

MELTRIC PRESENTS...

# *the* **MOTOR PLUG**



**MELTRIC'S SWITCH RATED  
PLUGS & RECEPTACLES  
ARE THE CHOICE FOR  
MOTOR CONNECTIONS.**

**UNPARALLELED SAFETY  
& DURABILITY**

**CODE COMPLIANCE**

**CHANGE-OUT TIME  
& COST MINIMIZATION**

**PERFECT FOR "PLUG & PLAY"  
AND MODULAR EQUIPMENT**

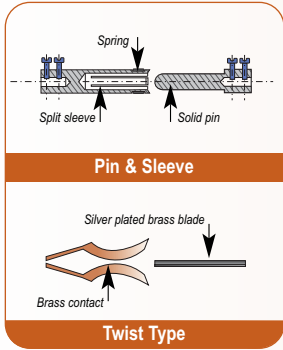


# SAFETY – NOT ALL PLUGS & RECEPTACLES ARE CREATED EQUAL...

## THE OTHER GUYS

### CONTACT TECHNOLOGY

## MELTRIC

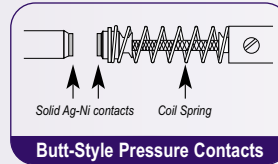


- ▼ Brass contacts are inexpensive, but wear and oxidize rapidly in use resulting in deteriorating electrical performance
  - ▼ wear reduces beneficial contact pressure
  - ▼ oxidation increases contact resistance
- ▼ Brass is not arc-resistant and thus is not suitable for making/breaking under load
- ▼ Soft Silver plating easily wears off and vaporizes under arcing, eliminating the benefit of its low contact resistance
- ▼ Disconnection speed is operator dependent increasing the probability of arcing

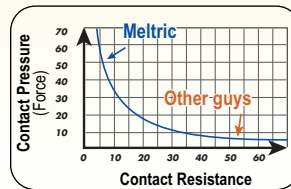
▼ The charts to the right show that the contact resistance of brass is 20 times higher than Silver-Nickel and that contact resistance increases as contact pressure decreases.

The higher contact resistance of brass creates additional heat. This causes further oxidation, which increases resistance and temperature. This vicious cycle of degradation accelerates as the brass wears and contact pressure is reduced.

MATERIAL	CONTACT RESISTANCE	
	New	Oxidized
SILVER	6 $\square\Omega$	25 $\square\Omega$
SILVER-NICKEL	23 $\square\Omega$	60 $\square\Omega$
COPPER	29 $\square\Omega$	400 $\square\Omega$
BRASS	370 $\square\Omega$	1400 $\square\Omega$



- ▼ Solid Silver-Nickel (85/15) butt contacts are similar to those used in motor starters. They combine the outstanding contact properties of silver with excellent mechanical properties of nickel.
  - ▼ The solid contact tips are not affected by wear and thus provide long operating lives
  - ▼ Unlike brass, silver-nickel only welds at extremely high pressure and temperature and thus withstands arcs very well
  - ▼ Unlike brass, the contact resistance, heat and probability of arcing of silver-nickel does not increase significantly with oxidation
- ▼ Spring-loading of the contacts, via a coil spring, provides constant pressure and performance over thousands of operations. Unlike other products this pressure does not reduce with use and wear.
- ▼ Spring-loaded plug and receptacle disengagement provides a consistently fast disconnection (not shown), reducing the probability of arcing

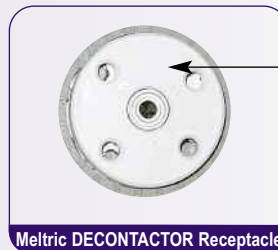


## CONSTRUCTION



### EASY ACCESS TO LIVE PARTS

- ▼ Significantly increases the probability of injury due to accidental contact or arcing



### DEAD FRONT CONSTRUCTION ELIMINATES THE POSSIBILITY OF ACCESS TO LIVE PARTS

- ▼ Live parts can be accessed only by the mating plug after insertion into the receptacle
- ▼ Different contact configurations and locations are used to prevent mating of plugs and receptacles with different (non-compatible) voltages, polarity or amperage

## TESTING, RATINGS & LISTINGS

▼ UL 1682      ▼ CSA 182.1  
 ▼ IEC/EN 60309-1      ▼ AS 3123

These devices are only horsepower rated when coupled with a mechanical interlock switch. The manufacturers recommend against motor disconnection under load.

**NONE**

←----- PLUG & RECEPTACLE ----->

←----- HORSEPOWER ----->

←----- SWITCH ----->

▼ UL 1682 & UL Subject 2682      ▼ CSA 182.1  
 ▼ IEC/EN 60309-1      ▼ AS 3123

UL/CSA Horsepower rated - can be safely disconnected under full load on a routine basis

- ▼ UL/CSA listed as a Switch Rated Plug and Receptacle
- ▼ Approved by UL/CSA for use as a:
  - Motor Circuit Disconnect Switch
  - Branch Circuit Disconnect Switch
- ▼ UL/CSA Switch testing includes:
  - 50 times @ 6xFLA & .4-.5 power factor (PF) \*
  - 6000 times @ FLA & .75-.8 PF, plus 4000 mechanical operations
  - Short circuit make and withstand @  $\geq 65\text{kA}$ , 600V &  $\leq .15$  PF
- ▼ Applicable standards are:
  - UL Subject 2682 (used for both UL & CSA listing)
  - UL Subject 2682 was formerly UL miscellaneous file 98/508

\* DS100 and DS200 tested at 1.5 x rated ampacity & .75 - .8 PF

# WHICH PLUG WOULD YOU RATHER DISCONNECT?

# CODE COMPLIANCE – MELTRIC MAKES IT EASY...

## WHAT THE CODES REQUIRE

### NATIONAL ELECTRIC CODE

Articles 430.101 through 430.113 regulate motor disconnection means. They require motors to have readily accessible, Line of Sight disconnects that are either an approved switch or a properly rated plug and receptacle.

- ▼ **430.102** A disconnecting means must be located in sight from the motor and driven equipment.
- ▼ **430.107** The disconnecting means must be readily accessible.
- ▼ **430.109** The disconnecting means must be an approved switch or a horsepower rated plug & receptacle with ratings at least equivalent to the motor ratings.
- ▼ **430.110** The disconnecting means must have an amp rating at least 115% of the full-load current rating of the motor. The horsepower rating of the disconnecting means must be determined based on the sum of all resistive currents and the locked rotor current of the motor.

Only Meltric's DECONTACTOR™ Series Plugs & Receptacles pass testing at the 6xFLA current level required relative to locked rotor conditions.

### NFPA 70E

This OSHA consensus standard covers electrical safety related work practices and procedures for employees who work on or near exposed energized electrical conductors or circuit parts. Relevant requirements include:

Power must be proven to be off before performing work. This includes:

- ▼ The safe interruption of the load & opening of the disconnect
- ▼ Visual verification/voltage testing to ensure deenergization

The potential electrical hazard must be identified and documented.

- ▼ Flash Hazard analysis must be performed
- ▼ Flash protection boundaries must be determined

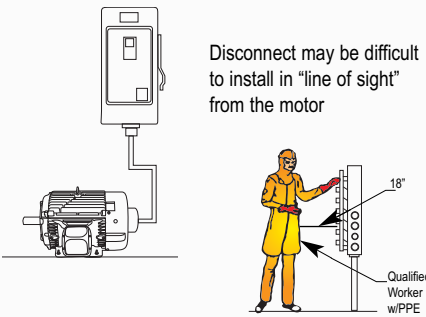
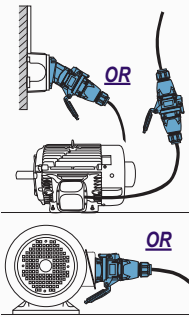
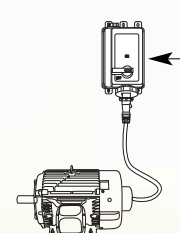
Appropriate steps must be taken to protect persons working near live parts or within the flash protection boundary.

- ▼ Personal Protective Equipment must be provided based on the relevant incident energy exposure levels (ca/cm<sup>2</sup>)
- ▼ Only properly qualified persons shall be allowed to perform work

By using Meltric's DECONTACTOR™ Series Plugs & Receptacles to connect equipment, users can avoid these requirements and procedures.

See published NFPA 70E standard for complete safety requirements.

## WHAT THE CODES MEAN RELATIVE TO MOTOR CHANGE-OUTS

MOTOR HARD-WIRED TO A BLADED DISCONNECT SWITCH	MOTOR CONNECTED WITH A MELTRIC MOTOR PLUG	MOTOR CONNECTED WITH A COMPETITIVE PLUG & RECEPTACLE
 <p>Disconnect may be difficult to install in "line of sight" from the motor</p> <p>18"</p> <p>Qualified Worker w/PPE</p>	 <ul style="list-style-type: none"> <li>▼ Cord connection allows easy "line of sight" location</li> <li>▼ Dead front eliminates access to live parts, so there is no need for PPE</li> <li>▼ Ability to safely make &amp; break under load eliminates the need for interlocks</li> <li>▼ ≥ 65kA short circuit make and withstand rating ensures safety during reenergization</li> </ul>	 <ul style="list-style-type: none"> <li>▼ Expensive mechanical interlocks are required since these plugs &amp; receptacles cannot safely make &amp; break under load</li> <li>▼ The interlock must be mounted on a fixed surface—this may make "line of sight" location more difficult</li> </ul>
<p><b>MOTOR CHANGE-OUT PROCESS</b></p> <ol style="list-style-type: none"> <li>1. Electrician opens disconnect switch</li> <li>2. Determine PPE requirements and obtain</li> <li>3. Remove disconnect cover</li> <li>4. Voltmeter test to verify deenergization</li> <li>5. Apply lockout/tagout</li> <li>6. Disconnect motor from hard-wiring</li> <li>7. Mechanic removes old/installs new motor</li> <li>8. Electrician connects motor to hard wiring</li> </ol>	<p><b>MOTOR CHANGE-OUT PROCESS</b></p> <ol style="list-style-type: none"> <li>1. Mechanic removes plug from receptacle</li> <li>2. Apply lockout/tagout as required</li> <li>3. Mechanic removes old/installs new motor</li> <li>4. Mechanic inserts plug into receptacle</li> </ol> <p style="text-align: center;"><i>Meltric Makes it Safe &amp; Easy</i></p>	<p><b>MOTOR CHANGE-OUT PROCESS</b></p> <ol style="list-style-type: none"> <li>1. Open interlock switch</li> <li>2. Determine PPE requirements &amp; obtain</li> <li>3. Remove interlock cover</li> <li>4. Voltmeter test to verify deenergization</li> <li>5. Remove plug</li> <li>6. Apply lockout/tagout as required</li> <li>7. Remove old/install new motor</li> <li>8. Insert plug into receptacle</li> </ol>

## MOTOR CHANGE-OUT DOWNTIME & COST REDUCTION

Using Meltric's DECONTACTOR™ Series Motor Plugs to connect motors instead of hard-wiring can help reduce motor change-out and downtime costs by as much as 50%. Pre-wiring replacement motors with Meltric plugs eliminates the time, cost and hassles of needing an electrician to do wiring during change-outs and perform associated safety-related work practices. Most importantly, you get your process back on-line in a fraction of the time.

The quick, safe & flexible connection capabilities of Meltric Motor Plugs makes them the choice for plug & play and modular process applications.

# MOTOR PLUGS

Meltric's **DECONTACTOR™ Series Motor Plugs** are a combination plug & receptacle and disconnect switch in the same device. These devices are UL horsepower and switch rated and have at least a 65kA short circuit make and withstand rating\*. With their unique ability to withstand high in-rush currents and their compact, watertight and dead front design, they are the perfect choice for the "line of sight" disconnect required on motors and other inductive loads. Optional pilot contacts can be added as required for control applications.

## DSN 20-60A



- ▼ 600VAC/250 VDC
- ▼ NEMA 4X, IP66/67
- ▼ Polyester Housing Material
- ▼ UL 1682/UL 2682/UL 1686
- ▼ UL, IEC & CSA Switch Rated (AC only)
- ▼ Silver-Nickel Pressure Contacts
- ▼ 100kA\* Short Circuit Make and Withstand Rating

## DS 20-200A



- ▼ 600VAC/250 VDC
- ▼ NEMA 3R
- ▼ Polyester & Metal Housings
- ▼ UL 1682/UL 2682/UL 1686
- ▼ UL, IEC & CSA Switch Rated (AC only)
- ▼ Silver-Nickel Pressure Contacts
- ▼ ≥65kA\* Short Circuit Make and Withstand Rating

## DB 30-100A



- ▼ 600VAC/250 VDC
- ▼ IP67
- ▼ Metal Housings
- ▼ UL 1682/UL 2682/UL 1686
- ▼ UL, IEC & CSA Switch Rated (AC only)
- ▼ Silver-Nickel Pressure Contacts
- ▼ 100kA\* Short Circuit Make and Withstand Rating
- ▼ Internal Arc Splitting/Blowing

\* Testing was performed with RK1 current limiting fuses sized at 400% of the highest full load motor ampacity associated with the devices hp ratings, except for DB100 which was tested with 250A fuses. Non-horsepower rated DS100 and DS200 devices were tested with RK5 time delay fuses sized at 100% of the devices rated ampacity.

DSN HORSEPOWER RATING		
VOLTAGE	hp RATING	DEVICE
120V Single Ø	1/2 hp	DSN 20
	1 hp	DSN 30
	2 hp	DSN 60
240V Single Ø	1 hp	DSN 20
	3 hp	DSN 30
	3 hp	DSN 60
208V 3Ø	2 hp	DSN 20
	5 hp	DSN 30
	7 1/2 hp	DSN 60
240V 3Ø	2 hp	DSN 20
	5 hp	DSN 30
	7 1/2 hp	DSN 60
480V 3Ø	5 hp	DSN 20
	10 hp	DSN 30
	20 hp	DSN 60
600V 3Ø	15 hp	DSN 30
	20 hp	DSN 60

DS HORSEPOWER RATING		
VOLTAGE	hp RATING	DEVICE
120V Single Ø	1/2 hp	DS 20
	3/4 hp	DS 30
	2 hp	DS 60 or DS 100C
240V Single Ø	1 1/2 hp	DS 20
	2 hp	DS 30
	3 hp	DS 60 or DS 100C
208V 3Ø	3 hp	DS 20
		DS 30
	7 1/2 hp	DS 60 or DS 100C
240V 3Ø	2 hp	DS 20
	3 hp	DS 30
	7 1/2 hp	DS 60 or DS 100C
480V 3Ø	5 hp	DS 20
	10 hp	DS 30
	20 hp	DS 60 or DS 100C
600V 3Ø	7 1/2 hp	DS 20
	25 hp	DS 60 or DS 100C

DB HORSEPOWER RATING		
VOLTAGE	hp RATING	DEVICE
120V Single Ø	1 1/2 hp	DB 30
	3 hp	DB 60
	7 1/2 hp	DB 100
240V Single Ø	3 hp	DB 30
	7 1/2 hp	DB 60
	10 hp	DB 100
208V 3Ø	7 1/2 hp	DB 30
	15 hp	DB 60
	30 hp	DB 100
240V 3Ø	7 1/2 hp	DB 30
	15 hp	DB 60
	30 hp	DB 100
480V 3Ø	10 hp	DB 30
	30 hp	DB 60
	60 hp	DB 100
600V 3Ø	10 hp	DB 30
	30 hp	DB 60
	60 hp	DB 100

**MELTRIC – THE SAFE, EASY & COST EFFECTIVE CHOICE FOR MOTOR CONNECTIONS**