to the fact that the water vapour is not given sufficient time to diffuse through the Tyvek material, thus creating internal pressure within the bag, resulting in a seal rupture. Temperature should not increase faster than 0.1° to 0.3°C per minute.

3. Set the temperature of the oven to 118°C, and allow the bags of desiccant to reach equilibrium temperature. **WARNING:** Tyvek has a melt temperature of 121 - 127°C. (NON MIL-D-3464E activation or reactivation of both silica gel and Bentonite clay can be achieved at temperatures of 104°C).
4. Desiccant bags should be allowed to remain in the oven at the assigned temperature for 24 hours. At the end of the timer period, the bags should be immediately removed and placed in a desiccator jar or dry (0% relative humidity) air tight container for cooling. If this procedure is not followed precisely, any water vapour driven off during reactivation may be re-adsorbed during cooling and /or handling.
5. After the bags of desiccant have been allowed to cool in an airtight desiccator, they may be removed and placed in either an appropriate type polyliner tightly sealed to prevent moisture adsorption, or a container that prevents moisture from coming into contact with the regenerated desiccant.

CAUTION

Some care should be taken when re-activating desiccant bags. If heated in an oven which is too hot, the bags may burst. If in any doubt, we recommend purchasing new desiccant packs instead of oven drying.

The enclosure is supplied with a humidity indicator card, which provides a general indication of humidity inside the enclosure and also indicates when the desiccant bags need to be replaced. Remove the backing tape from the self-adhesive strip, and attach the card in a suitable position on the inside wall of the enclosure. The frequency of desiccant bag exchange varies with the application. Using the enclosures in high humidities or where there are large daily temperature changes will mean that the bags have to be exchanged more frequently, e.g. as frequently as every 3-4 weeks. The desiccant in systems subject to small daily temperature changes and moderate humidities should last for several months.

NOTE

When enclosures are used on sites which have extended maintenance periods (e.g. yearly) we strongly recommend that extra desiccant packs are purchased and placed in the enclosure to ensure that it remains moisture free during this period.

Fitting the blanking plug in place of the porous vent plug in the small cable gland will greatly extend the life of the desiccant, but this is only possible in certain applications (see above).

CAUTION

Failure to use or exchange the desiccant may lead to condensation inside the enclosure. Not only will this lead to corrupted data but, in the long term, can also cause corrosion which is expensive to repair.

7. Attachment to an Instrument Mount

7.1 Tripod Mast

The mast mount option is intended for mounting our enclosures to the mast of any of our tripods. An enclosure ordered with this option will be shipped with a three-piece bracket for mounting on the top of the enclosure and an identical three-piece bracket for mounting to the bottom of the enclosure (see Figures 7-1, 7-2, and 7-3).

Attach the enclosure to the mast as follows:

1. Position the enclosure on the north side of the mast.
2. Use the furnished 62 mm centre u-bolts to secure the enclosure to the tripod mast.
3. Route the 14 AWG wire from the brass tripod grounding clamp to the enclosure grounding lug. Strip one inch of insulation from each end of the wire and insert the end of the wire into the grounding lugs and tighten.

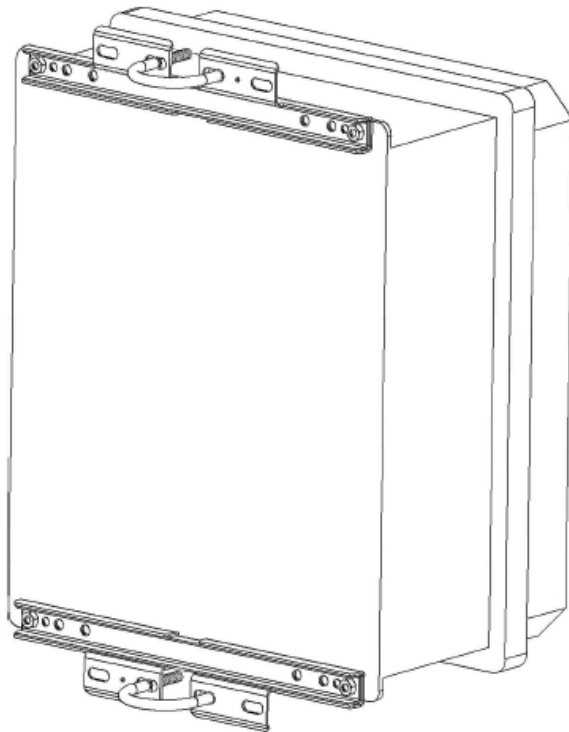


Figure 7-1. An enclosure with the mast mounting option attaches to a tripod mast via u-bolts.

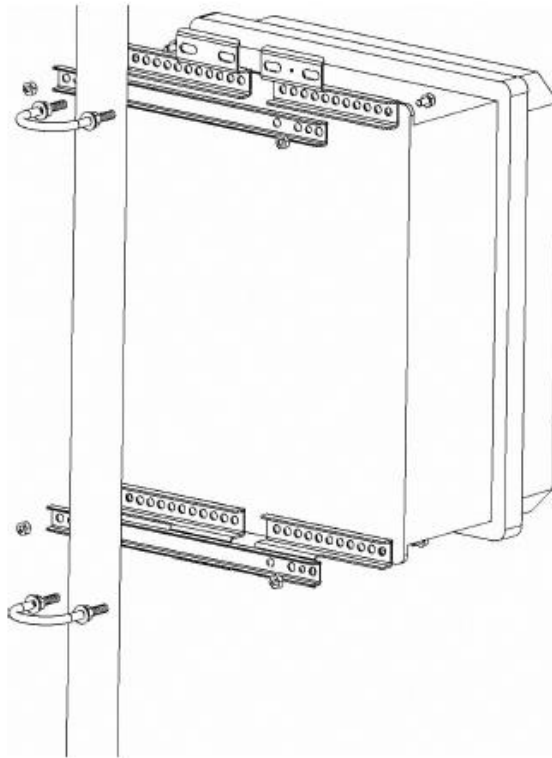


Figure 7-2. This exploded view shows the components of a mast mounting bracket.

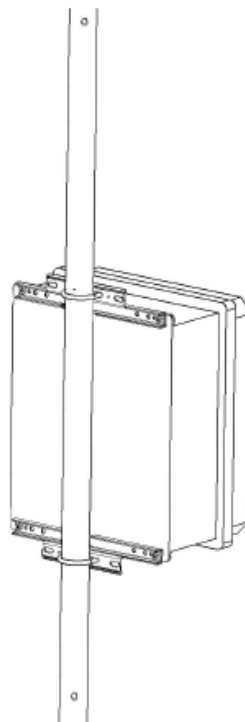


Figure 7-3. An enclosure attached to a tripod mast.

7.2 Tower mounting

The tower mount option is used to attach our enclosures to UT930, UT920, and ATW towers. An enclosure ordered with the tower mount option will be shipped with a three-piece bracket for fitting to the top of the enclosure and an identical three-piece bracket for fitting to the bottom of the enclosure. This mounting bracket option uses the same three-piece brackets as the mast mount option, except the pieces are rearranged so that the flanges are on the side of the bracket instead of in the middle. For the UT930 the distance between the centres of each flange needs to be 43 cm (see Figures 7-4, 7-5, and 7-6), if mounted on the lowest section of the tower. For other towers adjust accordingly.

Attach the enclosure to a UT930 tower as follows:

1. Remove the bolts and nuts connecting the bracket to the enclosure.
2. Slide out the flange sections so that the distance between the centres of each flange is 43 cm (see Figure 7-4).
3. Reattach the bracket to the enclosure using the original bolts and nuts.
4. Position the enclosure on the north side of the mast.
5. Place the enclosure at the desired height. Please note that the recommended lead lengths for our sensors assume the bottom of the enclosure is 90 cm from the ground.
6. Use the furnished 46 mm centre u-bolts to secure the enclosure to the tower legs.
7. Route the 14 AWG wire from the brass tower grounding clamp to the enclosure grounding lug. Strip one inch of insulation from each end of the wire and insert the end of the wire into the grounding lugs and tighten.

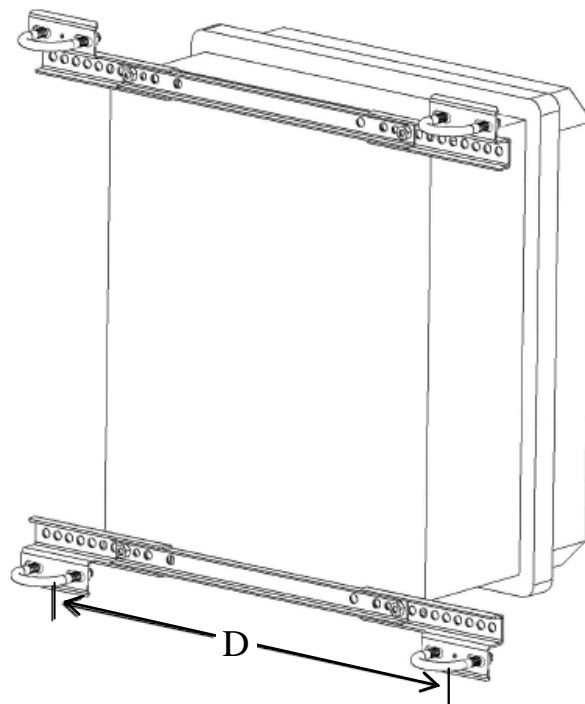


Figure 7-4. Enclosure brackets configured for a tower mount.

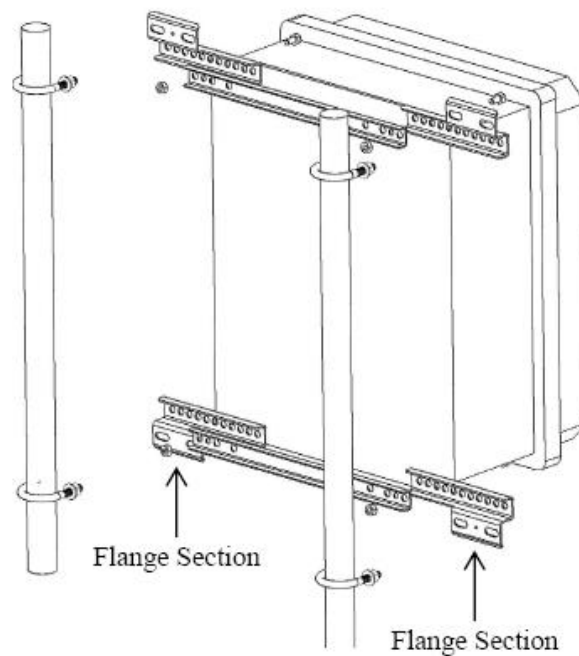


Figure 7-5. This exploded view shows the components of a tower mount bracket option.

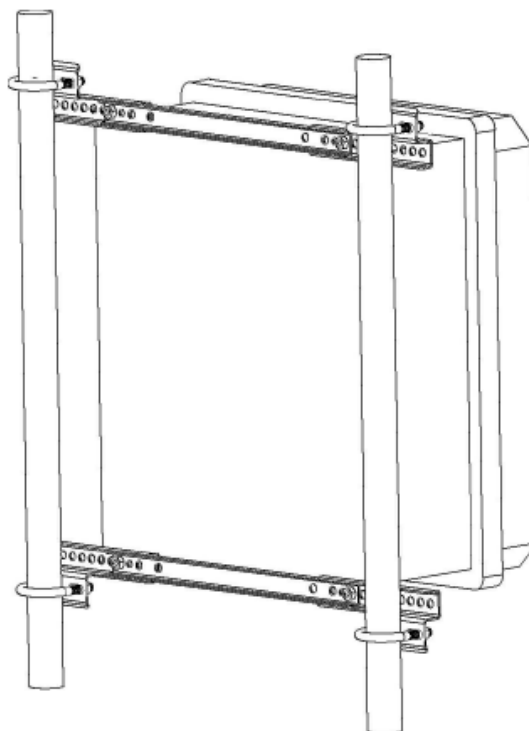


Figure 7-6. An enclosure attached to two tower legs.

7.3 Leg Base of a CM110, CM115, CM120 Tripod

The leg mount option is intended for attaching an ENC10/12, ENC12/14, or ENC14/16 enclosure to the leg base of a CM110, CM115, or CM120 tripod. An enclosure ordered with this option will be shipped with a bracket attached to each side of the enclosure and a u-bolt bracket. A #19124 bracket must also be attached to the tripod (see Figure 4-7).

NOTES

(1) For some tripods, the #19124 bracket may not be pre-installed on the tripod at the factory. In this situation, the #19124 bracket and mounting hardware will be shipped with the tripod and will need to be installed as shown in Figure 7-7.

(2) An ENC16/18 cannot be mounted to the leg base.

Attach the enclosure to the leg base as follows:

1. Place the flange of the tripod's bracket into a notch in one of the enclosure's bracket (see Figures 7-7, 7-8, and 7-10).
2. Attach the u-bolt bracket on the other enclosure bracket (see Figure 7-9).
3. Use the furnished 70 mm centre u-bolt to secure the enclosure bracket to a tripod leg (see Figures 7-9 and 7-10).
4. Route the 14 AWG wire from the brass tripod grounding clamp to the enclosure grounding lug. Strip one inch of insulation from each end of the wire and insert the end of the wire into the grounding lugs and tighten.

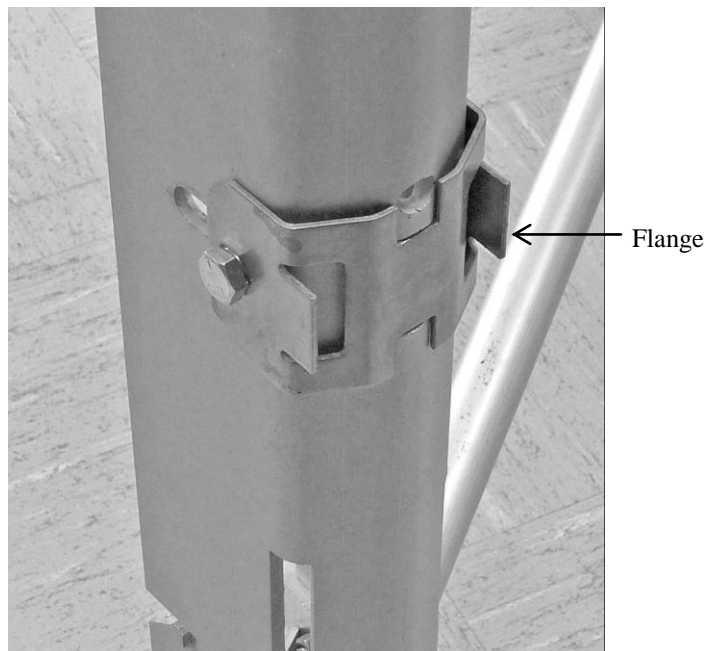


Figure 7-7. The #19124 bracket attached to a CM110 tripod.

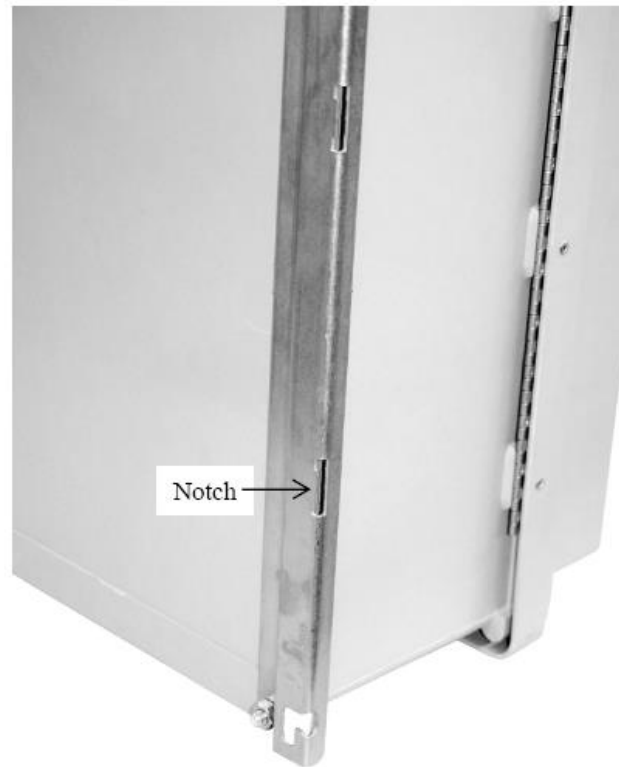


Figure 7-8. An ENC 14/16 enclosure with a leg mount bracket.



Figure 7-9. The u-bolt bracket.



Figure 7-10. An enclosure attached to the leg base of a CM110 tripod.

8. Resistance to Weathering / Ageing

Regardless of the product range or the manufacturer, it is known that hot compression moulded GRP is subject to erosion when used outdoors. Due to the combined action of rain, wind and UV rays, the polyester matrix is superficially eroded and glass fibres may become apparent. However, the depth of this erosion is only 7µm.

This slight erosion is unavoidable unless a surface coating (e.g. varnish) is applied (which brings with it additional problems such as adhesion). It is important to note that **any erosion is very superficial** and has no effect on the physical characteristics (electrical, mechanical or chemical) of the polyester.

Enclosures of the type supplied by Campbell Scientific have been successfully used outdoors since 1958 and tests on field samples support laboratory results. These enclosures are maintenance free.

If you wish to remove the appearance of any small surface scratches or scuffs simply apply petroleum jelly (e.g. Vaseline) or oil to the surface and rub lightly. Similarly any slight surface erosion due to weathering can be restored to its original appearance by gently rubbing with fine sandpaper before applying petroleum jelly.

NOTE

As of September 2009, all enclosures will be supplied with a special surface coating to reduce surface ageing. No extra surface treating should be necessary unless the enclosures are exposed to extreme environments.

Appendix A. DIN rail terminal kits

A.1 Introduction

The 006706-002 (5-inch) or #28532 (9-inch) kit can facilitate wiring when many wires need to be connected to one terminal. The kit contains one #15906 5-inch DIN-Rail (or one #28531 9-inch DIN-Rail) Mounting Bracket, #505 screws, #6044 grommets, and #15908 DIN-Rail Stoppers. A complete configuration will also include pn #15920 Terminal Strips, pn #15907 End Plates, and pn #15909 Jumpers. The stoppers, terminal strips, and end plates are mounted onto the DIN-Rail bracket. The DIN-Rail bracket is mounted to an enclosure backplate using the kit's screws and grommets.

One #15920 terminal strip consists of three spring-loaded “guillotine” terminals that provide connection points for individual wires. Up to 20 of these terminal strips may be fastened to the 006706-002 DIN-Rail bracket. The 006706 DIN-Rail bracket holds up to 36. The #15907 End Plates separate the terminal strips. The #15909 Jumpers are used to electrically connect the terminals. A stopper needs to be on each end of the terminal strip assembly.

A.2 Installation Procedure

1. Mount the #15908 DIN-Rail Stoppers, #15920 Terminal Strips, and #15907 End Plates onto the DIN-Rail Bracket (see Figure A-1 through Figure A-3).

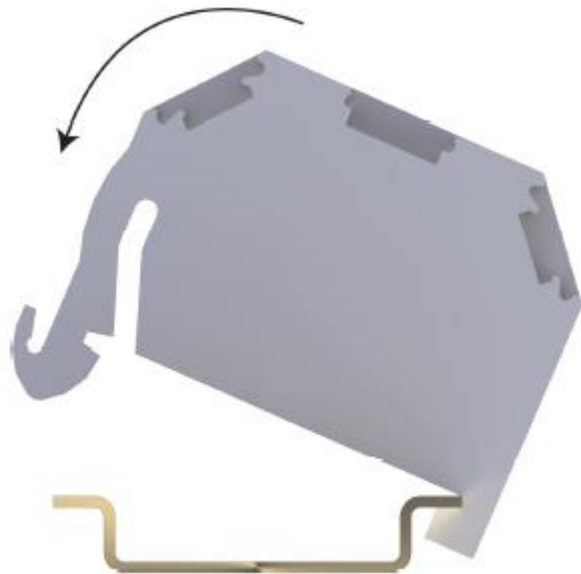


Figure A-1. #15908 DIN-Rail Stopper installation

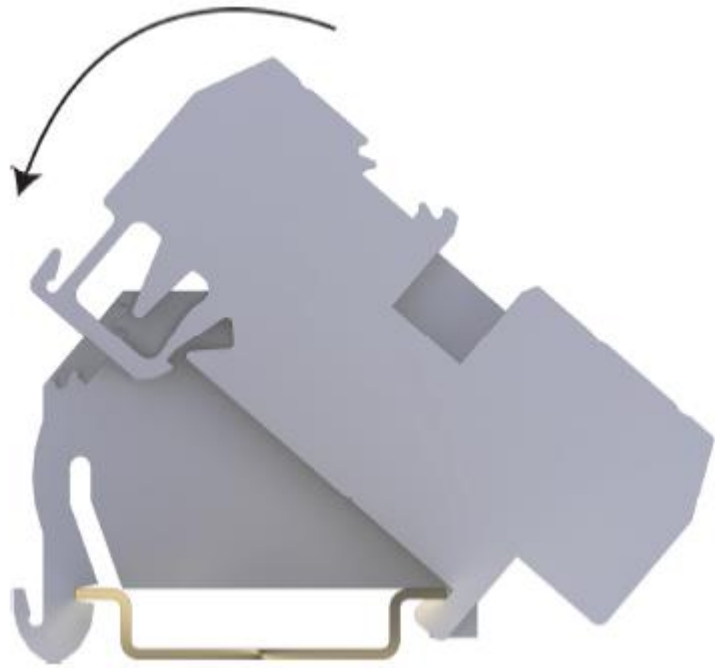


Figure A-2. #15920 Terminal Strip installation

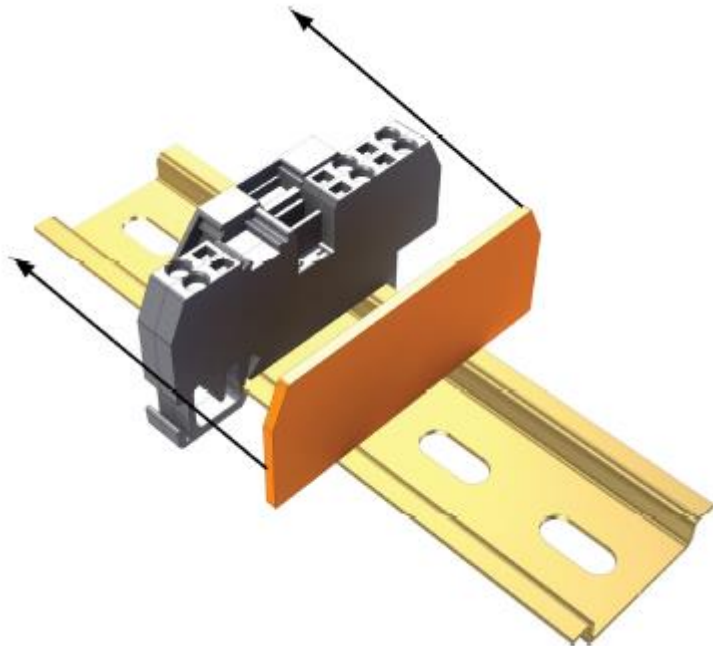


Figure A-3. #15907 End Plate installation

2. Insert the #15909 Jumpers in the terminal strips as shown in Figure A-4.

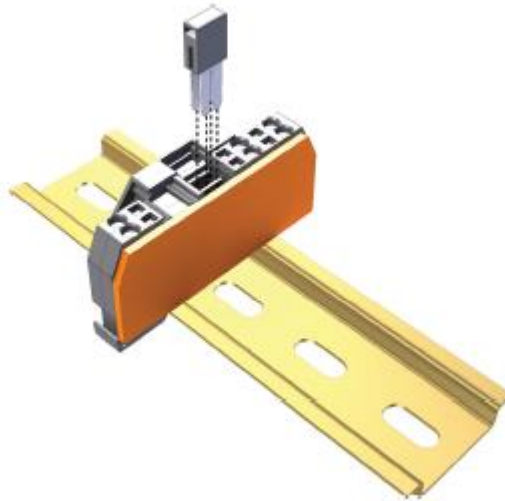


Figure A-4. #15909 Jumper installation

3. Mount the DIN-Rail bracket onto the enclosure backplate using two #505 screws and two #6044 grommets (see Figure A-5).

NOTE The 006706 includes three screws and three grommets. Use the third screw and grommet to secure the 9-pin DIN-Rail at its centre.

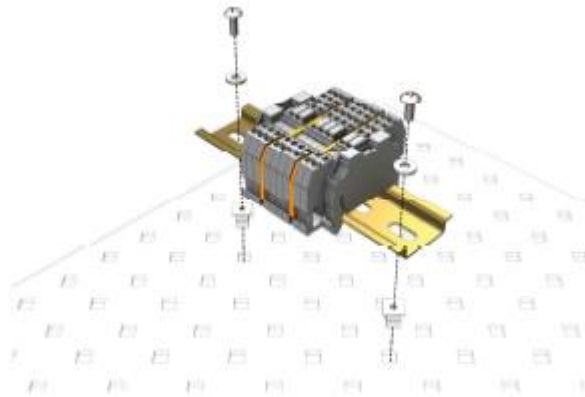


Figure A-5. DIN-Rail bracket mounted onto an enclosure backplate

4. Connect the wires to the terminals (see Figure A-6 and Figure A-7). The #8125 flat-bladed screwdriver is used to open the terminals' guillotines for wire entry.



Figure A-6. An installed and wired 006706-002 DIN-Rail Terminal Kit



Figure A-7. The 006706-002 DIN-Rail Terminal Kit facilitates wiring of multiple sensors

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