COMPLETE COMBINATION STARTER SERIES

MN32 & MN65

from 0.1A to 65A

Conformity to Standards:

UL Type-E, UL508-F with contactors + Aux.

Coordination Type 2 per IEC60947-4-1

IEC 60947-1, 60947-2, 60947-4-1

UL508/cULus

DIN VDE 0660T 100/101/102 Suitable for Motor Disconnect

Features:

High Interrupting Ratings:
50kA @ 480V MN32
32kA @ 480V MN65

Din Rail Mountable

Phase Loss Protection

35mm DIN-rail Mounting

Class 10 Thermal Overload Protection

Ambient Temp. Compensation:
-4°F +140°F (-20°C +60°C)

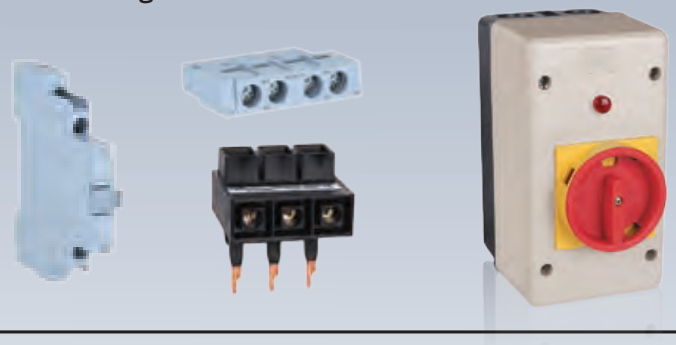
Class 10 Thermal Overload Protection

ELECTRICAL & ELECTRONIC CONTROLS, INC.
3881 DANBURY ROAD
BREWSTER, NY 10509
845-278-5777, FAX 845-278-5444
www.eecontrols.com
E-MAIL: info@eecontrols.com

COMBINATION CONTROLS

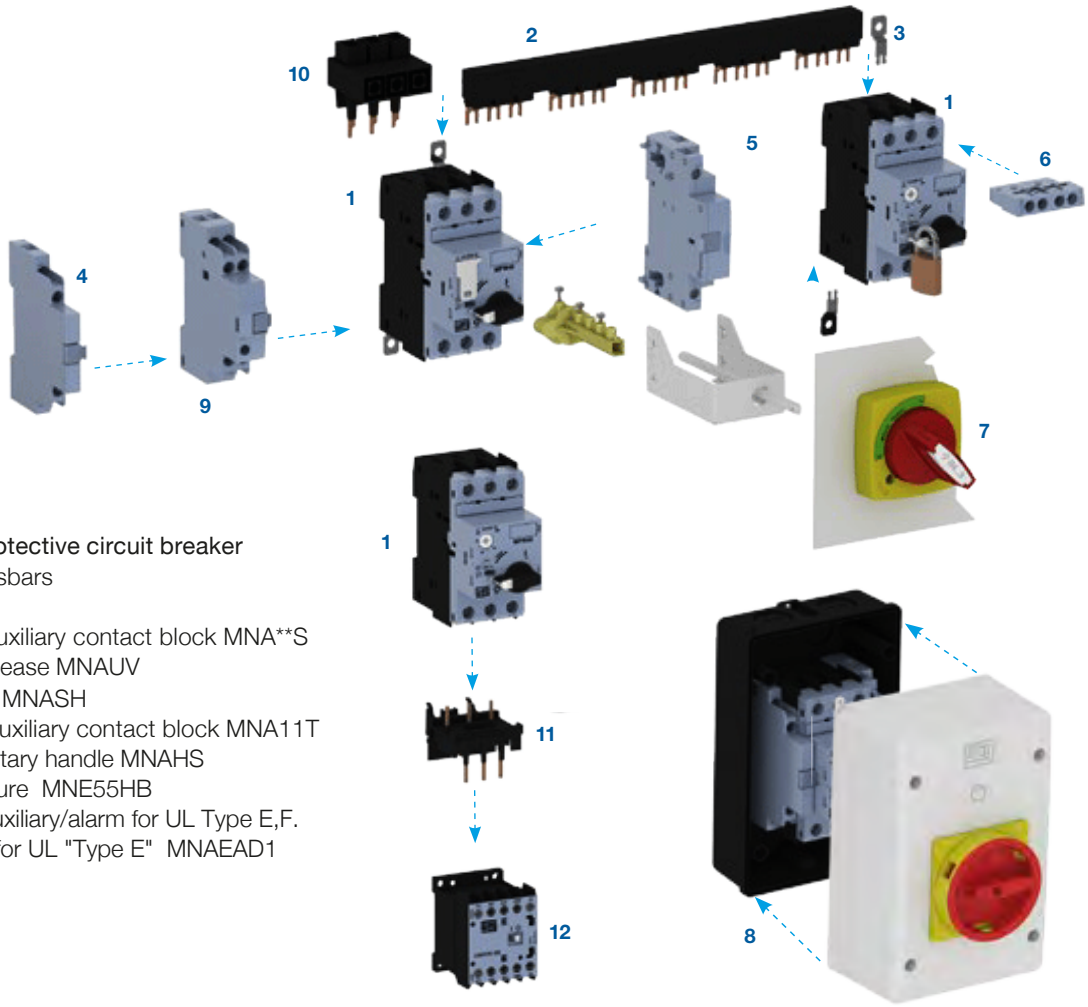
Full Line of Field Kit Accessories

- Auxiliary Switch
- Short Circuit Alarm Contact
- Shunt Trip
- Under Voltage Release
- Enclosures
- Pilot Lights
- Line Buss Bars



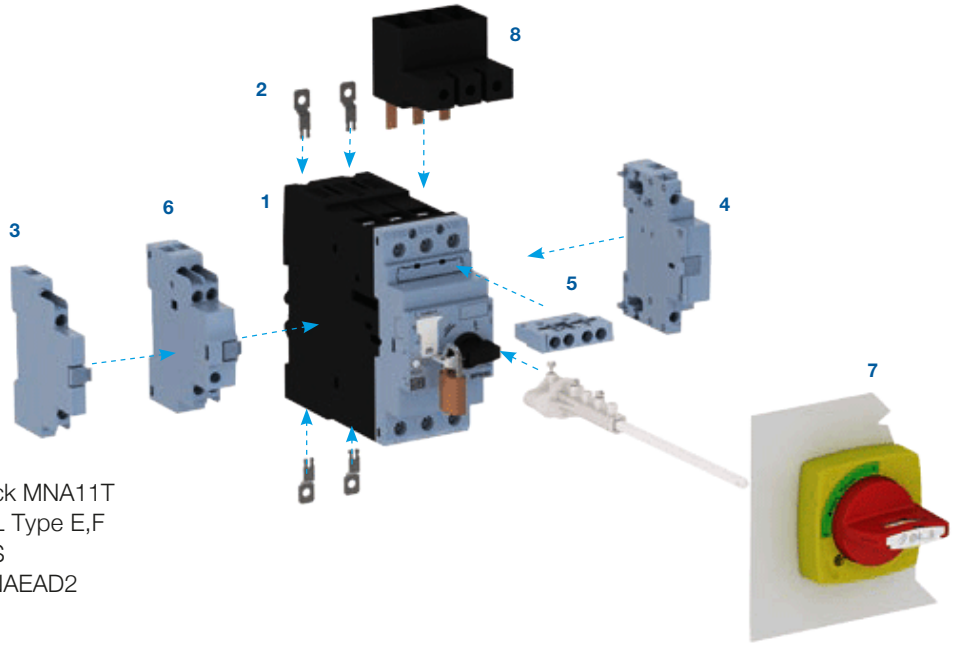
EE CONTROLS

MN32



1 - MN32 motor protective circuit breaker
2 - Three-phase busbars
3 - Push-in-lugs
4 - Side mounted auxiliary contact block MNA**S
5 - Undervoltage release MNAUV
or Shunt release MNASH
6 - Front mounted auxiliary contact block MNA11T
7 - Door coupling rotary handle MNAHS
8 - Insulated Enclosure MNE55HB
9 - Side mounted auxiliary/alarm for UL Type E,F.
10 - Feeder terminal for UL "Type E" MNAEAD1
11 - Link Module
12 - Contactor

MN65

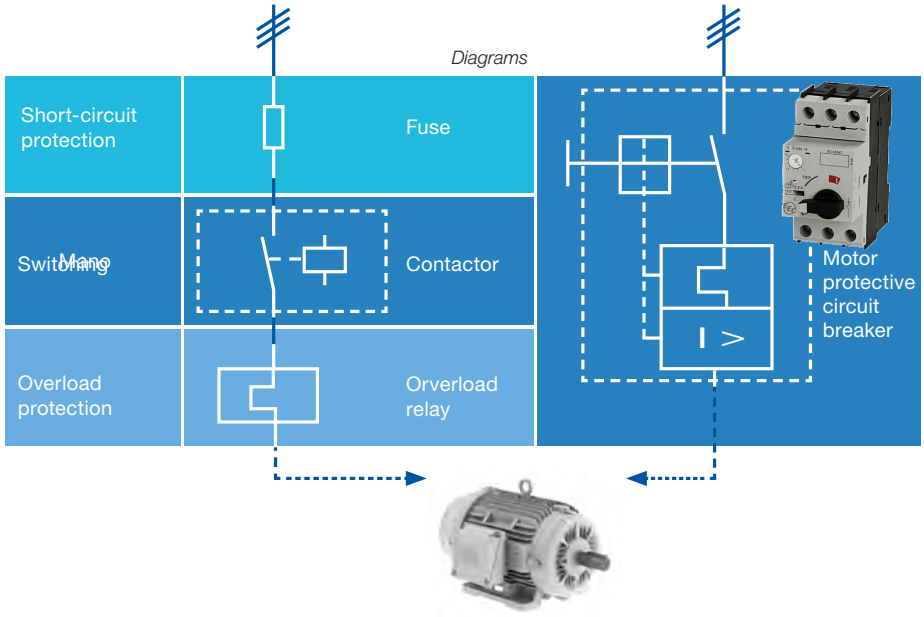


1 - MN65 motor protective
circuit breaker
2 - Push-in-lugs
3 - Side mounted auxiliary contact
block MNA**S
4 - Undervoltage release MNAUV
or Shunt release MNASH
5 - Front mounted auxiliary contact block MNA11T
6 - Side mounted auxiliary/alarm for UL Type E,F
7 - Door coupling rotary handle MNAHS
8 - Feeder terminal for UL "Type E" MNAEAD2

MN32 / MN65
ADVANTAGES

MN Motor-Protective Circuit Breaker

Three Functions in a Single Product!
Its main function is the protection against short-circuits and overloads in electric motor applications. In addition, they allow switching operations (15 operations/ hour) directly with their handle .

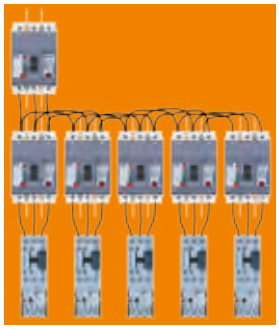


Cable Connection
The circuit breakers allow direct connection of cables to the circuit breaker without the need for terminals at the end of the connection cables.

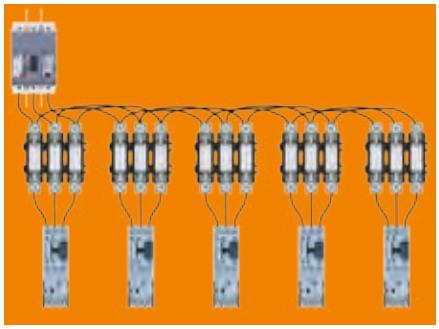
Cost Reduction
The designs with motor-protective circuit breakers are smaller than those with protection by molded-case circuit breakers or fuses. They allow the assembly on DIN rail 35 mm, avoiding unnecessary expenses with fastening by screws. Over 50% of reduction of assembly space.

Conventional panels with:

Molded-case circuit breakers

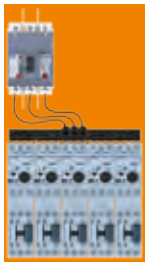


Fuses



Compact panel with:

Motor-protective circuit breakers



MN32 / MN65
ADVANTAGES

Combination starters are the most common type of packaged motor controllers. They are called combination because of their construction and combined functions required by the US National Electric Code (NEC): Motor Disconnect, Motor Branch Circuit Protection, Motor Controller and Motor Overload Protection. UL currently recognizes six different types of combination starters that meet the requirements of a motor branch circuit. Construction Types A through D are traditional starters that use either a listed disconnect switch and fuses or a listed circuit breakers as the disconnect means and for short circuit protection. Each type uses a separate UL 508 listed motor controller and overload relay. Recently revisions on UL508 introduced the Type E and Type F starters.

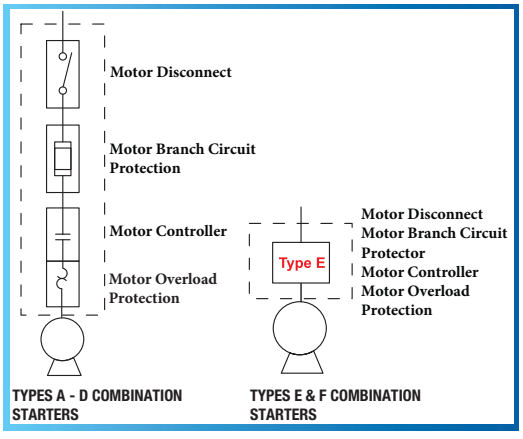
Type E starter is a self-protected combination motor controller that combines in a single device all the required functions of a combination starter and eliminates any additional requirements for upstream fuses or circuit breakers. These starters clear faults within their rating without sustaining damage to themselves or the rest of the system, being able to get back into operation. There are two arrangements for a Type E starter: manual (as stand-alone) and associated with a contactor. Both are submitted to the same tests sequences. Type F starter consists of a listed manual Type E combined with a UL508 listed contactor. The difference between the two types is related to the absence of self-protected characteristic; hence, Type F has softened tests sequences allowing damages on the contactor after a fault.

Tests performed in order to fulfill the Type E requirements are considered the hardest in UL508, including short-circuit and endurance tests on the same sample. As a comparison, UL Type E exceeds the requirements for Type F and IEC60947-4-1 Coordination type 2.

EEC's self-protected combination Type E combines all of these functions within a single product for a manual operation or within a set of two products (with a listed contactor) for a remote operation. Both options must be associated with the accessories Line Side Terminal (MNAEAD) and Tripping Signaling Block (MNATSB) to accomplish UL508 requirements for spacing (clearance and creepage) and short-circuit indication.

The Manual Type E Starter is a stand-alone product – MN series – that ranges from fractional up to 50Hp@460V motors (0.16 to 65A) with up to 100KA@480V and 50KA@600V interrupting short-circuit capability. Together with some accessories that complete this product line, the MN series are a compact and reliable solution for starting and protecting motors.

<table>
<tr><th>UL Combination Starter Type</th><th>Disconnected</th><th>Branch Circuit Protection</th><th>Motor Controller</th><th>Motor OL Relay</th></tr>
<tr><td>A</td><td rowspan="2">UL 98 Manual Disconnect</td><td>UL 248 Fuses</td><td rowspan="3">UL 508 Magnetic or Solid State Controller</td><td rowspan="3">UL 508 Motor Overload Relay</td></tr>
<tr><td>B</td><td>UL 508 Motor Short Circuit Protector</td></tr>
<tr><td>C</td><td colspan="2">UL 489 Inverse Time Circuit Breaker</td></tr>
<tr><td>D</td><td colspan="2">UL 489 Instantaneous Trip Circuit Breaker</td><td colspan="2"></td></tr>
<tr><td>E</td><td colspan="4">UL 508 Self-protected Combination Controller</td></tr>
<tr><td>F</td><td colspan="2">UL 508 Manual Self-protected Combination Controller</td><td>UL 508 Magnetic or Solid State Controller</td><td>UL 508 Manual Self-Protected Combination Controller</td></tr>
</table>



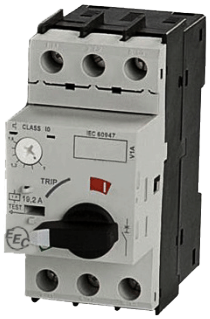
MN32 / MN65
Technical Data

Referene code		MN32	MN65
Maximum rated current In_{max} (I_e)		32 A	65 A
Number of poles		3	3
Short-circuit release		13 x Ie_{max}	13 x Ie_{max}
Rated operational voltage U_e		690 V[1)]	690 V[1)]
Rated frequency		50/60 Hz	50/60 Hz
Rated insulation voltage U_i		690 V	690 V
Rated impulse withstand voltage U_{imp}		6 kV	6 kV
Use category	IEC 60947-2 (circuit breaker)	A	A
	IEC 60947-4-1 (motor starter)	AC-3	AC-3
Tripping test		Yes	Yes
Overload protection		Yes	Yes
Phase failure sensitivity (IEC 60947-4-1)		Yes	Yes
Tripping indication		Yes	Yes
Tripping class (IEC 60947-4-1)		10	10
Maximum operation per hour	Operations/hour	15	15
Altitude (m)		2,000	2,000
Degree of protection (IEC 60529)		IP20	IP20
Mechanical life	Number of operations	100,000	50,000
Electrical life	Number of operations	100,000	25,000
Permissible ambient temperature			
Transport and storage		-50...+80 °C	-50...+80 °C
Operation[2)]		-20...+70 °C	-20...+70 °C
Temperature compensation (IEC 60947-4-1)		-20...+60 °C	-20...+60 °C
Resistance to impact (IEC 60068-2-27)		15 g	15 g
Standards			
IEC 60947-1		Yes	Yes
IEC 60947-2		Yes	Yes
IEC 60947-4-1		Yes	Yes
Dimensions			
Width (mm)		45	54
Height (mm)		97	125
Depth (mm)		98	157
Connection			
Type of terminal		Screws phillips (Nº 2)	Allen (4 mm)
Tightening torque	N.m	2...2.5	6
	lb.in	18...22	53
Number of conductors		1 or 2	1 or 2
Flexible cable		14...8 AWG	12...2 AWG

Auxiliary Contact Blocks

Reference	MNA11T (Top mtg.)			MNA**S (Side mtg.)			
Rated insulation voltage Ui	250 V			690 V			
Utilization category	24 V ac	220-230 V ac		24 V ac	230 V ac	400 V ac	690 V ac
AC-15	2 A	0.5 A		6 A	4 A	3 A	1A
AC-12	2.5 A	2.5 A		10 A	10 A	10 A	10 A
DC-13	24 V dc	48 V dc	60 V dc	24 V dc	110 V dc	220 V dc	440 V dc
	1 A	0.3 A	0.15 A	2 A	0.5 A	0.25 A	0.1 A
Type of screw	Phillips (Nº 2)			Phillips (Nº 2)			
Tightening torque	1...1.5 N.m (7...10 lb.in)			1...1.5 N.m (7...10 lb.in)			
Rigid cable	1 or 2 x (0.5...1.5 mm) 1 or 2 x (0.75...2.5 mm) 1 or 2 x (18...14 AWG)			1 or 2 x (0.5...1.5 mm) 1 or 2 x (0.75...2.5 mm) 1 or 2 x (18...14 AWG)			
Flexible cable							
Finely stranded with end sleeve[1)]							

MN32 MN65 SPECIFICATIONS/ DIMENSIONS



MN32
(0.10A-32A)

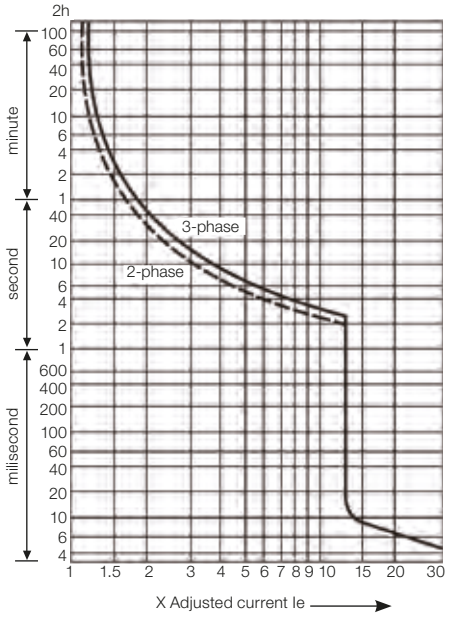
MN65
(32A-65A)

Features

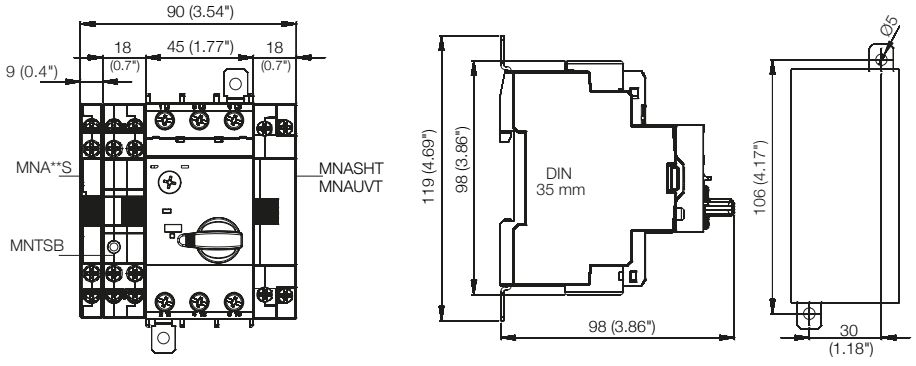
- High short-circuit interrupting rating:
  50kA @ 480V (MN32) 35kA @ 480V (MN65)
- Current limiting short-circuit protection
- Thermal overload protection Class 10
- Phase loss sensitivity protection
- Ambient temperature compensation
  -4ºF +140ºF (-20ºC +60ºC)
- Lockable rotary handle mechanism for disconnect
- Visual indication of ON-TRIP-OFF status
- 35mm DIN-rail mounting
- Snap-in accessories
- Finger safe protected terminals
- Rated for DC applications
- Test trip feature

Standards / Approvals

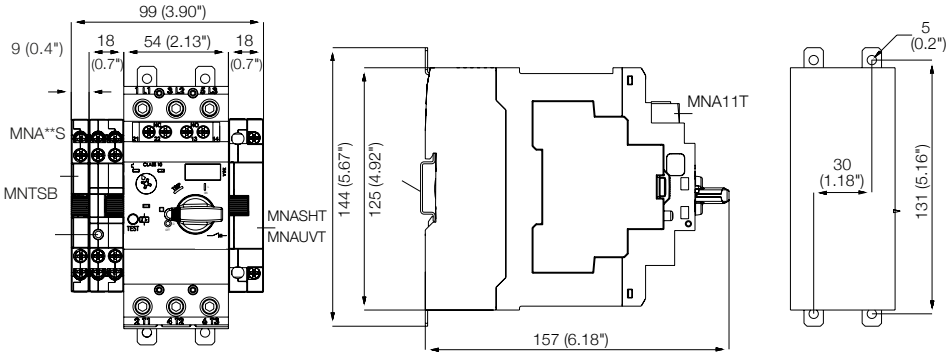
- Coordination type 2 per IEC60947-4-1 and UL508E, with contactors.
- Group motor installations (per NEC Article 430)
- Multi-motor starter applications
- Suitable for motor disconnect UL
- Type-E self protected combination starter, see page 8,9
- UL Type-F combination starter, see page 8,9



Dimensions



(MN32)



(MN65)

Dimensions (Approx.) MM (inches)

MN32 / MN65 SELECTION

MN32

(50kA @ 480V)

FLA Adjustment Range ①	Three Phase HP				Single Phase HP ②		Catalog No.	Open List Price	Enclosed Compact IP55/NEMA 12 -IP55	Enclosed NEMA 1/3R -3R ③	Enclosed NEMA 4 -N4 ③	Enclosed NEMA 4X -4X ③
	200-208V	220-240V	440-480V	575-600V	115V	230V						
0.10-0.16	-	-	-	-	-	-	MN32H 001	$126	$164	$324	$372	$382
0.16-0.25	-	-	-	-	-	-	MN32H 002	126	164	324	372	382
0.25-0.40	-	-	-	-	-	-	MN32H 004	126	164	324	372	382
0.40-0.63	-	-	-	1/4	-	-	MN32H 006	114	152	312	360	370
0.63-1.0	-	-	1/2	1/2	-	-	MN32H 010	114	152	312	360	370
1-1.6	1/4	1/3	3/4	1	-	1/10	MN32H 016	114	152	312	360	370
1.6-2.5	1/2	1/2	1 1/2	1 1/2	-	1/6	MN32H 025	114	152	312	360	370
2.5-4	3/4	1	2	3	1/8	1/3	MN32H 040	114	152	312	360	370
4-6.3	1 1/2	1 1/2	3	5	1/4	3/4	MN32H 063	114	152	312	360	370
6.3-10	3	3	5	7 1/2	1/2	1 1/2	MN32H 100	138	176	336	384	394
10-16	5	5	10	15	1	3	MN32H 160	138	176	336	384	394
16-20	5	7 1/2	15	15	1 1/2	3	MN32H 200	138	176	336	384	394
20-25	7 1/2	7 1/2	15	20	2	3	MN32H 250	156	194	354	402	412
25-32	10	10	20	25	2	5	MN32H 320	166	204	364	412	422

MN65

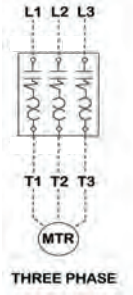
(35kA @ 480V)

FLA Adjustment Range ①	Three Phase HP				Single Phase HP ②		Catalog No.	Open List Price $	Enclosed NEMA 1/3R -3R $ ③	Enclosed NEMA 4/12 -N4 $ ③	Enclosed NEMA 4X -4X $ ③
	200-208V	220-240V	440-480V	575-600V	115V	230V					
32-40	10	10	25	30	3	7 1/2	MN65H 400	344	842	890	800
40-50	15	15	30	40	3	10	MN65H 500	344	842	890	800
50-65	20	20	50	60	5	10	MN65H 650	344	842	890	800

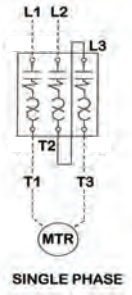
① Selection of the controller depends on the actual motor full load current and service factor. For motors with service factor of 1.15 or greater, use motor full load current to select the approximate current range. For motors with a service factor less than 1.15, multiply the normal full load current by .9 for the current setting.

② Single phase applications require all three overload legs to be energized for proper operation. Use separate conductor to connect terminal T2 to L3. Connect power to L1 and L2 and apply load between T1 and T3.

③ Enclosed unit includes safety door interlock & external operator.



THREE PHASE

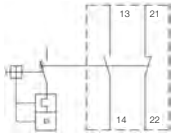


SINGLE PHASE

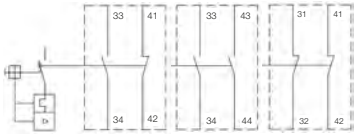
Modifications, and Accessories, See pages 8 thru 10.

MN32 / MN65 ACCESSORIES

Auxiliary contact blocks

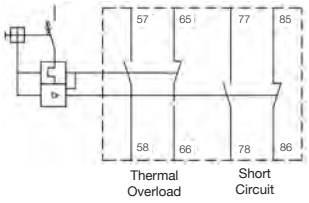


Description	For use with	Type	Cat. no.	List
Front Mount				
1 contact block per starter. (240VAC Max)	MN32 & MN65	1NO / 1NC	**MNA11T**	**$20**



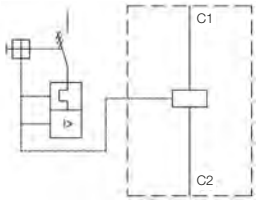
Description	For use with	Type	Cat. no.	List
Side Mount				
1 contact block per starter. (600VAC Max)	MN32 & MN65	1NO / 1NC	**MNA11S**	**$20**
		2NO	**MNA20S**	**20**
		2NC	**MNA02S**	**20**

* *Trip Signaling Block (Required for UL Type E & F)*



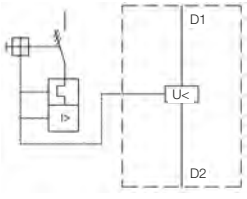
Description	For use with	Type	Cat. no.	List
Required for UL Type E + F for short circuit indication. Indicator to identify if trip caused by over voltage, or short circuit. Can be used with side mounted Aux.	MN32 & MN65	1NO / 1NC (Overload Trip) 1NO / 1NC Short Circuit Trip)	**MNTSB**	**$40**

Shunt trip device



Description	For use with	Voltage	Cat. no.	List
Operating Voltage -30% to +10%	MN32 & MN65	24 VAC	**MNASHTG**	**$54**
		120 VAC	**MNASHTA**	**54**
		230 VAC	**MNASHTC**	**54**

Under Voltage trip device



Description	For use with	Voltage	Cat. no.	List
Operating Voltage -15% to +10% Tripping Voltage -30%	MN32 & MN65	24 VAC	**MNAUVTG**	**$54**
		120 VAC	**MNAUVTA**	**54**
		208 VAC	**MNAUVTC**	**54**
		230 VAC	**MNAUVTH**	**54**
		480 VAC	**MNAUVTE**	**54**

MN32 / MN65
ACCESSORIES

External Handle Operators

Description	For use with	Type	Cat. no.	List
• *Degree of Protection IP65 / Nema 4X* • *Shows breaker position "I"(ON), TRIP, "O"(OFF)* • *Up to 3 Padlocks can be used for lockout in "OFF"* • *7" - 16" Deep enclosure for MN32* • *10" - 18" Deep enclosure for MN65* • *Can be bypassed in "ON" position by qualified technician for servicing "Thermometry"*	MN32	Grey / Black	**MNAHS1N4X**	**$80**
	MN32	Red / Yellow	**MNAHR1N4X**	**80**
	MN65	Grey / Black	**MNAHS2N4X**	**80**
	MN65	Red / Yellow	**MNAHR2N4X**	**80**

* Feeder Terminal (Required for UL Type E & F)

Description	For use with	Type	Cat. no.	List
Line side terminal block meets required spacing for clearance and creepage. Rated insulation voltage 690V *Terminals: 8-20AWG*	MN32	Three Pole Feed in Adaptor	**MNAEAD1**	**$22**
Line side terminal block meets required spacing for clearance and creepage. Rated insulation voltage 690V *Terminals: 4-8AWG*	MN65	Three Pole Feed in Adaptor	**MNAEAD2**	**44**

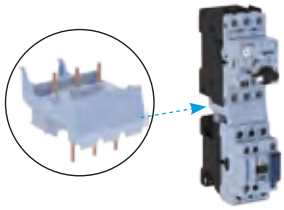
Compact Enclosure IP55

Description	For use with	Type	Cat. no.	List
• *IP55 - Nema 12* • *Includes Ground & Neutral Terminals* • *Handle can be locked with up to 3 padlocks in "Off"* • *Two cable entry knockouts, top and bottom (PG16)*	MN32	Grey / Black	**MNE55HB**	**$38**
		Red / Yellow	**MNE55HG**	**38**

Compact Enclosure IP55

Description	For use with	Color	Voltage	Cat. no.	List
Pilot lights for compact IP55 Enclosed Motor Circuit Protectors.	MNE55HB MNE55HG	Red	24 V 50/60 Hz / V dc	**MNILRG**	**$38**
			110...130 V 50/60 Hz	**MNILRA**	**38**
			210...230 V 50/60 Hz	**MNILRC**	**38**
			400...575 V 50/60 Hz	**MNILRF**	**38**
		Green	24 V 50/60 Hz / V dc	**MNILGG**	**$38**
			110...130 V 50/60 Hz	**MNILGA**	**38**
			210...230 V 50/60 Hz	**MNILGC**	**38**
			400...575 V 50/60 Hz	**MNILGF**	**38**

Link Module



Description	For use with	Type	Cat. no.	List
For direct connection (electrical and mechanical) of motor circuit breakers to contactors. ***Note: Only works with contactors with AC coils.***	MN32	Connects to BA16 MN32H001- MN32H100	**MNADBA1**	**$12**
		Connects to LSN11 MN32H001- MN32H200	**MNADLS1**	**14**
		Connects to LSN15 MN32H001- MN32H320	**MNADLS2**	**14**

Combination Mounting Plate

Description	For use with	Type	Cat. no.	List
Mounting plate for MN32, and directly connected contactor to 35mm DinRail, or backplate.	MN32	Contactors BA16, LSN4, LSN11	**MNAPKD**	**$26**

Three-Phase Busbar

(without side mounted Aux block)

Description	For use with	Type	Cat. no.	List
• For parallel blocking of side-by-side mounted circuit breakers. without side auxiliary contacts • Enables the use of frontal auxiliary contact block • U_e: 600 V ac • I_e: 63 A	MN32	2x MN32	**MN32BN02**	**$14**
		3x MN32	**MN32BN03**	**20**
		4x MN32	**MN32BN04**	**28**
		5x MN32	**MN32BN05**	**32**

Three-Phase Busbar

(with side mounted Aux block)

Description	For use with	Type	Cat. no.	List
• For parallel blocking of side-by-side mounted circuit breakers Enables • the use of side auxiliary contact block mounted on each motor protective circuit breaker • U_e: 600 V ac • I_e: 63 A	MN32	2x MN32	**MN32BD02**	**$20**
		3x MN32	**MN32BD03**	**26**
		4x MN32	**MN32BD04**	**34**
		5x MN32	**MN32BD05**	**38**

MN SERIES COMBINATIONS
Open / Enclosed

MN Enclosed Combinations

Includes:

- ✓ Motor Protector (Controller, Short Circuit & Overload Protection)
- ✓ Enclosure
- ✓ Through Door Safety Interlock *(Padlockable)*
- ✓ Contactor

4X Enclosed Control

Open Unit

MEETS UL508 "TYPE E" and "F" REQUIREMENTS ⋆

	Amp Range	Single Phase HP		Three Phase HP				Contactor	Part # Combination Starter	-O Open List	-M1 Nema1 List	-3R Nema3R List	-12 Nema12 List	-4X Nema4X List
		115V	230V	200V	230V	460V	575V							
MN32	0.10-0.16	-	-	-	-	-	-	BA16 ▲▲	MN32CH001-B16-*	$190	$486	$506	$526	$520
	0.16-0.25	-	-	-	-	-	-		MN32CH002-B16-*	$190	$486	$506	$526	$520
	0.25-0.4	-	-	-	-	-	-		MN32CH004-B16-*	$190	$486	$506	$526	$520
	0.4-0.63	-	-	-	-	-	1/4		MN32CH006-B16-*	$180	$476	$496	$516	$510
	0.63-1.0	-	-	-	-	1/2	1/2		MN32CH010-B16-*	$180	$476	$496	$516	$510
	1.0-1.6	-	1/10	1/4	1/3	3/4	1		MN32CH016-B16-*	$180	$476	$496	$516	$510
	1.6-2.5	-	1/6	1/2	1/2	1 1/2	1 1/2		MN32CH025-B16-*	$180	$476	$496	$516	$510
	2.5-4.0	1/8	1/3	3/4	1	2	3		MN32CH040-B16-*	$180	$476	$496	$516	$510
	4.0-6.3	1/4	3/4	1 1/2	1 1/2	3	5		MN32CH063-B16-*	$180	$476	$496	$516	$510
	6.3-10	1/2	1 1/2	3	3	5	7 1/2		MN32CH100-B16-*	$200	$496	$516	$536	$530
	10-16	1	3	5	5	10	15	LSN11	MN32CH160-L11-*	$280	$576	$596	$616	$610
	16-20	1 1/2	3	5	7 1/2	15	15		MN32CH200-L11-*	$280	$576	$596	$616	$610
	20-25	2	3	7 1/2	7 1/2	15	20	LSN15	MN32CH250-L15-*	$350	$676	$696	$716	$710
	25-32	2	5	10	10	20	25		MN32CH320-L15-*	$360	$676	$696	$7162	$710
MN65	32-40	3	7 1/2	10	10	25	30	LSN22	MN65CH400-L22-*	$562	$1,090	$1,200	$1,300	$1,250
	40-50	3	10	15	15	30	40	LSN30	MN65CH500-L30-*	$630	$1,190	$1,300	$1,400	$1,350
	50-65	5	10	20	20	50	60	LSN37	MN65CH650-L37-*	$660	$1,250	$1,360	$1,460	$1,410

⋆ To comply with UL508 "Type E" & "Type F" Change "C" to "E" in part number.
Add $62 list to MN32 Combinations Add $84 list to MN65 Combinations

Example : MN32EH100-B16-A-O $262 list.

Coil Voltage Selection

⋆	G	A	C	H	E	F
50Hz	24	110	230	230	415	500
60Hz	24	120	230	277	480	600

Modifications

Description	-Suffix	-$ Adder
HAND - OFF - AUTO SELECTOR (Nema 1)	-KSL-1	$50.00
HAND - OFF - AUTO SELECTOR (Nema 12,4X,3R)	-KSL-3	$120.00
START / STOP OPERATOR (Nema1)	-KSS-2	$50.00
START / STOP OPERATOR (Nema 3R,12,4X)	-KSS-3	$120.00
OFF - ON - SELECTOR (Nema1)	-KSN-1	$50.00
OFF - ON - SELECTOR (Nema 12,4X,3R)	-KSN-3	$120.00
GREEN PILOT LIGHT (Nema1,4X,3R,12) ①	-PL	$75.00
208/230/460-120/24 Transformer (50VA) *For contactors BA16- LSN15 combinations*	-FT___ ②	$250.00
208/230/460-120/24 Transformer (100VA) *For contactor LSN30 combinations*	-FT___ ②	$350.00

Above combinations include the following auxiliaries on the contactors as standard.

Contactor	Standard Number Auxiliaries
BA16	1 N.O.
LSN11-LSN37	1 N.O. 1 N.C.

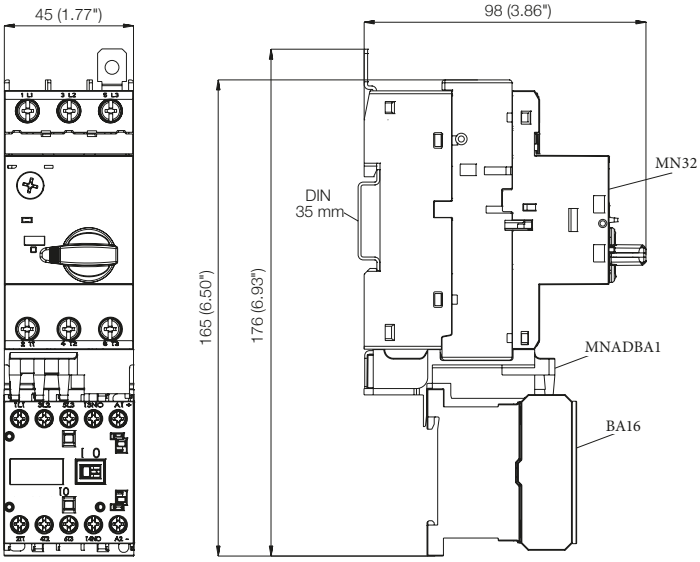
For open starter dimensions see page 11.

① Voltage of pilot light will be that of the control voltage specified in control part number.

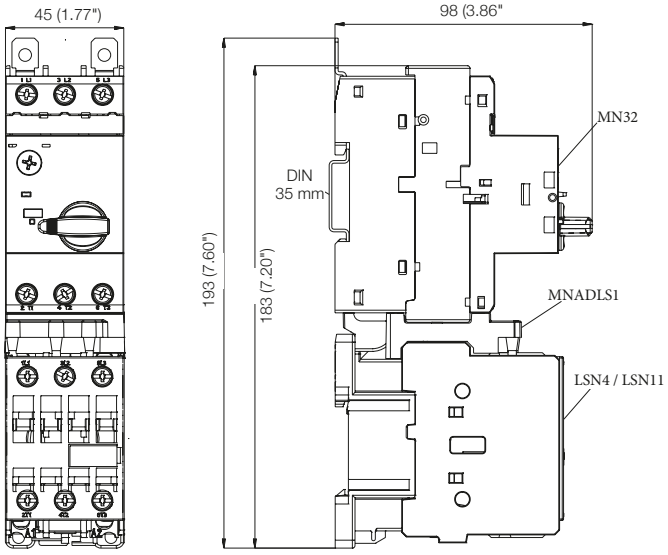
② Transformer will be wired per the primary voltage specified: for example "-FT 480" (480V Primary)

DIMENSIONS

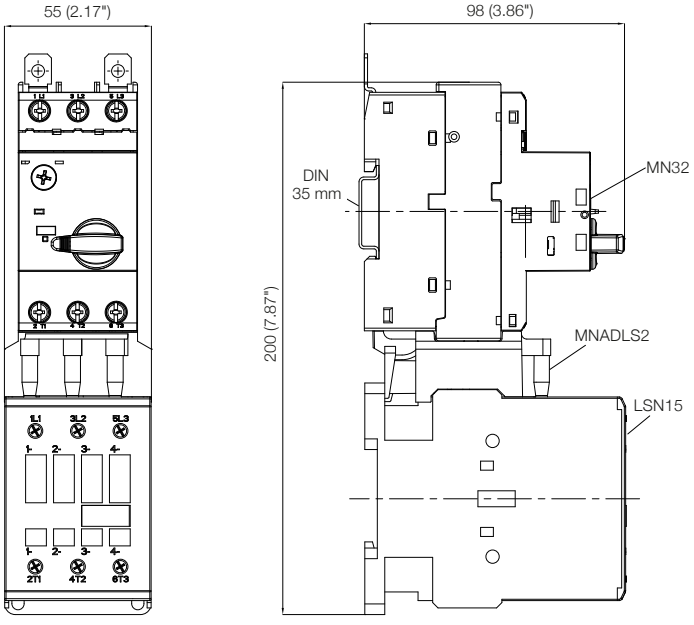
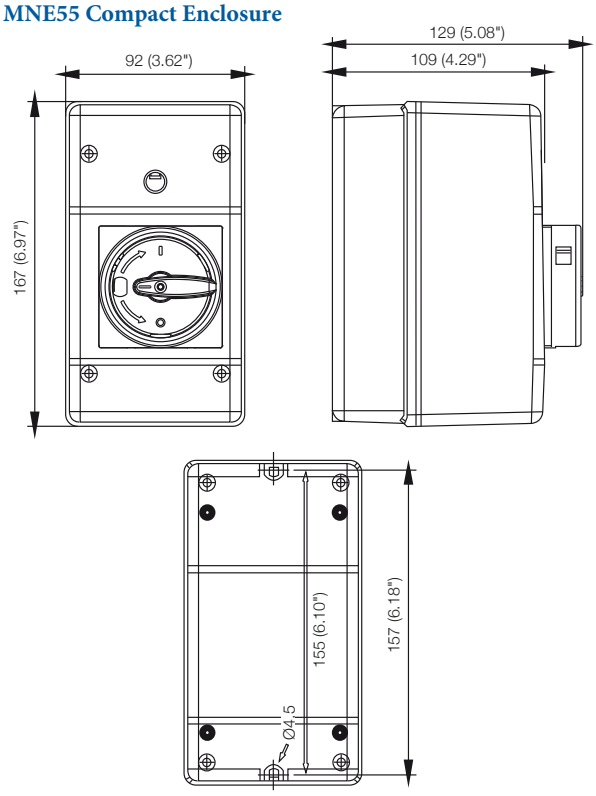
MN32 +BA16



MN32 + LSN11



MN32 + LSN15



MNE55 Compact Enclosure