

Manual Starters and Switches Selection Guide

Class 2510, 2511, 2512, 2601



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SQUARE D
GROUPE SCHNEIDER





Type FG2P

**FRACTIONAL HORSEPOWER MANUAL STARTERS
WITH MELTING ALLOY TYPE THERMAL OVERLOAD RELAY**

Application Data

Type F fractional horsepower starters provide overload protection as well as manual “On-Off” control for small motors in a variety of industrial and commercial installations. Typical applications include fans, conveyors, pumps, and small machine tools.

They are available in one or two pole versions. Both one-pole and two-pole versions are suitable for use with AC single phase motors rated up to 1 horsepower. Two-pole starters may also be used with DC motors rated up to 0.75 horsepower.

Voltage Rating 277 VAC maximum (1 or 2 pole)
 230 VDC maximum (2 pole only)

Horsepower Ratings

| Volts | Maximum Horsepower | | |
|------------|--------------------|--------|-----------------------------|
| | AC Single Phase | | DC |
| | 1 Pole | 2 Pole | 2 Pole Only |
| 115 to 230 | 1 | 1 | ³ / ₄ |
| 277 | 1 | 1 | — |

Continuous Current Rating 16 A

Enclosures

NEMA Type 1 surface mounting enclosures are sheet steel with a thermoplastic wrap-around cover for convenience in wiring. The NEMA Type 1 enclosure is also available in an oversized version that allows more space for wiring. A zinc alloy die casting is used for NEMA Type 4 enclosures, and a cast aluminum enclosure is offered for NEMA Type 3R, 7 & 9 applications.

Pilot Light

Red or green neon pilot light units are available factory installed in NEMA Type 1 surface and flush mounting and NEMA Type 4 enclosures. They are also available as a field modification kit for NEMA Type 1 enclosures and gray flush plates.

Use order number as is for red pilot light; add a G to the number for a green pilot light.

Handle Guard/Lock-Off

An optional handle guard on NEMA Type 1 enclosed starters prevents accidental operation of the toggle operator and allows the toggle operator to be padlocked in either the On or Off position.

The handle guard can be factory installed on NEMA Type 1 enclosed starters. It is also available in kit form for field installation on NEMA Type 1 surface and flush mounting enclosures. Standard NEMA Type 4 and NEMA Type 3R, 7 & 9 enclosures include provision for locking in the Off position.

Terminals

Binder head screw type terminals are suitable for #10 or smaller copper wire, and are accessible from the front. All terminals are clearly marked.

Mounting

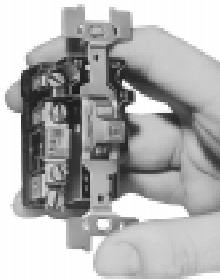
Open types without a pilot light fit standard single gang switch boxes, and can be used with any cover plate having a standard toggle cutout. Single-unit flush mounting types, including those with pilot light, are suitable for wall mounting in a standard switch box or for machine cavity mounting without a box.

Operator

Available with toggle handle or with removable key type operator to discourage unauthorized operation.

Thermal Units

Starters will not operate without properly installed thermal units. Install thermal units so that the markings face the front of the starter.



Type FO2






Manual Starters and Switches

Class 2510, 2512 Type F

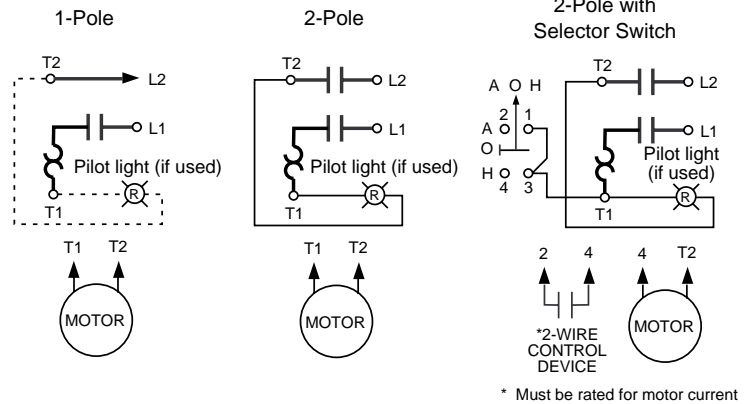
Emergency Off Actuator

A toggle operator extender is available for NEMA Type 1 surface-mounted units. The extender has a red vinyl button that provides a fast and easy method for locating and switching the device's toggle operator into the Off position. The Emergency Off Actuator is available in kit form only for field installation.

Approvals

| | Enclosed Unit | Open Unit | Explosion-Proof Unit |
|---|-------------------------------|-------------------------------|-------------------------------|
|  | File E42243 CCN NLRV | — | File E58760 CCN NPXZ |
|  | File LR25490 Class 3211 05 | File LR25490 Class 3211 05 | File LR26817 Class 3218 04 |
|  | — | File E42243 CCN NLRV2 | — |

Typical Wiring Diagrams



Single-Unit Types (Class 2510)

| Type of Operator | No. of Poles | Features | NEMA Type 1 General Purpose Enclosure Surface Mounting | | General Purpose Flush Mounting (Without Pull Box) | | | NEMA Type 4▲ Watertight and Dusttight Enclosure | NEMA Types 3R, 7 & 9▲ Class I Groups B, C, & D & Class II Groups E, F & G Enclosure | Open Type | Number of Thermal Units Required |
|--|--------------|----------------------|--|-----------|---|--------------------------------------|-----------------------------------|---|---|-----------|----------------------------------|
| | | | Standard | Oversized | Gray Flush Plate | Standard Stainless Steel Flush Plate | Jumbo Stainless Steel Flush Plate | | | | |
| Basic Starter – Class 2510 | | | | | | | | | | | |
| Toggle | 1 | Standard | FG1 | FGJ1 | FF1 | FS1 | ..... | ..... | ..... | FO1 | 1 |
| | | With Red Pilot Light | FG1P | FGJ1P | FF1P | FS1P | FSJ1P | ..... | ..... | FO1P | 1 |
| | 2 | Standard | FG2 | FGJ2 | FF2 | FS2 | ..... | ..... | ..... | FO2 | 1 |
| | | With Red Pilot Light | FG2P | FGJ2P | FF2P | FS2P | FSJ2P | ..... | ..... | FO2P | 1 |
| Key | 1 | Standard | FG3 | FGJ3 | FF3 | FS3 | ..... | ..... | ..... | FO3 | 1 |
| | | With Red Pilot Light | FG3P | FGJ3P | FF3P | FS3P | FSJ3P | ..... | ..... | FO3P | 1 |
| | 2 | Standard | FG4 | FGJ4 | FF4 | FS4 | ..... | ..... | ..... | FO4 | 1 |
| | | With Red Pilot Light | FG4P | FGJ4P | FF4P | FS4P | FSJ4P | ..... | ..... | FO4P | 1 |
| Starter with Handle Guard/Lock-Off – Class 2510 | | | | | | | | | | | |
| Toggle | 1 | Standard | FG5 | FGJ5 | Order basic starter plus separate handle guard kit. | | | FW1 | FR1 | ..... | 1 |
| | | With Red Pilot Light | FG5P | FGJ5P | | | | FW1P | ..... | ..... | 1 |
| | 2 | Standard | FG6 | FGJ6 | | | | FW2 | FR2 | ..... | 1 |
| | | With Red Pilot Light | FG6P | FGJ6P | | | | FW2P | ..... | ..... | 1 |

▲ Furnished with one 3/4" pipe tap in bottom (reversible for top feed). To obtain 3/4" pipe tap top and bottom, add suffix letter "H" to type number.



Manual Starters and Switches Class 2510, 2512 Type F

Duplex Units (Class 2510)

| Type of Operator | No. of Poles | Features | NEMA Type 1 General Purpose Enclosure Surface Mounting | General Purpose Flush Mounting (Without Pull Box) | | Number of Thermal Units Required |
|--|--------------|------------------------------|--|---|---|----------------------------------|
| | | | | Gray Flush Plate for Wall or Cavity Mounting | Stainless Steel Flush Plate for Wall or Cavity Mounting | |
| One Starter in Duplex Enclosure – Class 2510 | | | | | | |
| Toggle | 2 | Standard | FG02 | .... | .... | 1 |
| | | With Red Pilot Light | FG02P | .... | .... | 1 |
| Key | 2 | With Red Pilot Light | FG04P | .... | .... | 1 |
| Two Starters in One Enclosure – Class 2510 | | | | | | |
| Toggle | 2 Each Str. | Standard | FG22 | FF22 | .... | 2 |
| | | With Red Pilot Light on Each | FG22P | FF22P | FS22P | 2 |
| Key | 2 Ea. Str. | With Red Pilot Light on Each | FG44P | FF44P | FS44P | 2 |
| Starter and "AUTO-OFF-HAND" SPDT Selector Switch (AC Only) – Class 2510 | | | | | | |
| Toggle | 1 | Standard | FG71 | FF71 | .... | 1 |
| | | With Red Pilot Light | FG71P | FF71P | FS71P | 1 |
| | 2 | Standard | FG72 | FF72 | .... | 1 |
| | | With Red Pilot Light | FG72P | FF72P | FS72P | 1 |
| Key | 2 | With Red Pilot Light | FG74P | FF74P | FS74P | 1 |

Two Speed Starters (Class 2512)

Type F two-speed manual starters are designed for the control of small single-phase AC motors that have separate windings for high and low speed operation. Two toggle-operated starters are used, with overload protection included for each motor winding. Surface mounting devices, and those with a gray flush plate, utilize a mechanical interlock which allows direct control of the motor by means of the toggle operators.

| Type of Operator | No. of Poles | Features | NEMA Type 1 General Purpose Enclosure Surface Mounting | General Purpose Flush Mounting (Without Pull Box) | | Number of Thermal Units Required | |
|---------------------------|--------------|---|--|---|---|---------------------------------------|---|
| | | | | Gray Flush Plate for Wall or Cavity Mounting | Stainless Steel Flush Plate for Wall or Cavity Mounting | | |
| Two Speed Starters | | | | | | Replacement Starter Class 2510 | |
| Toggle | 1 | Standard with mechanical interlock | FG11 | FF11 | — | FO1T | 2 |
| | | Standard with mechanical interlock and two red pilot lights | FG11P | FF11P | — | FO1PT | 2 |
| | | Standard with HIGH-OFF-LOW selector switch and two red pilot lights | — | — | FS101P | FO1PT | 2 |
| | 2 | Standard with mechanical interlock: | FG22 | FF22 | — | FO2T | 2 |
| | | Standard with mechanical interlock and two red pilot lights | FG22P | FF22P | — | FO2PT | 2 |
| | | Standard with HIGH-OFF-LOW selector switch and two red pilot lights | — | — | FS202P | FO2PT | 2 |



Manual Starters and Switches

Class 2510, 2511, 2512 Type K



Type KG1A

MANUAL SWITCHES – TYPE K REVERSING, NON-REVERSING, TWO SPEED

Application Data

Type K motor starting switches provide manual “on-off” control of single- or three-phase AC motors, where overload protection is not required or is provided separately. These devices are suitable for use with three-phase AC motors rated up to 20 horsepower. Compact construction and a 600 volt rating make these switches suitable for a wide range of industrial and commercial uses. Typical applications include small machine tools, pumps, fans, conveyors, and many other types of electrical machinery. They may also be used on non-motor loads such as resistance heaters.

Voltage Rating 600 VAC maximum
230 VDC maximum

Continuous Current Rating 30 A at 600 VAC maximum

Horsepower Ratings

| Class 2510 | No. of Poles | Motor Type | Maximum Horsepower | | | | DC Rating | | |
|------------|--------------|------------|--------------------|-------|-------|-------|-----------|-------|-------|
| | | | 115 V | 230V | 460 V | 575 V | 90 V | 115 V | 230V |
| KO1, KO3 | 2 | 1-Phase | 2 | 2 | 3 | 3 | 1 | 2 | 1-1/2 |
| KO2, KO4 | 3 | 3-Phase | 2 | 7-1/2 | 10 | 10 | 1 | 2 | 1-1/2 |
| KO5 | 2 | 1-Phase | 2 | 3 | 7-1/2 | 10 | 1 | 2 | 1-1/2 |
| KO6 | 3 | 3-Phase | 2 | 7-1/2 | 15 | 20 | 1 | 2 | 1-1/2 |



Type KO2

| Device | No. of Poles | Motor Type | Maximum Horsepower | | | | DC Rating | | |
|------------|--------------|-------------------------------------|--------------------|-------|-------|-------|-----------|-------|-------|
| | | | 115 V | 230V | 460 V | 575 V | 90 V | 115 V | 230V |
| Class 2511 | 2 | 1-Phase | 2 | 2 | 3 | 3 | 1 | 2 | 1-1/2 |
| | 3 | 3-Phase | 2 | 7-1/2 | 10 | 10 | 1 | 2 | 1-1/2 |
| Class 2512 | 2 | 1-Phase | 2 | 2 | 3 | 3 | 1 | 2 | 1-1/2 |
| | 3 | 3-Phase Constant or Variable Torque | 2 | 7-1/2 | 10 | 10 | 1 | 2 | 1-1/2 |
| | 3 | 3-Phase Constant Horsepower | 2 | 7-1/2 | 10 | 10 | 1 | 2 | 1-1/2 |

Enclosures

NEMA Type 1 surface mounting enclosures are sheet steel with a thermoplastic wrap-around cover for convenience in wiring. The NEMA Type 1 enclosure is also available in jumbo and oversized versions that allow more space for wiring. A zinc alloy die casting is used for NEMA Type 4 enclosures, and a cast aluminum enclosure is offered for NEMA Type 3R, 7 & 9 applications.

Mounting

Open types without a pilot light fit standard single gang switch boxes, and can be used with any cover plate having a standard toggle cutout. Single-unit flush mounting types, including those with pilot light, are suitable for wall mounting in a standard switch box or for machine cavity mounting without a box. For difficult wall surfaces, such as concrete block or tile, a jumbo size flush plate is recommended. See the dimensional drawings for additional details and mounting provisions of enclosed types.

Pilot Light

Red or green neon pilot light units are available factory installed in NEMA Type 1 surface and flush mounting and NEMA Type 4 enclosures. They are also available as a field modification kit for NEMA Type 1 enclosures and gray flush plates.

Use order number as is for red pilot light; add a G to the number for a green pilot light.

Operator

Available with toggle handle or with removable key type operator to discourage unauthorized operation.



Manual Starters and Switches Class 2510, 2511, 2512 Type K

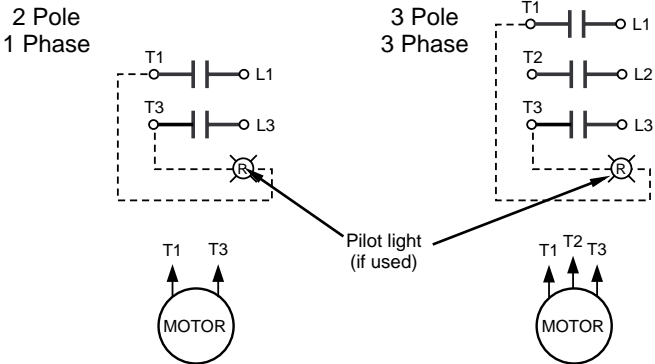
Emergency Off Actuator

A toggle operator extender is available for NEMA Type 1 surface-mounted units. The extender has a red vinyl button that provides a fast and easy method for locating and switching the device's toggle operator into the Off position. The Emergency Off Actuator is available in kit form only for field installation.

Approvals

Same as for Type F; see page 4.

Typical Wiring Diagrams



Non-Reversing (Class 2510)

| Type of Operator | No. of Poles | Features | NEMA Type 1 General Purpose Enclosure Surface Mounting | | General Purpose Flush Mounting (Without Pull Box) | | | NEMA Type 4 ▲ Watertight and Dusttight Enclosure | NEMA Types 3R, 7 & 9 ▲ Class I Groups B, C & D & Class II Groups E, F, and G Enclosure | Open Type |
|------------------|--|--|--|----------------|---|--------------------------------------|-----------------------------------|--|--|----------------|
| | | | Standard | Oversized | Gray Flush Plate | Standard Stainless Steel Flush Plate | Jumbo Stainless Steel Flush Plate | | | |
| Toggle | 2 | Standard | KG1 | KGJ1 | KF1 | KS1 | ..... | KW1 | KR1 | KO1 |
| | | With Pilot Light 115 VAC 230 VAC | KG1A KG1B | KGJ1A KGJ1B | KF1A KF1B | KS1A KS1B | KSJ1A KSJ1B | KW1A KW1B | ..... | KO1A* KO1B* |
| | 3 | Standard | KG2 | KGJ2 | KF2 | KS2 | ..... | KW2 | KR2 | KO2 |
| | | With Pilot Light 208-277 VAC 440-600 VAC | KG2B KG2C | KGJ2B KGJ2C | KF2B KF2C | KS2B KS2C | KSJ2B KSJ2C | KW2B KW2C | ..... | KO2B* KO2C* |
| | 2 | Standard | KG5 | KGJ5 | ..... | ..... | ..... | KW5 | ..... | KO5 |
| | | With Pilot Light 115 VAC 230 VAC | KG5A KG5B | ..... | ..... | ..... | ..... | KW5A KW5B | ..... | KO5A KO5B |
| 3 | Standard | KG6 | KGJ6 | ..... | ..... | ..... | KW6 | ..... | KO6 | |
| | With Pilot Light 208-277 VAC 440-600 VAC | KG6B KG6C | ..... | ..... | ..... | ..... | KW6B KW6C | ..... | KO6B KO6C | |
| Key | 2 | Standard | KG3 | KGJ3 | KF3 | KS3 | ..... | ..... | ..... | KO3 |
| | | With Pilot Light 115 VAC 230 VAC | KG3A KG3B | KGJ3A KGJ3B | KF3A KF3B | KS3A KS3B | KSJ3A KSJ3B | ..... | ..... | KO3A KO3B |
| | 3 | Standard | KG4 | KGJ4 | KF4 | KS4 | ..... | ..... | ..... | KO4 |
| | | With Pilot Light 208-277 VAC 440-600 VAC | KG4B KG4C | KGJ4B KGJ4C | KF4B KF4C | KS4B KS4C | KSJ4B KSJ4C | ..... | ..... | KO4B KO4C |

▲ Furnished with one 3/4" pipe tap in bottom (reversible for top feed). To obtain 3/4" pipe tap top and bottom, add suffix letter "H" to type number.

* Do not use as replacement interiors for NEMA Type 4 devices. For replacement unit, order Type KO1 or KO2 and separate pilot light kit.



Manual Starters and Switches

Class 2510, 2511, 2512 Type K



File E42243
CCN NLRV2



File LR25490
Class 3211 05

Reversing (Class 2511)

Type K reversing manual switches provide a compact means of starting, stopping, and reversing AC motors where overload protection is not required or is provided separately. They are suitable for use with three-phase squirrel cage motors and for single-phase motors which can be reversed by reconnecting motor leads. Two switches are used, one to connect the motor for forward rotation and one for reverse.

| Type of Operator | No. of Poles | Motor Types for Which Suitable | Features (Including Mechanical Interlock) | NEMA Type 1 General Purpose Enclosure Surface Mounting | With Flush Plate for Cavity Mounting (Without Pull Box) | Replacement Switch Class 2510 |
|------------------|--------------|--|---|--|---|-------------------------------|
| Toggle | 2 | Single Phase, 3-Lead Repulsion-Induction | Standard | KG11 | KF11 | KO1T |
| | | | With Pilot Light 115 VAC 230 VAC | KG11A KG11B | KF11A KF11B | KO1AT KO1BT |
| | 3 | Three Phase; also Single Phase Capacitor, Split Phase, or 4-Lead Repulsion-Induction | Standard | KG22 | KF22 | KO2T |
| | | | With Pilot Light 110-120 VAC 208-220 VAC 440-600 VAC | KG22A KG22B KG22C | KF22A KF22B KF22C | KO2AT KO2BT KO2CT |

Two Speed (Class 2512)

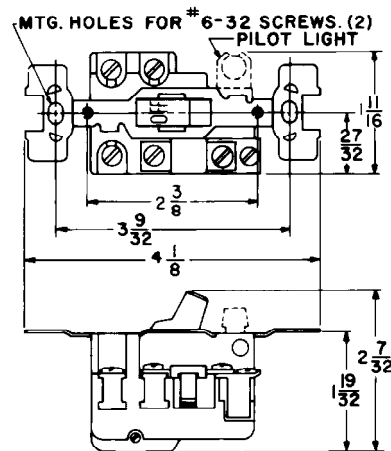
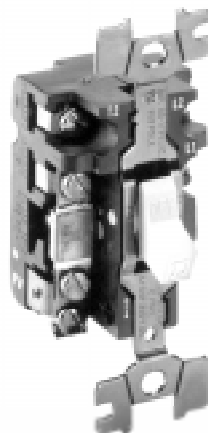
Type K two-speed manual switches may be used with separate winding three- or single-phase AC motors where overload protection is not required or is provided separately. Two switches are employed to give "on-off" control in each speed.

| Type of Operator | No. of Poles | Motor Types for Which Suitable | Features (Including Mechanical Interlock) | NEMA Type 1 General Purpose Enclosure Surface Mounting | With Flush Plate for Cavity Mounting (Without Pull Box) | Replacement Switch Class 2510 |
|------------------|--------------|---|---|--|---|-------------------------------|
| Toggle | 2 | Single Phase, Two Winding (3-Lead) | Standard | KG11 | KF11 | KO1T |
| | | | With 2 Pilot Lights 115 VAC 230 VAC | KG11A KG11B | KF11A KF11B | KO1AT KO1BT |
| | 3 | Three Phase, Separate Winding (Wye-Connected) | Standard | KG22 | KF22 | KO2T |
| | | | With 2 Pilot Lights 208-240 VAC 440-600 VAC | KG22B KG22C | KF22B KF22C | KO2BT KO2CT |

APPROXIMATE DIMENSIONS FOR OPEN TYPE

Type F Fractional Horsepower

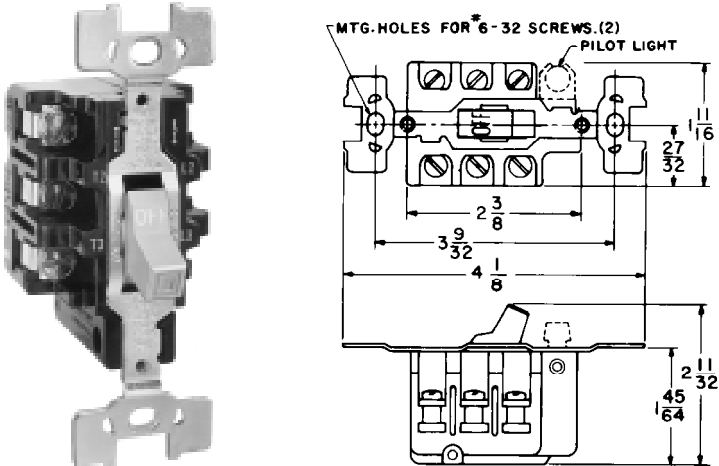
Dimensions are typical for key operator devices.



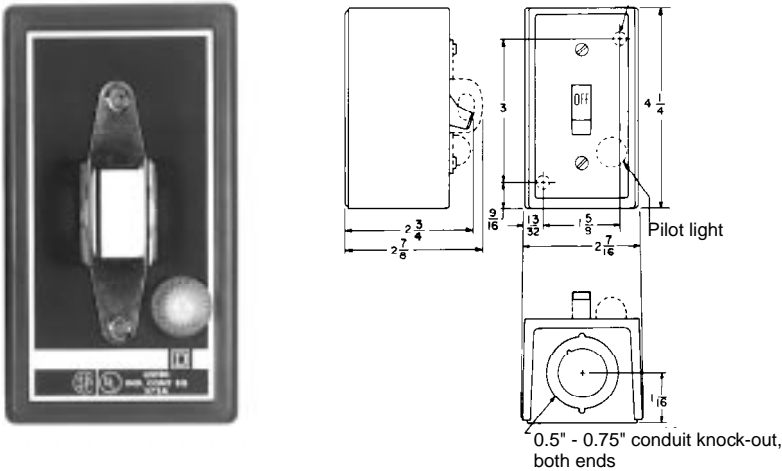
Manual Starters and Switches Type F and K Dimensions

Type K Motor Starting Switch

Dimensions are typical for key operator devices.

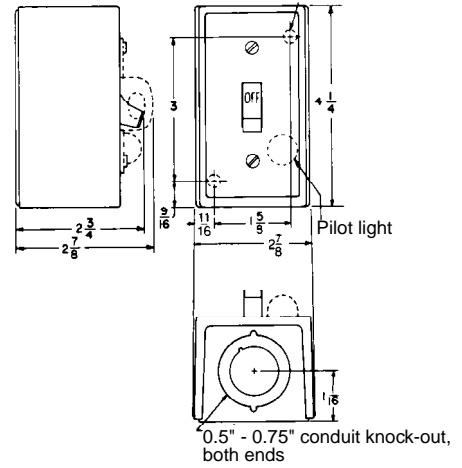


Dimensions for NEMA Type 1 General Purpose Surface Mounting Enclosures Standard Size

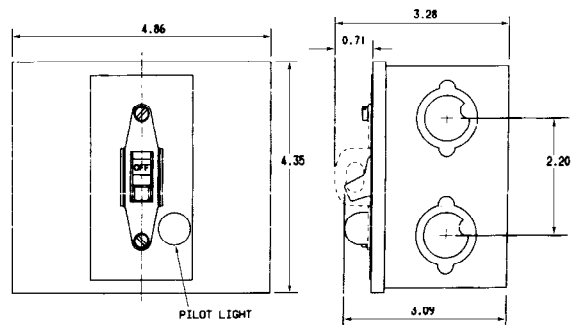


Manual Starters and Switches Type F and K Dimensions

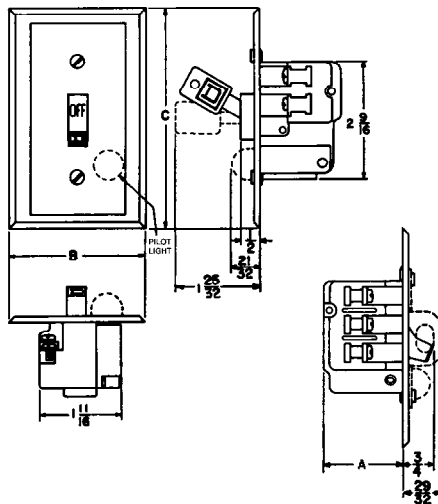
Dimensions for NEMA Type 1 General Purpose Surface Mounting Enclosures — Oversized



Dimensions for NEMA Type 1 General Purpose Surface Mounting Enclosures — Jumbo Size



Dimensions for General Purpose Flush Mounting



| Device | Type of Operator | Class 2510 Type | Dimensions (in.) | | |
|-----------|------------------|--|------------------|------|------|
| | | | A | B | C |
| Type F | Toggle | FF1, 1P, 2, 2P FS1, 1P, 2, 2P | 1.44 | 2.75 | 4.5 |
| | | FSJ1P, 2P | 1.44 | 3.5 | 5.25 |
| | Key | FF3, 3P, 4, 4P FS3, 3P, 4, 4P | 1.44 | 2.75 | 4.5 |
| FSJ3P, 4P | | 1.44 | 3.5 | 5.25 | |
| Type K | Toggle | KF1, 1A, 1B KF2, 2B, 2C KS1, 1A, 1B KS2, 2B, 2C | 1.75 | 2.75 | 4.5 |
| | | KSJ1A, 1B KSJ2B, 2C | 1.75 | 3.5 | 5.25 |
| | Key | KF3, 3A, 3B KF4, 4B, 4C KS3, 3A, 3B KS4, 4B, 4C | 1.75 | 2.75 | 4.5 |
| | | KSJ3A, 3B KSJ4B, 4C | 1.75 | 3.5 | 5.25 |

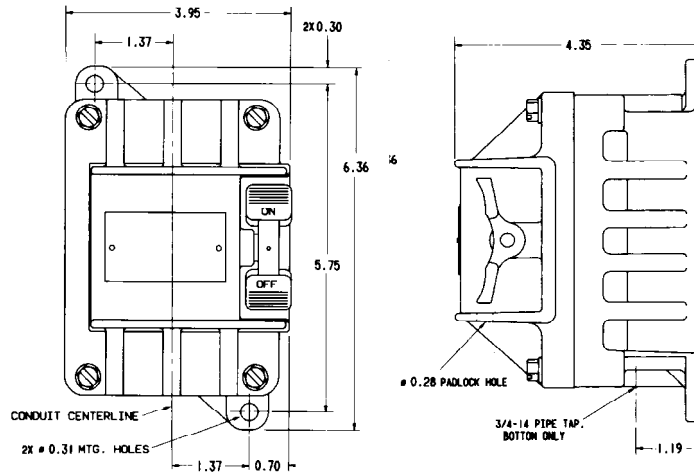


Manual Starters and Switches Type F and K Dimensions

Dimensions for NEMA Type 3R, 7, and 9 Cast Aluminum Enclosure for Hazardous Locations



Class 2510 Type KR2H
NEMA Type 3R, 7, & 9
Weight 3.5 lbs.

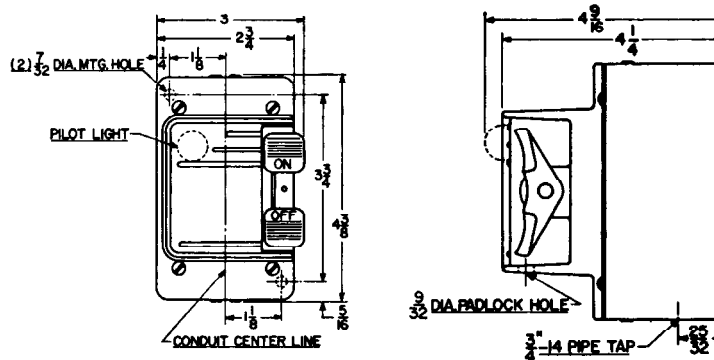


| Device | Class | Type |
|--------|-------|--------|
| Type F | 2510 | FR1, 2 |
| Type K | 2510 | KR1, 2 |

Dimensions for NEMA Type 4 Watertight Die Cast Zinc Enclosure



NEMA Type 4
Weight 3.0 lbs.



| Device | Class | Type |
|--------|-------|--|
| Type F | 2510 | FW1, 1P, 2, 2P |
| Type K | 2510 | KW1, 1A, 1B KW2, 2B, 2C KW5, 5A, 5B KW6, 6B, 6C |

Dimensions for Two-Unit Devices — NEMA Type 1 General Purpose Enclosure

| Device | Type of Operator | Class | Type |
|--------------------------------------|------------------|-------|---|
| One Starter | Toggle | 2510 | FGO2, FGO2P |
| | Key | 2510 | FGO4P |
| Two Starters | Toggle | 2510 | FG22, FG22P |
| | Key | 2510 | FG44P |
| One Starter and One Selector Switch▼ | Toggle | 2510 | FG71, FG71P, FG72, FG72P |
| | Key | 2510 | FG74P |
| Reversing Switch◆ | Toggle | 2511 | KG11, KG11A, KG11B, KG22A, KG22B, KG22C |
| Two-Speed Starter | Toggle | 2512 | FG11, FG11P, FG22, FG22P |
| Two-Speed Switch | Toggle | 2512 | KG11, KG11A, KG11B, KG22, KG22B, KG22C |

▼ Selector switch is on the left; increases the overall depth to 3.5".

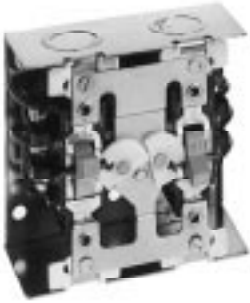
◆ Only one pilot light (located on the right) is used on Class 2511 switches.

A dimensional drawing is shown on the next page.



Manual Starters and Switches Type F and K Dimensions

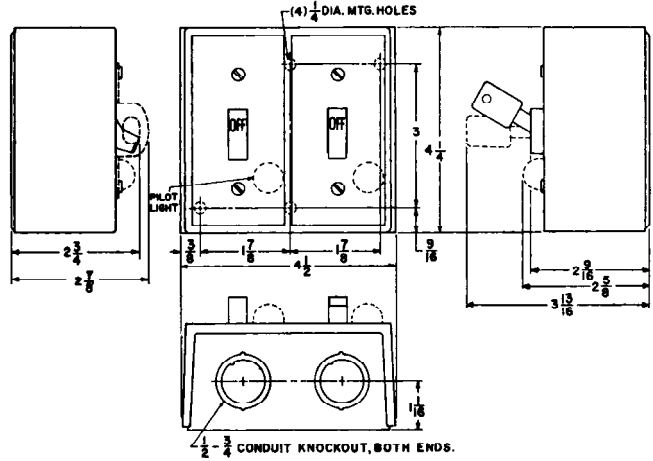
Two-Unit NEMA Type 1 General Purpose Enclosure



Class 2511 Type KG22
(Cover Removed)



Class 2511 Type KG22
(Cover)



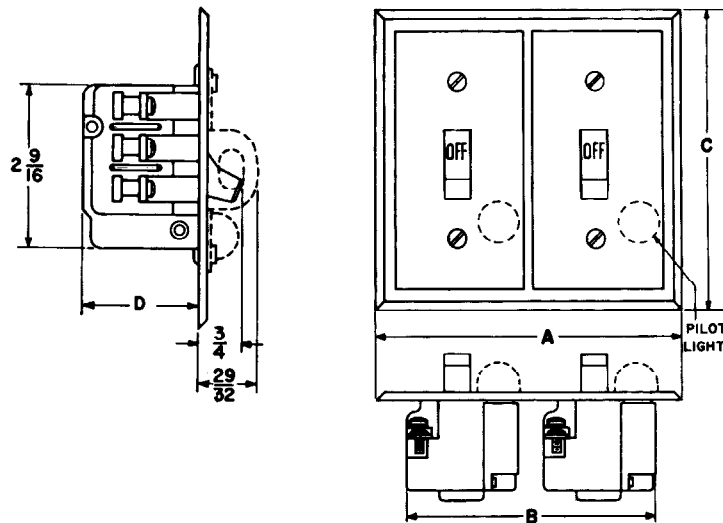
Two-Unit General Purpose Flush Mounting Plate



Class 2512 Type KF22

| Device | Type of Operator | Class | Type | Dimensions | | | |
|--------------------------------------|------------------|-------|---|------------|------|------|------|
| | | | | A | B | C | D |
| Two Starters | Toggle | 2510 | FF22, FF22P | 5.25 | 3.75 | 5.25 | 1.44 |
| | | | FS22P | 4.56 | 3.5 | 4.5 | 1.44 |
| | Key | 2510 | FF44P | 5.25 | 3.75 | 5.25 | 1.44 |
| | | | FS44P | 4.56 | 3.5 | 4.5 | 1.44 |
| One Starter and One Selector Switch▼ | Toggle | 2510 | FF71, FF71P, FF72, FF72P | 5.25 | 0.75 | 5.25 | 2.0 |
| | | | FS71P, FS72P | 4.56 | 3.5 | 4.5 | 2.0 |
| | Key | 2510 | FF74P | 5.25 | 3.75 | 5.25 | 2.0 |
| | | | FS74P | 4.56 | 3.5 | 4.5 | 2.0 |
| Reversing Switch■ | Toggle | 2511 | KF11, KF11A, KF11B KF22, KF22A, KF22B, KF22C | 5.25 | 3.75 | 5.25 | 1.75 |
| Two-Speed Starter | Toggle | 2512 | FF11, FF11P, FF22, FF22P | 5.25 | 3.75 | 5.25 | 1.75 |
| Two-Speed Switch | Toggle | 2512 | KF11, KF11A, KF11B KF22, KF22B, KF22C | 5.25 | 3.75 | 5.25 | 1.75 |

▼ Selector switch is on the left; extends 1.63" from the mounting surface.
■ Dimensions include factory-wired power connections.



Manual Starters and Switches Integral Horsepower — Types M and T

CLASS 2510, 2511, 2512 INTEGRAL HORSEPOWER STARTERS — TYPES M AND T



Class 2510
Type M and T
in General Purpose
Enclosure

Application Data

Types M and T integral horsepower manual starters provide convenient “On-Off” operation of small single phase, polyphase, or DC motors. Typical applications include small machine tools, pumps, fans, and conveyors. They feature push button or toggle operators and reliable overload protection. Pilot lights and auxiliary contacts are available.

| | |
|--------------------|---|
| Size | Available in NEMA Sizes M-0, M-1, and M-1P |
| Poles | AC: Two poles single phase; three poles polyphase DC: 2 poles (without Low Voltage Protection only) |
| Voltage Rating | 600 VAC maximum 250 VDC maximum |
| Overload Relays | Melting alloy thermal overload relays have provisions for one Type B thermal unit for single phase starters and three Type B thermal units for three phase starters. All thermal units must be installed and the device reset before the starter contacts will operate. After overload relays have tripped, allow one or two minutes for the alloy to solidify before resetting. |
| Operator | Available with a push button or toggle operator in open and NEMA 1 versions. NEMA Types 4 and 12 utilize a direct-acting push button only. NEMA Types 4X, 7 & 9 utilize an external toggle to actuate a push button device inside. |
| Mechanism Lock Off | Both open devices and starters in NEMA Type 1 surface and flush mounting, NEMA Types 4, 4X, 7 & 9, and 12 enclosures may be locked in the Off or Stop position. The NEMA Type 1 surface mounting, 4, 4X, 7 & 9, and 12 enclosures may also be locked closed to prevent unauthorized entry. |
| Terminals | |



Size M-1, 3-Pole
Push Button Operated

| NEMA Size | Power Terminals | | Auxiliary Interlock Terminals | |
|-----------|-----------------|---------------------------|-------------------------------|---------------------------|
| | Type of Lug | Wire Size* Min. - Max. | Type of Lug | Wire Size* Min. - Max. |
| M-0 | Pressure Wire | #14 - #8 | Pressure Wire | #16 - #12 |
| M-1 | Pressure Wire | #14 - #8 | Pressure Wire | #16 - #12 |
| M-2 | Box Lug | #14 - #6 | Pressure Wire | #16 - #12 |

* Solid or stranded copper wire.

| NEMA Size | Series | Number of Poles | Service Bulletin | Replacement Contact Kit | |
|-----------|--------|-----------------|------------------|-------------------------|------|
| | | | | Class | Type |
| M-0 | A | 2 or 3 | 312AS | 9998 | ML1 |
| | B | 2 or 3 | 312AS | 9998 | ML1 |
| M-1 | A | 2 or 3 | 312AS | 9998 | ML2 |
| | B | 2 or 3 | 312AS | 9998 | ML2 |
| M-1P | A | 2 | 312AS | 9998 | ML2 |
| | B | 2 | 312AS | 9998 | ML2 |

Approvals

All Except
NEMA Type 7 & 9



File E4847
CCN NLRV



File LR60905
Class 3211 05

NEMA Type 7 & 9 Only



File E78503
CCN NPXZ



File LR60905
Class 3218 04

Maintenance of Equipment

For proper performance, all equipment should be periodically inspected and maintained. Replacement contacts and interlocks are available in kit form to facilitate servicing and stocking. In addition, the service bulletin referenced in the table above contains an exploded view of the device with components clearly marked for easy identification by description and part number.



Manual Starters and Switches

Integral Horsepower — Types M and T



NEMA Type 4
Watertight and Dusttight
Stainless Steel

Accessories and Modification Kits

One auxiliary contact, either N.O. or N.C., can be easily added internally to any open or enclosed Type M or T manual starter. It occupies the space provided in either the upper right or left corners of the device. These contacts are for AC loads only.

A unique red pilot light assembly that clips into place is available factory-installed on NEMA Types 1, 4, 4X, 12, and flush enclosures. The assembly is also available as a field modification kit for NEMA Type 1 surface or flush mounting enclosures. The color cap assembly snaps into a knockout in the enclosure cover on the NEMA Type 1 enclosures. Pilot light kits are available for use on various voltages between 110 and 600 V. (Pilot light assemblies are not available for NEMA Type 7 & 9 enclosures.)

Class 2510 Non-Reversing Integral Horsepower Manual Starters (600 VAC Maximum)

| No. of Poles | NEMA Size | Ratings | | | NEMA Type | | | | | | Open Type | |
|--------------|-----------|---------------------------|-------------------------|----------------------|-----------------------------|-----------------|---|---|--|---|-----------------------------|-----------------|
| | | Motor Voltage | Max. HP | | Type 1 Surface Mounting | | Type 4 Watertight and Dusttight Enclosure Brushed Stainless Steel | Type 4X Watertight, Dusttight & Corrosion-Resistant Glass-Polyester Enclosure | Types 7 & 9* For Hazardous Locations Class I Grps C, D Class II Grps E, F, G | Type 12▲ Driptight and Driptight Industrial Use Enclosure | Square Push Button Operator | Toggle Operator |
| | | | Poly-Phase | Single Phase | Square Push Button Operator | Toggle Operator | | | | | | |
| 2 Pole | M-0 | 115 230 | .... .... | 1 2 | MBG1 | TBG1 | MBW11★ | MBW1★ | MBR1★ | MBA1★ | MBO1 | TBO1 |
| | M-1 | 115 230 | .... .... | 2 3 | MCG1 | TCG1 | MCW11 | MCW1 | MCR1 | MCA1 | MCO1 | TCO1 |
| | M-1P | 115 230 | .... .... | 3 5 | MCG2 | TCG2 | MCW12 | MCW2 | MCR2 | MCA2 | MCO2 | TCO2 |
| 3 Pole | M-0 | 115 200-230 380-575 | 3 5 | .... .... .... | MBG2 | TBG2 | MBW12★ | MBW2★ | MBR2★ | MBA2★ | MBO2 | TBO2 |
| | M-1 | 115 200-230 380-575 | 7½ 10 | .... .... .... | MCG3 | TCG3 | MCW13 | MCW3 | MCR3 | MCA3 | MCO3 | TCO3 |
| DC 2 Pole | M-0 | 115 230 | 1 HP-D.C. 1½ HP-D.C. | .... | MBG4 | TBG4 | MBW14 | MBW4 | .... | MBA4 | MBO4 | TBO4 |
| | M-1 | 115 230 | 1½ HP-D.C. 2 HP-D.C. | .... | MCG5 | TCG5 | MCW15 | MCW5 | MCR5 | MCA5 | MCO5 | TCO5 |

* NEMA Types 7 & 9 enclosures are cast-iron. NEMA Types 4X, 7 & 9 enclosures (cast aluminum) are available for outdoor use; to order these type of enclosures, replace the "R" in the catalog number with a "T". For additional information, contact your local Square D Field Sales Office.

▲ NEMA Type 12 enclosures may be field modified for outdoor applications.

★ Approved for group motor installations per NEC 430-53(c).

Starters will not operate without properly installing thermal units and then resetting the device. Thermal units must be installed so that markings face the front of the starter.

Class 2511 Reversing Manual Starters

Class 2511 reversing manual starters consist of two mechanically interlocked Class 2510 Type M or T manual starters. These starters are available in NEMA Type 1 surface-mounting enclosures or as open type. See page 19 for modifications.



NEMA Type 12
Driptight and Dusttight
Industrial Use

| Number of Poles | NEMA Size | Ratings | | NEMA Type 1 Surface Mounting | | Open Type | |
|-----------------|-----------|---------------|--------------------|------------------------------|-----------------|-----------------------------|-----------------|
| | | Motor Voltage | Maximum Horsepower | Square Push Button Operator | Toggle Operator | Square Push Button Operator | Toggle Operator |
| 3 Pole | M-0 | 200-230 | 3 | MBG1 | TBG1 | MBO1 | TBO1 |
| | | 380-575 | 5 | | | | |
| | M-1 | 200-230 | 7½ | MCG1 | TCG1 | MCO1 | TCO1 |
| | | 380-575 | 10 | | | | |



Manual Starters and Switches Integral Horsepower — Types M and T

Class 2512 Two-Speed Manual Starters

Class 2512 two-speed manual starters are for wye-connected separate winding motors only. They consist of two mechanically interlocked Class 2510 Type M or T manual starters. These starters are available with or without low voltage protection in NEMA Type 1 enclosures or open type. See page 19 for modifications.



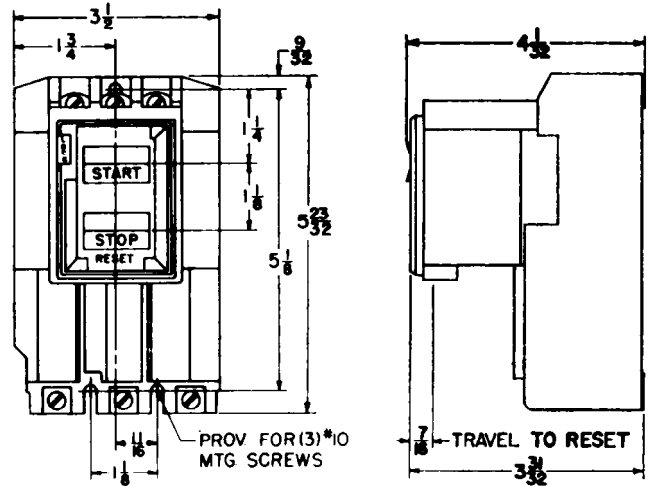
NEMA Type 4X
Watertight, Dusttight, and
Corrosion-Resistant
Glass Polyester

| Number of Poles | NEMA Size | Ratings | | | NEMA Type 1 Surface Mounting | | Open Type | |
|-----------------|-----------|---------------|---------------------|-----------------------------|------------------------------|-----------------|-----------------------------|-----------------|
| | | Motor Voltage | Constant Horsepower | Constant or Variable Torque | Square Push Button Operator | Toggle Operator | Square Push Button Operator | Toggle Operator |
| 3 Pole | M-0 | 200-230 | 2 | 3 | MBG1 | TBG1 | MBO1 | TBO1 |
| | | 380-575 | 3 | 5 | | | | |
| | M-1 | 200-230 | 5 | 7½ | MCG1 | TCG1 | MCO1 | TCO1 |
| | | 380-575 | 7½ | 10 | | | | |

Dimensions for Class 2510 Starters

Starters will not operate without properly installing thermal units and then resetting the device. Thermal units must be installed so that markings face the front of the starter.

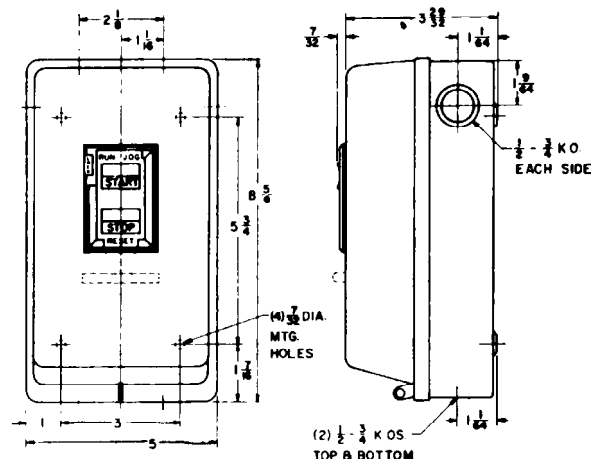
Class 2510 Type M – Open Type
Sizes M-0, M-1, M-1P
App. Shipping Weight 3 pounds



Class 2510 Types M & T Sizes M-0 and M-1
NEMA Type 1 General Purpose Enclosure
Approximate Shipping Weight 5 pounds



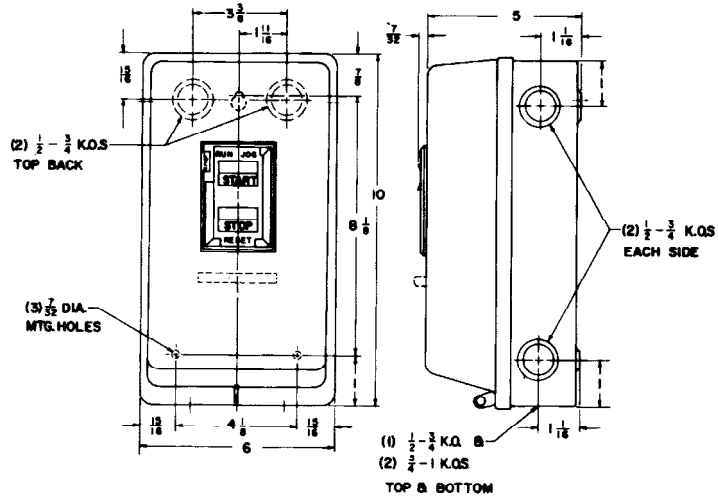
NEMA Type 7 & 9
Hazardous Location
Cast Iron



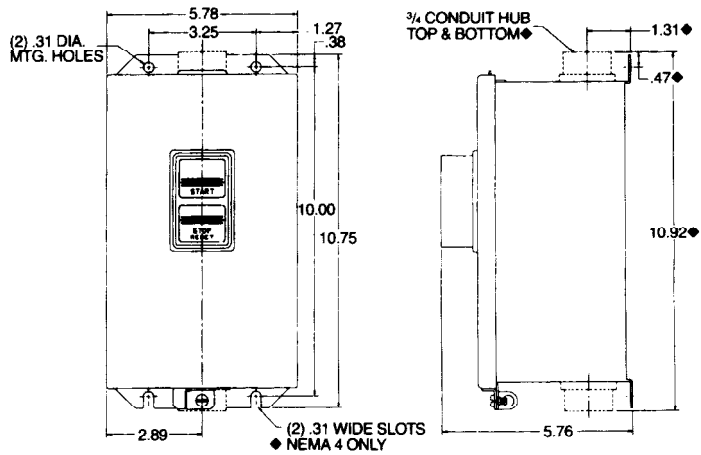
Manual Starters and Switches

Integral Horsepower — Types M and T

Dimensions for Class 2510 Starters



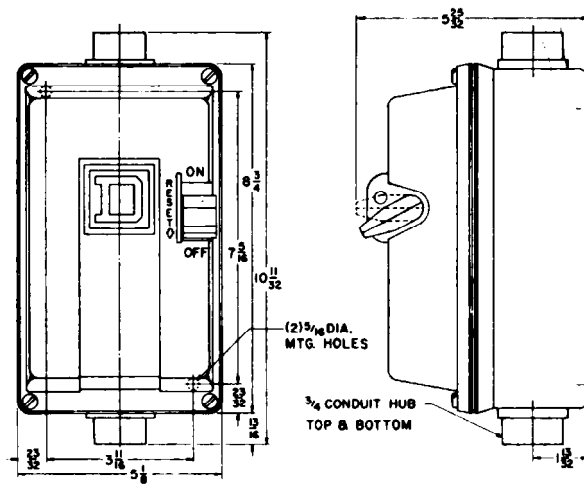
Class 2510 Types M & T Size M-1P
 NEMA Type 1 General Purpose Enclosure
 Approximate Shipping Weight 5 pounds



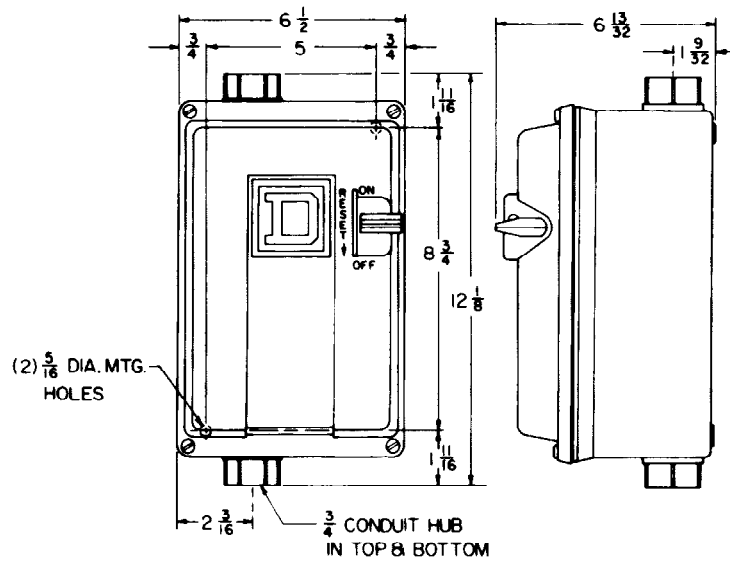
Class 2510 Type M Sizes M-0, M-1, and M-1P
 NEMA Type 4 Watertight Stainless Steel Enclosure
 NEMA Type 12 Dusttight Industrial Use Enclosure
 Approximate Shipping Weight 9 pounds

Manual Starters and Switches Integral Horsepower — Types M and T

Dimensions for Class 2510 Starters



Class 2510 Type M Size M-0 (AC - DC) & M-1 (DC)
NEMA Type 4X Watertight, Corrosion-Resistant
Glass Polyester Enclosure
Approximate Shipping Weight 6 pounds

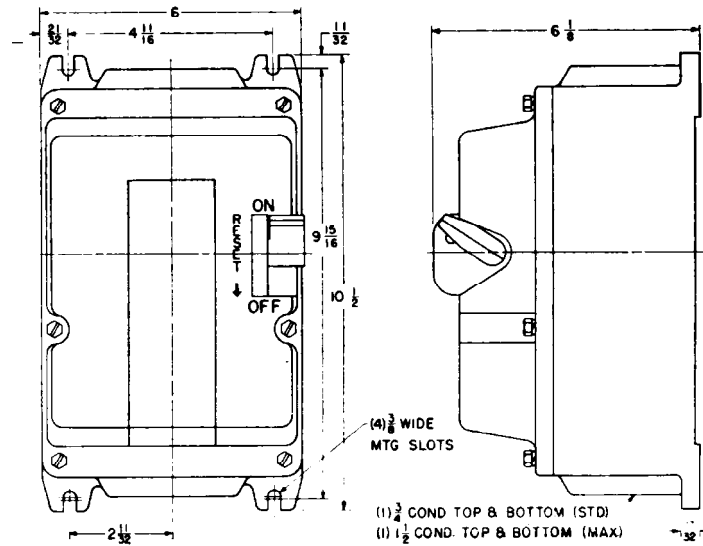


Class 2510 Type M Sizes M-1 and M-1P (AC)
NEMA Type 4X Watertight, Corrosion-Resistant
Glass Polyester Enclosure
Approximate Shipping Weight 6 pounds

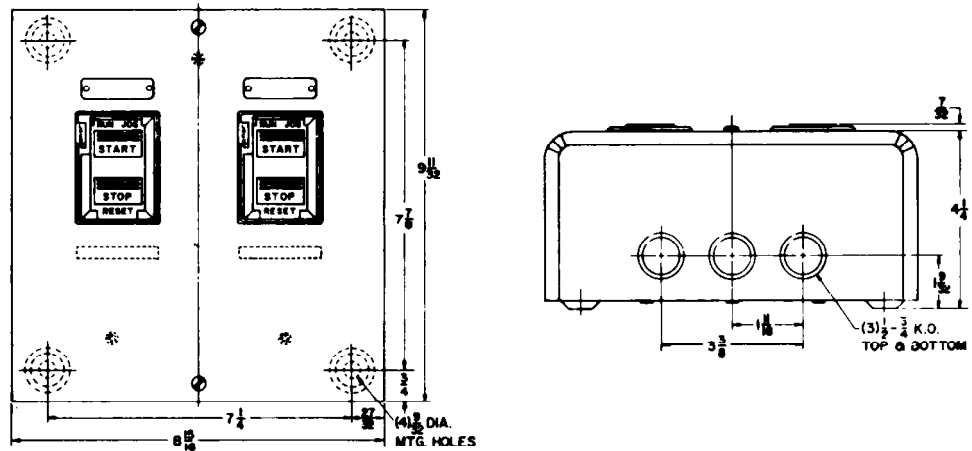


Manual Starters and Switches Integral Horsepower — Types M and T

Dimensions for Class 2510, 2511, and 2512 Starters



Class 2510 Type M Sizes M-0, M-1, and M-1P
NEMA Type 7 & 9 Hazardous Location
Cast Iron Enclosure
Approximate Shipping Weight 18 pounds



Class 2511 and 2512 Types M & T
Sizes M-0 and M-1
NEMA Type 1 General Purpose Enclosure
Approximate Shipping Weight 9 pounds

Manual Starters and Switches Accessories and Modifications

Accessories for Class 2510 Types F and K

| Description | Class & Type |
|--|--------------|
| Handle Guard Kit with Padlock Provision‡ | 2510 FL1 |
| Emergency Off Actuator | 2510 PB1 |
| Additional Key for Key Operated Devices | 2510 FK1 |

‡ Standard on Type K devices.

Pilot Light Kits for Class 2510 Types F and K

| Application | Voltage | Red Pilot Light | Green Pilot Light |
|------------------|----------------|--------------------|----------------------|
| | | Class & Type | Class & Type |
| Type KF, KG, KW* | 110–120 Vac | 9999 PL11 | 9999 PL11G |
| | 208–277 Vac | 9999 PL12 | 9999 PL12G |
| | 440–600 Vac | 9999 PL13 | 9999 PL13G |
| Type FF or FG | 115–240 Vac/dc | 9999 PL10 | 9999 PL10G |

* Lens cannot be replaced.

Replacement Parts

| Description | Class and Type |
|---|-----------------------|
| Replacement Toggle Kits: Type FW and KW (NEMA Type 4) Type FR and KR (NEMA Type 7 & 9) | 9998 HW1 9998 HR2 |
| Replacement Handle Kits: Type MBA, MCA, MBW, MCW (NEMA Type 4 & 12) Type MBR, MCR, MBW, MCW (NEMA Type 4X, 7 & 9) | 9998 HWA1 9998 HR3 |
| Internal Lever | 9998 IL1 |

Replacement Nameplates for Class 2510 Types F and K

| Description | Application | Nameplate Marking | Nameplate Type Number – Class 2510 | | | |
|---|--|---|------------------------------------|------------------|--|------------------|
| | | | For Type K Switch | | For Type F Starter (Includes “Reset” Indication) | |
| | | | Without Pilot Light | With Pilot Light | Without Pilot Light | With Pilot Light |
| 1 ³ / ₄ " x 2 ¹³ / ₁₆ " Nameplate with Embossed Mounting Holes for #6 Head Screws | Standard commercial switch box cover or flush plate, including Square D stainless steel plates | Blank | FN1 | — | FN2 | — |
| | | Special Marking (specify marking desired) | FN5 | — | FN6 | — |
| 1 ²⁹ / ₃₂ " x 3 ²⁷ / ₃₂ " Flat Nameplate with Mounting Holes for #6 Pan Head Screws | Square D NEMA Type 1 surface mounted enclosure or gray flush plate | Blank | FN10 | FN20 | FN30 | FN40 |
| | | High | FN11 | FN21 | FN31 | FN41 |
| | | Low | FN12 | FN22 | FN32 | FN42 |
| | | Forward | FN13 | — | — | — |
| | | Reverse | FN14 | FN24 | — | — |
| | | Special marking (specify marking desired) | FN15 | FN25 | FN35 | FN45 |

Enclosures

| For use with Class 2510 Type | Oversized NEMA Type 1 General Purpose Class 9991 Type |
|--|---|
| FO1, FO1P, F02, FO2P, FO3, FO3P, FO4, FO4P | FE1 |
| For use with Class 2510 Type | Oversized NEMA Type 1 Class 9991 Type |
| KO1, KO1A, KO1B KO2, KO2B, KO2C KO3, KO3A, KO3B KO4, KO4B, KO4C KO5 KO6 | KE1 |
| | Jumbo Type 1 |
| | KE2 |
| | NEMA Type 3R |
| | KE3 |

Modifications (Types M and T Only)

| Description | Factory Modifications and Forms | Field Modifications |
|-----------------------------|---------------------------------|--|
| | Form Number | Kit Class & Type |
| Red Pilot Light† | P11 | 9999 MP1 (110–120 V) 9999 MP2 (208–240 V) 9999 MP3 (440–600 V) |
| Auxiliary Contacts♦ | X1 (1 N.O.) X2 (1 N.C.) | 9999 SX11 (N.O.) 9999 SX12 (N.C.) |
| Jumper Straps ▲ | N/A | 9998 SO31 |
| Contact only | Y76 | N/A |
| Electropolished Finish – N4 | G16 | N/A |

† May only be field-added to NEMA Type 1 enclosures.

♦ For proper operation, only one auxiliary contact kit per device is allowed to be added.

▲ Used to control a single phase motor utilizing a three phase starter.



Manual Starters and Switches

Reversing Drum Switches

CLASS 2601 REVERSING DRUM SWITCHES

Reversing drum switches are designed to start and reverse motors by connecting them directly across-the-line. The devices may be used with squirrel cage motors; single-phase motors designed for reversing service; and series, shunt, and compound DC motors. The applications should be such that across-the-line starting of the motors is not objectionable, unless other means is provided for limiting starting current and torque. Class 2601 drum switches are field convertible from maintained to momentary operation.

Application Data

The reversing drum switches find application wherever manual reversing control is desired. They are particularly suited for use on machine tools, woodworking machines, and similar types of equipment. Examples include lathes, milling machines, planers, grinders, shapers, and boring mills. Other possible applications include door operators, small hoists, and conveyor belts.

Overload and low voltage protection are not incorporated in these reversing drum switches. Should the power fail, the contacts will remain closed, unless assembled for momentary operation, and the handle stays in the selected position. The motor will restart when the power returns.

| | |
|-------------------|--|
| Voltage | 600 VAC Maximum 250 VDC Maximum |
| Contact Mechanism | Large movable contact segments are rigidly attached to the main operating shaft. They are fully insulated from each other and from the shaft. Stationary contact fingers are mounted in polymeric blocks. Both movable and stationary contacts are plated for maximum life. Extremely accessible terminals are provided for easy wiring. Type A is provided with screw type terminals and Type B is provided with pressure wire connector terminals. Contacts are not replaceable. |

| | |
|---------------------|--|
| Operating Mechanism | As supplied from the factory, the operating mechanism is assembled for maintained position operation. That is, when the handle is moved to the forward or reverse position, it will remain there until moved. The mechanism can be easily converted, with no additional parts needed, to provide "spring return to off" operation. This conversion is accomplished by removing the handle screw and handle, turning the shaft 180 degrees, and then replacing the handle and handle screw. |
|---------------------|--|

| | |
|------------------|--|
| Optional Handles | Both the NEMA Type 1 and NEMA Type 4 devices offer as standard a one piece die cast handle. An optional ball and shaft or fluted handle is available. Drum switches with optional handles are available on a factory Quick-Ship basis. To order, add the letter B (for a ball and shaft type handle) or F (for fluted type handle) to the type number. |
|------------------|--|

| | |
|------------|---|
| Enclosures | The polymeric NEMA Type 1 enclosure is suitable for indoor applications when normal atmospheric conditions prevail. The NEMA Type 4 enclosure is suitable for applications requiring watertight and dusttight capabilities. Generous wiring space is provided in both types. Two knockouts or openings for 1/2" conduit entries are located in the bottom plate of the AG/BG types, while two 1/2" conduit entries with hubs are provided as standard in AW/BW types. |
|------------|---|

| | |
|------------|--|
| Enclosures | A single captive screw holds the cover on NEMA Type 1 enclosures, while three captive screws hold the cover on NEMA Type 4 enclosures. Removal of the cover allows free access to three sides of the switch mechanism. Large legible nameplates are securely attached to the enclosures to clearly indicate switching positions and to provide complete rating information. An instruction sheet showing motor connections is also provided. |
|------------|--|



Type AG2



Type AW2



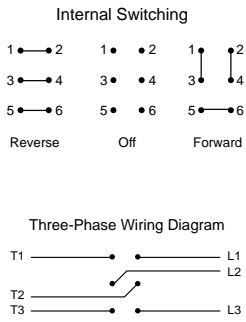
Ball and Shaft Type



Fluted Type

Manual Starters and Switches Reversing Drum Switches

NEMA Type 1, 3R, 4, and 13 without Overload Protection

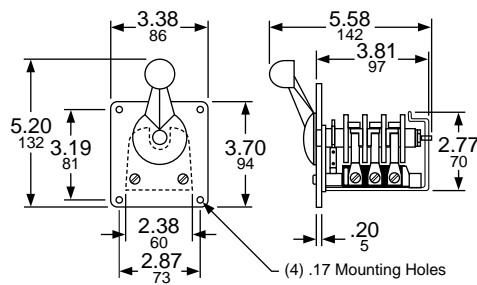


| Volts | Ratings | | | NEMA Type | | | | |
|---------|--------------------|------------------|------|---|--|--|--------------------------------------|--|
| | Maximum Horsepower | | | Type 1 General Purpose Enclosure | Type 4 Watertight & Dusttight Enclosure | Type 3R Rainproof Outdoor Enclosure | Type 1 Maintained & Momentary* | Type 13 Oiltight Flush Mounting |
| | AC 1-Phase | AC Poly-Phase | DC | | | | | |
| 115 | 1 1/2 | .... | 1/4 | AG2 | AW2 | AH2 | AG2S2 | AF2 |
| 200/230 | .... | 2 | .... |  |  |  |  |  |
| 230 | 2 | .... | 1/4 | | | | | |
| 460/575 | .... | 2 | .... |  |  |  |  |  |
| 115 | 1 1/2 | .... | 2 | BG1 | BW1 | N/A | BG1S4 | BF1 |
| 200/230 | .... | 5 | .... |  |  |  |  |  |
| 230 | 3 | .... | 2 | | | | | |
| 460/575 | 5 | 7 1/2 | .... |  |  |  |  |  |

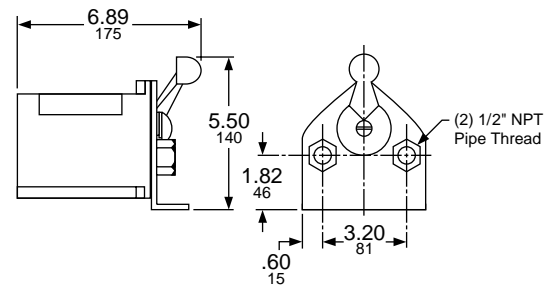
* Maintained – “forward”; momentary – “reverse.” Not field convertible.



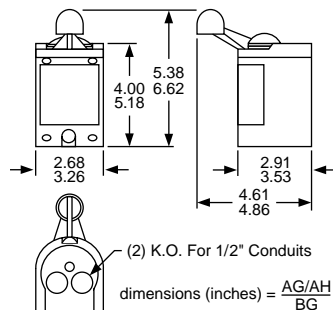
Approximate Dimensions



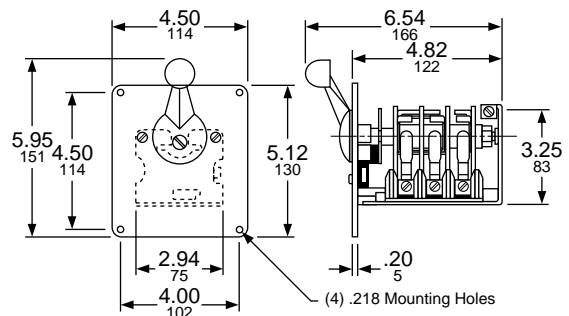
Class 2601 Type AF2



Class 2601 Types AW and BW



Class 2601 Types AG, AH, B



Class 2601 Type BF1





NOTES





NOTES



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