NuStart

Compressor Soft Starter
230/460 VAC Three Phase Series

Parts List:

1 x NuStart Soft Starter
1 x Mounting Bracket

NuStart Models:

5010-30
5010-31

SPECIFICATIONS

Attribute	Nu-Calgon Model	
	5010-30	5010-31
Rated Voltage (Vrated)	208-230 VAC	460 VAC
Rated Phase	Three Phase	Three Phase
Rated Frequency, Hz	50/60	60
Motor Current, Max RLA/FLA range	04-28A	04-27A
Maximum Lock Rotor Current (LRA)	210A	210A
Number of Starts/Hour (Evenly Distributed)	15 starts/hr	15 starts/hr
Maximum I^2t for Fusing, A^2s	1060	1060
Minimum Startup Voltage	187V	414V
Short Circuit Current Rating (SCCR), kA	5	5
Shutdown on Low Voltage	176V	391V
Maximum Permissible High Voltage	253V	510V
Operating Ambient [°F]	-4 to 140°F	-4 to 140°F
Storage Temperature [°F]	-40 to 185°F	-40 to 185°F
Power Supply + Control Voltage	Auto-Start at Power Up	
Life Expectancy (At maximum rated load)	Minimum 100,000 Cycles	
Start Current Reduction*	30%- 50% of LRA	30%- 50% of LRA
Degree of Protection	IP20	IP20
Weight	500g/ 1.1 lb	500g/ 1.1 lb
Dimensions	5.30" x 1.96" x 2.94" (135 x 50 x 75mm)	5.30" x 1.96" x 2.94" (135 x 50 x 75mm)
Limited Warranty	One Year	One Year

*For motor loads with:
50< LRA ≤150: achieve 30-50% start current reduction.
150< LRA ≤210: achieve 30-40% start current reduction.

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NuStart functions as a three phase motor starter, a contactor is still required. NuStart is suitable for a wide range of air conditioning and refrigeration applications using scroll compressors, including digital types. NuStart is not for use with inverter type compressors. For other compressor types, consult Nu-Calgon. Care is required to determine the correct model as per nameplate data on the condensing unit or the compressor.

NuStart is connected between the contactor and the compressor. Current reduction is largest in the controlled phases compared to the uncontrolled phase. The third phase is used for voltage referencing only.

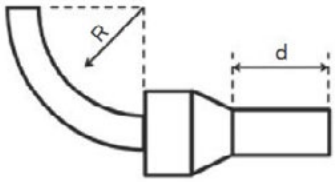
⚠ CAUTION:

1. NuStart is designed for install in the electrical compartment of the condensing unit, confirm dry fit location before installation. If NuStart must be installed outside the condensing unit, contact Nu-Calgon.
2. NuStart must not be used in conjunction with inverter drives or other soft start devices.
3. For use with single/dual stage scroll compressors, plus digital type scroll compressors. For other compressor designs, contact Nu-Calgon.
4. This soft starter is NOT designed for motor loads which require a starting time greater than 0.5s upon direct on-line supply at nominal voltage.
5. NuStart must be installed in a location that ensures that the external heat from a hot gas line, compressor discharge piping, or similar heat source will not cause damage. Minimum 3" (76 mm) clearance is recommended.
6. This device is not intended for use as motor overload protection. Must be supported with a suitably rated overload relay and Short Circuit Protective Device.
7. This device has been certified for use with hermetic refrigerant scroll compressors ONLY.
8. Device does not require grounding. Motor chassis must be earthed, and all applicable codes adhered to.
9. **Opening of the starter or attempting to run the unit on motor loads beyond stated capacity will void the warranty!**

Field Wiring Specifications:

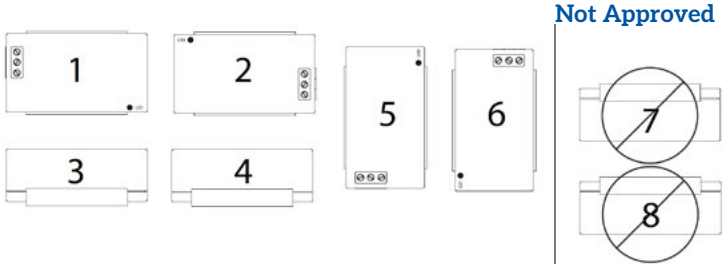
ENSURE ALL POWER IS ISOLATED BEFORE WORKING ON THE EQUIPMENT.

1. Ensure all wire sizing used are compliant with compressor full load current requirements as stated below.
2. Increase conductor sizing to next higher rated cross-section if ambient temperatures above 50°C (122°F) are expected.
3. Use TINNED stranded copper wire ONLY.
4. Ensure minimum conductor length of 20 in. (50cm).
5. All main connector terminations must be tightened to 10.5 lb-in (1.2 Nm).
6. Minimum end use enclosure size: 10" x 8" x 6"
7. Insertion length of ferrule "d": 12 mm (0.47")
8. Cable bend radius "R" > 38mm (1.5") minimum
9. Improper or loose termination can lead to heating and subsequent damage to the soft starter.



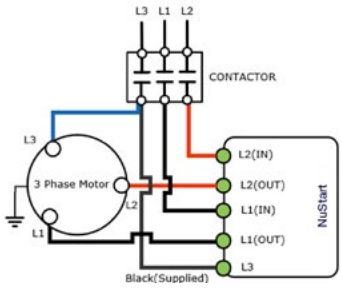
I < 20A	20A ≤ I < 30 A	I ≥ 30A
AWG 12 /2.5-4 mm²	AWG 10 / 4-6 mm²	AWG 8/ 6-10 mm²

Approved Mounting:

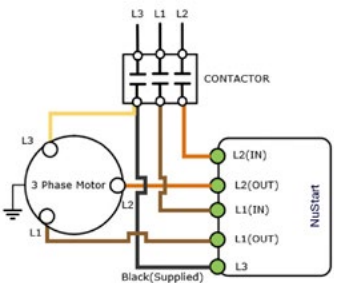


General Wiring Schematic

5030-30



5030-31



Installation Procedure

NuStart must be installed by a qualified/licensed technician. Record date of installation on device.

STEP 1: Phase Rotation Identification

FIRST ESTABLISH THAT THE SUPPLY PHASE ROTATION OF THE CONNECTED MOTOR IS CORRECT WITHOUT THE NUSTART INSTALLED. Incorrect phase rotation may have damaging effects on the motor and its connected load.

Note: Correct phase rotation for the application must be established by the installer.

Identifying the correct phase rotation for the motor is crucial for each installation. This is to align the internal phase detection of the soft starter with the application. Once correctly installed, NuStart has a phase rotation lock-out feature. This feature will prevent the motor from starting if the phase rotation is reversed and the LED will flash to indicate this.

STEP 2: NuStart Wiring

ENSURE ALL POWER IS ISOLATED BEFORE WORKING ON THE EQUIPMENT. Remove any start assist devices if they already exist.

L1-L2-L3 is assumed as the standard phase rotation input available at contactor input terminals.
L2-L1-L3 is assumed as the desired phase rotation required for the application.

1. Ensure STEP 1 is verified.
2. Disconnect the L1 motor lead from the load side L1 of the contactor.
3. Add a wire link from open L1 load terminal of the contactor and the NuStart connection L1 (IN).
4. Connect the loose L1 motor lead to the next NuStart connection L1 (OUT).
5. Next, disconnect the L2 motor lead from the load side L2 of the contactor.
6. Add a wire link from open L2 load terminal of the contactor and the NuStart connection L2 (IN).
7. Connect the loose L2 motor lead to the next NuStart connection L2 (OUT).
8. The L3 connection of the contactor remains directly connected to the motor L3 termination.
9. The additional black wire (L3) from NuStart device must be connected to the load side of the contactor on the L3 phase.

STEP 3: Phase Confirmation Test

Upon First Power up, the installation is complete if the motor starts running OR NuStart will flash a 'Reverse Phase' fault code if the supply phase sequence is incorrectly aligned with its built-in phase detection setup.

To correct the phase alignment:
1. **REMOVE POWER TO THE UNIT**
2. Swap the connections at load side of contactor terminals L2 and L1.
3. Also, swap the motor leads at the soft starter L1 (OUT) and L2 (OUT).
(Note that this double swap keeps the phase sequence to the motor unchanged but reverses the phase sequence for NuStart only).

After re-wiring, verify that the installation is complete if the motor starts running on second Power Up.

Ensure that connections on NuStart terminals are re-tightened to required torque specifications.

NuStart Operation

Device does not require any auxiliary control voltage input for its operation.

1. Line contactor must first operate. After the contactor pulls in, NuStart will initiate a start sequence after one second delay or the LED fault indicator will be flashing. The compressor stops when the contactor opens or if the NuStart observes any fault condition.
2. If the supply voltage is less than Start-up Voltage (90% of Vrated), no start will be attempted. The LED will flash for "Low Voltage/Over Voltage". NuStart will attempt a restart after three minutes.
3. Allow up to 6-7 starts to obtain an optimized softstart performance.
4. Maximum programmed NuStart time is less than 600ms.
5. In case of an intermittent power interruption longer than 100ms or a failure to start-up the compressor, the NuStart enters a 3-minute cycle delay after which it will attempt a restart provided all supply conditions are favorable again.
6. NuStart does not offer any soft stop feature.

LED Flash Codes

Flash Code	Definition	Time to re-start attempt
Rapid Flash (1/2 sec.)	Reverse Phase Rotation	3 min.
Double Flash (2 / 2 secs.)	Low Voltage / Over Voltage	3 min.
Slow Flash (1 / 4 secs.)	Fault Mode/ Cycle Delay	3 min.

NOTE: LED fault indicator remains off in normal running mode.

During running of the compressor, if the voltage falls below **Running LOW voltage cut-off** (85% of Vrated), a rapid shut down of the compressor is initiated. The LED will flash for "Low voltage/Over voltage". NuStart will attempt a restart after 3 minutes.

If the voltage is higher than **Running HIGH voltage cut-off** (111% of Vrated), no start will be attempted. During running of the compressor, a rapid shut down of the compressor is initiated if supply voltage exceeds this value. The LED will flash for "Low voltage/Over voltage". NuStart will attempt a restart after 3 minutes on its own.

COMPLIANCES / CERTIFICATIONS

NuStart is products are complaint to RoHS, REACH, 3TG and SCIP regulations.
UL compliance as per UL IEC60947-4-2
Compliant under ETL file 5008 865
CE compliance as per IEC60947-4-2 and IEC61000 series EMI/EMC standards

WARNING

This product can expose you to chemicals including Bisphenol, which are known to the State of California to cause cancer or birth defects, or other reproductive harm. For more information, go to www.P65Warnings.ca.gov

Limited Warranty: NuStart offers a limited one-year warranty from the date of installation. The warranty does not cover labor, return shipping charges, damages caused by normal wear and tear, field modifications within the housing, inadequate maintenance or faulty repair, failure to observe the operating instructions, overloading, use of any unsuitable material, effect of chemical or electrolytic action, building or resulting from other reasons beyond Nu-Calgon's control. Contact Nu-Calgon with further questions.