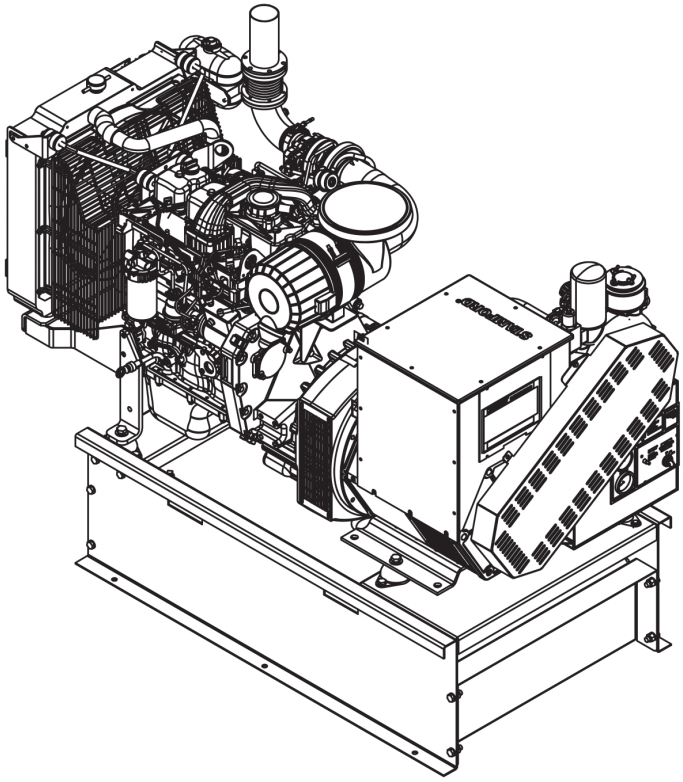
WINCO®

DE4040/2
GENERATOR



INSTALLATION AND OPERATORS MANUAL

MANUAL KEY START AND DSE4510 ELECTRIC START

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COPY YOUR MODEL AND SERIAL NUMBER HERE
No other WINCO generator has the same serial number as yours. If you should ever need to contact us on this unit, it will help us to respond to your needs faster.

MODEL _____

SERIAL NUMBER _____

PURCHASE DATE _____

DEALER NAME _____

DEALER PHONE # _____

SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during installation and maintenance of the generator. Read and understand all instructions in the manual before starting and operating the generator.

USING THIS MANUAL
Congratulations on your choice of a WINCO generator. You have selected a high-quality, precision-engineered generator designed and tested to give you years of satisfactory service.

To get the best performance from your new generator, it is important that you carefully read and follow the operating instructions in this manual.

Should you experience a problem please follow the “Troubleshooting Tables” near the end of this manual. The warranty listed in the manual describes what you can expect from WINCO should you need service assistance in the future.

SAFETY INFORMATION

This engine generator set has been designed and manufactured to allow safe, reliable performance. Poor maintenance, improper or careless use can result in potentially deadly hazards; from electrical shock, exhaust gas asphyxiation, or fire. Please read all safety instructions carefully before installation or use. Keep these instructions handy for future reference. Take special note and follow all warnings on the unit labels and in the manuals.

ANSI SAFETY DEFINITIONS

DANGER:
DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

WARNING:
WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION:
CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

1. ELECTRICAL SHOCK -
The output voltage present in this equipment can cause fatal electric shock. This equipment must be operated by a responsible person.

A. Do not allow anyone to operate the generator without proper instruction.
B. Guard against electric shock.
C. Avoid contact with live terminals or receptacles.
D. Use extreme care if operating this unit in rain or snow.
E. Use only three-pronged grounded receptacles and extension cords.
F. Be sure the unit is properly grounded to an external ground rod driven into the earth.

2. FIRE HAZARD -
Gasoline and other fuels present a hazard of possible explosion and/or fire.

A. Do not refuel when the engine is running or hot.
B. Keep fuel containers out of reach of children.
C. Do not smoke or use open flame near the generator set or fuel tank.
D. Keep a fire extinguisher nearby and know its proper use. Fire extinguishers rated ABC by NFPA are appropriate.
E. Store fuel only in an approved container, and only in a well ventilated area.
F. Follow local codes for closeness to combustible material.

3. DEADLY EXHAUST GAS -
Exhaust fumes from any gasoline engine contain carbon monoxide, an invisible, odorless and deadly gas that must be mixed with fresh air.

A. Operate only in well ventilated areas.
B. Never operate indoors including attached garages
C. Never operate the unit in such a way as to allow exhaust gases to seep back into closed rooms (i.e. through windows, walls, floors).

4. NOISE HAZARD -
Excessive noise is not only tiring, but continual exposure can lead to loss of hearing.

A. Use hearing protection when working around this equipment for long periods of time.
B. Keep your neighbors in mind when using this equipment.

5. CLEANLINESS -
Keep the generator and surrounding area clean.

A. Remove all grease, ice, snow or materials that create slippery conditions around the unit.
B. Remove any rags or other materials that could create a potential fire hazard.
C. Carefully clean up any gas or oil spills before starting the unit.

6. SERVICING EQUIPMENT -
All service, including the installation or replacement of service parts, should be performed only by a qualified technician.

A. Use only factory approved repair parts.
B. Do not work on this equipment when fatigued.
C. Never remove the protective guards, covers, or receptacle panels while the engine is running.
D. Use extreme caution when working on electrical components. High output voltage from this equipment can cause serious injury or death.
E. Always avoid hot mufflers, exhaust manifolds, and engine parts. They can cause severe burns instantly.
F. The use of the engine-generator set must comply with all national, state, and local codes.

TESTING POLICY

Before any generator is shipped from the factory, it is fully checked for performance. The generator is loaded to its full capacity, and the voltage, current, and frequency are carefully checked.

Rated output of generator is based on engineering tests of typical units, and is subject to, and limited by, the temperature, altitude, fuel, and other conditions specified by the manufacturer of applicable engines.

This unit comes factory set for either key start or manual start. With the DSE 4510 controller used in the manual start option it is possible to wire the control for remote start. Wiring instructions can be found further in this manual. The key start version does not have this option.

SPECIFICATIONS

DE4040F4

MODEL	DE4040F4-3	DE4040F4-4	DE4040F4-17	DE4040F4-18
Generator				
Wattage	33,500	40,000	40,000	40,000
Volts	120/240	120/208	120/240	277/480
Phase	Single	Three	Three	Three
PF	1.0	.80	.80	.80
Amps	138	139	120	60
Hertz	60	60	60	60
Engine				
Model			FPT N45SM2 Turbocharged	
Starting System			12 Volt Manual	
Muffler			Standard	
Fuel Consumption (full load)			4.57 Gal/hr	

Generator Testing Resistance

Model	Stamford UC1224D
Winding Group	311
Resistances	Ohms
Rotor	0.59
Stator	0.181 @ 22°C
Exciter Rotor	0.071
Exciter Stator	21.0
Voltage Regulator	SX460

Engine Fluid Specifications

Fuel	ASTM D-975 -1D or 2D EN590 or equivalent
Oil Type	10W-30 CF-CH4
Oil Capacity	13.5 Quarts
Cooling System	50/50 mix

INTRODUCTION

PRODUCT DESCRIPTION

The engine-generator set consists of a multi-cylinder, liquid-cooled engine nominally operating at 1800 RPM. The generator frequency regulation is maintained by the engine governor to within +/- 1.5 Hertz from no load to rated load for standard mechanical governors. The generator is connected to the engine flywheel via flexible drive disks. The generator set is skid mounted with isolation mounts between the engine and base.

NOTICE: These engine generator sets have only basic engine protections. The manual key start panel only provides low-oil pressure, high compressor oil temperature, and high-coolant temperature protection. The DSE 4510 electronic start panel displays a voltage and frequency reading. Based on this information, it also provides basic over/under speed and voltage protection. Low-oil pressure and high-coolant temperature reading/shutdowns are provided by senders mounted on the engine. No other control options are available. If your application requires additional safety devices or signals, consider upgrading to the DR series generators manufactured by WINCO.

A Customer supplied 12 Volt battery is required to complete the installation. Battery requirements are listed later under the battery installation section.

These engine-generator sets come standard with a manual key start system. This key start system utilizes a safety latching relay that shuts the unit down if the oil pressure gets low or if the water or compressor oil temperatures get too high. **The safety latching relay must be depressed during cranking.** The optional DSE4510 digital controller is available and electronically starts the generator set.

GENERATOR SET:

Every WINCO generator set has its own unique identity data plate. This data plate identifies the complete unit model number, the system serial number, and has links to the individual components that form the generator set in our factory records. Several of the major components also have their own individual data plates providing additional information to document build data for warranty and replacements parts. Be sure to have the main WINCO unit data plate information recorded inside the front cover of this manual for future reference and for identification whenever requesting field or factory assistance. Primary fields needed for assistance are complete model number and serial number.

ENGINE:

This manual covers specific operation of the combined engine generator set. The basic engine information provided in this manual is not suitable for all operating conditions. Refer to the engine operators manual for more detailed operation and maintenance information.

CAUTION: EQUIPMENT DAMAGE:
Be sure to check the engine oil level frequently as specified in the engine manual.

The engine manufacturer has established an excellent worldwide engine service organization; engine service is available from a nearby authorized dealer or distributor. Go to the WINCO website for a list of engine dealers (http://wincogen.com/Engine_Support) or contact the WINCO Service Department.

The rated power of each engine-generator is limited by the temperature, altitude, and all other ambient conditions specified by the engine manufacturer. Engine power may decrease 3½% for each 1000 feet above sea level, and will decrease an additional 1% for each 10 degrees Fahrenheit above 60° Fahrenheit. Units should not be operated in ambient temperature greater than 125° Fahrenheit.

GENERATOR:

WINCO generator sets use brushless, AVR (Auto-Voltage Regulator) controlled broad-range generator ends. The generator converts rotational mechanical energy into electrical energy. These WINCO units

are equipped with generators manufactured by Cummins Generator Technology. Each generator 'end' has its own data tag. A unique serial number is on the data plate and the data label is affixed to the main frame on the generator on the left side.

PREPARING THE UNIT

UNPACKING

1. As you receive your unit, it is critical to check it for any damage. If any damage is noted, it is always easiest to refuse the shipment and let WINCO take care of the freight claim. If you sign for the unit, the transfer of the ownership requires that you file the freight claim

2. Before proceeding with the preparations of your new generator for operation, take a couple of minutes to ensure the unit you have received is the correct model and review the specification pages in this manual to ensure that this unit meets your job requirements.

CAUTION: EQUIPMENT DAMAGE:
This unit is shipped with oil and a 50/50 mix of coolant. Be sure to check all fluid levels before operating. See engine manufacturer's instruction manual for recommended oil requirements before initial starting.

Once generator set is on-site:
1. Carefully remove the crate.
2. After inspecting the engine-generator for external, physical damage, locate and check the following items packed with the unit:
    a. Installation and Operator's Manual.
    b. Engine manufacturer's instruction manual.
    c. Battery hold-down brackets & hardware.
    d. Unit components or accessory items shipped loose for on-site installation.
    e. Optional accessories.
3. Remove main frame hold-down bolts.
4. Unit can now be lifted from shipping rails.

LIFTING THE GENERATOR SET

NOTICE: PERSONAL INJURY:
To prevent injury to persons or equipment, observe the following guidelines when lifting the generator:

Due to the different designs, configurations, options, weights, site conditions, and available material handling equipment, specific lifting instructions are not provided for each individual generator set model. General guidelines provided are applicable to the entire generator line. It is the responsibility of the installing party to follow the lifting equipment's operator's manual to prevent injury to personnel and damage to the generator. Smaller generator sets may not require use of overhead lifting equipment and may be placed on the pad with basic material handling equipment, i.e. a forklift.

CAUTION:
Do not attempt to lift the generator set by the means of the lifting eyes on the engine or generator end. These lifting points are only for the use during the manufacturing process and are designed for lifting of the individual generator set components.

WARNING:
NEVER attempt to lift the fuel tank filled with fuel. Sloshing of the fuel can cause a shift in the balance of the fuel tank, making for a DANGEROUS, unbalanced lifting load. If the generator was shipped on the fuel tank, use the lifting points located on the fuel tank to move the entire generator set into place. DO NOT PLACE FUEL IN THE TANK PRIOR TO LIFTING.

INSTALLATION

WARNING: PERSONAL INJURY:
Before proceeding with the installation, be sure the engine control is in the "stop" position. Also, be sure the generator MLCB (main line circuit breaker) in is the "off" position and the unit starting battery is disconnected.

GENERAL INFORMATION

This engine-generator set is designed and built as an open power unit, meaning no weather protection has been provided. This unit must be installed inside of an enclosure that will provide proper protection from the elements and ventilation.

Before beginning the installation process, recheck the voltage, phase, and amperage rating of the generator set. Be certain it can handle the intended load and are compatible with the intended loads. Plans for installation should be prepared with proper attention to mechanical and electrical engineering detail to assure a satisfactory system installation. The installation must comply with all national, state, and local codes.

The information in this manual is offered only as a guide to finalizing your installation plans.

ENGINE GENERATOR SET MOUNTING

The unit's main frame must be bolted solidly to a solid base. The engine-generator is mounted on channels which are attached with special shock mounts to the main frame. This allows the engine-generator free movement without affecting the base or surrounding equipment.

WARNING: EQUIPMENT DAMAGE:
Never mount these engine-generator sets to a wooden base/structure. Over time, the wood will deteriorate and the unit mountings will come loose. These units must be mounted to a steel or concrete base.

The unit should be mounted to allow ample working room around it. A general rule to follow is to allow 24 inches or more of clearance for maintenance. Follow local codes for clearance from combustible surfaces.

VENTILATION REQUIREMENTS

WARNING: EQUIPMENT DAMAGE:
It is the installer's responsibility to ensure that there is sufficient cooling air available to prevent the engine and generator from over heating. Damage caused by overheating is not covered by warranty.

Providing proper air movement during your installation planning is absolutely essential. You will need to provide a fresh air inlet as well as a hot air outlet (to the outside of protection housing) for proper engine performance. These engine-generator sets are equipped with unit mount radiators and the engine is equipped with a pusher type fan. The hot air from the face of the radiator must be ducted out of the enclosure to ensure proper cooling. Failing to do so will allow the hot air to recirculate around the radiator causing the engine to overheat, resulting in an engine shutdown. If louvers are used in front of the hot air duct to protect the unit from outside weather, the louvers should be 1½ times as large as the area of the radiator face to prevent back pressure.

In addition to a hot air discharge, you must plan a fresh air intake opposite the radiator discharge. There fresh air inlets should also be 1½ to 2 times larger than the radiator face. The extra air inlet area is required to minimize restriction and to provide combustion air for the engine. Do not block fresh air intakes with other equipment as this will result in insufficient air flow to the engine for cooling. Installing them opposite the hot air discharge will allow a sweeping flow of cooling air across the engine, preventing hot spots.

INSTALLING THE FUEL LINE

This unit comes standard with a 54 gallon fuel tank. A larger tank that is supplied by the customer may be used to fuel the generator.

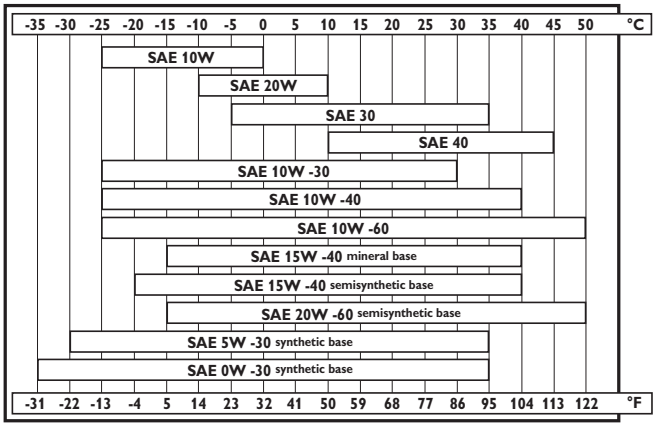
WARNING: FIRE DANGER:
Connecting rigid fuel line (i.e. steel or copper line) directly to the inlet fuel filter or fuel pump may cause the fuel line to crack during operation creating a serious fire hazard.

DE44 FUEL CONNECTIONS

LUBRICATION

Before starting the engine, check the oil level in the crankcase. If it is low, refill to the full mark with the proper weight/grade of oil as recommended by the engine manufacturer's maintenance instructions. The necessity of using the correct oil, and keeping the crankcase full, cannot be over emphasized. Failure to use the proper oil and keep the crankcase properly filled will cause excessive engine wear and shorten its useful life.

Fiat Oil Viscosity Table



COOLANT

WARNING: PERSONAL INJURY:
Never open a hot radiator cap.

Before starting the engine, check the coolant level in the radiator overflow. If it is low, refill as needed. For additional information on engine coolant requirements, see engine manufacturer's maintenance instructions.

INSTALLING THE BATTERY

CAUTION:
In the following battery installation procedure, check to be sure the engine control is in the "stop" position. This should be your last step before initial start-up.

A customer supplied 12 Volt battery is required to complete the installation. Installation of the highest CCA rated battery, within the correct BCI group, will increase cold weather starting performance.

BATTERY REQUIREMENTS

Model	Voltage	BCI Group	Min. CCA Rating
DE4040F4	12	24	650

WARNING: EQUIPMENT DAMAGE:
All of these units are 12 Volt and they are all negative ground. Permanent damage will occur if they are connected to a 24 Volt system or a positive ground system. If you are using the truck batteries to start these units, you may have to disable the charging system to keep it from interfering with the vehicle charging system.

Installation and servicing of batteries must only be preformed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.

When installing or replacing batteries, use the proper group/size starting battery. The battery should be a maintenance-free lead acid design. Deep cycle batteries will not work for this application.

CAUTION: PERSONAL DANGER:
NEVER *dispose a battery in a fire. The battery is capable of exploding.*

DO NOT *open or mutilate the battery. Released electrolyte is known to be harmful to the skin and eyes and to be very toxic.*

These engine-generator sets are all NEGATIVE ground. Be very careful not to connect the battery in reverse polarity, as this may short circuit the battery charging system on the engine.

CAUTION:
A battery presents a risk of electrical shock and high short circuit current. The following precautions must be observed when working with batteries:

1. *Remove watches, rings, and other metal objects.*
2. *Use tools with insulated handles.*
3. *Check both the battery cable ends and the battery posts to be sure they are free of corrosion.*
4. *Always connect the battery positive cable first and then connect the battery negative cable. When removing the battery cables from the battery, reverse the procedure, disconnect the negative first and then the positive cable.*
5. *Be sure all connections are tight and coat the terminals and cable ends with dialectic grease.*

WARNING:
The electrolyte is diluted sulfuric acid that is harmful to the skin and eyes. It is electrically conductive and corrosive. The following precautions must always be taken.

1. *Always wear full eye protection and protective clothing.*
2. *Where electrolyte contacts skin, wash off immediately with water.*
3. *If electrolyte contacts the eyes, flush thoroughly and immediately with water and seek immediate medical attention*
4. *Spilled electrolyte is to be washed down with an acid neutralizing agent. A common practice is to use a solution of one pound of bicarbonate of soda (baking soda) to one gallon of water. The bicarbonate of soda solution is to be added until the evidence of reaction (foaming) has ceased. The resulting liquid is to be flushed with water and the area dried.*

DANGER: EXPLOSIVE FIRE RISK:
1. *Never smoke when near batteries.*
2. *Do not cause a flame or spark in the battery area.*
3. *Always discharge static electricity from your body before touching batteries by first touching a ground metal surface.*

SERVICING BATTERIES

Batteries used on these units may, over time, lose water. This is especially true if you are using a trickle charger to maintain your battery. Different types of batteries require various types of maintenance. Refer to the battery manufacturer for specific recommendations.

NOTE: *Always make sure that a new battery is fully charged before installing it on a generator set. Failure to do so can cause damage to the engine control module in the generator set.*

All connections must be clean and tight. Depending on your battery type, check the electrolyte in the battery periodically to be sure it is above the plates. Never allow the battery to remain in a discharged condition.

A.C. ELECTRICAL CONNECTIONS

NOTICE: CLASS 1 WIRING METHODS ARE TO BE USED FOR ALL FIELD WIRING CONNECTIONS TO TERMINALS OF A CLASS 2 CIRCUIT

NOTE: The symbol ⏚ always indicates ground where shown. All wiring must be completed in accordance with the National Electric Code as well as any state and local codes.

You must pay particular attention to wire size requirement for the amperage of service you are dealing with. **Wire amperages have been derated for 40° C ambient temperatures operation.**

WARNING:
Make sure the generator is disconnected from the battery to prevent accidental starting.

CURRENT TRANSFORMERS

Current transformers (CT) have been shipped loose with the generator. The CTs will be labeled G1, G2, and G3 on the black wire next to the CT. Ensure these are corresponding with the correct leads. Run the wires through the CT so that the white wire is facing the generator and the side with the black wire facing towards the load. Zip tie the CTs tightly in place to prevent them from rubbing through the lead wires or against the generator end. If power readings are negative, check CT orientation.

NEUTRAL AND GROUND LUGS

Each DE unit comes with a neutral lug from the factory to provide a connection point from the generator to the transfer switch or load distribution center. **The generator ships from the factory with a bonded neutral.**

Ground lugs are provided to connect to the distribution center. **The Generator ships from the factory with a bonded neutral.**

Model	Lug AMP	Wire Capability	Torque
DE4040	225	#4 AWG to 300 MCM	250 in. lbs.

WARNING: EQUIPMENT DAMAGE:
When installing a three phase 240 Volt system, be sure you know which lead is high voltage 'wild' leg (208 Volt to neutral). The generator normally carries the high voltage on the G2 lead.

GENERATOR CIRCUIT BREAKER

This unit **does not** come with circuit breaker protection. This gives flexibility for installation as the circuit breaker can be mounted remotely. A circuit breaker is required in the system

The following tables are recommended circuit breaker size, lug wire sizes and torque specifications. See actual breaker for additional information and restrictions.

kW	Voltage	PH	AMP	Wire Capability	Lug Torque
33.5	120/240	1	150	#4 AWG - 300 MCM	250 in lbs
40	120/208	3	150	#4 AWG - 300 MCM	250 in lbs
40	120/240	3	125	#4 AWG - 300 MCM	250 in lbs
40	277/480	3	60	#8 - 3/0 AWG	120 in lbs

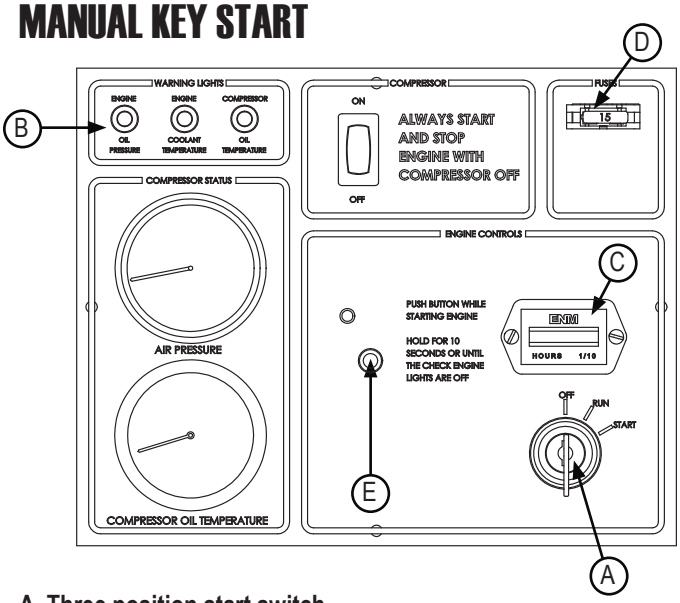
For additional conductor sizes between the generator and the load. Based on wire type and temperature rating.

				Wire Temperature Rating			
				Cu Conductor		Al Conductor	
kW	Voltage	PH	CB AMP	75°C	90°C	75°C	90°C
33.5	120/240	1	150	3/0 AWG	1/0 AWG	4/0 AWG	3/0 AWG
40	120/208	3	150	2/0 AWG	1/0 AWG	4/0 AWG	3/0 AWG
40	120/240	3	125	1/0 AWG	#1 AWG	3/0 AWG	2/0 AWG
40	277/480	3	60	#4 AWG	#6 AWG	#3 AWG	#4 AWG

Wire has been derated for 40°C ambient temperature. For additional information on wire sizing refer to table 310.16 of the National Electrical Code ANSI/NFPA 70.

ENGINE CONTROL PANEL LAYOUT

MANUAL KEY START



A. Three position start switch

1. Off - In this position all power to the engine is turned off and the engine is stopped.

2. Run - With the switch in this position the fuel solenoid and the fuel pump on the engine are activated. A 12 Volt signal is also being sent to the Voltage regulator on the engine alternator to activate it.

3. Start - This position on the switch will activate the starter on the engine to start it.

B. Check engine light

This light will come on when the low oil pressure switch or the high water temperature sensor come on when you go to start the engine. This will also come on when you go to start the engine. This light will also come on when you go to start the engine and stay on until the engine has built sufficient oil pressure to open the low oil pressure switch.

C. Running the meter

This meter records the actual hours of the engine operation.

D. 15 Amp fuse

This fuse protects all the DC wiring in the engine control panel and on the engine. If this fuse is blown, nothing will work on the engine.

E. Safety latching relay

This safety latching relay provides the 12 Volt DC power to the fuel solenoid and the engine alternator field circuit during normal operation. If the system experiences a low oil pressure fault, a high water temperature fault, or a high compressor oil temperature fault, this relay will trip, disconnecting the furl solenoid and shutting down the engine. When tripped, the button on the panel will extend out about 1 inch. This button must also be held in during starting until the check engine light goes out.

INITIAL START UP

Use the following check list to verify correct installation before starting the engine.

- ☐ Engine oil. Fill as required with proper grade/qty.
- ☐ Engine coolant. Fill as required with proper mixture.
- ☐ Unit mounting base properly bolted down.
- ☐ Clearance for service and maintenance on all sides.
- ☐ Proper fuel line material and size.
- ☐ All fuel line connections tight.
- ☐ Battery connections clean and tight
- ☐ Battery fully charged.
- ☐ All AC and DC wiring installed and properly protected.
- ☐ Compressor oil. Fill as required with proper grade/qty.

After completing the previous checklist, the engine-generator set is ready for the initial start-up test.

STARTING PROCEDURE

1. Rotate the start switch (A) to the Run position. Then while depressing the Safety Latching Relay button (E) rotate the switch to the Start position. At this point the starter should engage and the unit will start.

2. As the unit starts, release the Start Switch and it will return to the run position. You must continue to depress the Safety Latch Relay button until the Check Engine light goes out. When this light goes out, it indicates that the engine has built sufficient oil pressure to operate properly and the high coolant temperature has not been exceeded.

WARNING: EQUIPMENT DAMAGE:
Do not depress the safety latching relay button for over 10 seconds. If the light has not gone out in 10 seconds, it indicates that either the engine has not built oil pressure or the coolant temperature has exceeded the allowable maximum.

3. After the engine is up and running, the circuit breaker can be closed to power your loads. During periods of very cold operation, it is best to let the engine warm up for a few minutes before applying load.

4. When stopping the unit, it is best to turn off all of the loads before turning the Start Switch to the off position. This prevents your loads from getting low Voltage while still running during unit shutdown.
If for any reason during operation the oil pressure should drop below the allowable level the Safety Latching Relay button will pop out and the unit will shutdown. You will also get a check engine light at this time. If you find the unit stopped with the relay button popped out, it could have been caused by either low oil pressure or high water temperature.

DSE4510 ELECTRONIC START

NOTE: See DSE4510 Wiring Schematic in this manual for proper wiring procedure.

STARTING PROCEDURE

WARNING: EQUIPMENT DAMAGE:
Before attempting to start this unit, complete your pre-start checklist and ensure the generator mainline circuit breaker is in the proper position prior to starting. Starting this unit without it properly connected can cause serious personal injury or equipment damage.

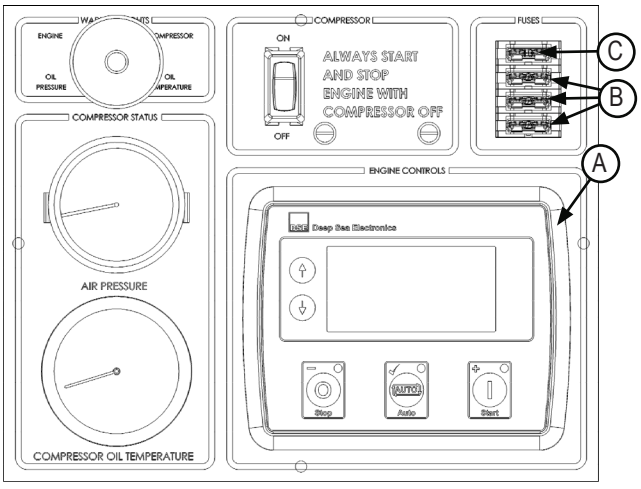
WARNING: EQUIPMENT DAMAGE:
DO NOT jump start these engine-generator sets. Starting these units on a low battery or jump starting them will cause damage to the engine control module.

INITIAL START UP

Use the following check list to verify correct installation before starting the engine.

- ☐ Engine oil. Fill as required with proper grade/qty.
- ☐ Engine coolant. Fill as required with proper mixture.
- ☐ Unit mounting base properly bolted down.
- ☐ Clearance for service and maintenance on all sides.
- ☐ Proper fuel line material and size.
- ☐ All fuel line connections tight.
- ☐ Battery connections clean and tight
- ☐ Battery fully charged.
- ☐ All AC and DC wiring installed and properly protected.
- ☐ Compressor oil. Fill as required with proper grade/qty.

CONTROL LAYOUT



A. Deep Sea 4510 Engine control

B. 2 Amp fuses
These fuses are in the AC input line from the generator that provide the AC Voltage reading on the display. If the fuse is blown, the DSE4510 will not display a voltage or frequency reading and will shutdown on low voltage or frequency. (Replacement fuse ATO-ATC-2A-250 Volt)

C. 10 Amp fuse
This fuse supplies the 12 Volt DC to power the DSE 4510 controller circuits on the boards. If this fuse is blown, the DSE 4510 will not function at all. (Replacement for ATO-ATC 2A-250 Volt)

After completing the previous checklist, the engine-generator set is ready for initial start-up.

1. Press and release the red Stop/Reset button

2. Press and release the green Start Engine button. The engine-generator set will crank and start automatically. If the engine fails to start, it will display a fault code and the common alarm indicator will start blinking. See the fault code appendix portion of this manual.

3. With the unit running smoothly, check the no load voltage and frequency of the generator output.

4. Once the unit is running and the safety on time has elapsed, the engine monitoring switches are active for low oil pressure and high water temperature.

5. After the engine is up and running, the circuit breaker can be closed to power your loads. During periods of very cold operation, it is best to let the engine warm up for a few minutes before applying the load. See Air Compressor section in this manual for starting the air compressor.

6. When stopping the unit, it is best to turn off all the loads before pressing the stop button. This prevents your loads from getting low voltage while still running during shutdown.

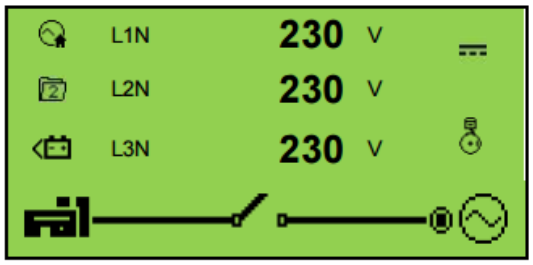
	STOP/RESET (red button) - This button places the module into its Stop/Reset mode. This will clear any alarm conditions for which the triggering criteria have been removed. The fuel supply de-energizes and the engine comes to a standstill. Should a remote start signal be present while operating in this mode, a remote start WILL NOT occur.
	AUTO (white button) - This button places the module into its Automatic mode. This mode allows the module to control the function of the generator automatically. The module will monitor the remote start input and once a start request is made, the set will be automatically started and placed on load. The module will then wait until the next start event.
	START (green button) - Pressing this button from STOP/RESET will start the engine and run the load.
	MENU NAVIGATION - Used for navigating the instrumentation, event log, and configuration screens.

PROTECTIONS
When an alarm is present, the common alarm LED if configures will illuminate. The LCD display will show an icon to indicate the failure.

WARNINGS
Warnings are non-critical alarm conditions and do not affect the operation of the generator system, they serve to draw the operator's attention to an undesirable condition. Warning alarms are self-resetting when the fault condition is removed. The icon will appear steady in the display.

SHUTDOWN
Shutdowns are critical alarm conditions that stop the engine and draw the operator's attention to an undesirable condition. Shutdown alarms are latching. The fault must be removed and the STOP/RESET button pressed to reset the module. The icon will be flashing in the display.

Example of DSE home page display



FRONT PANEL CONFIGURATION

1. Press the O and the AUTO buttons together to enter the editor mode.

2. Press the ↑ or ↓ navigation buttons to cycle through the front panel editor to select the required page in the configuration tables.

3. Press the I to select the next parameter or O to select the previous parameter within the current page.

4. When viewing the parameter to be edited, press the AUTO button, the value begins to flash.

5. Press the I or O buttons to adjust the value to the required setting.

6. Press the AUTO button to save the current value, the value ceases flashing.

7. Press the AUTO button to save and exit the editor, the configuration icon is removed from the display.

NOTES:
Pressing and holding the I or O buttons will give auto-repeat functionality. Values can be changed quickly by holding the buttons for a prolonged period of time.

The editor automatically exits after 5 minutes of inactivity to ensure security.

The PIN number is not set by WINCO when the module leaves the factory. If the code has been 'lost' or 'forgotten', the module must be returned to the DSE factory to have the module removed. A charge will be made for this procedure.
NB - This procedure cannot be performed away from the factory.

The PIN number is automatically reset when the editor is exited (manually or automatically) to ensure security.

DSE4510 DEFAULT CODES

	Auxiliary Inputs - Auxiliary inputs can be be user configured and will display the message as written by the user.
	Fail to Start -The engine has not fired after the preset number of start attempts.
	Low Oil Pressure - The module detects that the engine oil pressure has fallen below the low oil pressure pre-alarm setting level after the Safety On timer has expired.
	Engine High Oil Temperature - The module detects that the engine oil temperature has exceeded the high engine temperature pre-alarm setting level after the Safety On timer has expired.
	Underspeed - The engine speed has fallen below the underspeed pre-alarm setting.
	Overspeed - The engine speed has risen above the overspeed pre-alarm setting.
	Generator Under Voltage - The generator output voltage has fallen below the pre-set pre-alarm setting level.
	Generator Over Voltage - The generator output voltage has risen above the pre-set pre-alarm setting after the Safety On timer has expired.
	Generator Under Frequency - The generator frequency has fallen below the pre-set pre-alarm setting after the Safety On timer has expired.
	Generator Over Frequency - The generator output frequency has risen above the pre-set alarm setting
	Analogue Input Configured As Digital - The analogue inputs can be configured to digital inputs.The module detects that an input configured to create a fault condition has become active.
	Charge Failure - The auxiliary charge alternator voltage is low as measured from the W/L terminal.

	Low Fuel Level - The level detected by the fuel level sensor is below the low fuel level pre-set alarm setting.
	High Fuel Level - The level detected by the fuel level sensor is above the high fuel level pre-set alarm setting.
	Delayed Over Current - The measured current has risen above the configured trip level for a configured duration.
	kW Overload - The measured kW has risen above the configured trip level for a configured duration
	CAN ECU Fault - The engine ECU has detected an alarm – CHECK ENGINE LIGHT Contact Engine Manufacturer for support.
	CAN Data Fail - The module is configured for CAN operation and does not detect data on the engine Can data link
	Emergency Stop -The emergency stop button has been depressed. This failsafe (normally closed to emergency stop) input and immediately stops the set should the signal be removed.
	Oil Sender Open Circuit - The oil pressure sensor has been detected as being open circuit.
	Coolant Temperature Sender Open Circuit - The coolant temperature sensor has been detected as being open circuit
	Oil Filter Maintenance Alarm Maintenance due for oil filter.
	Air Filter - Maintenance Alarm Maintenance due for air filter.
	Fuel Filter - Maintenance Alarm Maintenance due for fuel filter.

DE4040 TROUBLESHOOTING TABLE

Problem	Possible Causes
Engine won't crank	Low/dead battery Blown DC fuses Defective DSE4510 Defective key switch Loose or dirty battery terminals Defective starter Defective start solenoid Locked up engine genset Defective engine harness Improper battery voltage to start solenoid, fuel pump, or fuel solenoid
Engine cranks but will not start	Improper fuel delivery to the unit Fuel supply shut off Fuel tank empty Air in the fuel system Engine fuel solenoid has not opened Defective fuel pump Defective fuel solenoid Defective engine harness Improper battery voltage to fuel pump or fuel solenoid
Engine starts, then stops and alarm light comes on	Engine oil pressure is low Engine has high water temperature Refer to fault code on DSE4510
Engine will not come up to speed after it starts	Insufficient fuel volume getting to the unit 1. Too small of fuel line 2. Fuel racks not open properly Governor is defective AC short in generator components
No AC output from generator	Defective diode Defective voltage regulator Defective rotor Defective stator Defective exciter rotor Defective exciter stator AC short in the output leads Defective/open generator output breaker Wiring error
Negative current/kW on DSE display	Reverse CT direction
No air output/low output	See Air Compressor Trouble Shooting Table

AIR COMPRESSOR

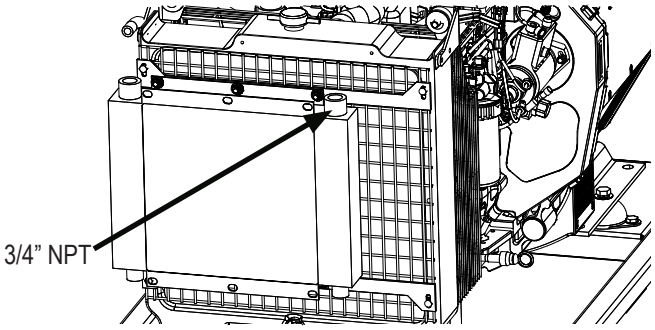
This unit has been equipped with an air compressor that uses an auxiliary shaft from the generator to provide counter-clockwise 120 PSI @ 40 CFM

AIR COMPRESSOR SPECIFICATIONS

Model	Rotorcomp NK 31
Max. Operating Pressure	218 PSI (15 bar)
Max. Gauge Pressure	239 PSI (16.5 bar)
Oil Capacity	101.4 oz. (3.17 qts)

CONNECTING TO COMPRESSOR

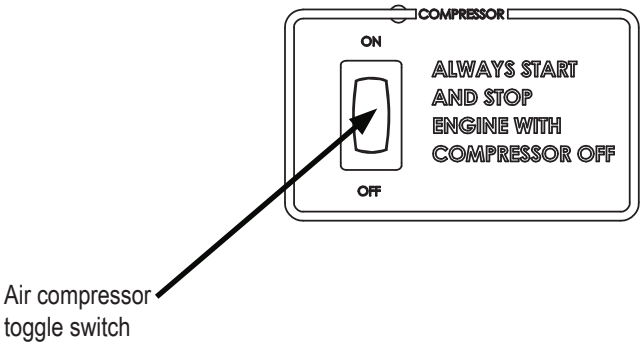
Locate the 3/4" NPT on the air cooler (reference following image) and attach your air hose.



START UP

Follow the starting procedure found previously in this manual.

Once the engine is running at speed, engage the air compressor toggle switch to the 'on' position.

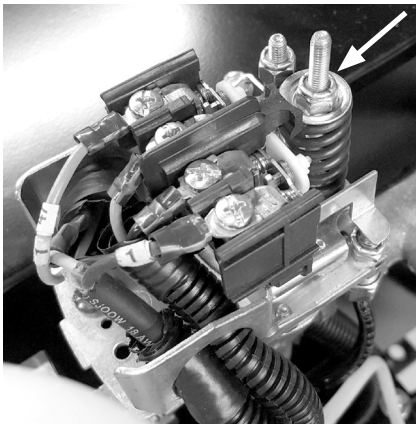


WARNING: EQUIPMENT DAMAGE
Always start and stop engine with the air compressor OFF.

ADJUSTING AIR PRESSURE

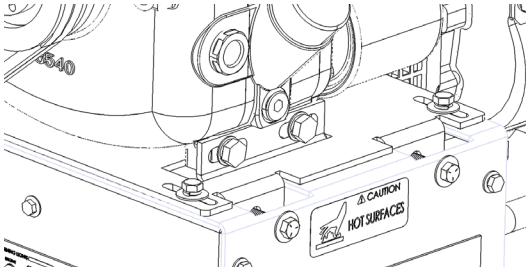
Adjustment of the maximum pressure of the compressor is done through the switch that it mounted near the outlet of the compressor.

There is an approximate 30PSI difference between the cutout pressure and the point at which the switch loads the compressor again. In order to reach the adjustment nut, unscrew the acorn nut on the top of the gray switch housing and lift the housing off of the switch. To increase the cutout pressure, turn the nut clockwise; to lower the cutout pressure turn.



ADJUSTING THE BELT

NOTE: When adjusting or replacing the belt on the unit, care must be taken to ensure that the pulleys are properly aligned and that the belt is properly tensioned. Failure to do this may result premature wear and failure of the drive belts, damage to the equipment, or poor performance. There are several things to keep in mind when adjusting the compressor.



There are four bolts that bolt into the base of the compressor that can be loosened to adjust the compressor front to rear and help with minor tweaks to the angle. Adjust these bolts first in order to do any major front to rear adjustment. Torque those bolts to 32 FT-LBS. There are four corner bolts that secure the sliding base into place; these must be loosened before the tension can be set on the belt. Once the four bolts are loosened, the two bolts on the right side of the compressor base can be turned clockwise in order to tighten the belt or counter clockwise in order to allow the belt to be loosened. Tighten the belt until there is 2-3lbs of tension in the belt that can be checked with a gauge or about .3 inches of deflection at the midpoint of the belt. It is recommended to use a proper pulley alignment too when making any adjustments to the pulley in order to keep the alignment accurate so as to prevent excess wear on the belts. Once the belt tension has been set, tighten the four corner screws to lock the tension and alignment into place. Verify after tightening all four corner bolts that the pulley alignment has not shifted.

AIR COMPRESSOR MAINTENANCE

All maintenance, assembly, and repair work should be carried out by an authorized, qualified, specially trained personnel. These precautions must be followed:

1. Only use suitable tools for maintenance and repair parts.
2. Only use genuine parts.
3. All maintenance and repair work must only be carried out with the complete unit shut down and the power supply switched off. Ensure the machine is secured against accidental switch-on.

WARNING: PERSONAL INJURY
Before removing plugs, filters, and other pressurized parts, the compressor must be cut off from all pressure sources and a pressure relief of the entire system must be carried out.

4. Never use flammable solvents or carbon tetrachloride to clean parts.
5. Always ensure the area is clean and free from dirt when conducting maintenance or repair work. Cover parts and exposed openings with a clean cloth, paper, or adhesive tape.
6. Do not conduct any welding or other heat producing work around the oil system.
7. Ensure no tools, loose parts, or cloths are left on or on the system.
8. Prior to using the unit, check whether the operating pressure, temperatures, time settings, and the oil levels are correct. Also check that the control and switch-off devices function properly.

MAINTENANCE SCHEDULE CHART

Before operation

- Check oil level

Once after 50 hours

- Check oil level
- Tighten all screw pipe fittings & electrical screw terminal fittings
- Check all other connections for firm seating

Every 100 hours

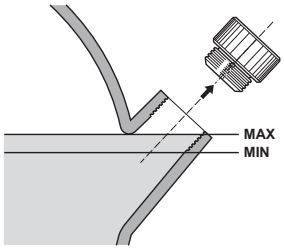
- Check oil level, top off if low

Every 1,000 - 6,000 hours or annually

- Replace fine separator cartridge
- Change oil and replace
- Replace oil filter
- Replace filter element in intake air filter
- Check system for leaks and inspect system

CHECKING THE OIL LEVEL

Oil level can only be checked at the oil filler opening.



NOTE: The screw cap has a safety hole on the side, oil or air escapes if there is any residual pressure in the tank.

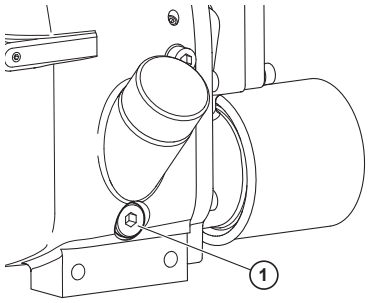
1. Switch off the compressor and disconnect the battery to prevent the engine from starting.
2. Wait one minute at standstill.
3. Screw off plug of the filler neck by hand with the oil level depressurized.
4. Check the oil level. Reference the previous diagram.
5. If necessary, top off oil to the maximum level.
6. Screw on the plug firmly by hand.
7. Switch on the system.
8. Check the plug for any leaks, replace the o-ring if necessary.
9. Carefully remove escaped, excess oil.

CHANGING THE OIL

Refer to the maintenance schedule chart for required oil change intervals.

WARNING: PERSONAL INJURY
Rotating, pressurized, and hot components. The oil change can only be changed at a standstill and with the compressor system completely discharged.

NOTE: Dispose of the used oil according to applicable regulations.



1. Switch off the compressor and disconnect the battery to prevent the engine from starting.
2. Completely release the pressure in the system.
3. Slowly screw off the screw plug on the oil filler neck.
4. Unscrew the oil drain screw (ref. 1) and drain the used oil into an approved container.
5. Clean the oil drain screw and screw back in.
6. Replace the oil filter if necessary. See Changing Oil Filter of the Air Compressor section of this manual.
7. Refill with new oil at the filler neck to the maximum level.

NOTE: The compressor must be operated with an oil suitable for special requirements. This oil must be approved by the manufacturer for screw compressors. It must even be suitable under unfavorable operating conditions, such as soiling of the intake air with gases, solvent vapors and exhaust gases and at high ambient temperatures. Suitable oil types and oil manufacturers can be specified for screw compressor on request.

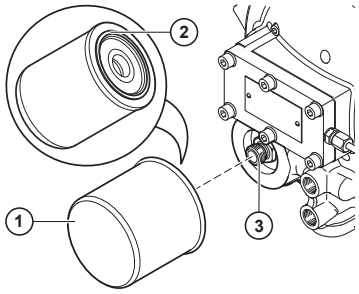
Refined oils (mineral oils) synthetic oils and bio oils (biodegradable) can be used as screw compressor oil. The materials and gaskets used in the screw compressor system must be taken into account when selecting the oil type. Corrosion and other material damage may not occur. It is not permissible to mix different oils.

This compressor requires 101.4 ounces (3.17 quarts) of oil if it is completely drained. Use caution when refilling.

8. Turn on the compressor and allow to run for 3 minutes.
9. Check oil level. Top off to the maximum level if needed.

CHANGING THE OIL FILTER

WARNING: PERSONAL INJURY
Rotating, pressurized, and hot components. The oil change can only be changed at a standstill and with the compressor system completely discharged.

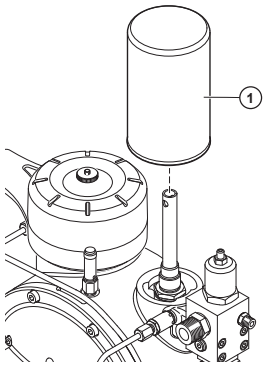


1. Switch off the compressor and disconnect the battery to prevent the engine from starting.
2. Remove the oil filter cartridge (Ref. 1) with a suitable tool, i.e. oil filter strap wrench.
3. Oil the gasket (Ref. 2.) on the new filter cartridge with the same oil type in use with the compressor.
4. Screw the new oil filter cartridge on (Ref. 3) and tighten by hand.
5. Switch on the compressor.
6. Check the filter for leaks while the system is running.
7. Turn off compressor and check oil level. Top off to the maximum level if needed.

REPLACING FINE SEPARATOR CARTRIDGE

WARNING: PERSONAL INJURY
Rotating, pressurized, and hot components. The fine separator cartridge can only be changed at a standstill and with the compressor system completely discharged.

NOTE: Heavily soiled intake air or a poor oil quality will result in early replacement of the fine separator cartridge.



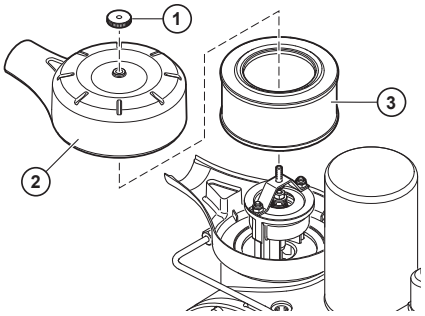
1. Switch off the compressor and disconnect the battery to prevent the engine from starting.
2. Unscrew the fine separator cartridge (Ref. 1) with a suitable tool, i.e. an oil filter strap wrench.
3. Oil the gasket on the new fine separator cartridge with the same oil type as in the compressor module.
4. Tighten the new fine separator cartridge by hand.
5. Switch on the system.
6. Check for any leaks.

REPLACING THE AIR INTAKE FILTER

NOTE: The air filter must not be cleaned and then reused, always replace the air filter.

WARNING: EQUIPMENT DAMAGE

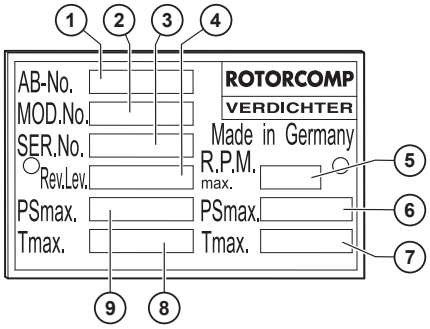
No dirt or dust particles may get into the air inlet of the air compressor.



1. Switch off the compressor and disconnect the battery to prevent the engine from starting.
2. Screw off the nut (Ref 1) and remove the filter cover (Ref. 2).
3. Carefully remove dust from the filter housing.
4. Remove the old filter (Ref. 3).
5. Insert the new filter in the filter housing.
6. Securely screw the filter cover back on using the wing nut.
7. Switch on the compressor.
8. Conduct a test run and operating test.

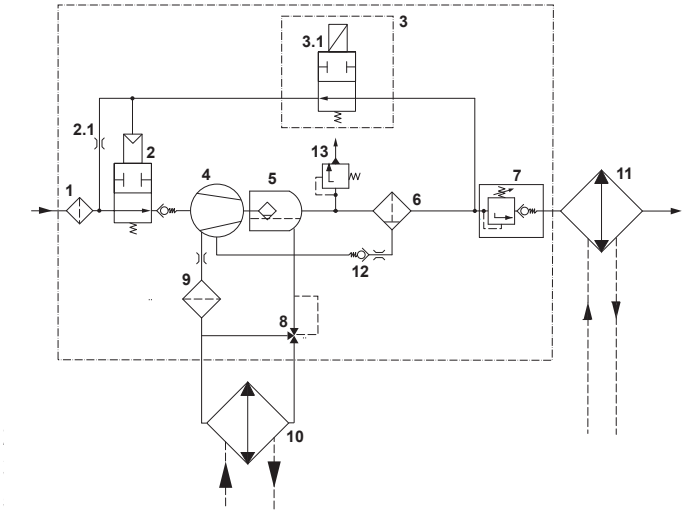
TROUBLESHOOTING

In the event you will need technical support, please have the following information ready:



1. Order number
2. Model number
3. Serial number
4. Year of manufacture
5. Max. RPM
6. Max. operating pressure (PSI)
7. Max. operating temperature (˚F)
8. Max. operating temperature (˚C)
9. Max. operating pressure in bar

FLOW DIAGRAM

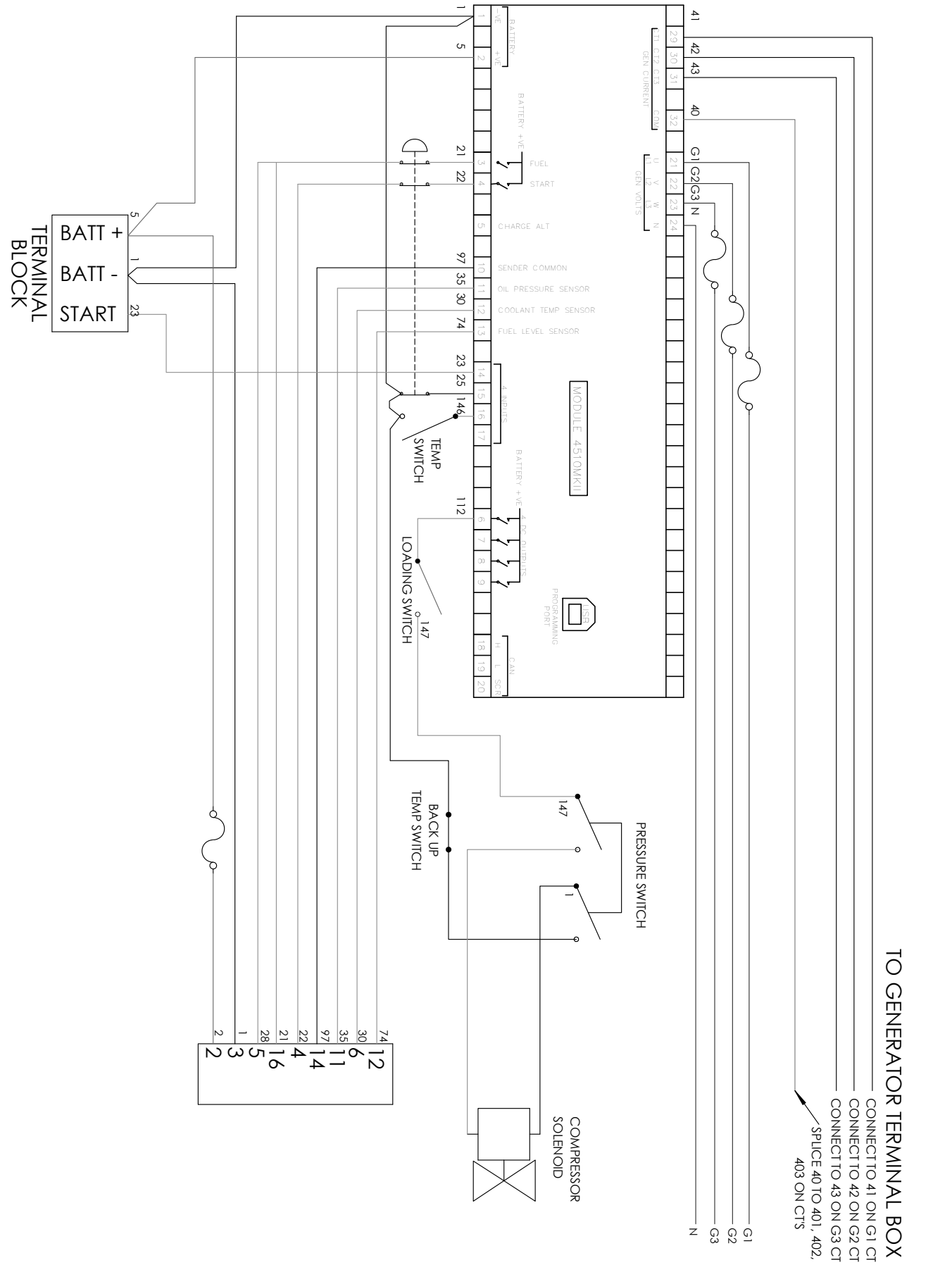


7. Minimum pressure valve
8. Oil thermostat
9. Oil filter
10. Oil cooler
11. Air after-cooler
12. Non-return valve
13. Safety valve (optional)

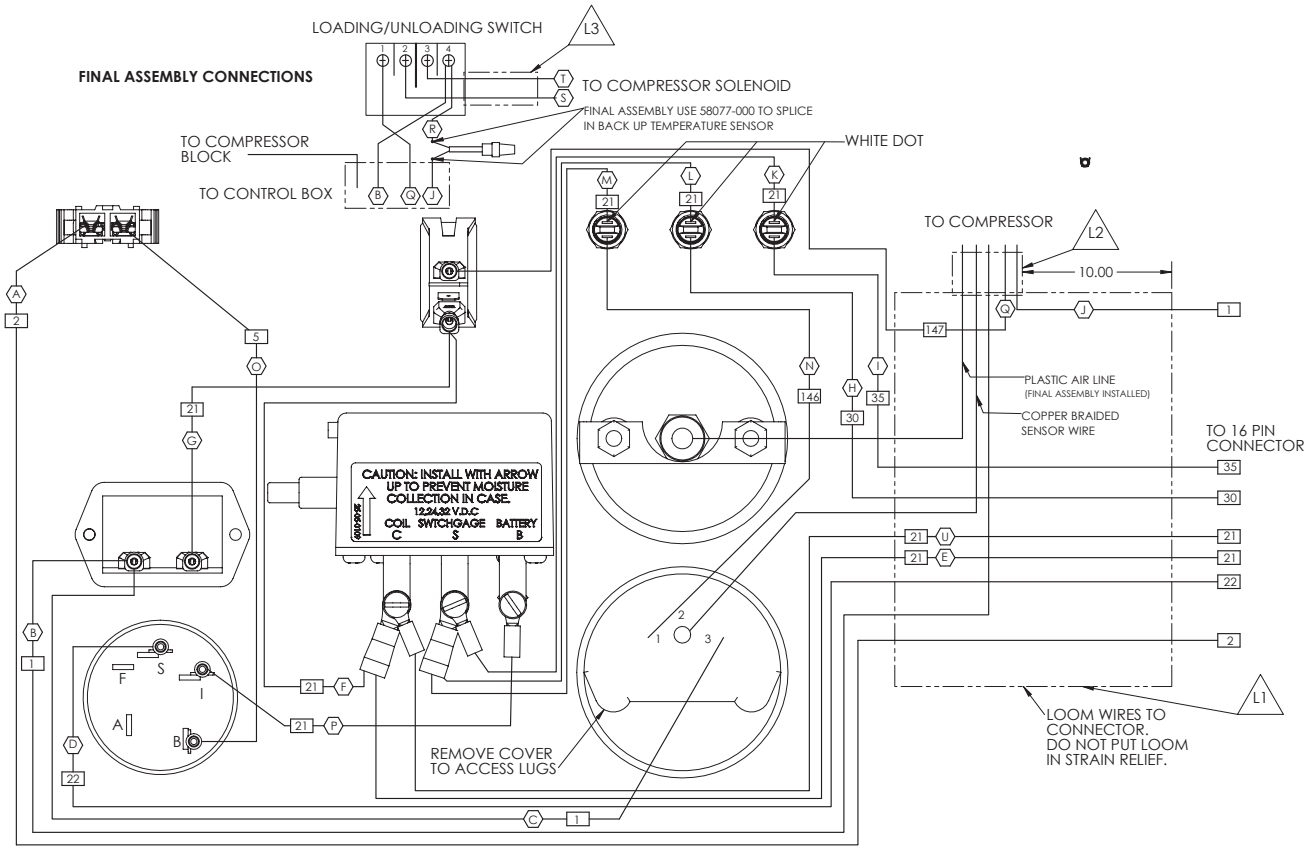
AIR COMPRESSOR TROUBLESHOOTING TABLE

PROBLEM	POSSIBLE CAUSES	REMEDY
Incorrect direction of rotation	Phase reversed	Reconnect 2 supply line
System does not start	No electricity Combistat switches off due to excessively high temp	Check electrical connections Check oil level, cooling, thermo-bypass
System difficult to start	Motor output insufficient Drive gear ratio 'too fast' Star-delta switchover incorrect Compressor is flooded with oil System has not been discharged yet Oil is filling to viscous	Check Check Set Check Check Check viscosity
Differential pressure	Pressure in separator cartridge too high with clogged or full separator cartridge	Replace separator cartridge
Combistat switches off due to excessively high temp	Oil shortage Oil filter soiled Thermostat defective Oil cooler soiled Incorrect installation 1. Room ventilation 2. Exhaust air blocked 3. Thermal short circuit Combistat faulty or incorrectly adjusted Fan has failed	Check oil level, top off if necessary Replace oil filter Replace thermostat Clean oil cooler on air side and oil side See Air Compressor Manual Adjust combistat or replace Check fan
Safety valve blows	Safety valve defective Fine separator cartridge soiled System does not relieve continuous operation System does not switch off automatically (drop-out mode)	Replace safety valve Replace cartridge
Oil in compressed air	Oil extraction line with nozzle in oil sight glass soiled Fine separator cartridge defective Oil level in oil reservoir too high; possibly excessive condensate	Clean oil extraction system Check cartridge and replace if necessary Observe oil level marking; drain and replace if necessary
System is not discharged during continuous operation, system does not switch off automatically in case of intermittent operation, i.e. safety valve blows off	Upper switching point of network pressure monitor set too high Solenoid or relief valve defective Minimum pressure valve jammed	Readjust network pressure monitor Replace solenoid or relief valve Check minimum pressure valve for smooth movement; ensure smooth movement if necessary
System continually discharges, low feed quantity	Solenoid or relief valve defective Break in electric supply line to solenoid valve	Replace solenoid or relief valve Eliminate break
No or insufficient feed quantity	Intake filter soiled Oil shortage Intake control valve does not open Leaks in system	Replace filter insert Check oil level and top off if necessary Check control valve Check, seal off
Control valve does not close	Pressure switch or control valve	Check setting
Oil exits through intake control valve during stop	Sealing surface on intake control valve damaged, spring in intake control valve broken	Check parts and replace if necessary
System does not relieve	Solenoid valve/electrical system Impulse-pressure relief valve	Check Check and replace parts if necessary
Control valve constantly discharges	Solenoid valve/electrical system	Check
Oil escapes during discharging (oil foam in fine separator cartridge)	Oil type incorrect Oil foam forms during stop Oil level too high	Oil change Install discharge delay valve, replace with different nozzle diameter Drain off oil

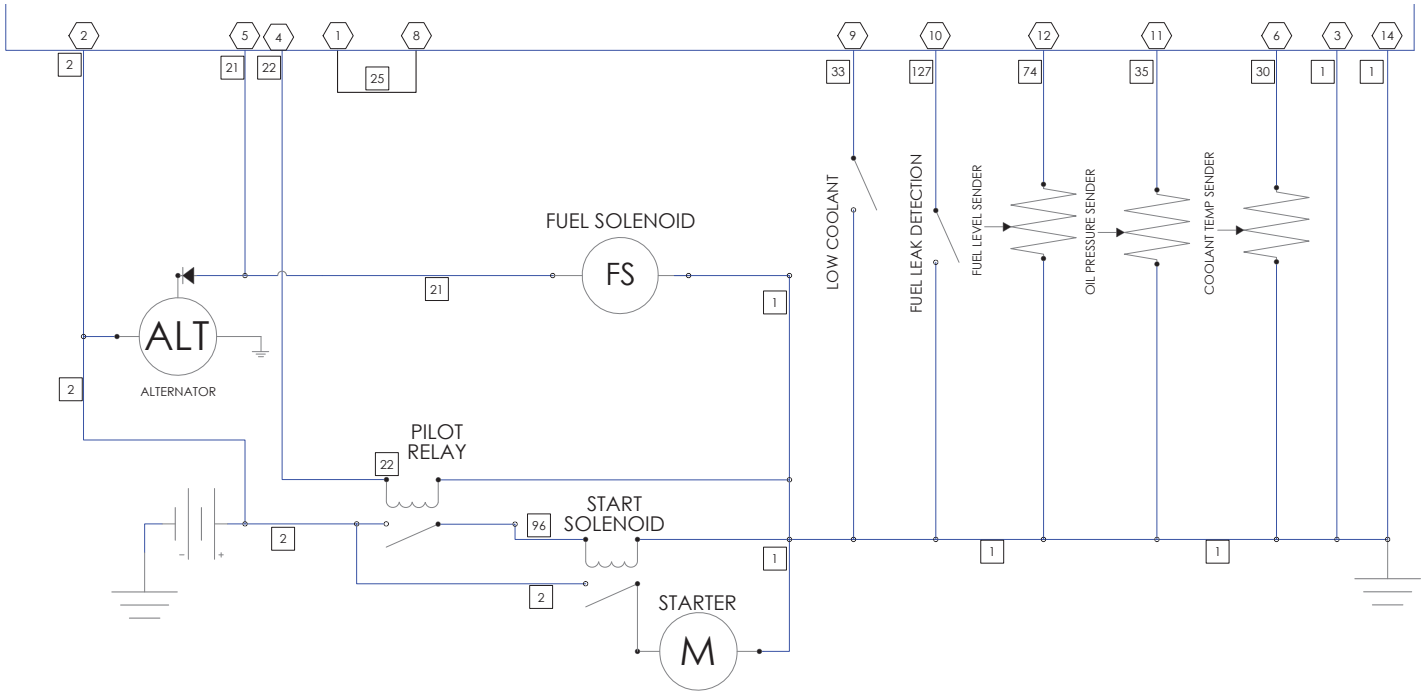
DSE4510 WIRING SCHEMATIC



KEY START PANEL SCHEMATIC

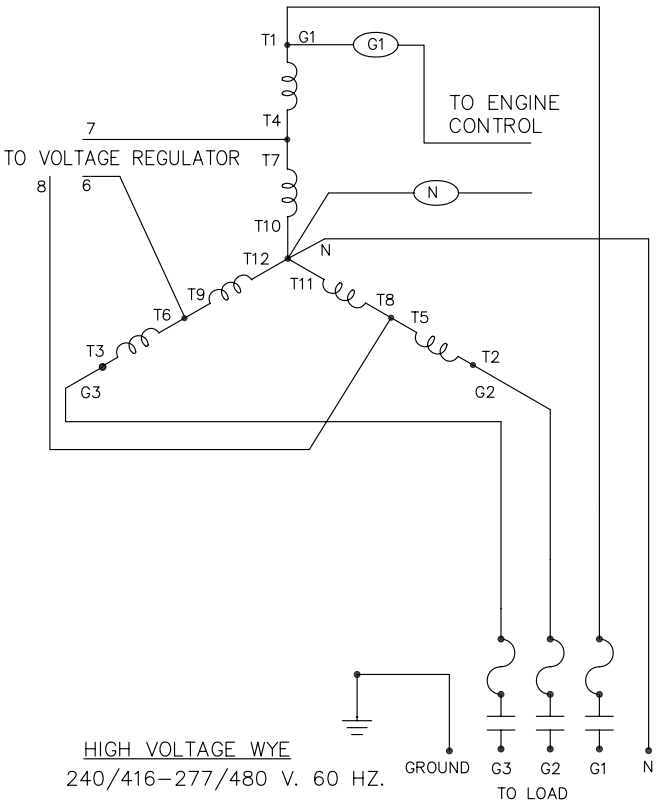


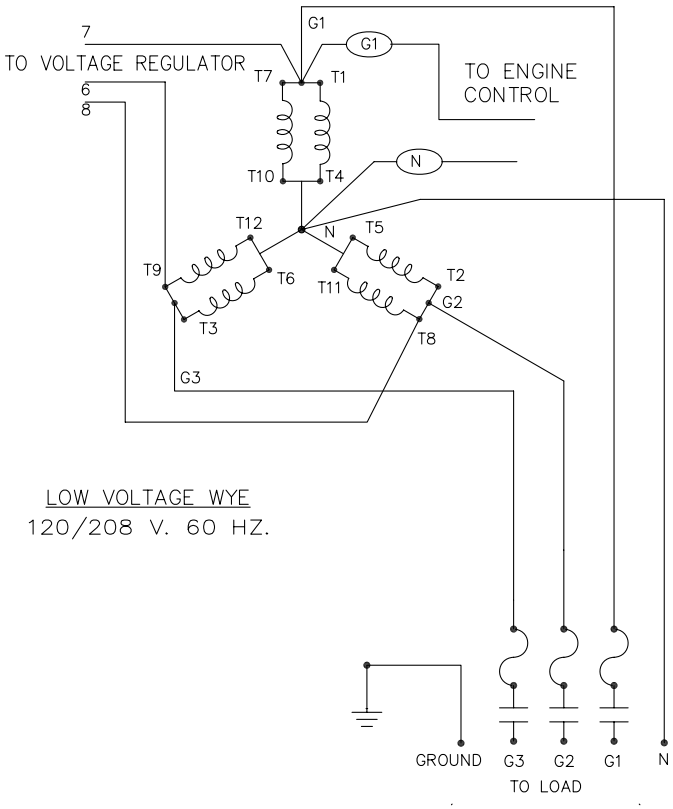
ENGINE HARNESS SCHEMATIC



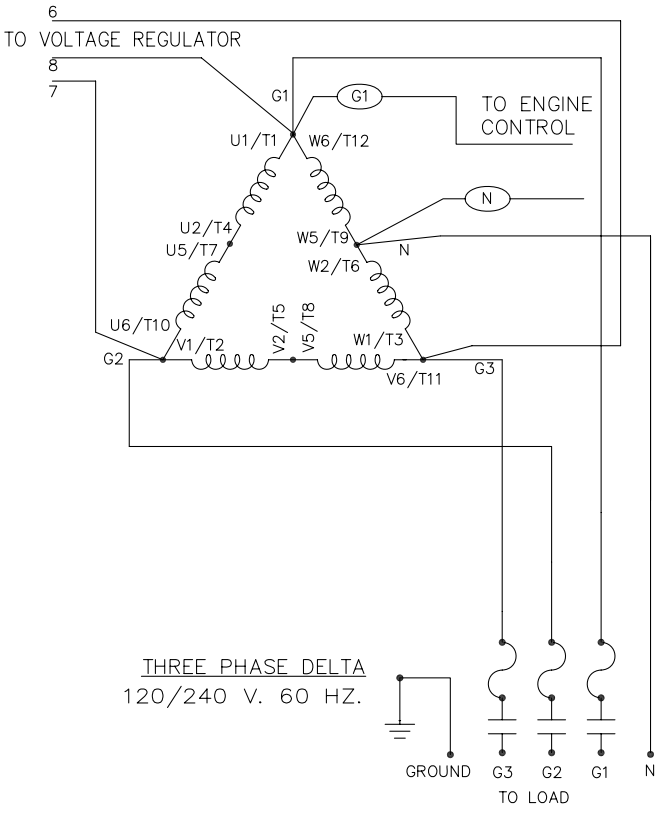
NOTE: LOW COOLANT SWITCH IS OPTIONAL. OIL PRESSURE AND COOLANT TEMPERATURE SENDERS INCLUDED ON MODELS WITH ELECTRONIC ENGINE CONTROLS. FUEL LEVEL IS FOR UNITS WITH TANKS AND LEAK DETECTION FOR UNITS WITH SECONDARY CONTAINMENT.

THREE PHASE AC WIRE HIGH AND LOW WYE

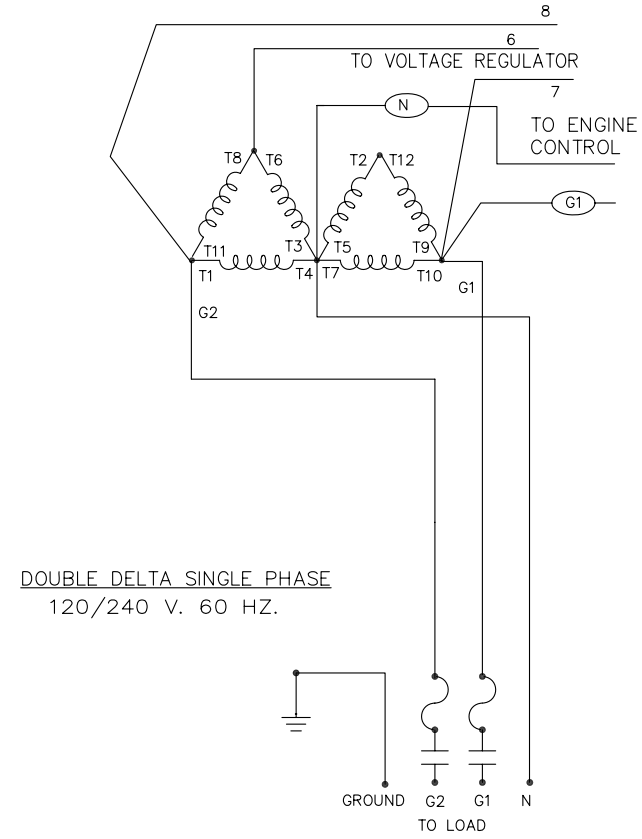




THREE PHASE AC WIRING- DELTA



SINGLE PHASE 311 WINDING



12 MONTH LIMITED WARRANTY

WINCO, Incorporated warrants to the original purchaser for 12 months or 1000 hours which ever occurs first, that goods manufactured or supplied by it will be free from defects in workmanship and material, provided such goods are installed, operated and maintained in accordance with WINCO written instructions.

WINCO's sole liability, and Purchaser's sole remedy for a failure under this warranty, shall be limited to the repair of the product. At WINCO's option, material found to be defective in material or workmanship under normal use and service will be repaired or replaced. For warranty service, return the product within 12 months or 1000 hours which ever occurs first from the date of purchase, transportation charges prepaid, to your nearest WINCO Authorized Service Center or to WINCO, Inc. at Le Center Minnesota.

THERE IS NO OTHER EXPRESS WARRANTY.

To the extent permitted by law, any and all warranties, including those of merchantability and fitness for a particular purpose, are limited to 12 months or 1000 hours which ever occurs first, from date of purchase. In no event is WINCO liable for incidental or consequential damages.

Note: Some states do not allow limitation on the duration of implied warranty and some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations may not apply in every instance. This warranty gives you specific legal rights which may vary from state to state.

WINCO reserves the right to change or improve its products without incurring any obligations to make such changes or improvement on products purchased previously.

EXCLUSIONS:

WINCO does not warrant Engines. Engines are covered exclusively by the warranties of their respective manufacturers, see enclosed warranties.

WINCO does not warrant Component Parts that are warranted by their respective manufacturers.

WINCO does not warrant modifications or alterations which were not made by WINCO, Inc.

WINCO does not warrant products which have been subjected to misuse and/or negligence or have been involved in an accident.

This warranty does not include travel time, mileage, or labor for removal or re-installation of WINCO product from its application.