Switch & outlet boxes – technical data

Outlet boxes and covers

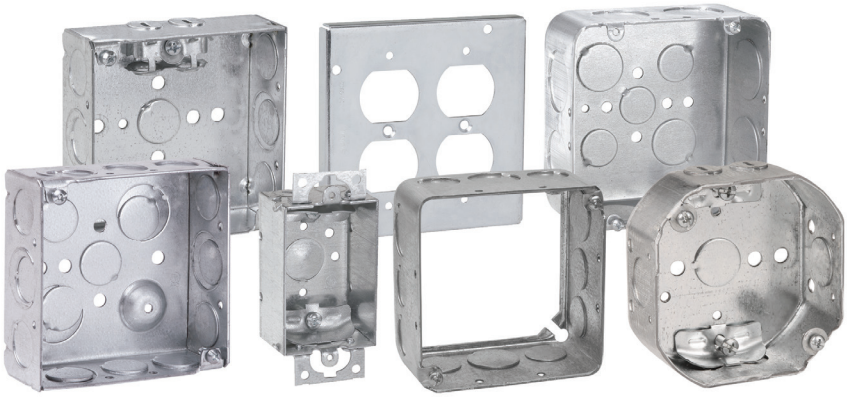
Eaton has assembled one of the most complete outlet box product lines in the business. We've been leading in quality and selection for decades and throughout the Crouse-Hinds series steel outlet box offering, you will find innovative products and solutions that save labor, cut material costs and increase productivity.

We have a complete offering of:

- 4", 4 11/16" and 5" square drawn and welded boxes with raised cover plate screws for ease of attaching covers
- Switch, masonry, utility, outlet, ceiling, fan and gangable boxes
- Drawn boxes available with concentric knockouts, combining ½" and ¾" knockout
- Complete line of covers, partitions, extension rings and accessories
- Uni-Mount™ covers
- Quick-Lok™ outlet boxes and assemblies
- Ruff-IN™ pre-fabricated assemblies
- Fire alarm boxes and covers, with red powder coat optional
- **Boxes available with various means of grounding including**
  - **Tapped ground holes**
  - **Pre-installed ground screw, add "G" suffix to box catalog number**
  - **Pre-installed ground pigtail, add "PF" suffix to box catalog number**







 Copyright© 2023 Commercial Products Catalog

General information

Compliances:

Article 314 of the National Electrical Code® (NEC®) covers the installation and use of boxes. The article includes table references that guide the electrician in the selection of the proper size box necessary to safely accommodate electrical service requirements. The box capacity table is reproduced in part from NEC as a quick reference and guide. The NEC should be consulted for complete details.

Outlet boxes for fixture or fan support:

A box, with or without a bracket or bar hanger, intended for support of a fixture/luminaire weighing 50 lbs. or less is marked "FOR FIXTURE/LUMINAIRE SUPPORT" on the carton to indicate that the box is intended for fixture/luminaire support. A box, with or without a bracket or bar hanger, intended for support of a fixture/luminaire weighing more than 50 lbs. is marked with the weight of the fixture/luminaire to be supported. Metallic device boxes and device plaster rings have not been investigated for support of a ceiling fixture/luminaire unless marked for use in ceilings, walls and with the weight of the product to be supported. Metallic device boxes intended to be installed in an existing structure have been investigated for the support of utilization equipment weighing not more than 6 lbs.

Knockouts:

Under File No. E-23156, Eaton's Crouse-Hinds Series concentric and "moon" KO style boxes, the following is stated "Suitable for bonding without any additional bonding means around concentric (or eccentric) knockouts where used in circuits above or below 250V."



Fire resistance rating wall penetrations:

Eaton's Crouse-Hinds series products are produced in accordance with the requirements of UL514A, UL514B and UL514C, and are classified for fire resistance according to the standard, Fire Tests of Building Construction and Materials, ANSI/UL263, ASTM E 119 and NFPA 251. This listing is based on products when used in a fire rated (2 HR) wall or ceiling. Eaton's Crouse-Hinds series steel boxes are listed with UL File No. E-23156 and non-metallic boxes are listed with UL File No. E-102328 and UL (2 HR fire rated) File No. R9933.

NEMA standards:

Eaton's Crouse-Hinds series switch and outlet boxes comply with the requirements of NEMA Standard OS-1 and Federal Spec. W-J-800F.

Grounding hole:

The majority of Crouse-Hinds outlet boxes have at least one tapped #10-32 grounding hole.

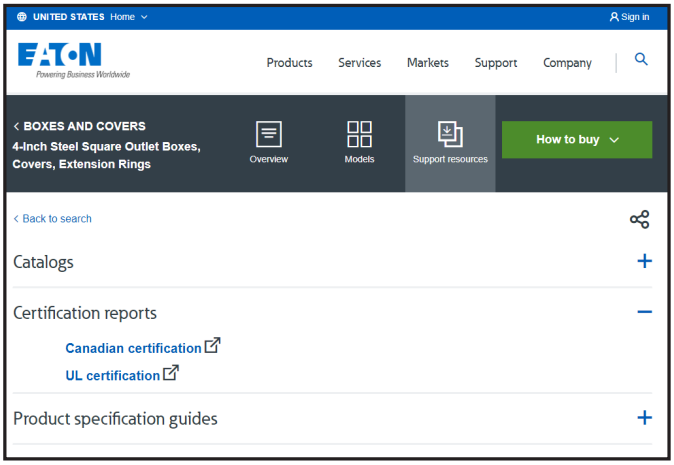
Combination screw heads:

Cover and clamp screws have combination slotted/Phillips screw heads. Self-tapping screws provide for 100% thread engagement.



Third party certification information:

Third party certification documents can be found on the product detail page of the Eaton website. Just click on the resource tab and click on the link to view the third party document. Document can then be saved or printed.



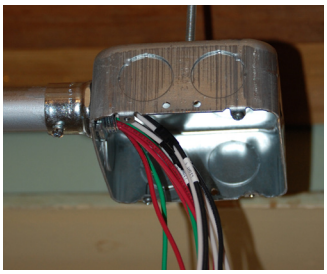
Standard materials – steel covers, outlet and switch boxes:

- Steel boxes and covers are made of .0625 inch thick pre-galvanized sheet steel
- Handy box covers are made of .030 inch thick galvanized sheet steel

Calculating box size and wire fill

Calculate the minimum box size:

NEC® 314.16 (A) and (B) describes the detailed way of counting wires, as well as clamps, fittings or devices (i.e., switches, receptacles, combination devices) – by establishing an equivalent conductor value for each. Those values are added together to get a total number of conductors. The minimum size box is the smallest one in Table 314.16(A) that can accommodate that number of conductors. Note that the volume of the cover is also included in the box fill volume calculation.



1. No matter how many ground wires come into a box, they only count as one conductor within the box.
2. Any wire running unbroken through the box counts as one wire.
3. Each wire coming into a splice device (crimp or twist-on type) is counted as one wire.
4. Each wire coming into the box and connecting to a device counts as one wire of that size.
5. Fixture studs, cable clamps and hickeys are to be counted as one regardless of how many there may be. If a box contains two cable clamps, the total is only to be increased by one. Note that Quick-lok™ connectors do not need to be counted as they are outside the box.
6. Where devices are mounted in the box, the total conductor count must be increased by two for each mounting strap.

Example #1:

Cable Boxes: This example will illustrate how the minimum size is determined for a box with cable clamps fed by two #12-2 nonmetallic sheathed cables and supplying a 15A duplex receptacle. After supplying the receptacle, the conductors are extended to other outlets.

Circuit conductors	4
Ground conductors	1
Cable clamps	1
Device (receptacle)	2
Total	8

Using the Box Fill table from the next page, read across the line "Allowances" to column 8, then down to the minimum cubic inches required for #12 conductor. This example requires a minimum of 18.0 cubic inches.

Note: per Table 314.16(B) on the following page, #12 AWG conductors require 2.25 cu. in. per conductor.

Table 314.16(A) metal boxes

Box dimension (in.)	Min. Cu. in.	Maximum number of conductors (arranged by AWG size)						
Trade Size or Type	Cap.	No. 18	No. 16	No. 14	No. 12	No. 10	No. 8	No. 6
4 X 1¼ round or octagonal	12.5	8	7	6	5	5	5	2
4 X 1½ round or octagonal	15.5	10	8	7	6	6	5	3
4 X 2⅛ round or octagonal	21.5	14	12	10	9	8	7	4
4 X 1¼ square	18.0	12	10	9	8	7	6	3
4 X 1½ square	21.0	14	12	10	9	8	7	4
4 X 2⅛ square	30.3	20	17	15	13	12	10	6
4 11/16 X 1¼ square	25.5	17	14	12	11	10	8	5
4 11/16 X 1½ square	29.5	19	16	14	13	11	9	5
4 11/16 X 2⅛ square	42.0	28	24	21	18	16	14	8
3 X 2 x 1½ device	7.5	5	4	3	3	3	2	1
3 X 2 x 2 device	10.0	6	5	5	4	4	3	2
3 X 2 x 2¼ device	10.5	7	6	5	4	4	3	2
3 X 2 x 2½ device	12.5	8	7	6	5	5	4	2
3 X 2 x 2¾ device	14.0	9	8	7	6	5	4	2
3 X 2 x 3½ device	18.0	12	10	9	8	7	6	3
4 X 2⅛ x 1½ device	10.3	6	5	5	4	4	3	2
4 X 2⅛ x 1⅞ device	13.0	8	7	6	5	5	4	2
4 X 2⅛ x 2⅛ device	14.5	9	8	7	6	5	4	2
3¾ X 2 x 2½ masonry box/gang	14.0	9	8	7	6	5	4	2
3¾ X 2 x 3½ masonry box/gang	21.0	14	12	10	9	8	7	4
FS - 1¾ single cover gang	13.5	9	7	6	6	5	4	2
FD - 2⅜ single cover gang	18.0	12	10	9	8	7	6	3
FS - 1¾ multiple cover gang	18.0	12	10	9	8	7	6	3
FD - 2⅜ multiple cover gang	24.0	16	13	12	10	9	8	4

Table 314.16(B) volume required per conductor

Size of conductor	Free space within box for each conductor
No. 18	1.5 cubic inches
No. 16	1.75 cubic inches
No. 14	2 cubic inches
No. 12	2.25 cubic inches
No. 10	2.5 cubic inches
No. 8	3 cubic inches
No. 6	5 cubic inches

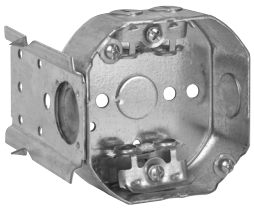
For SI units: one cubic inch = 16.4 cm^3.

Reprinted with permission from NFPA 70-2005, the National Electrical Code®, Copyright® 2017 National Fire Protection Association, Quincy MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety. National Electrical Code® and NEC® are registered trademarks of the National Fire Protection Association, Inc., Quincy, MA 02269.

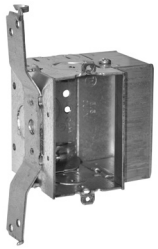
Outlet box brackets

Bracket technical data

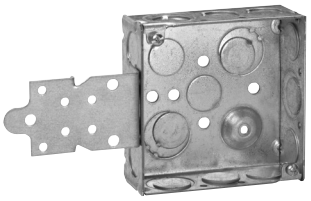
Bracket type	C	D	F	S	SD	VP	VS	H	M	MSB	SSB	VMS
Length	3 5/8	5 13/16	2 7/8	5 13/16	5 9/16	6 61/64	6 59/64	2 1/2	2 1/2	2 1/2	1 1/4	6 13/16
Width	2 1/2	7/8	1 3/4	7/8	1 5/16	1 9/16	1 9/16	1 3/32	1 3/32	1 3/8	2 1/8	1 3/8
Set back	1/4	5/8		5/8	5/8	3/8	7/8					5/16
For metal		√	√		√		√	√	√	√	√	√
For wood	√	√	√	√	√	√	√	√	√			√
Stud mount	side/ceiling	side	face	side	side	side	side	face	face	face	face	side



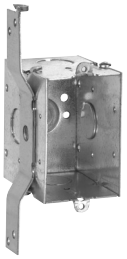
“C” bracket



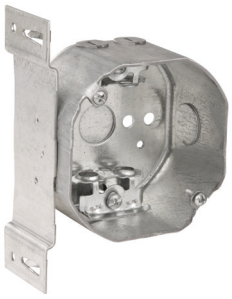
“D” bracket



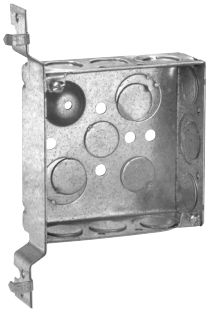
“F” bracket



“S” bracket



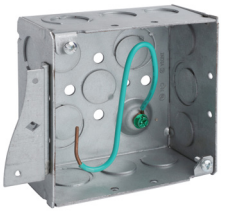
“SD” bracket



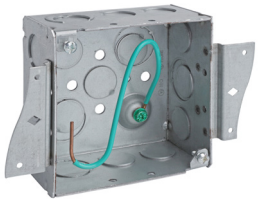
“VP” bracket



“VS” bracket



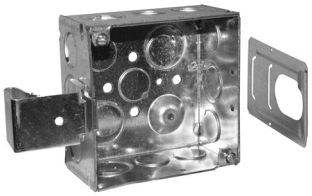
“H” bracket



“M” bracket



“MSB” bracket



“SSB” bracket



“VMS” bracket

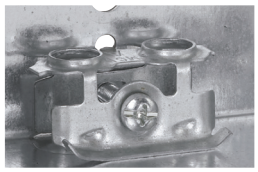
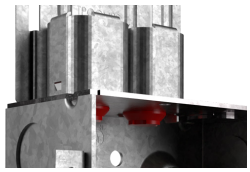
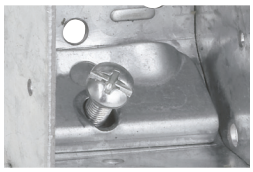
 Copyright© 2023 Commercial Products Catalog

Outlet box clamps

Clamp technical data

	Raceway type							
	Armored cable (BX)		Metal clad interlocking cable (MCI)					
Clamp type	Steel	Aluminum	Steel	Aluminum	Steel (MC-PCS)	Aluminum (MC-PCS)	Non-metallic sheathed cable	Flexible metallic conduit
Quick-Lok boxes	#14-2 to 10-4	#14-2 to 10-4	#14-2 to 10-3	#14-2 to 10-3	#12-2 to 10-2	#12-2 to 12-3	—	—
MC-BX	#14-2 to 12-3	#14-2 to 10-2	#14-2 to 10-2	#14-2 to 10-2	—	—	—	7/32" trade size
NM-1	—	—	—	—	—	—	#14-2 to #12-3 w/ground	—
NM-2	—	—	—	—	—	—	#14-2 to #12-3 w/ground	—
NM-4	—	—	—	—	—	—	#14-2 to #12-3 w/ground	—

Note: Applicable and listed Southwire Armorlite™ all purpose type MC cable and all purpose hospital care facility type HCF MC cable

For armored and metal clad interlocking cable (MCI)		For non-metallic cable		
				
MC-BX	**Quick-Lok**	**NM-1**	**NM-2**	**NM-4**

Outlet box entry knockout and pryouts



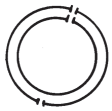
½" Conduit KO



¾" Conduit KO



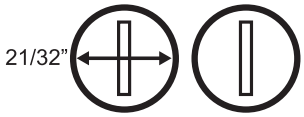
1" Conduit KO



Concentric ½" and ¾" KO



Eccentric ½" and ¾" KO



Cable pry-outs always in pairs

Conduit KOs have standard trade size dimensions. KOs are uniform and true for attachment of cable or conduit connectors. Pry-outs for cable entrance are slotted – a twist with screwdriver removes them. KOs and pry-outs are precision stamped to permit easy removal, but remain sufficiently strong and sturdy when not removed.

4" square drawn boxes feature a ½" and ¾" "inverted" concentric KO – easily removed. Our 4" square welded boxes feature our ½" eccentric KO which also features easy removability of both the ½" and ¾" KOs.

Note: These KOs are suitable for bonding without bonding jumpers around concentric (or eccentric) knockouts where used in circuits above or below 250V.