

General Information

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Conditions of Sale and Shipment

Note: The following terms are for general information only. All conditions of sales are subject to change and are valid as determined in the latest terms and conditions publication of Moeller Electric Corporation (referred to herein after as "The Company").

1. Acceptance of orders:

All orders are subject to final acceptance by an authorized representative of the Company and are subject to the Company's terms and conditions in effect at the time of acceptance. The Company takes exception to any other terms and conditions except for such terms and conditions as the Company may expressly accept in writing.

2. Prices:

Prices and discounts are subject to change without notice. In the event of a net price change, the price of equipment on order but unshipped will be the price in effect on the date of shipment. In no case will the amount of a price increase exceed 10% of the price at which the order was accepted, except that, if the delivery is delayed upon instructions from the purchaser, prices shall be those in effect when the instructions are received to proceed with the order. Price reductions shall only apply to unshipped portions of outstanding orders. Any addition or alteration to an outstanding order will be accepted at prices in effect when the addition or alteration is accepted. Applicable taxes are additional.

3. Quotations:

All quotations are in accordance with the Company's interpretation of plans and specifications and only material shown on the Company's quotations are included. Written quotations automatically expire thirty (30) days from the date of issue unless sooner terminated by notice. Quotations are subject to all existing or future limitations and regulations issued by any government agency. In the event that a quotation is not accepted in its entirety, the Company reserves the right to decline any parts of the order based on such quotation.

All Stenographic, clerical or other errors are subject to correction.

4. Minimum Billing:

Orders amounting to less than \$ 100.00 net will be billed at \$ 100.00 plus the transportation charge, at a minimum of \$15.00.

5. Terms - Regular:

Terms to purchasers of satisfactory credit are: 30 days net from the date of invoice. Cash discounts, when applicable, are indicated on the face of the Company's invoice. To avoid delay in filling orders purchasers without previous experience with the Company should include credit references with the first order, or send a certified check or money order.

Any amount owed to the Company becomes due and payable immediately in case of change of ownership of the purchaser, attachment or execution against the purchaser or his representatives, unless the Company otherwise agrees.

6. Payments:

Payments should be made to the address indicated on the invoice, or to Moeller Electric Corporation, 25 Forge Parkway, Franklin, Massachusetts 02038.

7. Delivery:

The Company reserves the right to make delivery in installments, unless otherwise expressly stipulated in the contract for sale; and all such installments when separately invoiced shall be paid for when due per invoice, without regard to subsequent deliveries. Delay in delivery of any installment shall not relieve the purchaser of its obligations to accept remaining deliveries. Shipments delayed to accommodate the purchaser will be invoiced upon completion of fabrication and additional charges for warehousing, trucking and other incidental expenses created by the delay will be at the expense of the purchaser. Delivery is dependent upon prompt receipt of all specifications, final approved prints and any other details essential to the proper execution of the purchaser's order.

Claims for shortages or other errors must be reported in writing to the Company within 10 days after receipt of shipment. Failure to do so will constitute a waiver of all claims by the purchaser.

8. Shipping Terms:

The method and route of shipment is determined by the Company. When the purchaser specifies a method or routing of shipment other than that selected by the Company, the purchaser will be billed accordingly. No credits will be allowed in lieu of transportation in the case of pickups at the Company's warehouses, branches, or factory. No transportation charges can be deducted from a selling price.

When the destination can only be reached by ship, or air, shipment will be made F.O.B. point of shipping. Air freight, water freight, heavy lift charges, pier delivery charges, wharfage, marine insurance and the cost of stevedoring are chargeable to the purchaser. These terms include shipments to Alaska, Hawaii, Puerto Rico, and the Virgin Islands.

9. Packing other than standard:

If other than standard commercial packing is required the cost of such special packing (determinable only after packing is completed) will be charged to the purchaser.

Export packing shall be considered as packing other than standard.

10. Acceptance of orders:

The purchaser will be responsible for any applicable export license and all associated costs involved with said license on any export project.

11. Responsibility and Title:

Title in the equipment shall remain with the Company as security only and until full payment therefore. Risk of loss for the equipment shall pass to purchaser upon shipment from F.O.B. point of shipment.

12. Loss or Damage in Transit:

Conditions of Sale and Shipment

The Company does not hold itself responsible for any loss, damage, (obvious or concealed) or pilferage sustained in transit. Claims of such character should be made, by the purchaser, promptly against the transportation company. If the Company is notified of such claims, the Company will offer to lend assistance to secure adjustment. The Company employs experienced packers and cannot be held responsible for breakage that occurs after the Company's securing the "Received in Good Order" receipt from the transportation company.

13. Return of Merchandise:

No equipment may be returned unless authorization has been obtained from an authorized representative of the Company. Unauthorized returns of equipment cannot be accepted.

A. To be returned for credit:

Only unused equipment of current design may be returned for credit. Where a purchaser returns equipment for reasons of his own, a minimum restocking charge of 20% of billing, plus transportation charges, will be made. Any cost incurred in putting the equipment into saleable condition shall also be deducted from allowed credit. If return of goods is made necessary by fault of the Company, full credit will be allowed including transportation charges.

B. To be returned for replacement:

If the equipment is under guarantee and the return is made necessary because of defect in material and/or workmanship, providing permission is obtained from the Company for its return, the Company will replace the defective goods "no charge", and will assume the transportation charges.

C. Custom-built equipment:

Equipment built based upon purchaser specification cannot be returned for credit.

14. Cancellations:

Any order placed with the Company can be canceled by the purchaser provided that: a) the cancellation is agreed to in writing by the Company; and b) the purchaser agrees to compensate the Company for engineering, fabrication, outside sourcing of devices and any other demonstrated expenses incurred or commitments made by the Company up to the date of notice of cancellation and all charges incurred by the Company in respect of the cancellation.

15. Force Majeure:

The Company shall not be liable for any delay in the performance of orders or contracts or in the delivery or shipment of goods or for any loss and/or damages suffered by purchaser by reason of such delay when such delay is directly or indirectly caused by fire, floods, accidents, riots, acts of God, war, invasion, sabotage, terrorism and governmental interference or embargoes, strikes, labor difficulties, shortage of labor, fuel, power, materials or supplies or any other cause beyond the Company's reasonable control. In any event, the Company shall not be liable for special or consequential damages for loss of use.

Should such a delay occur, the delivery date shall be extended as may be necessary to compensate for the delay.

The Company shall not be liable for any change of dimensions, weights and materials as long as the change is nonessential for the proper performance of the product.

16. Guarantee:

The Company guarantees for a period of one (1) year from the date of the Company invoice that equipment furnished under the order will be of merchantable quality, free from defects in material, workmanship and design each as determined, at the date of shipment by the Company by generally recognized, applicable and accepted practices and procedures in the industry including any specifications furnished by the purchaser and agreed to in writing by the Company for incorporation into the equipment.

Satisfaction of this guarantee, consistent with other provisions herein, will be limited to the replacement or repair or modification of, or issuance of a credit for, the equipment involved at the Company's option, with the Company to determine the availability of service personnel and purchaser to pay associated service expenses: such guarantee satisfaction available only if: (a) the Company is promptly notified in writing upon discovery of an alleged defect and (b) the company's examination of the subject equipment discloses, to the Company's satisfaction, that any defect has not been caused by misuse, neglect, improper installation, improper operation, improper maintenance, repair or alteration, accident, or unusual deterioration or degradation of the equipment parts, thereof due to physical environment or due to electrical or electromagnetic noise environment. THIS GUARANTEE IS IN LIEU OF ALL OTHER GUARANTEES WHETHER EXPRESSED, IMPLIED OR STATUTORY, INCLUDING IMPLIED GUARANTEES OF MERCHANTABILITY OR FITNESS and thereby excludes certifications or the like for equipment performance, use or design with respect to any standard, regulation or the like (unless and to the extent independently approved in writing by the Company) AND EXTENDS ONLY TO THE CUSTOMER OR PURCHASER PURCHASING FROM THE COMPANY OR AN AUTHORIZED COMPANY DISTRIBUTOR.

17. Penalty Clauses:

The Company will not accept any liability for penalty clauses of any kind, written or implied, unless specifically approved in writing by the Company.

18. Nuclear Applications:

Unless otherwise agreed to in writing by a duly authorized representative of the Company, products sold hereunder are not intended for use in connection with, any nuclear facility or activity. The Company disclaims all liability for any nuclear damage, injury or contamination and purchaser shall indemnify the Company against such liability, whether as a result of breach of contract, warranty tort (including negligence) or otherwise.

The Company shall identify special controls which are manufactured and tested for use in connection with any nuclear installation or activity by the appropriate catalog number.

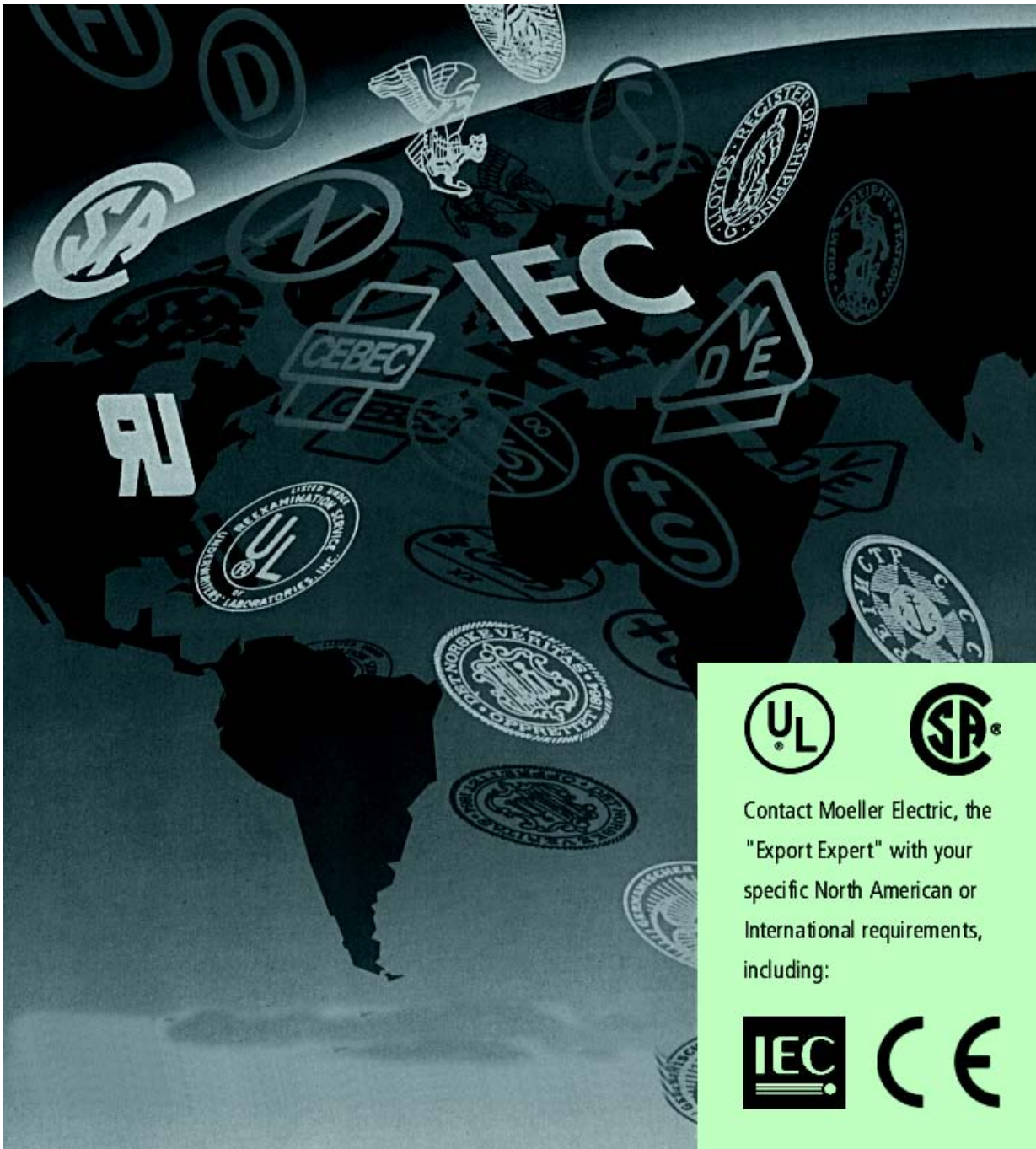
The Company will charge a price addition for control devices sold for nuclear applications. Any questions by purchaser regarding products or pricing should be referred to the Company for clarification.

Approvals and Certifications



Systems and devices for world markets.

Moeller Electric products are accepted in all countries where official approval is required. If you export, this fact can save you and your customers the trouble of having to deal with individual approval authorities.



At Moeller Electric, we take into account national and international specifications and regulations right from the design stage so that the equipment will meet the local specifications.



The image shows a dark silhouette of a world map. Overlaid on the map are numerous international certification logos in various colors and sizes. Prominent logos include UL (Underwriters Laboratories), IEC (International Electrotechnical Commission), CE (Conformité Européenne), and others like VDE, CSA, and TUV. The logos are scattered across the map, representing global reach.

Contact Moeller Electric, the "Export Expert" with your specific North American or International requirements, including:

Customer Service

Wherever electricity is used, Moeller Electric can be found

working towards tomorrow's world, providing a complete service to customers



Argentina	El Salvador	Latvia	Slovak Republic
Armenia	Estonia	Lebanon	Slovenia
Australia	Finland	Lithuania	Spain
Austria	France	Luxembourg	Sri Lanka
Azerbaijan	Germany	Macedonia	Sudan
Bahrain	Georgia	Malaysia	Surinam
Bangladesh	Great Britain	Mexico	Sweden
Belgium	Greece	Morocco	Switzerland
Bolivia	Guatemala	Namibia	Syria
Bosnia-Herzegovina	Haiti	Netherlands	Taiwan
Botswana	Hong Kong	New Zealand	Thailand
Brazil	Hungary	Nigeria	Trinidad
Bulgaria	Iceland	Norway	Tunisia
Canada	India	Pakistan	Turkey
Chile	Indonesia	Paraguay	Ukraine
China	Iran	Peru	Uganda
Columbia	Ireland	Philippines	United Arab Emirates
Croatia	Israel	Poland	United States of America
Cyprus	Italy	Portugal	Venezuela
Czech Republic	Japan	Republic of South Africa	Vietnam
Denmark	Jordan	Romania	Zaire
Dominican Republic	Kenya	Russia	Zambia
Ecuador	Korea	Saudi Arabia	Zimbabwe
Egypt	Kuwait	Singapore	

Moeller Electric has over 350 customer service facilities in over 90 countries around the world.

Wherever you are, you can quickly contact the technical specialists in a nearby Moeller Electric factory branch. Each factory branch is much more than just a technical sales office. It is a fully integrated facility which includes extensive local stock, a complete workshop for assembly, wiring and testing and a design office.

The resulting ability to respond quickly, without long communication channels and to be sensitive to local needs has proven to be an important factor in fulfilling our subjective of providing the best possible customer service in the industry - both here in North America and throughout the world.

Type Reference List

Type	Reference	Page	Type	Reference	Page
+A-NZM12	Shunt trip	09/083	A-NZM7	Shunt trips	09/016
+A-NZM9	Shunt trip	09/075	A-NZM9	Extension shaft	09/076
+AH1002-NZM9	Early-make auxiliary contact	09/074	A-PKZ0	Shunt trips	08/015
+AH121-NZM12	Early-make auxiliary contact	09/082	A-PKZ2-...	Shunt trips	08/038
+G5	Key-lockable handle	12/004	A...-NZM7	Extension shaft	09/022
+M12	Motor operator	09/083	AB-CI-K4/5	External mounting bracket kit	11/006
+M12S	Motor operator for quick-acting switches	09/083	AD.../...	Control panel busbar adapter	08/021, 048
+MS9	Motor operator for quick-acting switches	09/075	ADT...	Spacer	11/006, 013
+NHI22-NZM12	Standard auxiliary contact	09/082	AGM2-...-PKZ0	Trip-indicating auxiliary contact	08/015
+NHI22-NZM9	Standard auxiliary contact	09/074	AGM2...-PKZ2	Trip-indicating auxiliary contact	08/036
+PM	Wall or pole mounting bracket	12/003	AHI-NZMH4-NA	Early-make auxiliary contact	09/054
+R-NZM12	Rear operation shaft	09/085	AHI002-NZM6-NA	Early-make auxiliary contact	09/064
+RHI002-NZM9	Trip-indicating auxiliary contact	09/074	AK-PKZ0	Padlockable knob handle	08/019
+RHI21-NZM12	Trip-indicating auxiliary contact	09/082	AKDIL...M	Adapter set	03/055
+ST	Control circuit tap-off terminals	09/079	AR-AT0	Operating head	06/011
+T0	Lifting angle	12/004	AR-AT4	Operating head	06/018
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+U-NZM9	Undervoltage trips	09/075	ARK-ATR	Roller lever operator	06/012
+VHI002-NZM9	Early-make auxiliary contact	09/074	AT...	Reduced voltage starter, autotransformer type	03/048
+VHI21-NZM12	Early-make auxiliary contact	09/082	AT...-.../ZB	Safety interlock switches	06/029
01SDILM	Auxiliary contact module	03/013	AT0-...	Limit switches	06/006-010
02DIL	Auxiliary contact module	02/008, 009	AT0-...-...-ZB/ZX	Safety interlock switch	06/026
02DILE	Auxiliary contact module	02/004, 005 03/009	AT4/11-...	Oiltight limit switches	06/014-017
02DILEM	Auxiliary contact module	03/009	ATB11-...	Switch mechanisms	06/018
04DIL	Auxiliary contact module	02/008, 009	ATR-...-.../KG	Hasp-operated safety switches	06/028
04DILE	Auxiliary contact module	02/004, 005 03/009	ATR-...-.../TS	Hinge-operated safety switches	06/028
10SDILM	Auxiliary contact module	03/013	ATR-11-...	Limit switches	06/012, 013
11DDILE	Auxiliary contact module	02/004, 005 03/009	AVHI-NZM7	Early-make shunt trip	09/016
11DIL	Auxiliary contact module	02/008, 009	AWB2528-...	"EASY" documentation	01/011
11DILE	Auxiliary contact module	02/004, 005 03/009	B		
11DILEM	Auxiliary contact module	03/009	B3.(...)-PKZ0	Three-phase feeder bus connector	08/020
11DILM	Auxiliary contact module	03/013	B3....-PKZ2	Three-phase feeder bus connector	08/047
11SDILM	Auxiliary contact module	03/013	BK25/3-PKZ0	Connector feeder terminal	08/020
13DIL	Auxiliary contact module	02/008, 009	BL-CI(-VA)	Mounting strap kit	11/014
13DILE	Auxiliary contact module	02/004, 005 03/009	BS...-CI	Assembly kit	11/014
20DIL	Auxiliary contact module	02/008, 009	BT480	Paralleling bridge	02/025, 03/055
20DILE	Auxiliary contact module	02/004, 005 03/009	BT483	Connection tab	02/025
22DDILE	Auxiliary contact module	02/004, 005 03/009	C		
22DDILM	Auxiliary contact module	03/013	C-NZM7	Clip plate	09/026
22DIL	Auxiliary contact module	02/008, 009	C-NZMH4	Clip	09/059
22DILE	Auxiliary contact module	02/004, 005 03/009	C-PKZ0	Clip plate	08/019
22DILEM	Auxiliary contact module	03/009	C-PKZ2	Clip plate	08/047
22DILM	Auxiliary contact module	03/013	C...-P2	Fuse clip kit	10/021
251W...	2-speed, 1-winding starter	03/034	CI-K	Small insulating material enclosure	11/004, 005
252W...	2-speed, 2-winding starter	03/034	CI-PKZ0(-...)	Insulating material enclosure	08/018
31DIL	Auxiliary contact module	02/008, 009	CI...-...-NA	Enclosure with cover and flanges	11/008
31DILE	Auxiliary contact module	02/004, 005 03/009	CI...-.../T-NA	Enclosure with door and flanges	11/009
31DILM	Auxiliary contact module	03/013	CI...-PKZ2(-NA)	Enclosure for motor protectors	08/046
40DIL	Auxiliary contact module	02/008, 009	CI...X...-NA	Enclosure with cover	11/010
40DILE	Auxiliary contact module	02/004, 005 03/009	CI...X.../T-NA	Enclosure with door	11/011
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A-NZM6	Extension shaft	09/056, 066	DA(OV)-NZM7	Rotary drive mechanism	09/022
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			DIL...-...	Contactors with auxiliary contact module	03/015
			DIL.../...	Contactors with auxiliary contact module	03/015
			DIL.../11/Z...	FVNR Starter	03/032
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DILR...(D)	Industrial control relay	02/008-013	H-NZM9	Terminal cover	09/079
DIUL.../11/Z.../MV	FVR Starter	03/025	H-NZMH4	Terminal cover	09/059
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Technical Data

IEC Ratings

Utilization categories for contactors to IEC/EN 60 947-4-1, VDE 0660 part 102			Verification of electrical endurance						Verification of rated making and breaking capacities							
Type of current	Utilization category	Typical applications	Make			Break			Make			Break				
			I_e	$\frac{I}{I_e}$	$\frac{U}{U_e}$	$\cos \phi$	I_c	$\frac{U_r}{U_e}$	$\cos \phi$	I_e	$\frac{I}{I_e}$	$\frac{U}{U_e}$	$\cos \phi$	I_c	$\frac{U_r}{I_e}$	$\cos \phi$
			A							A						
AC	AC-1	Non-inductive or slightly inductive loads, resistance furnaces	all values	1	1	0.95	1	1	0.95	all values	1.5	1.05	0.8	1.5	1.05	0.8
	AC-2	Slip-ring motors: starting, switching off	all values	2.5	1	0.65	2.5	1	0.65	all values	4	1.05	0.65	4	1.05	0.65
	AC-3	Squirrel-cage motors: starting, switching off motors during running ⁴⁾	$I_e \leq 17$	6	1	0.65	1	0.17	0.65	$I_e \leq 100$	10	1.05	0.45	8	1.05	0.45
			$I_e > 17$	6	1	0.35	1	0.17	0.35	$I_e > 100$	10	1.05	0.35	8	1.05	0.35
	AC-4	Squirrel-cage motors: starting, plugging, inching	$I_e \leq 17$	6	1	0.65	6	1	0.65	$I_e \leq 100$	12	1.05	0.45	10	1.05	0.45
			$I_e > 17$	6	1	0.35	6	1	0.35	$I_e > 100$	12	1.05	0.35	10	1.05	0.35
	AC-5A	Switching of electric discharge lamps,									3.0	1.05	0.45	3.0	1.05	0.45
	AC-5B	Switching of incandescent lamps									1.5 ²⁾	1.05 ²⁾		1.5 ²⁾	1.05 ²⁾	
	AC-6A ³⁾	Switching of transformers														
	AC-6B ³⁾	Switching of capacitor banks														
AC-7A	Slightly inductive loads in household appliances and similar applications	as specified by the manufacturer								1.5	1.05	0.8	1.5	1.05	0.8	
AC-7B	Motor loads for household applications									8.0	1.05 ¹⁾		8.0	1.05 ¹⁾		
AC-8A	Hermetic refrigerant compressor motor control with manual resetting of overload trips ⁵⁾									6.0	1.05 ¹⁾		6.0	1.05 ¹⁾		
AC-8B	Hermetic refrigerant compressor motor control with automatic resetting of overload trips ⁵⁾									6.0	1.05 ¹⁾		6.0	1.05 ¹⁾		
AC-53A	Control of squirrel-cage motors with semiconductor contactors									8.0	1.05	0.35	8.0	1.05	0.35	
			I_e	$\frac{I}{I_e}$	$\frac{U}{U_e}$	L/R	I_c	$\frac{U_r}{U_e}$	L/R	I_e	$\frac{I}{I_e}$	$\frac{U}{U_e}$	L/R	I_c	$\frac{U_r}{I_e}$	L/R
			A			ms			ms	A			ms			ms
DC	DC-1	Non-inductive or slightly inductive loads, resistance furnaces	all values	1	1	1	1	1	1	all values	1.5	1.05	1	1.5	1.05	1
	DC-3	Shunt motors: starting, plugging, inching, dynamic braking	all values	2.5	1	2	2.5	1	2	all values	4	1.05	2.5	4	1.05	2.5
	DC-5	Series motors: starting, plugging, inching, dynamic braking	all values	2.5	1	7.5	2.5	1	7.5	all values	4	1.05	15	4	1.05	15
	DC-6	Switching of incandescent lamps									1.5 ²⁾	1.05 ²⁾		1.5 ²⁾	1.05 ²⁾	
Utilization categories for control switches to IEC/EN 60 947-5-1, VDE 0660 part 200			Normal conditions of use						Abnormal conditions of use							
Type of current	Utilization category	Typical applications	Make			Break			Make			Break				
			$\frac{I}{I_e}$	$\frac{U}{U_e}$	$\cos \phi$	$\frac{I_c}{I_e}$	$\frac{U_r}{U_e}$	$\cos \phi$	$\frac{I}{I_e}$	$\frac{U}{U_e}$	$\cos \phi$	$\frac{I_c}{I_e}$	$\frac{U_r}{I_e}$	$\cos \phi$		
AC	AC-12	Control of resistive and solid state loads with isolation by optocouplers	1	1	0.9	1	1	0.9	-	-	-	-	-	-		
	AC-13	Control of solid state loads with transformer isolation	2	1	0.65	1	1	0.65	10	1.1	0.65	1.1	1.1	0.65		
	AC-14	Control of small electromagnetic loads (max. 72 VA)	6	1	0.3	1	1	0.3	6	1.1	0.7	6	1.1	0.7		
	AC-15	Control of electromagnetic loads (> 72 VA)	10	1	0.3	1	1	0.3	10	1.1	0.3	10	1.1	0.3		
				$\frac{I}{I_e}$	$\frac{U}{U_e}$	$t_{0.95}$	$\frac{I_c}{I_e}$	$\frac{U_r}{U_e}$	$t_{0.95}$	$\frac{I}{I_e}$	$\frac{U}{U_e}$	$t_{0.95}$	$\frac{I_c}{I_e}$	$\frac{U_r}{I_e}$	$t_{0.95}$	
DC	DC-12	Control of resistive and solid state loads with isolation by optocouplers	1	1	1	1	1	1	-	-	-	-	-	-		
	DC-13	Control of electromagnets	1	1	6xP ⁶⁾	1	1	6xP ⁶⁾	1.1	1.1	6xP ⁶⁾	1.1	1.1	6xP ⁶⁾		
	DC-14	Control of electromagnetic loads having economy resistors in circuit	10	1	15	1	1	15	10	1.1	15	10	1.1	15		

Technical Data

IEC Ratings

Utilization categories for switch disconnectors, disconnectors, switches and fuse combination units			Verification of electrical endurance					Verification of rated making and breaking capacities								
to IEC/EN 60 947-3, VDE 0660 part 107			Make		Break			Make		Break						
Type of current	Utilization category	Typical applications	I_e	$\frac{I}{I_e}$	$\frac{U}{U_e}$	$\cos \varphi$	I_c	$\frac{U_r}{U_e}$	$\cos \varphi$	I_e	$\frac{I}{I_e}$	$\frac{U}{U_e}$	$\cos \varphi$	I_c	$\frac{U_r}{I_e}$	$\cos \varphi$
			A				$\frac{I}{I_e}$	$\frac{U_r}{U_e}$		A				$\frac{I}{I_e}$	$\frac{U_r}{I_e}$	
AC	AC-20A (B) ⁸⁾	Connecting and disconnecting under no-load conditions	all values	7)	7)	7)	7)	7)	7)	all values	7)	1.05	7)	7)	1.05	7)
	AC-21A (B) ⁸⁾	Switching of resistive loads, including slight overloads	all values	1	1	0.9	1	1	0.95	all values	1.5	1.05	0.95	1.5	1.05	0.95
	AC-22A (B) ⁸⁾	Switching of mixed resistive and inductive loads, including slight overloads	all values	1	1	0.8	1	1	0.8	all values	3	1.05	0.65	3	1.05	0.65
	AC-23A (B) ⁸⁾	Switching of motor loads and other highly inductive loads	all values	1	1	0.65	1	1	0.65	$I_e \leq 100$	10	1.05	0.45	8	1.05	0.45
										$I_e > 100$	10	1.05	0.35	8	1.05	0.35
			I_e	$\frac{I}{I_e}$	$\frac{U}{U_e}$	L/R	$\frac{I_c}{I_e}$	$\frac{U_r}{U_e}$	L/R	I_e	$\frac{I}{I_e}$	$\frac{U}{U_e}$	L/R	$\frac{I_c}{I_e}$	$\frac{U_r}{I_e}$	L/R
			A			ms	$\frac{I}{I_e}$	$\frac{U_r}{U_e}$	ms	A			ms	$\frac{I}{I_e}$	$\frac{U_r}{I_e}$	ms
DC	DC-20A (B) ⁸⁾	Connecting and disconnecting under no-load conditions	all values	7)	7)	7)	7)	7)	7)	all values	7)	1.05	7)	7)	1.05	7)
	DC-21A (B) ⁸⁾	Switching of resistive loads, including slight overloads	all values	1	1	1	1	1	1	all values	1.5	1.05	1	1.5	1.05	1
	DC-22A (B) ⁸⁾	Switching of mixed resistive and inductive loads, including slight overloads (e.g. shunt motors)	all values	1	1	2	1	1	2	all values	4	1.05	2.5	4	1.05	2.5
	DC-23A (B) ⁸⁾	Switching of highly inductive loads (e.g. series motors)	all values	1	1	7.5	1	1	7.5	all values	4	1.05	15	4	1.05	15
Notes:	1) $\cos \varphi = 0.45$ for $I_e \leq 100$ A; $\cos \varphi = 0.35$ for $I_e > 100$ A.	Moeller equipment is designed for the world's markets					Key									
	2) The tests are to be carried out with an incandescent lamp load	All equipment is manufactured and tested in accordance with national and international standards and regulations, the most important of which are listed below:					I= Current made I _c = Current broken I _e = Rated operational current U= Voltage U _e = Rated operational voltage U _r = Recovery voltage									
	3) The test data are to be derived from the test values for AC-3 or AC-4 according to Table VIII, EN 60 947-4-1.	IEC 60 439 Low-voltage switchgear and controlgear assemblies					t _{0.95} = Time in ms to reach 95% of the steady-state current									
	4) AC-3 category may be used for occasional inching (jogging) or plugging for limited time periods, e.g. for setting up a machine. During such limited time periods, the number of such operations should not exceed five per minute or ten in any ten minute period.	IEC 60 947-..., EN 60 947-... Low voltage switchgear and controlgear VDE 0660					P= U _e x I _e = rated power consumption in Watts									
	5) A hermetic refrigerant compressor motor is a combination consisting of a compressor and a motor, both of which are enclosed in the same housing, with no external shaft or shaft seals and with the motor operating in the refrigerant.	IEC 60 664 Insulation co-ordination including clearances and creepage distances for equipment VDE 0110														
	6) The value "6xP" results from an empirical relationship which is found to represent most DC magnetic loads to an upper limit of P = 50W, where 6xP = 300ms. Loads with a rated power consumption greater than 50W are assumed to consist of smaller loads in parallel. 300 ms is therefore an upper limit, irrespective of the power consumption value.	IEC 60 364-... Electrical installations of buildings VDE 0100														
	7) If the switching device has a making and/or breaking capacity, the figures for the current and the power factor (time constants) must be stated by the manufacturer.	IEC 60 204-..., EN 60 204-... Electrical equipment of industrial machines VDE 0113														
	8) A: frequent actuation B: occasional actuation	VDE 0105 Operation of electrical power installations														
		IEC 60 536 Protection against electric shock VDE 0106														

Technical Data

IEC Ratings

Degree of protection given to electrical apparatus by enclosures and covers, in accordance with IEC 60 529

	1st numeral		2nd numeral
	Protection of persons against contact with live parts	Protection of equipment against solid foreign bodies and dust	Protection of equipment against ingress of liquid
IP 00	No protection	No protection	No protection
IP 20	Protection against accidental contact with fingers	Protection against solid particles > 12mm diameter	No protection
IP 41	Protection against accidental contact with tools, etc.	Protection against solid particles > 1 mm diameter	Drops of condensed water have no harmful effect
IP 43	Protection against accidental contact with tools, etc.	Protection against solid particles > 1 mm diameter	No harmful effect from rain or water sprayed from vertical to 30° from horizontal
IP 54	Complete protection	No harmful deposits of dust in the interior	No harmful effect from splashing water, any direction
IP 55	Complete protection	No harmful deposits of dust in the interior	No harmful effect from hosed water
IP 65	Complete protection	Complete dust protection (dust-proof)	No harmful effect from hosed water
IP 66	Complete protection	Complete dust protection (dust-proof)	No harmful effect from temporary flooding
IP 67	Complete protection	Complete dust protection (dust-proof)	No harmful effect from being immersed in water
IP 68	Complete protection	Complete dust protection (dust-proof)	No harmful effect from being immersed in water for an indeterminate period
IP 69K	Complete protection	Complete dust protection (dust-proof)	No harmful effects from water directed against the enclosure under very high pressure and from any direction (high pressure/ steam jet hoses, 80 - 100 bar)

Protection against electric shock to IEC 60 536

IEC 60 536 covers the erection of electrical equipment and its arrangement in electrical installations with rated voltages up to 1000 V AC and 1500 V DC, with regard to protection against direct contact where operating elements such as pushbuttons and switches are located in the vicinity of live parts.

"Finger-proofing" relates only to the operating device, and only in the normal direction of operation. A clearance of at least 30 mm radius must be ensured from the centre point of the device to any live parts.

Degree of protection IP 20 is superior to "finger-proofing" in that it embodies protection against contact with electrical apparatus in any direction. Devices which are "finger-proof" and have degree of protection IP 00 can be provided with further protection against contact in the form of shrouding, if so desired.

Damp heat, constant to IEC 60 068 Part 2 - 3

In this test, the effects of a constant high level of humidity ($93 \pm 2/_{-3}$) % and a constant air temperature (40 ± 2)° C are observed over a prescribed duration.

Damp heat, cyclic to IEC 60 068, Part 2 - 30, Test Db

This test is used to assess the suitability of electrical products for operation and storage at high relative humidity levels combined with cyclical temperature fluctuations.

A test cycle consists of 12 hours at (40 ± 2)° C, with relative humidity of (93 ± 3)° C, and 12 hours at (25 ± 3)°C, with relative humidity of at least 95%.

Ambient temperature

Ambient temperature is the temperature of the room (e.g. factory bay or switchgear room), in which the open or enclosed device is installed, and with the proviso that this temperature must not be significantly influenced by heat losses from the device.

Cross reference for various IEC, UL/NEMA and CSA standards

Type of equipment	Standard numbers		
	IEC/EN	UL/NEMA	CSA
Contactors	60 947-4	508 / ICS-2	C 22.2-14 / E 14
Circuit breakers	60 947-2	489 / AB 1	C 22.2-5
Air break switches	60 947-3	98 / KS 1	C 22.2-4
Control switches	60 947-5	508 / ICS-2	C 22.2-14 / E 14
Motor starters	60 947-2	508 / ICS 2	C 22.2-14 / E 14
Machine tool assembly	60 204	508A* / ICS-2	C 22.2-14 / E 14
Motor control center	60 439	845 / ICS-2	C 22.2-14 / E 14
Enclosures	60 529	508 / 50 / 250	C 22.2-94

* Based on NFPA-79

1-866-595-9616
1-630-595-9515



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Technical Data

NEMA / EEMAC Ratings

General Information

Voltage ratings

NEMA and EEMAC Standards recognize that industrial control is normally applied to the point of power utilization and that this utilization voltage is somewhat lower than nominal system voltages. The NEMA Standard "Industrial Control and Systems - 1993" includes the following:

ICS 1-112.22 Rated Operational Voltage (U_o)

Low voltage ratings for industrial control apparatus are based on utilization voltages and shall be as follows:

- a) Alternating current, 60 Hertz, multiphase - 115, 200, 230, 400, 460 and 575 volts
- b) Alternating current, 60 Hertz, single phase - 115 and 230 volts
- c) Direct current - 115 and 230 volts

Individual manufacturers may choose to mark coils or control-circuit transformers at the utilization voltage (listed above) or the corresponding nominal system voltage (120, 208, 240, 416, 480 or 600 volts, 60 Hertz). Coils marked with voltage ratings in multiples of 115 volts are considered adequate for use on nominal system voltage ratings in multiples of 120 volts.

In line with the above, industrial control equipment in this catalog is listed at the utilization voltage. Circuit breakers are listed at their corresponding nominal system voltage.

Commonly called volts	System voltage	Utilization voltage
110-115-120	120	115
208	208	200
220-230-240	240	230
440-460-480	480	460
550-575-600	600	575

NEMA / EEMAC "Sizes"

Motor starters are sometimes referred to by their NEMA/EEMAC sizes. The NEMA Standard "Industrial Controls and Systems - 1993" (ICS 2-321.20) lists the following horsepower ratings for these sizes for non-plugging and non-jogging duty:

Three Phase			
575 volts		230 volts	
Size	HP	Size	HP
00	2	00	1 1/2
0	5	0	3
1	10	1	7 1/2
2	25	2	15
3	50	3	30
4	100	4	50
5	200	5	100
6	400	6	200
7	600	7	300
8	900	8	450
9	1600	9	800
460 volts		200 volts	
Size	HP	Size	HP
00	2	00	1 1/2
0	5	0	3
1	10	1	7 1/2
2	25	2	10
3	50	3	25
4	100	4	40
5	200	5	75
6	400	6	150
7	600	7	-
8	900	8	-
9	1600	9	-
Single Phase		115 volts	
230 volts		Size	HP
Size	HP	Size	HP
00	1	00	1/3
0	2	0	1
1	3	1	2
1P	5	1P	3
2	7 1/2	2	3

NEMA/EEMAC sizes are not shown in our catalog listings but are easily converted to HP and voltage by reference to the above tabulation. It should be recognized that the NEMA/EEMAC Standard on Motors and Generators (MG-1-1998) list more HP ratings than that are shown above. For many of these "in-between sizes", Moeller Electric offers contactors and starters, with performance guaranteed, sized for the motor HP, at more economical prices than the NEMA/EEMAC sizes.

NEC 2002

- General, 430.1 through 430.18 Part I
- Motor Circuit Conductors, 430.21 through 430.29 Part II
- Motor and Branch Circuit Overload Protection, 430.31 through 430.44 Part III
- Motor Branch Circuit Short-Circuit and Ground-Fault Protection, 430.51 through 430.58 Part IV
- Motor Feeder Short-Circuit and Ground-Fault Protection, 430.61 through 430.63 Part V
- Motor Control Circuits, 430.71 through 430.74 Part VI
- Motor Controllers, 430.81 through 430.91 Part VII
- Motor Control Centers, 430.92 through 430.91 Part VIII
- Disconnecting Means, 430.101 through 430.127 Part IX
- Over 600 Volts, Nominal, 430.121 through 430.127 Part X
- Protection of Live Parts - All Voltages, 430.131 through 430.133 Part XI
- Grounding - All Voltages, 430.141 through 430.145 Part XII
- Tables, Tables 430.147 through 430.151(B) Part XIII

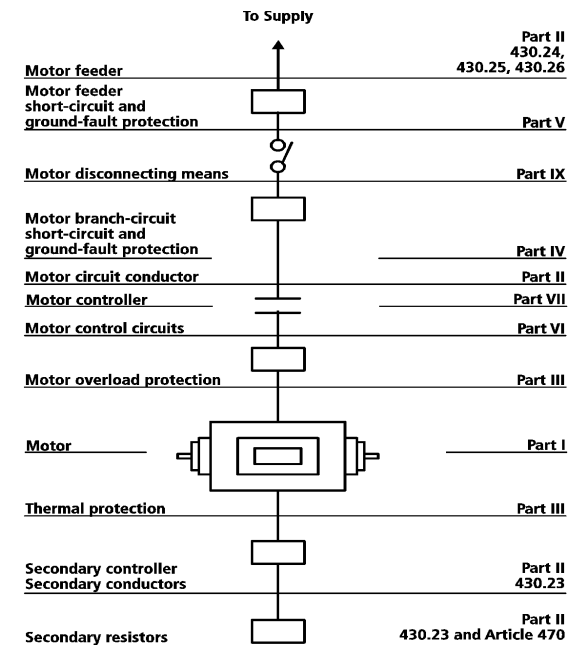


Diagram 430.1 from NEC Article 430

Useful Electrical Formulas

To find	AC System		DC System
	3 phase	1 phase	
HP output	$\frac{1 \times E \times 1.73 \times \%Eff \times \cos \phi}{746}$	$\frac{1 \times E \times \%Eff \times \cos \phi}{746}$	$\frac{1 \times E \times \%Eff}{746}$
Amperes when HP is known	$\frac{HP \times 746}{E \times 1.73 \times \%Eff \times \cos \phi}$	$\frac{HP \times 746}{E \times \%Eff \times \cos \phi}$	$\frac{HP \times 746}{E \times \%Eff}$
kVA	$\frac{1 \times E \times 1.73}{1000}$	$\frac{1 \times E}{1000}$	
Amperes when kVA is known	$\frac{kVA \times 1000}{1.73 \times E}$	$\frac{kVA \times 1000}{E}$	
kW	$\frac{1 \times E \times 1.73 \times \cos \phi}{1000}$	$\frac{1 \times E \times \cos \phi}{1000}$	$\frac{1 \times E}{1000}$
Amperes when kW is known	$\frac{kW \times 1000}{1.73 \times E \times \cos \phi}$	$\frac{kW \times 1000}{E \times \cos \phi}$	$\frac{kW \times 1000}{E}$

I = Amperes
E = Volts
kVA = Kilo-volt-amperes
kW = Kilowatts
%Eff = per cent efficiency
cos φ = power factor

Technical Data

Rating Codes, Environmental Protection Standards

Rating Codes for AC Control Circuit: Contacts at 50 and 60 Hz

Contact rating code designation ¹⁾	Thermal continuous test current	Maximum current, A ²⁾								VA	
		Make	Break	Make	Break	Make	Break	Make	Break	Make	Break
A 150	10	60	6.00	–	–	–	–	–	–	7200	720
A 300	10	60	6.00	30	3.00	–	–	–	–	7200	720
A 600	10	60	6.00	30	3.00	15	1.50	12	1.20	7200	720
B 150	5	30	3.00	–	–	–	–	–	–	3600	360
B 300	5	30	3.00	15	1.50	–	–	–	–	3600	360
B 600	5	30	3.00	15	1.50	7.5	0.75	6	0.60	3600	360
C 150	2.5	15	1.5	–	–	–	–	–	–	1800	180
C 300	2.5	15	1.5	7.5	0.75	–	–	–	–	1800	180
C 600	2.5	15	1.5	7.5	0.75	3.75	0.375	3.00	0.30	1800	180
D 150	1.0	3.60	0.60	–	–	–	–	–	–	432	72
D 300	1.0	3.60	0.60	1.80	0.30	–	–	–	–	432	72
E 150	0.5	1.80	0.30	–	–	–	–	–	–	216	36

Rating Codes for DC Control Circuit Contacts

Contact rating code designation ¹⁾	Thermal continuous test current	Max. Make or Break Current, A ³⁾			Max. Make and break VA at 300V or less
		125V	250V	301 to 600V	
N 150	10	2.2	–	–	275
N 300	10	2.2	1.1	–	275
N 600	10	2.2	1.1	0.40	275
P 150	5.0	1.1	–	–	138
P 300	5.0	1.1	0.55	–	138
P 600	5.0	1.1	0.55	0.20	138
Q 150	2.5	0.55	–	–	69
Q 300	2.5	0.55	0.27	–	69
Q 600	2.5	0.55	0.27	0.10	69
R 150	1.0	0.22	–	–	28
R 300	1.0	0.22	0.11	–	28

Notes:

- ¹⁾ The numerical suffix designates the maximum voltage design values, which shall be 600V, 300V, and 150V for suffixes 600, 300, and 150 respectively.
- ²⁾ For maximum ratings at voltages between the maximum design value and 120V, the maximum make-and-break ratings shall be obtained by dividing the volt-ampere rating by the applicable voltage. For voltages below 120V, the maximum make current shall be the same as for 120V and the maximum break current shall be obtained by dividing the break volt-ampere by the application voltage, but shall not exceed the thermal continuous test current.
- ³⁾ For maximum ratings at 300V or less, the maximum make-and-break ratings shall be obtained by dividing the volt-amperes rating by the application voltage, but shall not exceed the thermal continuous test current.

Source: CSA standard C22.2 No. 24-M 1995, UL 508 Tables 123.1 and 123.2 1999 (17th edition)

Terminal Capacities

General Information

Device	Copper Conductors																								Terminal screw or bolt
	One conductor												One conductor												
	Cross section: AWG												Cross section: AWG												
	18	14	10	6	3	1	2/0	4/0	250	350	500	18	14	10	6	3	1	2/0	4/0	250	350	500			
16	12	8	4	2	1/0	3/0	300	400	600	16	12	8	4	2	1/0	3/0	300	400	600						
Control circuit devices																									
RMQ16																									1)
Compact light	[18-14]												[18-14]												20 - 16 AWG
RMQ-Titan, FAK	[18-14]												[18-14]												
- screw terminal	[18-14]												[18-14]												20 - 14 AWG
- screwless	[18-14]												[18-14]												22 - 14 AWG
Limit switches																									
ATO, AT(R), AT4	[18-14]												[18-14]												
Industrial control relays																									
DILER(-G)	[18-14]												[18-14]												
DILR(-G)	[18-14]												[18-14]												
Control relay																									
EASY	[18-14]												[18-14]												28 - 14 AWG
Electronic safety relays																									
ESR3, ESR4	[18-14]												[18-14]												
Electronic measuring relays																									
EMR4	[18-14]												[18-14]												
Electronic timing relays																									
DILET	[18-14]												[18-14]												
ETR4	[18-14]												[18-14]												20 - 14 AWG
Contactors																									
DILEM	[18-14]												[18-14]												
DILH00M, DIL00(A)M(-G)	[18-14]												[18-14]												
DILH0M, DIL0(A)M(-G)	[18-14]												[18-14]												
DILH1M, DIL1(A)M(-G)	[18-14]												[18-14]												
DILH2M, DIL2(A)M(-G)	[18-14]												[18-14]												
DIL3M80	[18-14]												[18-14]												
DIL4M115	[18-14]												[18-14]												
DILM185(225)	[18-14]												[18-14]												
DILM250(300) (400)	[18-14]												[18-14]												
DILM500	[18-14]												[18-14]												
DILM580(650)	[18-14]												[18-14]												
DILM750(820)	[18-14]												[18-14]												
P1DILEM	[18-14]												[18-14]												
DILH00M/P1, P1DIL00M	[18-14]												[18-14]												
DILH0M/P1, P1DIL0M	[18-14]												[18-14]												
DILH1M/P1, P1/DIL1M	[18-14]												[18-14]												
DILH2M/P1, P1/DIL2M	[18-14]												[18-14]												
Auxiliary terminals	[18-14]												[18-14]												

Standard with terminal bolts, wiring terminals are optional



Notes: 1) 2.8 x 0.8mm fast-on terminal; see page 05/061 for crimp connector

Terminal Capacities

General Information

Device	Copper Conductors																				Terminal screw or bolt	
	One conductor										Two conductors											
	Cross section: AWG										Cross section: AWG											
	18	14	10	6	3	1	2/0	4/0	250	350	500	18	14	10	6	3	1	2/0	4/0	250		350	500
16	12	8	4	2	1/0	3/0		300	400	600	16	12	8	4	2	1/0	3/0		300	400	600	
Overload relays																						
ZE																						
Z00, EZ00																						
Z1, EZ1																						
Z5.../K3																						
Z5.../K4																						
Z5-.../FF250																					1)	
ZW7																						
ZEV																					see page 04/026-029 for all options	
Auxiliary																						
Thermistor tripping unit																						
EMT6																					20 - 14 AWG	
Cam switches																						
T0																						
T3																						
T5B																						
Manual motor controllers																						
P1																						
P3																						
Motor protectors																						
PKZM0, SE00																						
PKZ2, S-PKZ2																						
Auxiliary																						
Circuit breakers																						
NZM																					see section 09 for all terminal options	
Supplementary protectors																						
FAZ																						
Auxiliary																						
Disconnect switches																						
P2-30(/F-...)																						
P2-60(100)(/F-...)																						
	18	14	10	6	3	1	2/0	4/0	250	350	500	18	14	10	6	3	1	2/0	4/0	250	350	500
	16	12	8	4	2	1/0	3/0		300	400	600	16	12	8	4	2	1/0	3/0		300	400	600
	Cross section: AWG										Cross section: AWG											
	One conductor										Two conductors											



Notes: 1) Wiring terminals are optional

Weights

Type	Weight kg	Type	Weight kg	Type	Weight kg
Control relays		Thermal overload relays		Limit switches	
EASY200-EASY	0.070	ZE(Z 00)	0,07 (0,13)	AT0...I	0,05
EASY400-DP	0.150	Z1(Z 1-75)	0,21 (0,34)	AT0...IA	0,07
EASY204-POW	0.250	EZ00(EZ 1)	0,13 (0,13)	AT0...I/RS	0,06
EASY205-ASI	0.120	Z 5-.../SK3(KK3)	1,3 (1,44)	AT0...IA/RS	0,08
EASY412-...	0.200	Z 5-.../SK4(KK4)	1,41 (1,64)	AT0...I/R	0,07
EASY6...	0.300	Z 5-.../FF6	1,55	AT0...IA/R	0,09
		ZW7	0,8	AT0...I/V	0,10
		ZWA-6,3 to 100 (205)	0,6 (1,0)	AT0...IA/V	0,12
		ZWA-500 (820)	1,9 (3,2)	AT0...I/H	0,08
Control relays				AT0...IA/H	0,10
DILER(-G)	0,17 (0,2)			AT0...I/AR	0,06
DILR22 (31, 40, 22D)	0,32	RMQ-Titan control circuit devices		AT0...IA/AR	0,08
DILR40/04		M22-DD-...	0.015	AT0...I/WR	0,06
(13, 22, 40)	0,37	M22-PV	0.053	AT0...IA/WR	0,08
DILR44(53)D	0,37	M22-PVS	0.060	AT0...I/F	0,07
DILR22/TPE(D)11	0,40	M22-D-...	0.016	AT0...IA/F	0,09
DILR22		M22-DH-...	0.017	AT0...I/ZR	0,08
(31, 40, 22D)-G	0,50	M22-DP-...	0.019	AT0...IA/ZR	0,1
DILR40-G/04		M22-DPR-...	0.020	AT0...I/ZS	0,08
(13, 22, 40)	0,55	M22-W	0.014	AT0...IA/ZS	0,1
DILR44 (53) D-G	0,55	M22-M3	0.030	ATR...I	0,05
DILR22-G/TPE(D)11	0,58	M22-WS	0.050	ATR...IA	0,07
DILR22(31, 40)-G/V	0,60	M22-L-...	0.009	AT4.../R316	0,230
02(11, 20)DIL	0,03	M22-DL-...	0.010	AT4.../V	0,270
04(13, 22, 40)DIL	0,05	M22-WLK-...	0.013	AT4.../H	0,240
TPE(D)11DIL	0,08	M22-K10(01)	0.010	AT4.../S (/RS)	0,170
VDIL	0,10	M22-AK11	0.027	AT4.../AR	0,170
ETR4	0,10	M22-LED-...	0.011	AT4.../F	0,170
		M2-E1(2)	0.060 (0.075)	AT4.../2	0,180
Contactors		M22-E3(4)	0.096 (0.160)	ATB11...	0,055
DILEM(-G)	0,17 (0,2)	M22-E5(6)	0.160 (0.210)	ATB12(21)...	0,078
DILEM(-G)	0,17 (0,2)	M22-I1(2)	0.159 (0.240)	I-AT4	0,095
DIL00M(AM)	0,32	M22-I3(4)	0.268 (0.337)	IA-AT4	0,120
DIL0M(AM)	0,42	M22-I6(12)	0.370 (1.250)	IB-AT4	0,150
DIL1M(AM)	0,71			AT4.../ZB	0,210
DIL2M(AM)	0,95	RMQ16 control circuit devices		AT0...-ZB	0,085
DIL3M80	2,0	Q18(25) D...	0,01	AT0...-ZBZ/...	0,440
DIL4M115	2,9	Q18(25) L...	0,01		
DILM 185	6,5	Q18(25) W...	0,01	Cam switches	
DILM225	6,5	Q18(25) S...	0,02	surface mounting	
DILM250	6,5	E8	0,08	T0-1(4)-.../11	0,22 (0,30)
DILM300	8,0	I8	0,3	T0-3(4)-.../12	0,5 (0,67)
DILM400	8,0	I(E)LP...	0,13 (0,25)	T5B-1(4)-.../14	0,72 (0,8)
DILM500	8,0	E10(E01)	0,003		
DILM580	15,0			flush mounting	
DILM650	15,0	Signal towers		T0-1-.../E	0,12
DILM750	15,0	SL-100-L-RGY/...	0.49	each additional unit:	0,03
DILM820	15,0	SL-100-L-RG/...	0.38	T3-1-.../E	0,19
		SL-100-L-W(R-G)/...	0.27	each additional unit:	0,04
Reversing contactors		SL-100-FL...(W(R)	0.29	T5B-1-.../E	0,38
DIULEM	0,42	SL-100-AP...	0.265	each additional unit:	0,1
DIUL00AM	0,8			rear mounting	
DIUL0M(AM)	1,0			T0.../Z	0,14
DIUL1AM	1,6			each additional unit:	0,03
DIUL2AM	2,3			T3-1-.../Z	0,26
DIUL3M80	5,5			each additional unit:	0,04
DIUL4M115	6,5			T5B-1-.../Z	0,5
				each additional unit:	0,1

Notes:

This table contains only the weights of the individual components and certain equipment combinations. Weights of further combinations can be found by adding/subtracting the individual weights. A small percentage should be added where applicable for wiring and accessories (e.g. BT assembly parts, screws, etc.)

Weights

Type	Weight kg	Type	Weight kg
Motor protectors		Small enclosures	
PKZM0	0,30	CI-K2-100-TS (M)	0,35 (0,48)
NHI11-PKZ0	0,034	CI-K2-145-TS (M)	0,43 (0,56)
NHI12-PKZ0	0,042	CI-K3-125-TS (M)	0,58 (0,73)
NHI21-PKZ0	0,042	CI-K3-160-TS (M)	0,68 (0,82)
NHI2-115-PKZ0	0,090	CI-K4-125-TS (M)	0,82 (1,03)
AGM2...-PKZ0	0,035	CI-K4-160-TS(M)	0,95 (1,16)
A-PKZ0	0,082	CI-K5-125-TS (M)	1,09 (1,5)
U-PKZ0	0,082	CI-K5-160-TS (M)	1,23 (1,65)
S(E) 00-11-PKZ0	0,23(0,26)		
B3.0/2(0/4)-PKZ0	0,032 (0,07)		
B3.1/2(1/3)-PKZ0	0,038 (0,062)		
B3.1/4(1/5)-PKZ0	0,086 (0,11)		
B3.2/2(2/4)-PKZ0	0,04 (0,09)		
PKZ2	0,45		
ZM-...-PKZ2	0,22		
NHI 11-PKZ2	0,09		
NHI 22-PKZ2	0,1		
NHI S-PKZ2	0,18		
AGM-PKZ2	0,04		
R-PKZ2	0,5		
U(A)-PKZ2	0,19		
S-PKZ2	0,85		
CL-PKZ2	0,52		
Circuit breakers		Enclosures	
NZM(S, H)4-...	2,0	CI23E(X)-125	1,3 (1,50)
NZM(S, H)6-...	2,5	CI23E(X)-150	1,42 (1,63)
NZM7-...	2,3	CI43E(X)-125	1,88 (2,29)
NZM(S, H)9-...	7,0	CI43E(X)-150	2,02 (2,44)
NZM10-.../ZM-...	9,1	CI43E(X)-200	2,44 (2,85)
NZM12-...	34,0	CI44E(X)-125	2,58 (2,90)
		CI44E(X)-150	2,75 (3,08)
		CI44E(X)-200	3,11 (3,44)
		CI44E(X)-250	3,37 (3,70)
		CI45E(X)-200	4,3 (4,70)
		CI23-125	1,23
		CI23-150	1,35
		CI43-125	1,78
		CI43-150	1,92
		CI43-200	2,34
		CI44-125	2,32
		CI44-150	2,50
		CI44-200	2,86
		CI44-250	3,11
		CI45-200	4,1
		CI48-200	4,62
		CI48-250	5,13
Disconnect switches		Insulating flanges	
N6-...	1,5	FL1-X	0,12
P7-...	2,0	FL2-X	0,16
N9-...	5,5	FL3-X (1, 2)	0,21
N12-...	20,0	FL4-X (1, 2, 3, 4, 5)	0,30
P1-.../I2	0,6		
P3-63/I4	0,8		
P3-100/I5	1,2		
Motor operators		Mounting plates	
MS9...	3,6	M3-CI23 (43)	0,79 (1,96)
R-NZM10	5,5	M3-CI44 (48)	2,80 (5,50)
M12 (S)...	12,0	M3-CI 45	3,50
		IM4-CI23 (43)	0,5
		IM4-CI44 (48)	0,7 (1,6)
Supplementary protectors		Pre-drilled plates	
FAZ... 1-pole (2-pole)	0,13 (0,26)	L1-CI23	0,79
FAZ... 3-pole (4-pole)	0,39 (0,52)	L3/5-CI23	0,79
		L1-CI43	1,96
		L3-CI43	1,96
		L5-CI43	1,96
		L1-CI44	2,80
		L5-CI44	2,80
		L5-CI48	5,50

Useful Tables

General Information

Table 430-91: Motor Controller Enclosure Section Table

provides a degree of protection against the following environmental conditions	For Outdoor Use						
	Enclosure Type Number ¹⁾						
	3	3R	3S	4	4X	6	6P
Incidental contact with the enclosed equipment	x	x	x	x	x	x	x
Rain, snow and sleet	x	x	x	x	x	x	x
Sleet *	-	-	x	-	-	-	-
Windblown dust	x	-	x	x	x	x	x
Hosedown	-	-	-	x	x	x	x
Corrosive agents	-	-	-	-	x	-	x
Occasional temporary submersion	-	-	-	-	-	x	x
Occasional prolonged submersion	-	-	-	-	-	-	x

* mechanism shall be operable when ice covered

provides a degree of protection against the following environmental conditions	For Indoor Use										
	Enclosure Type Number ¹⁾										
	1	2	4	4X	5	6	6P	12	12K	13	
Incidental contact with the enclosed equipment	x	x	x	x	x	x	x	x	x	x	x
Falling dirt	x	x	x	x	x	x	x	x	x	x	x
Falling liquids and light splashing	x	x	x	x	x	x	x	x	x	x	x
Circulating dust, lint, fibers and flyings	-	-	x	x	-	x	x	x	x	x	x
Settling airborne dust, lint, fibers and flyings	-	-	x	x	x	x	x	x	x	x	x
Hosedown and splashing water	-	-	x	x	-	x	x	-	-	-	-
Oil and coolant seepage	-	-	-	-	-	-	-	x	x	x	-
Oil or coolant spraying and splashing	-	-	-	-	-	-	-	-	-	x	-
Corrosive agents	-	-	-	x	-	-	x	-	-	-	-
Occasional temporary submersion	-	-	-	-	-	x	x	-	-	-	-
Occasional prolonged submersion	-	-	-	-	-	-	x	-	-	-	-

¹⁾ Enclosure type number shall be marked on the motor controller enclosure

Table 430-10(b): Minimum Wire Bending Space at the Terminals of Enclosed Motor Controllers (in inches)

Size of Wire AWG or kcmil	Wires per terminal *	
	1	2
14 - 10	not specified	-
8 - 6	1 ½	-
4 - 3	2	-
2	2 ½	-
1	3	-
1/0	5	5
2/0	6	6
3/0 - 4/0	7	7
250	8	8
300	10	10
350 - 500	12	12
600 - 700	14	16
750 - 900	18	19

* where provision for 3 or more wires exists, the minimum wire bending space shall be in accordance with the requirements of Article 373

**Table 310-16: Allowable Ampacities of Insulated Conductors Rated 0 through 2000 Volts, 60° to 90°C (140° to 194°F).
Not more than Three Current-carrying Conductors in Raceway or Cable or Earth (directly buried), based on Ambient Temperature of 30°C (86°F)**

Size	Temperature Rating of Conductor, see Table 310-13						Size
	60°C 140°F	75°C 167°F	90°C 194°F	60°C 140°F	75°C 167°F	90°C 194°F	
AWG kcmil	Types TW ¹⁾ UF ¹⁾	Types FEPW ¹⁾ RH ¹⁾ RHW ¹⁾ THHW ¹⁾ THW ¹⁾ THWN ¹⁾ XHHW ¹⁾ USE ¹⁾ ZW ¹⁾	Types TBS SA SIS FEP ¹⁾ FEPB ¹⁾ MI RHH ¹⁾ RHW-2 THHN ¹⁾ THHW ¹⁾ THW-2 ¹⁾ USE-2 XHH XHHW ¹⁾ XHHW-2 ¹⁾ ZW-2	Types TW ¹⁾ UF ¹⁾	Types FEPW ¹⁾ RH ¹⁾ RHW ¹⁾ THHW ¹⁾ THW ¹⁾ THWN ¹⁾ XHHW ¹⁾ USE ¹⁾ ZW ¹⁾	Types TBS SA SIS FEP ¹⁾ FEPB ¹⁾ MI RHH ¹⁾ RHW-2 THHN ¹⁾ THHW ¹⁾ THW-2 ¹⁾ USE-2 XHH XHHW ¹⁾ XHHW-2 ¹⁾ ZW-2	AWG kcmil
	Copper			Aluminum or Copper-clad Aluminum			
18	...	...	14	...	...	...
16	...	...	18	...	...	...
14	20 ¹⁾	20 ¹⁾	25 ¹⁾	
12	25 ¹⁾	25 ¹⁾	30 ¹⁾	20 ¹⁾	20 ¹⁾	25 ¹⁾	
10	30	35 ¹⁾	40 ¹⁾	25	30 ¹⁾	35 ¹⁾	
8	40	50	55	30	40	45	
6	55	65	75	40	50	60	
4	70	85	95	55	65	70	
3	85	100	110	65	75	85	
2	95	115	130	75	90	100	
1	110	130	150	85	100	115	
1/0	125	150	170	100	120	135	
2/0	145	175	195	115	135	150	
3/0	165	200	225	130	155	175	
4/0	195	230	260	150	180	205	
250	215	255	290	170	205	230	
300	240	285	320	190	230	255	
350	260	310	350	210	250	280	
400	280	335	380	225	270	305	
500	320	380	430	260	310	350	
600	355	420	475	285	340	385	
700	385	460	520	310	375	420	
750	400	475	535	320	385	435	
800	410	490	555	330	395	450	
900	435	520	585	355	425	480	
1000	455	545	615	375	445	500	
1250	495	590	665	405	485	545	
1500	520	625	705	435	520	585	
1750	545	650	735	455	545	615	
2000	560	665	750	470	560	630	

Correction Factor

Ambient Temp °C	For ambient temperatures other than 30°C (86°F), multiply the allowable ampacities shown above by the appropriate factor shown below						Ambient Temp °F
21-25	1.08	1.05	1.04	1.08	1.05	1.04	70-77
26-30	1.00	1.00	1.00	1.00	1.00	1.00	78-86
31-35	.91	.94	.96	.91	.94	.96	87-95
36-40	.82	.88	.91	.91	.94	.96	96-104
41-45	.71	.82	.87	.71	.82	.87	105-113
46-50	.58	.75	.82	.58	.75	.82	114-122
51-55	.41	.67	.76	.41	.67	.76	123-131
56-60	...	.58	.71	...	.58	.71	132-140
61-70	...	.33	.58	...	.33	.58	141-158
71-80	...	...	.41	...	...	.41	159-176

¹⁾ Unless otherwise specifically permitted elsewhere in this code, the overcurrent protection for conductor types marked with ¹⁾ shall not exceed 15 amperes for No. 14, 20 amperes for No. 12 and 30 amperes for No. 10 copper, or 15 amperes for No. 12 and 25 amperes for No. 10 aluminum and copper-clad aluminum after any correction factors for ambient temperature and number of conductors have been applied.

Conversion Tables

General Information

Table A : Millimeters to Inches

mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches
1	0.0393	26	1.0236	51	2.0078	76	2.9921	105	4.1338	260	10.2362
2	0.0787	27	1.0629	52	2.0472	77	3.0315	110	4.3307	270	10.6299
3	0.1181	28	1.1023	53	2.0866	78	3.0708	115	4.5275	280	11.0236
4	0.1574	29	1.1417	54	2.1259	79	3.1102	120	4.7244	290	11.4173
5	0.1968	30	1.1811	55	2.1653	80	3.1496	125	4.9212	300	11.8110
6	0.2362	31	1.2204	56	2.2047	81	3.1889	130	5.1181	325	12.7952
7	0.2755	32	1.2598	57	2.2440	82	3.2283	135	5.3149	350	13.7795
8	0.3149	33	1.2992	58	2.2834	83	3.2677	140	5.5118	375	14.7637
9	0.3543	34	1.3385	59	2.3228	84	3.3070	145	5.7086	400	15.7480
10	0.3937	35	1.3779	60	2.3622	85	3.3464	150	5.9055	425	16.7322
11	0.4330	36	1.4173	61	2.4015	86	3.3858	155	6.1023	450	17.7165
12	0.4724	37	1.4566	62	2.4409	87	3.4252	160	6.2992	475	18.7007
13	0.5118	38	1.4960	63	2.4803	88	3.4645	165	6.4960	500	19.6850
14	0.5511	39	1.5354	64	2.5196	89	3.5039	170	6.6929	525	20.6692
15	0.5905	40	1.5748	65	2.5590	90	3.5433	175	6.8897	550	21.6535
16	0.6299	41	1.6141	66	2.5984	91	3.5826	180	7.0866	575	22.6377
17	0.6692	42	1.6535	67	2.6378	92	3.6220	185	7.2834	600	23.6220
18	0.7086	43	1.6929	68	2.6771	93	3.6614	190	7.4803	650	25.5905
19	0.7480	44	1.7322	69	2.7165	94	3.7007	195	7.6771	700	27.5590
20	0.7874	45	1.7716	70	2.7559	95	3.7401	200	7.8740	750	29.5275
21	0.8267	46	1.8110	71	2.7952	96	3.7795	210	8.2677	800	31.4960
22	0.8661	47	1.8503	72	2.8346	97	3.8189	220	8.6614	850	33.4645
23	0.9055	48	1.8897	73	2.8740	98	3.8582	230	9.0551	900	35.4330
24	0.9448	49	1.9291	74	2.9133	99	3.8976	240	9.4488	950	37.4015
25	0.9842	50	1.9685	75	2.9527	100	3.9370	250	9.8425	1000	39.3700

Table B : Decimal to Fraction

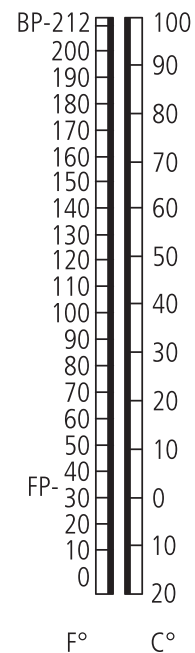
decimal	fraction equivalent	decimal	fraction equivalent
0.0156	1/64	0.5156	33/64
0.0312	1/32	0.5312	17/32
0.0469	3/64	0.5469	35/64
0.0625	1/16	0.5625	9/16
0.0781	5/64	0.5781	37/64
0.0937	3/32	0.5937	19/32
0.1094	7/64	0.6094	39/64
0.125	1/8	0.625	5/8
0.1406	9/64	0.6406	41/64
0.1562	5/32	0.6562	21/32
0.1719	11/64	0.6719	43/64
0.1875	3/16	0.6875	11/16
0.2031	13/64	0.7031	45/64
0.2187	7/32	0.7187	23/32
0.2344	15/64	0.7344	47/64
0.25	1/4	0.74	3/4
0.2656	17/64	0.7656	49/64
0.2812	9/32	0.7812	25/32
0.2969	19/64	0.7969	51/64
0.3125	5/16	0.8125	13/16
0.3281	21/64	0.8281	53/64
0.3437	11/32	0.8437	27/32
0.3594	23/64	0.8594	55/64
0.375	3/8	0.875	7/8
0.3906	25/64	0.8906	57/64
0.4062	13/32	0.9062	29/32
0.4219	27/64	0.9219	59/64
0.4375	7/16	0.9375	15/16
0.4531	29/64	0.9531	61/64
0.4687	15/32	0.9687	31/32
0.4844	31/64	0.9844	63/64
0.5	1/2	1.0	1

How to use conversion table A and B

To convert millimeters to inches:

- a) 27mm - from table A, 27mm = 1.0629"
+ from table B, 0.0629 = 1/16" → 27mm = 1-1/16"
- b) 295mm - from table A, 290mm = 11.4173"
+ 5mm = 0.1968"
+ from table B, 0.6141 = 39/64" → 295mm = 11-39/64"

To convert	to	multiply by
Atmospheres	pounds per square inch	14.7
Cubic centimeters	cubic inches	0.06102
Cubic inches	cubic centimeters	16.39
Feet	meters	0.3048
Gallons (Br. imp.)	liters	4.546
Gallons (U.S.)	liters	3.785
Grams	ounces (avoirdupois)	0.0353
HP	kilowatts	0.7457
Kilograms	pounds	2.205
Kilograms	tons (2,000 lb.)	0.001102
Kilograms	tons (2,240 lb.)	0.0009842
Kilometers	miles	0.6214
Kilowatts	HP	1.341
Joules	calories	0.239
Liters	gallons (Br. imp.)	0.220
Liters	gallons (U.S.)	0.2642
Meters	feet	3.281
Meters	yards	1.094
Miles	kilometers	1.609
Millimeters	inches	0.03937
Newton (force)	pounds	0.2248
Newton-meter	foot-pounds	0.737
Ounces (avoirdupois)	grams	28.349
Pounds	kilograms	0.4536
Tons (2,000 lb.)	kilograms	907.18
Tons (2,240 lb.)	kilograms	1016.0
Yards	meters	0.9144



F° C°

Notes

General Information

Useful Tables

Table 430-150: Full-Load Current Three-Phase Alternating-Current Motors

The following values of full-load currents are typical for motors running at speeds usual for belted motors and motors with normal torques characteristics. Motors built for low speeds (1200 RPM or less) or high torques may require more running current, and multispeed motors will have full-load current varying with speed. In these cases, the nameplate current ratings shall be used.

The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220, 440 to 480, and 550 to 600 volts.

HP	Induction Type Squirrel-cage and Wound-rotor							Synchronous Type Unity Power Factor* Amperes			
	115V	200V	208V	230V	460V	575V	2300V	230V	460V	575V	2300V
1/2	4.4	2.5	2.4	2.2	1.1	0.9	-	-	-	-	-
3/4	6.4	3.7	3.5	3.2	1.6	1.3	-	-	-	-	-
1	8.4	4.8	4.6	4.2	2.1	1.7	-	-	-	-	-
1 1/2	12.0	6.9	6.6	6.06	3.0	2.4	-	-	-	-	-
2	13.6	7.8	7.5	6.8	3.4	2.7	-	-	-	-	-
3	-	11.0	10.6	9.6	4.8	3.9	-	-	-	-	-
5	-	17.5	16.7	15.2	7.6	6.1	-	-	-	-	-
7 1/2	-	25.3	24.2	22	11	9	-	-	-	-	-
10	-	32.2	30.8	28	14	11	-	-	-	-	-
15	-	48.3	46.2	42	21	17	-	-	-	-	-
20	-	62.1	59.4	54	27	22	-	-	-	-	-
25	-	78.2	74.8	68	34	27	-	53	26	21	-
30	-	92	88	80	40	32	-	63	32	26	-
40	-	120	114	104	52	41	-	83	41	33	-
50	-	150	143	130	65	52	-	104	52	42	-
60	-	177	169	154	77	62	16	123	61	49	12
75	-	221	211	192	96	77	20	155	78	62	15
100	-	285	273	248	124	99	26	202	101	81	20
125	-	359	343	312	156	125	31	253	126	101	25
150	-	414	396	360	180	144	37	302	151	121	30
200	-	552	528	480	240	192	49	400	201	161	40
250	-	-	-	-	302	242	60	-	-	-	-
300	-	-	-	-	361	289	72	-	-	-	-
350	-	-	-	-	414	336	83	-	-	-	-
400	-	-	-	-	477	382	95	-	-	-	-
450	-	-	-	-	515	412	103	-	-	-	-
500	-	-	-	-	590	472	118	-	-	-	-

* For 90 and 80 percent factor, the above figures shall be multiplied by 1.1 and 1.25 respectively.

Table 430-148: Full-Load Currents in Amperes Single-Phase Alternating-Current Motors

The following values of full-load currents are for motors running at usual speeds and motors with normal torque characteristics. Motors built for especially low speeds or high torques may have higher full-load currents, and multispeed motors will have full-load current varying with speed, in which case the nameplate current ratings shall be used.

The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120 and 220 to 240 volts.

HP	115 Volts	200 Volts	208 Volts	230 Volts
1/6	4.4	2.5	2.4	2.2
1/4	5.8	3.3	3.2	2.9
1/3	7.2	4.1	4.0	3.6
1/2	9.8	5.6	5.4	4.9
3/4	13.8	7.9	7.6	6.9
1	16	9.2	8.8	8
1 - 1/2	20	11.5	11	10
2	24	13.8	13.2	12
3	34	19.6	18.7	17
5	56	32.2	30.8	28
7 - 1/2	80	46	44	40
10	100	57.5	55	50