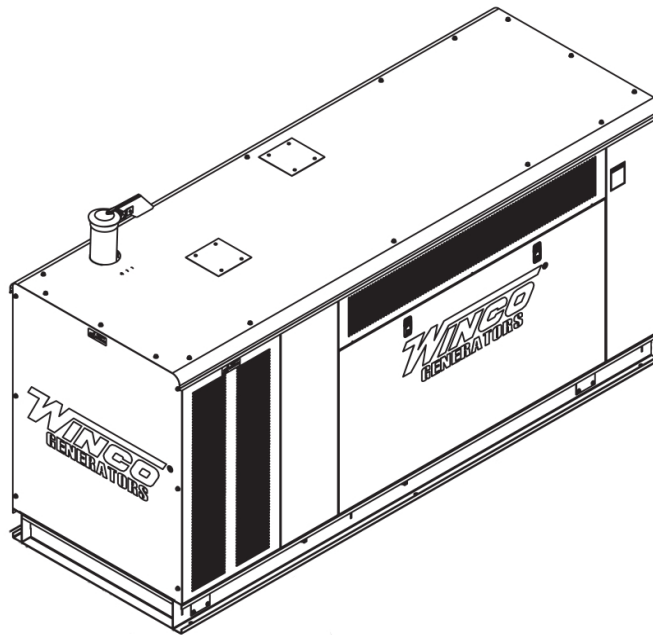


WINCO[®]

**PSS60/E
PSS90/E
GENERATOR**



INSTALLATION AND OPERATORS MANUAL

DSE 7310 MKII ELECTRIC START

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TABLE OF CONTENTS

SAVE THESE INSTRUCTIONS	3
TESTING POLICY	4
SAFETY INFORMATION	4
ANSI SAFETY DEFINITIONS	
SPECIFICATIONS	5
PSS60/E	
PSS90/E	
INTRODUCTION	6
PRODUCT DESCRIPTION	
PREPARING THE UNIT	6
UNPACKING	
INSTALLATION	6
ENGINE-GENERATOR SET MOUNTING	
FUEL INSTALLATION	7
INSTALLING THE FUEL LINE	
LIQUID PROPANE VAPOR (LP)	
NATURAL GAS (NG)	
FUEL PRESSURE	
FUEL PRESSURE TABLES	
NG/LP FUEL CONVERSION	
INSTALLING THE BATTERY	9
SERVICING BATTERIES	
BATTERY CHARGING	
CONNECTING THE BATTERY CHARGER & BLOCK HEATER	
AC ELECTRICAL CONNECTIONS	11
DC ELECTRICAL INTERCONNECTION	12
ASCO 185 UL SWITCH	
ASCO 300 UL SWITCH	
STARTING PROCEDURE	13
INITIAL START UP	
VOLTAGE REGULATOR WIRING	15
TROUBLE SHOOTING TABLES	15
MAINTENANCE SCHEDULE	16
PREVENTATIVE MAINTENANCE	16
AUTOMATIC TRANSFER SWITCH	
ENGINE-GENERATOR SET	
COLD WEATHER OPERATION	
THREE PHASE WIRING - DELTA	17
THREE PHASE AC WIRE HIGH AND LOW WYE	17
SINGLE PHASE AC WIRING - 4 LEAD	17
ENGINE HARNESS SCHEMATIC	18
DSE 7310 MKII WIRING DIAGRAM	19
24 MONTH LIMITED WARRANTY	20

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.

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 # _____

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.

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 internal combustion 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.

SPECIFICATIONS

PSS60/E

LP Gas				
Wattage	56,000	60,000	60,000	60,000
Volts	120/240	120/208	120/240	277/480
kvA	56	75	75	75
Phase	Single	Three	Three	Three
Amps	233	208	180	90
CB Size	250	200	200	90
Hertz	60	60	60	60
Natural Gas				
Wattage	55,000	58,000	58,000	58,000
Volts	120/240	120/208	120/240	277/480
kvA	55	72	72	72
Phase	Single	Three	Three	Three
Amps	229	201	174	87
CB Size	250	200	200	90
Hertz	60	60	60	60
Engine				
Model	GM 5.7L			
Starting System	12 Volt			
Muffler	Standard			
Fuel Consumption (full load)				
LP	9.29 GAL/HR - 850,964 BTU/HR			
NG	799 FT ³ /HR - 798,455 BTU/HR			

Generator Testing Resistance

Note: Review the Stamford Newage nameplate on your generator before selecting the correct information below.

Model	Stamford UCI224F1J
Winding Group	06
Resistances:	
Rotor	0.83 Ohms @20°C
Stator (L-L)	0.012 Ohms Per Ph @ 20°C
Exciter Rotor (L-L)	0.156 Ohms Per Ph @ 20°C
Exciter Stator (L-L)	20.00 Ohms @ 20°C
Aux Winding	2.6 Ohms @ 20°C
Voltage Regulator (L-L)	AS440

Model	Stamford UCI224F1L
Winding Group	311
Resistances:	
Rotor	0.83 Ohms @20°C
Stator (L-L)	0.033 Ohms Per Ph @ 20°C
Exciter Rotor (L-L)	0.156 Ohms Per Ph @ 20°C
Exciter Stator (L-L)	20.00 Ohms @ 20°C
Aux Winding	2.6 Ohms @ 20°C
Voltage Regulator (L-L)	AS440

PSS90/E

LP Gas				
Wattage	80,000	80,000	80,000	80,000
Volts	120/240	120/208	120/240	277/480
kvA	80	100	100	100
Phase	Single	Three	Three	Three
Amps	333	278	240	120
CB Size	350	300	300	150
Hertz	60	60	60	60
Natural Gas				
Wattage	90,000	90,000	90,000	90,000
Volts	120/240	120/208	120/240	277/480
kvA	90	112	112	112
Phase	Single	Three	Three	Three
Amps	375	312	270	135
CB Size	350	300	300	150
Hertz	60	60	60	60
Engine				
Model	GM 5.7L			
Starting System	12 Volt			
Muffler	Standard			
Fuel Consumption (full load)				
LP	12.4 GAL/HR - 1,192,000 BTU/HR			
NG	1,230 FT ³ /HR - 1,230,000 BTU/HR			

Generator Testing Resistance

Note: Review the Stamford Newage nameplate on your generator before selecting the correct information below.

Model	Stamford UCI274C1J
Winding Group	06
Resistances:	
Rotor	1.12 Ohms @20°C
Stator (L-L)	0.011 Ohms Per Ph @ 20°C
Exciter Rotor (L-L)	0.156 Ohms Per Ph @ 20°C
Exciter Stator (L-L)	20.0 Ohms @ 20°C
Aux Winding	2.6 Ohms @ 20°C
Voltage Regulator (L-L)	AS440

Model	Stamford UCI274C1L
Winding Group	311
Resistances:	
Rotor	1.12 Ohms @20°C
Stator (L-L)	0.030 Ohms Per Ph @ 20°C
Exciter Rotor (L-L)	0.156 Ohms Per Ph @ 20°C
Exciter Stator (L-L)	20.0 Ohms @ 20°C
Aux Winding	2.6 Ohms @ 20°C
Voltage Regulator (L-L)	AS440

INTRODUCTION

PRODUCT DESCRIPTION

The Package Standby System is designed to automatically provide standby power to unattended loads during electrical outages. Upon interruption of normal electrical service, the Packaged Standby System electrical control circuits will automatically start the engine. The generator will produce electrical power and the Automatic Transfer Switch (ATS) will automatically transfer the electrical loads to the engine-generator set. Upon restoration of normal electrical service the emergency transfer switch will sense return of the normal commercial power. The Automatic Transfer Switch will transfer the load back to the normal commercial power source. The engine control circuits will begin a cool-down cycle, after which the fuel supply will be shut off and the engine ignition system disabled.

These packaged standby systems consist of two major components:

1. AUTOMATIC TRANSFER SWITCH

A wall mounted ASCO 185 or ASCO 300 Automatic Transfer Switch (ATS) designed for inside or outside installation. The transfer switch is UL1008 approved. A fourteen day electronic exerciser circuit is installed in the ATS as standard equipment. The ATS also contains the power failure sensing circuitry necessary to start and stop the engine generator set. The transfer switch is also equipped standard with a 3 second start delay, and a 15 second transfer delay to allow the engine to warm up before transferring the load to the generator. When the line power is restored the ATS has a 5 minute transfer delay to allow the incoming utility to stabilize before transferring back to line power and then an additional 1 minute engine cool down delay before the engine shuts down. Read and understand the ATS owners manual before installing, servicing or operating the transfer switch.

UNIT	VOLTAGE	MINIMUM ATS AMPERAGE
PSS60-3	120/240	230
PSS60-4	120/208	200
PSS60-17	120/240	200
PSS60-18	277/480	100
PSS90-3	120/240	400
PSS90-4	120/208	400
PSS90-17	120/240	400
PSS90-18	277/480	150

2. ENGINE / GENERATOR

The engine generator set consists of a GM 5.7L, Industrial, four cylinder, liquid cooled engine equipped to run on L.P./N.G. fuel. The engine operates at 1800 rpm and frequency regulation is maintained by the electronic governor within .5 cycles variation, from no load to rated load. The generator is a single bearing, direct drive, rotating field design. The generator is connected to the engine flywheel via flexible drive disks. The engine generator is available mounted in a weather proof enclosure for outside installation. Connection boxes are provided to all customer connections (both AC output and DC control). A customer supplied 12 Volt, 650 CCA (BCI group 24) battery is required to complete the installation. Engine operation is controlled by a Deep Sea MKII (DSE) engine mounted in the engine generator enclosure.

OPM-117

NOTICE:

These units will automatically transfer if a power outage occurs while running in an exercise mode.

PREPARING THE UNIT

UNPACKING

CAUTION: EQUIPMENT DAMAGE

When you unpack your new generator, be sure to remove all of the information sheets and manual from the carton.

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:

These units are shipped with oil. Be sure to check oil levels before operating. See engine manufacturer's instruction manual for recommended oil requirements before initial starting.

INSTALLATION

WARNING:

*Before proceeding with installation, be sure the operation selector switch is in the **stop** position and the battery disconnected.*

These engine generator sets are designed to be mounted on a pad where there is proper ventilation. The transfer switch is mounted next to your electrical entrance or distribution panel inside or outside the building. Consult a qualified, licensed electrician or contractor to install and wire the transfer switch. The installation must comply with all national, state and local codes. Before beginning the installation process check the rating of the generator set and its transfer switch rating. Be certain they can handle the intended load and are compatible with the entrance voltage, phase and current ratings. Plans for installation should be prepared with proper attention to mechanical and electrical engineering detail to assure a satisfactory system installation. The information in this manual is offered only as a guide to finalizing your installation plans.

ENGINE-GENERATOR SET MOUNTING

WARNING: PERSONAL INJURY:

The enclosures on these units can become very hot adjacent to the exhaust areas. Special care must be taken when installing these units to insure that the risk of contact by people is minimized.

The unit's main frame should be bolted to a pad that meets local code. Various materials, including concrete and composites, are acceptable

as long as they are structurally sound supporting the weight of the unit and preventing movement during operation. The mounting holes on the base of this unit is 0.625" in diameter. The engine-generator is mounted on a sub-frame which is isolated with special shock mounts on the main frame. This allows the engine-generator to vibrate without affecting the control panel on the main frame.

Do not install any shock mounts between the base frame and the pad. Engine vibration will be transmitted to the control panel causing erroneous start/stop cycles and premature control failure. These units should be mounted a minimum of 24" from a structure. This will allow for ample room to maintain and work on the generator set. Units must be installed in accordance with all local, state, and national codes. Consult your local agency for specific requirements.

FUEL INSTALLATION

The fuel supply should be as close as possible to the engine. This will reduce the installation cost of fuel runs. The information in this manual is offered to assist you in providing the proper fuel for your engine. However, this information is only provided to inform you of the engine's requirements and assist in making you aware of the decisions you must make. In no case should the instructions and information provided be interpreted to conflict with any local, state or national codes. If in doubt, always consult your local fire marshal, gas supplier or building inspector.

WARNING: FIRE HAZARD:

All fuel runs should be installed by a licensed fuel supplier.

To connect the fuel line to the generator set you will connect your incoming fuel line to the .75 inch NPT fitting located on the left side of the engine-generator set. This fitting is shipped with a plastic plug installed to insure the fuel system stays clean. For all vapor fuel systems the delivery pressure of the fuel to the fuel solenoid on the unit must be four to six ounces psi (per square inch) or 7 to 11 inches W.C. (water column). These fuel pressures are critical; failure to provide the proper pressure can cause many problems including failure to start, inability to produce full power, or damage to the equipment.

These generators have been tested with both natural gas and LP at the factory. Before starting the engine you must verify it is configured for the proper fuel. See additional information in the NG/LP conversion section.

INSTALLING THE FUEL LINE

NOTICE: *The engine generator sets are properly adjusted before they leave the factory. The electronic control panel will indicate if the LP mode is active*

NATURAL GAS or LP VAPOR PIPE SIZE

Size of pipe normally required for generators operating on natural gas or LP vapor. Unit location will determine the size of fuel line that is required to supply the engine with a constant fuel pressure and volume.

LIQUID PROPANE VAPOR (LP)

Refer to the tables on the following pages for fuel line size and recommended tank size. For distances of 25 feet or over, a two regulator fuel system is recommended. This is accomplished by installing a primary regulator at the tank which will reduce the tank pressure down to 10 to 15 lbs. A low pressure regulator is installed to further reduce the fuel pressure to the required six (6) oz. operating pressure. This low pressure regulator must be at least 10 feet from the engine generator set; any closer installation will require a larger line be installed to provide a fuel reservoir. This is also true for the single low pressure regulator, it should also be a minimum of 10 feet from the unit. If this is not done, the demand regulator on the unit and the pressure regulator in the fuel line will interfere with each other. When the two (2) regulator system is used on LP, a fuel line size of 3/4 to 1 inch is generally adequate for distances up to 300 feet from the primary to the low pressure regulator. Consult your local fuel supplier for your exact requirements. The appropriate line size from the following table is then installed from the low pressure regulator to the generator set.

Feet*	Size of pipe
Up to 25 ft	1.25" pipe
Over 25 ft**	Use a two regulator system

*Allow an additional 3 feet for each standard elbow.

** Not recommended for the PSS60
DO NOT use 'street ells' (restrictive).

LP TANK SIZING

Tank Temperature	PSS60 Tank Size	PSS90 Tank Size
60° F (16° C)	500 Gallons	1000 Gallons
32° F (0° C)	1000 Gallons	1000 Gallons
0° F (18° C)	2000 Gallons	2000 Gallons
-20° F (-29° C)	5000 Gallons	5000 Gallons

LIQUID WITHDRAWAL SYSTEMS

When installing a unit equipped with the LP liquid withdrawal, a primary regulator is not required on the supply tank. The supply line is connected to a liquid withdrawal valve on the supply tank and runs directly to the fuellock strainer mounted on the engine generator set. Normally a 3/8 to 1/2 inch copper line is acceptable for this type of fuel installation. You must be sure that the valve you have connected to on the supply tank is in fact a liquid supply valve and has a drop tube inside the tank that is pulling fuel from the bottom of the supply tank. Before starting the unit, you must confirm that you have a good liquid supply at the unit. **Engine generator sets equipped for liquid withdrawal will not run properly when supplied with vapor fuel.**

NATURAL GAS (NG)

The primary regulator (fuel meter) on the building should deliver the correct volume and pressure to the generator set. This regulator must be sized to deliver the required BTU's to the generator set and all other appliances in the building. If the primary regulator (fuel meter) is a high pressure regulator, then a low pressure regulator must be installed to bring the pressure down to 4-6 oz. (7-11 inches water column) of pressure. This low pressure regulator must be at least 10 feet from the engine generator set; any closer installation will require a larger line be installed to provide a fuel reservoir. If this is not done, the demand regulator on the unit and the pressure regulator in the fuel line will interfere with each other. This regulator must be sized to accommodate the demand of the generator set and any other appliance connected to it. See the following table for the correct size of pipe to be installed.

Feet*	Size of pipe
Up to 25 ft	1.25" pipe
Over 25 ft**	1.25" pipe

*Allow an additional 3 feet for each standard elbow.

** Not recommended for the PSS60

DO NOT use 'street ells' (restrictive).

WARNING: PERSONAL DANGER:

Do not use galvanized pipe in fuel line runs. The galvanized coating can become eroded and flake off, causing possible obstructions in the regulator or fuel valve. The results could range from inoperative engine to hazardous fuel leaks.

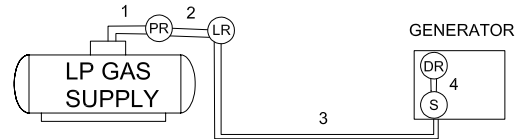
CAUTION:

Be careful when sealing gas joints. Excessive sealing compound can be drawn into the solenoid, regulator or carburetor causing an engine malfunction.

FUEL PRESSURE

Correct fuel pressure cannot be stressed enough. The most common cause for inoperative systems is an inadequate or incorrect fuel pressure. Performance of the engine is in direct relation to the correctness of the fuel system. Shown below is a diagram of a typical LP vapor fuel installation. Notice the following tables give two different units of measuring fuel pressure. The first and most accurate is the use of a simple water manometer. A manometer is calibrated in inches of water column. The second is with a pressure gauge calibrated in ounces per square inch.

TWO REGULATOR FUEL SYSTEM

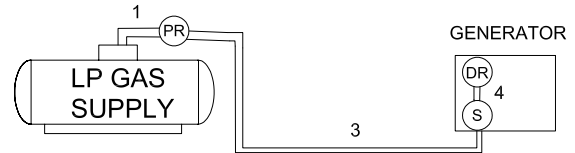


LEGEND:

- PR - PRIMARY REGULATOR (Reduces tank pressure to 10 - 15 PSI (pounds per square inch))
- LR - LOW PRESSURE REGULATOR (Reduces fuel pressure to 4 to 6 oz. (ounces per square inch))
- S - FUEL SOLENOID VALVE (Positive shut-off solenoid)
- DR - DEMAND REGULATOR (Requires engine vacuum to open)

Reference numbers 1 through 3 in the diagram above are system parts supplied by the customer. Reference number 4 is on the generator.

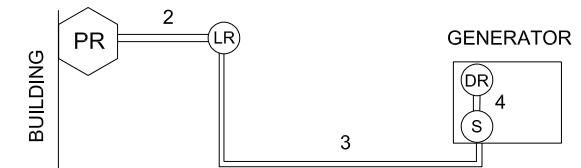
DUAL STAGE SINGLE REGULATOR SYSTEM



LEGEND:

- PR - PRIMARY REGULATOR (Reduces tank pressure to 4 to 6 oz.)
- S - FUEL SOLENOID VALVE (Positive shut-off solenoid)
- DR - DEMAND REGULATOR (Requires engine vacuum to open)

The following diagram is of a natural gas (NG) installation.



LEGEND:

- PR - PRIMARY REGULATOR (Fuel Meter)
- LR - LOW PRESSURE REGULATOR (Reduces fuel pressure to 4 to 6 oz. (ounces per square inch) IF REQUIRED)
- S - FUEL SOLENOID VALVE (Positive shut-off solenoid)
- DR - DEMAND REGULATOR (Requires engine vacuum to open)

Reference numbers 2 through 4 in the previous diagram are system parts supplied by the customer. Reference number 4 is on the generator.

FUEL PRESSURE TABLES

The following tables are the fuel pressure readings at each reference in the system.

Single low pressure regulator (LP vapor only)

Ref#	1	3	4
Unit off	Line PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
Starting	Line PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
No load	Line PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
Full load	Line PSI	7-11 in 4-6 oz	7-11 in 4-6 oz

Two regulator system (LP vapor only)

Ref#	1	2	3	4
Unit off	Line PSI	10-15 lbs	7-11 in 4-6 oz	7-11 in 4-6 oz
Starting	Line PSI	10-15 lbs	7-11 in 4-6 oz	7-11 in 4-6 oz
No load	Line PSI	10-15 lbs	7-11 in 4-6 oz	7-11 in 4-6 oz
Full load	Line PSI	10-15 lbs	7-11 in 4-6 oz	7-11 in 4-6 oz

Natural gas

Ref#	2	3	4
Unit off	2 PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
Starting	2 PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
No load	2 PSI	7-11 in 4-6 oz	7-11 in 4-6 oz
Full load	2 PSI	7-11 in 4-6 oz	7-11 in 4-6 oz

NG/LP FUEL CONVERSION

This generator set was tested on both LP and NG at the factory. Ensure proper fuel configuration before operating.

CAUTION: EQUIPMENT DAMAGE:

Do not make any fuel adjustments or governor adjustments until all pressure readings are in compliance with specification.

These engine/generator sets are easy to convert between LP or NG. As the engine timing is controlled by the ECU on the engine you only need to tell it what fuel you want to operate on. A small rocker switch has been provide on the underside of the engine control cabinet for this purpose.

Opening the rocker switch will tell the ECU mounted on the engine that you are operating on NG Fuel. Closing the rocker switch will tell the ECU that the fuel being supplied is LP. The Advance Power Controller has an indicator light for LP. When this light is on, the engine is set-up for LP, when the LP light is out the engine is set up for NG. The ECU will then reprogram the engine to operate on the proper fuel.

LUBRICATION & COOLANT

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 do so will cause excessive engine wear and shorten its useful life.

Before starting the engine, Check the coolant level in the radiator. If it is low, refill as specified in the engine manufacturer's maintenance instructions. The radiator should be filled to about 1 inch below the filler neck.

INSTALLING THE BATTERY

CAUTION:

In the following battery installation procedure, check to be sure the selector switch remains in the 'off' position. This should be your last step before initial start-up.

A customer supplied twelve-volt battery is required to complete the installation. Installation of the highest CCA rated battery, within the correct BCI group (size), will increase cold weather starting performance. **Gel batteries should not be used** with the battery tender installed in the generator enclosure.

Voltage	BCI Group	MIN. CCA Rating
12	24	650

Installation and servicing of batteries must be performed or supervised only by persons knowledgeable of batteries and the required precautions. Keep unauthorized persons 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 of 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 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 and damage electronic components.

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 and disconnect the negative cable first and then the positive cable.

5. Be sure all connections are tight and coat the terminals and cable ends with dielectric grease.

WARNING:

The electrolyte is a 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 immediately and thoroughly with water. 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 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:

Never smoke near batteries

Do not cause a flame or spark in the battery area.

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. When refilling the battery with water, use only distilled water. Tap water will shorten the service life of the battery.

Never fill the battery above the fill line. Over filling above the upper level line may cause electrolyte to overflow, resulting in corrosion to the engine or nearby parts. Immediately wash off any spilled electrolyte following the procedure above.

BATTERY CHARGING

This generator is equipped with an engine mounted alternator that will recharge the battery during operation. It is not necessary to have the battery charger circuit on the emergency distribution circuit.

CAUTION: EQUIPMENT DAMAGE:

Always connect the positive cable first and the negative cable last.

When disconnecting, remove the negative cable first and the positive cable last. Failure to connect and disconnect in the proper sequence can cause equipment damage.

Observe polarities: connect the positive (+) battery terminal to the (+) cable from the engine starter; the negative (-) battery terminal is connected to the negative cable (ground) from the engine generator assembly. All connections must be clean and tight. Check the electrolyte (fluid) in the battery periodically to be sure it is above the plates. Never allow the battery to remain in a discharge condition.

CAUTION: EQUIPMENT DAMAGE:

NEVER JUMP START these units. Doing so will destroy the engine control module, rendering the unit non-operational. Remove and fully recharge the battery before attempting to start.

CONNECTING THE BATTERY CHARGER & BLOCK HEATER

A three-stage battery charger is provided standard for all 12 volt standby systems. The standard charger is an Automatic Battery Charger & Maintainer. This Charger has three rates of charging. During the first stage, known as BULK Charging, the charging current is limited to 2 Amps at a voltage of up to 14.5 volts. The green LED will blink during this stage. During stage two, known as ABSORPTION Charging, the charging voltage is held at 14.5 volts and the charging rate gradually reduces the amount of current (amps) flowing to the battery. The green LED will also blink during this stage. Stage three is called MAINTENANCE Charging. During this stage the voltage will drop to 13.3 volts and the charge rate will drop to as low as .1 amps. This keeps your batteries in a fully charged condition without over charging them. During this stage the green LED is constantly lit. There are optional 5 and 10 amp chargers available that may be installed on some units

The block heater is thermostatically controlled and when plugged in will maintain the engine coolant temperature between 100 and 120 degrees F.

NOTICE:

The trickle charger is not intended to recharge a battery which has become completely discharged. It is designed to produce just enough current to maintain a fully charged battery.

The battery tender and block heater are powered by a customer supplied GFCI circuit and installed in accordance with the United States National Electric Code. These AC wires can be run in the same conduit as the other AC leads from the generator. It is suggested that this circuit be fused for 20 amps when the block heater and battery charger are on shared circuits and two 15 amp circuits when they are split. Splitting the battery charger and block heaters circuits are advantageous that if one of the components fail in a manner causing the breaker to trip the other component will be unaffected and continue operating normally.

The block heater and battery charger are both hard wired into a terminal block located in the AC wiring cabinet.

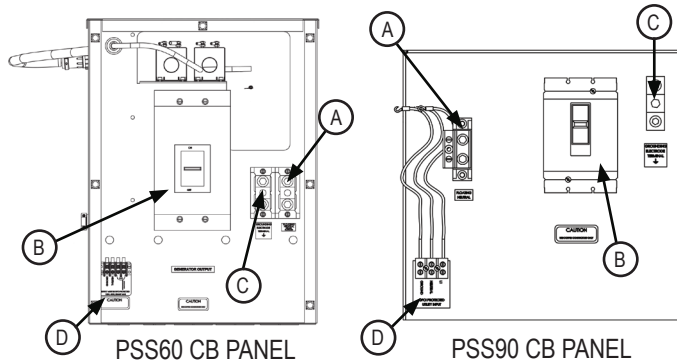
AC ELECTRICAL CONNECTIONS

NOTICE:

CLASS 1 WIRING METHODS ARE TO BE USED FOR ALL FIELD WIRING CONNECTIONS TO TERMINAL OF A CLASS 2 CIRCUIT.

WARNING:

A mainline circuit breaker has been provided inside the generator housing. During all wiring installation, make sure the breaker is in the off position and the generator operators switch is in the off position.



A - Neutral Lugs, These neutral lugs are isolated from ground and provided for you to connect your neutral wire from the transfer switch. The lugs on the 60 kW will handle wire sizes #4 AWG to 300 MCM and should be torqued to 250 in lbs. The lugs on the 90 kW will accommodate #1 AWG to 600 MCM and should be torqued to 300 in lbs.

B - Generator Circuit Breaker, This circuit breaker provides overload protection for the generator. Your power feeds from the transfer switch will connect to the bottom lugs on the circuit breaker. The generator power feeds have already been wired into the upper lugs.

The table below gives you the circuit breaker size, lug wire sizes and torque specification. (see the actual breaker for additional information and restrictions)

kW	Volts	PH	Amp	Wire Capability	Lug Torque
60	120/240	1	250	#1 AWG-600 MCM	375 in lbs
60	120/208	3	200	#4 AWG-300 MCM	250 in lbs
60	120/240	3	175	#4 AWG-300 MCM	250 in lbs
60	277/480	3	90	#14 - #3/0 AWG	120 in lbs
90	120/240	1	350	#1 AWG-600 MCM	375 in lbs
90	120/208	3	300	#1 AWG-600 MCM	375 in lbs
90	120/240	3	250	#1 AWG-600 MCM	375 in lbs
90	277/480	3	150	#14 - #30 AWG	120 in lbs

The following table shows the minimum conductor sizes between the generator and the ATS, based on wire type and temperature rating. Wire has been derated 40° C ambient temperatures.

kW	Volts	PH	Amp	Wire Temperature Rating			
				Cu Conductor		Al Conductor	
				75°C	90°C	75°C	90°C
60	120/240	1	250	300 MCM	250 MCM	500 MCM	350 MCM
60	120/208	3	200	4/0 AWG	3/0 AWG	300 MCM	250 MCM
60	120/240	3	175	3/0 AWG	2/0 AWG	250 MCM	4/0 AWG
60	277/480	3	90	#2 AWG	#3 AWG	1/0 AWG	#2 AWG
90	120/240	1	350	600 MCM	500 MCM	(NOTE 1)	600 MCM
90	120/208	3	300	500 MCM	350 MCM	600 MCM	500 MCM
90	120/240	3	250	300 MCM	250 MCM	500 MCM	350 MCM
90	277/480	3	150	2/0 AWG	1/0 AWG	4/0 AWG	3/0 AWG

Note 1 - Two 250 MCM may be used.

For additional information on wire sizing refer to table 310-16 of the National Electrical Code ANSI/NFPA 70.

C - Ground Lug, These ground lugs are bonded to ground and are provided for you to connect your ground wire from the transfer switch to. The lugs on the 60kW will accommodate #1 AWG to 250 MCM and should be torqued to 250 in. lbs. The lugs on the 90kW will accommodate #1 AWG to 300 MCM and should be torqued to 250 in. lbs.

D. 120 Volt Terminal Block. These terminals are for shore power. For a power line with one lead, plug into either terminals, ensuring the jumper is still connected. To isolate two leads for use of two separate circuit breakers, the jumper must be removed.

WARNING: EQUIPMENT DAMAGE:

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

The load current carrying wires (L) and (T) must be sized to handle the maximum load current without excessive voltage drop. By code, the wire must be heavy enough to handle the full current rating of the mainline circuit breaker (or fuse) in the entrance (or sub-panel) protecting the contactor switch.

All wires should be installed in rigid or flexible conduit. (knockouts are provided in the control box).

GROUNDING

A grounding lug has been provided on the engine generator set. Check your local codes for proper grounding requirements.

MOUNTING THE AUTOMATIC TRANSFER SWITCH

See the ASCO installation manual for additional details on proper wiring of the Automatic Transfer Switch.

Because of the many different types of service, feeder, and distribution equipment, no specific wiring instructions can be provided. It is recommended that only copper wire be used. In all cases it is essential that while the load is connected to the generator, there can be absolutely no feedback from the generator to the power line or the power line to the generator. When properly installed, the normal A.T.S. Control and safety systems will eliminate all paths for feedback.

To wire the automatic transfer switch into the existing wiring, first determine which circuits will be on the emergency load circuit. If the entire load is to be transferred, the transfer switch can be wired in directly after the watt-hour meter and the service entrance, providing the service entrance ampere rating is within the transfer switch's rated capability.

If only specific circuits are to be powered under emergency power failure conditions, an additional distribution panel designated "emergency distribution panel" must be installed.

All selected emergency circuits are removed from main distribution panels and installed in the emergency distribution panel. The A.T.S. is then installed between the main panel and the emergency distribution panel. Suggested circuits: freezer, refrigerator, furnace, emergency lights, sump pump, emergency outlet circuits, etc. Total running load must not exceed generator rating.

WARNING:

A service disconnect must be installed in front of the ATS panel as the ATS is not service entrance rated. This will allow you to test the generator under load. Should you ever have to work on the switch, you will be able to disconnect the power and work on the switch cold without having the power company pull your meter.

To wire the automatic transfer switch into the existing wiring, first determine which circuits will be on the emergency load circuit. If the entire load is to be transferred, the transfer switch can be wired in directly after the watt-hour meter and the service entrance, providing the service entrance ampere rating is within the transfer switch's rated capability.

If only specific circuits are to be powered under emergency power failure conditions, an additional distribution panel designated "emergency distribution panel" must be installed. All selected emergency circuits are removed from main distribution panels and reinstalled in the emergency distribution panel. Suggested circuits: freezer, refrigerator, furnace, emergency lights, sump pump, emergency outlet circuits, etc. Total running load must not exceed generator rating.

DC ELECTRICAL INTERCONNECTION

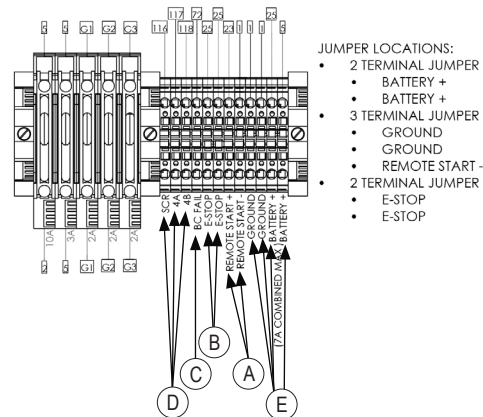
CAUTION:

Never run the AC and DC wiring on the same conduit.

NOTE:

There are various DC connectors on the engine that have nothing connected to them. This was done intentionally, the connectors are for END OF THE LINE TESTING and other diagnostic tests. They are not used during normal operations and can just be ignored.

All DC connections are completed on the terminal strip just below the engine control cabinet.



A - Customer Remote Start CONNECTIONS TERMINALS. The two remote start leads from the Automatic Transfer Switch are connected to the two terminals marked 1 & 23. The wire in terminal labeled #1 is Battery Negative/Ground and the wire in the terminal labeled #23 is your Remote Start lead. Closing these two leads together will signal the DSE 7310 MKII to go into an autostart mode and start up the engine generator.

Depending on the distance, 14 to 16 gauge stranded wire should be used. It is suggested that these wires be labeled S1 and S23.

Note: Any relay closure can be used to start and stop this generator. As long as the contact stays closed the engine generator set will continue to run. Once the relay is opened the unit will shut down and remain in the standby mode until the remote start relay is closed again.

B - ESTOP- & ESTOP+. Remote Emergency Stop terminals. These two terminals are shipped with a jumper installed. If your application requires the installation of a Remote Emergency Stop switch, remove the jumper and wire your switch to these terminals. This unit will not start and run without either the jumper installed or a remote N/C switch installed..

C - Battery Charger Failure. Battery charger failure relay input from remote battery charger to DSE7310 MKII controller.

D - Remote Display Panel Interface Terminals. These interface terminals are pre-wired to allow for the connection of a remote display. This display allows for the remote annunciation of alarms at a location such as a nurses station or a control room.

E - Battery Positive and Ground (battery negative). These terminals are dedicated for any accessory that will be installed. There is a maximum of 7 Amps combined.

DC INTERCONNECTIONS TO AUTOMATIC TRANSFER SWITCH

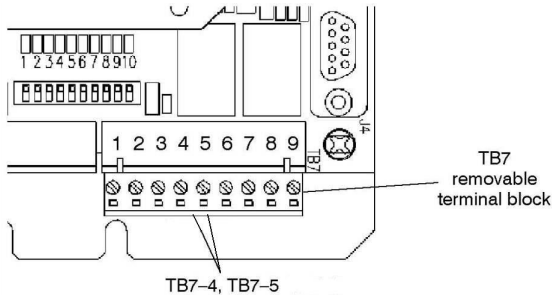
Two control wires are required between the ATS panel and the generator control terminal box. Depending on the distance, 14 and 16 gauge stranded wire should be used. These wires should be labeled S1 and S23.

WARNING:

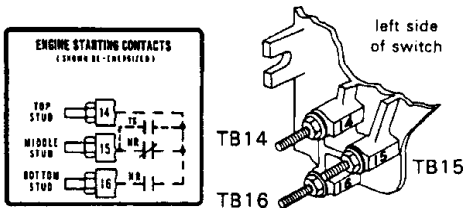
Be sure engine generator is in the OFF position before you make any DC interconnections.

ASCO 185 UL SWITCH

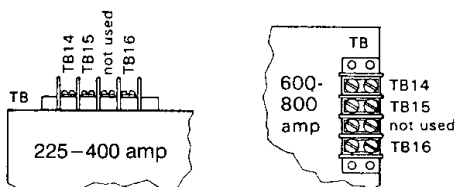
Your DC connection points in the ASCO 185 UL ATS are on the terminal block on the bottom of the controller in the lower left hand corner of the ATS panel. The terminal block (TB7) is numbered 1 through 9. These terminals will accept # 22 - # 14 AWG stranded wire. It is recommended that you use # 16 AWG for distances up to 200 feet. You need to run two (2) wires from the engine generator set to the transfer switch. You will be using terminals 4 and 5, wire Start # 23 will connect to terminal # 5 and wire Battery Negative # 1 will connect to terminal # 4. See the following table and illustration.



Your DC connection points in the ASCO 185 ATS are terminals “4” and “5” on the interface terminal block. As this is a “DRY” unpowered contact set it set, it makes difference which lead (battery negative #1 or start #23) connect to which terminal.



Engine starting contact label and location for 30 - 200 amp switches.

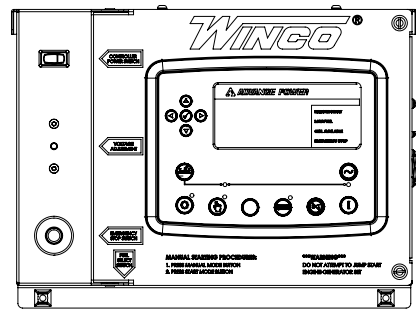


ASCO 300 UL SWITCH

Your DC connection points in the ASCO 300 ATS are terminals “14 and “15”. Depending on the size of the switch they are located in different locations. As this “DRY” un-powered contact set it makes no difference which lead (battery negative #1 or start #23) connect to which terminal.

STARTING PROCEDURE

CONTROL LAYOUT



	STOP/RESET - 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.
	MANUAL MODE - This button places the module into its Manual Mode. Once in Manual Mode, the model responds to the Start button to start the generator and run it off load.
	START - Pressing this button from STOP/RESET will start the engine and run the load.
	AUTO MODE - This button places the module into its Auto Mode. This mode allows the module to control the function of the generator automatically.
	ALARM/LAMP TEST - This button silences the audible alarm in the controller, deactivates the Audible Alarm output (if configured) and illuminates all of the LEDs on the module's face as a lamp test function.
	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.

INITIAL START UP

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.

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.

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 initial start-up.

MANUAL MODE

1. Press and release the MANUAL MODE button. The small LED light next to it should come on.

Note: There is no start delay in this mode of operation.

2. Press and release the green START ENGINE button. The DSE 7310 MKII will send two signals to the engine. The first signal wire #21 will engage the fuel solenoid, the second wire, #22, will engage the starter on the engine. At this point the DSE7310 will start the cranking cycle (10 seconds on and 10 seconds off).

Note: Wire #93 is energized to turn on the glow plugs for 15 seconds first and then the starter and fuel solenoid are engaged.

If the engine fails to start during this cranking period, the starter motor is disengaged and goes into a rest mode after which a second attempt is made to start the engine. Should this sequence continue through 3 cranking cycles the start sequence will be stopped and the display will show 'FAILED TO START'.

3. During manual operation, the load will not normally be applied to the generator. But caution must be used, if the line power should fail or be turned off the transfer switch during manual operation the load may be applied to the generator.

With the engine running smoothly check the no load voltage and frequency on the digital display. The voltage should be 208/240/480 AC depending on which model you have and a frequency of 59.5 to 60.5 hertz (Hz).

If you have the proper voltage at the generator the next step is to check the voltage at the generator terminals in the Automatic Transfer Switch. The voltage between the G1 and the G3 terminals should be the same as it was on the generator front panel. The voltage should also be checked between the hot terminals (G1 and G3) and the G-N to be certain of a balanced voltage output and a solid neutral connection. The voltage between G1 and G-N should be about 120 volts AC (277 on 480 units). The same approximate voltage should be found between terminals G3 and G-N (120 volts AC).

On three phase panels the G2 voltage level should also be checked. ON 240 VOLT (DELTA) SYSTEMS BE SURE YOU KNOW WHERE THE HIGH VOLTAGE "WILD" LEG IS. IT MUST BE IN THE SAME LOCATION ON THE LINE SIDE AS IT IS ON THE GENERATOR SIDE. (i.e. if it's on L-3 on the line side it must be on G-3 on the generator side. **Also on three phase systems make sure that the rotation is the same on the generator as it is on your line power. Failure to insure proper rotation will cause three phase motors to spin backwards possibly damaging them.**

NOTICE:

If for any reason during the check out procedure the voltage and frequency are not correct, depress the STOP/RESET button and correct the trouble before proceeding.

4. Stopping - There are two ways to stop the unit when it is in the manual mode. Pressing the STOP/RESET button will stop the unit immediately. Pressing the AUTO mode button will stop the unit but only after the cool down timers have timed out and there is no remote start signal being sent to the unit.

AUTO MODE

To activate the automatic start mode you will just need to depress the AUTO button, the LED indicator beside the button confirms that the unit is in automatic mode.

To test the Automatic Transfer Switch, follow the instruction on the operator's manual that came with the transfer switch. If you get a fault during the initial start up or prior to start up, it is most likely a false warning light. Simply reset the ATS start over.

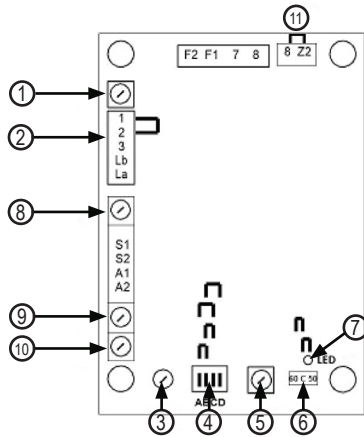
Once you have completed testing of the ATS, be sure you ALWAYS leave the system in the standby mode, unless servicing the unit. For standby operation, press the AUTO button on the front of the control. The green light should light up next to the AUTO button.

NOTE: For setting the exerciser circuit, for all ATS, see the operator's manual shipped with the ATS.

VOLTAGE REGULATOR WIRING

AS440 Automatic Voltage Regulator

The following is a list of connections on the AVR. These have been factory set and other than voltage adjustment, should never be changed.



1. VOLTS - Adjust generator output voltage.
Clockwise to increase voltage.
2. LINK: HAND TRIMMER
1-2: NO TRIMMER
NONE: TRIMMER FITTED
Adjust alternator output voltage
Clockwise to increase voltage by AVR voltage adjustment.
3. STABILITY - To prevent voltage hunting.
Clockwise to increase dampening effect.
4. LINK: POWER: RESPONSE
A-B: > 550kW : Fast
B-C: 100-550kW : Fast
A-C: < 100kW : Fast
B-D: < 100kW : Slow
5. UFRO - Under Frequency Roll Off
Clockwise decreases 'KNEE' point.
6. SWITCH - Select alternator frequency for UFRO
SWITCH LEFT: 60Hz
SWITCH RIGHT: 50Hz
7. LED Indicator Light - LED light on in UFRO or O/EXC condition.
8. DROOP - Adjust alternator droop to 5% at zero power factor.
Clockwise to increase increase droop.
9. TRIM - Adjust analog input sensitivity.
Clockwise to increase sensitivity.
10. O/EXC - Adjust over-excitation trip.
Clockwise to increase trip voltage.
11. LINK: SUPPLY
8-Z2: Main stator
None: Auxiliary winding
Select AVR supply source.

TROUBLE SHOOTING TABLES

UNIT WILL NOT CRANK WHEN THE POWER FAILS	<ol style="list-style-type: none"> 1. Digital genset controller not in "AUTO" 2. Transfer control switch not in "AUTOMATIC". 3. Incorrect wiring between transfer switch and generator. 4. Loose or dirty battery terminals. 5. Defective engine control module. 6. Defective starter. 7. Defective start solenoid. 8. Defective start/stop control in the transfer switch. 9. ATS panel in fault from previous run cycle. 10. Blown fuse on generator control panel.
ENGINE WILL NOT CRANK USING START BUTTON ON THE GENERATOR	<ol style="list-style-type: none"> 1. Low or dead battery, must hold 12 Volts during cranking. 2. Blown fuse on generator control panel. 3. Loose or dirty battery terminals. 4. Defective engine control module. 5. Defective starter. 6. Defective start solenoid. 7. Locked up engine generator set.
ENGINE CRANKS BUT WILL NOT START	<ol style="list-style-type: none"> 1. Improper fuel pressure being delivered to unit. 2. Fuel supply shut-off. 3. Fuel supply empty. 4. Defective spark plug. 5. Defective engine ignition module. 6. Dirty air cleaner filter 7. Defective fuel solenoid valve. 8. Low Voltage from battery to fuel solenoid, must hold 12 Volts during cranking. 9. Defective fuel regulator. 10. Defective starter/fuel solenoid relay(s).
ENGINE START AND THEN STOPS - Alarm light comes on	<ol style="list-style-type: none"> 1. Engine is low on oil 2. Engine has high water temperature. 3. Engine has overspeed. 4. Engine has gone into overcrank. 5. No output from engine alternator to engage stop crank cycle. 6. Generator is not operating at the correct speed. 7. Defective ECU on the engine.
ENGINE WILL NOT COME UP TO SPEED AFTER IT STARTS	<ol style="list-style-type: none"> 1. Insufficient fuel volume getting to the unit. <ol style="list-style-type: none"> a. Fuel line too small. b. Low fuel pressure. 2. AC short circuit. 3. Defective ECU on the engine. 4. Governor is defective.
ATS PANEL WILL NOT TRANSFER TO EMERGENCY SUPPLY	<ol style="list-style-type: none"> 1. No AC generator out put from generator. 2. See Automatic Transfer Switch Manual.
ATS PANEL WILL NOT PULL IN ON NORMAL POWER	<ol style="list-style-type: none"> 1. See Automatic Transfer Switch Manual.
NO AC OUTPUT FROM GENERATOR	<ol style="list-style-type: none"> 1. Defective diodes. 2. Defective voltage regulator. 3. Defective rotor. 4. Defective stator. 5. Defective exciter rotor. 6. Defective exciter stator. 7. AC short in the input leads. 8. Defective/Open breaker. 9. Wiring error.

MAINTENANCE SCHEDULE

SERVICE	INTERVALS
Check Engine Oil Level	Daily
Check Coolant Level and for Leakage	Daily
Change Engine Oil and Filter	Every 250 hrs
Check LPG System for Leaks	Prior to Service
Inspect Accessory Drive Belt for Cracks, Breaks, Splits, Glazing	Every 250 Hrs
Clean Debris From Radiator Core	Every 250 hrs
Inspect Coolant	Every 250 Hrs
Inspect Spark Plugs	Every 1000 Hrs
Inspect Distributor Cap and Rotor	Every 1000 Hrs
Inspect Spark Plug Wires	Every 1000 Hrs
Inspect Air Filter	Every 500 Hrs
Replace Air Filter	Every 1000 Hrs
Inspect Lock-Off Valves	Every 1000 Hrs
Check Fuel Lines for Leaks	Every 250 Hrs
Inspect Oxygen Sensor	Every 1000 Hrs
Inspect PCV System	Every 1000 Hrs

* There are additional maintenance items and explanations in the engine operator's manual. Read thoroughly before operating this unit.

PREVENTATIVE MAINTENANCE

Reasonable care in preventative maintenance will ensure high reliability and a long life for the engine-generator set and Automatic Transfer Switch.

WARNING:

When performing any type of maintenance on this equipment, make sure the selector switch on the engine-generator is in the off position. If you are working in the Automatic Transfer Switch, confirm with a reliable meter that all power has been disconnected.

AUTOMATIC TRANSFER SWITCH

Clean and inspect the switch once a year. De-energize all power sources, both line and engine-generator set, then brush and vacuum away any excessive dust or dirt accumulation. At this time, with the conductor de-energized, you can remove the contact covers and check the contacts. Make sure contacts are clean and not burned or pitted.

ENGINE-GENERATOR SET

Service the engine in accordance with the engine manufacturer's manual provided with your new equipment. Routinely remove debris and dirt from around the inside generator enclosure. Ensure that the air intakes are free from leaves and other debris at all times.

Clean and inspect battery terminals at least twice a year. Also check the battery water level at least twice a year.

Other than keeping the generator clean and free of debris, there is no other routine or preventative maintenance required as long as the generator is run bi-weekly to keep it dry and in good working order.

COLD WEATHER OPERATION

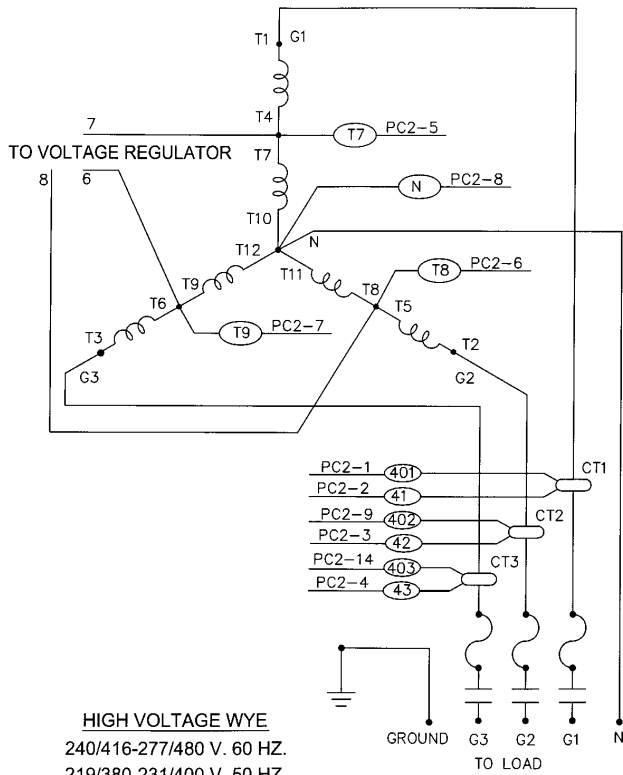
Extreme cold weather operation requires special considerations. Higher CCA batteries are required for cold weather starting; 650 CCA or larger are recommended. In addition, you should consider installing an oil heater kit and a battery warmer for reliable starting during cold weather.

WARNING:

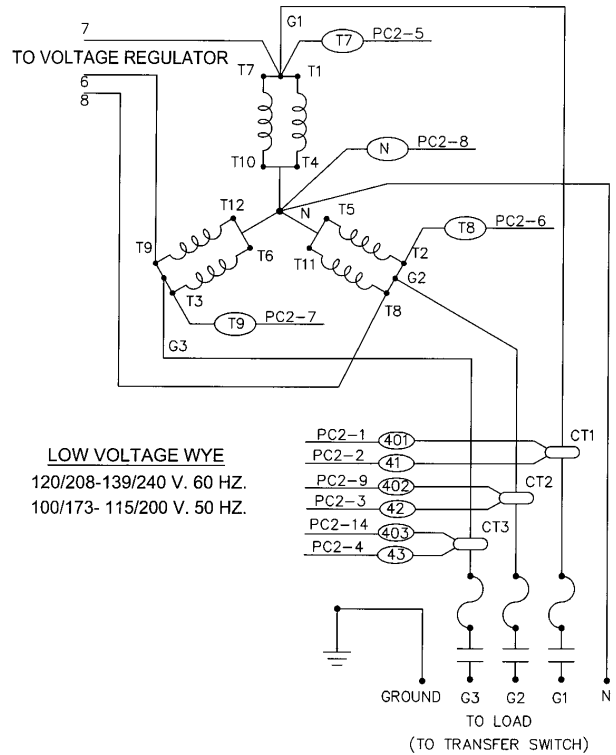
Never jump start these units. Jump starting these units with low or bad batteries will cause permanent damage to the engine control module.

THREE PHASE AC WIRE HIGH AND LOW WYE

THREE PHASE - HIGH WYE 277/480V

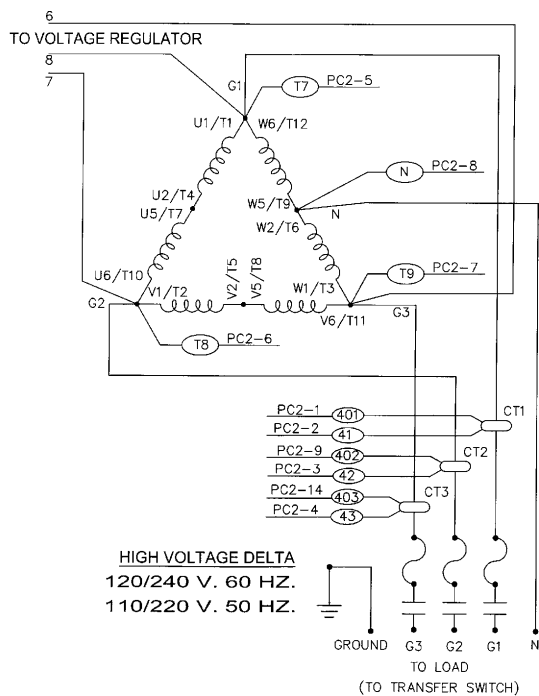


THREE PHASE - LOW WYE 120/208V



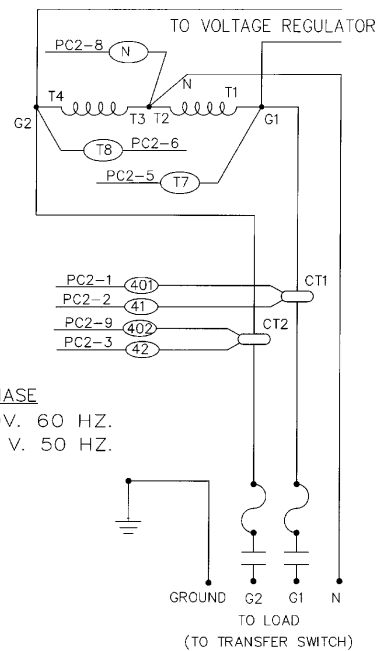
THREE PHASE WIRING - DELTA

THREE PHASE DELTA 120/240V

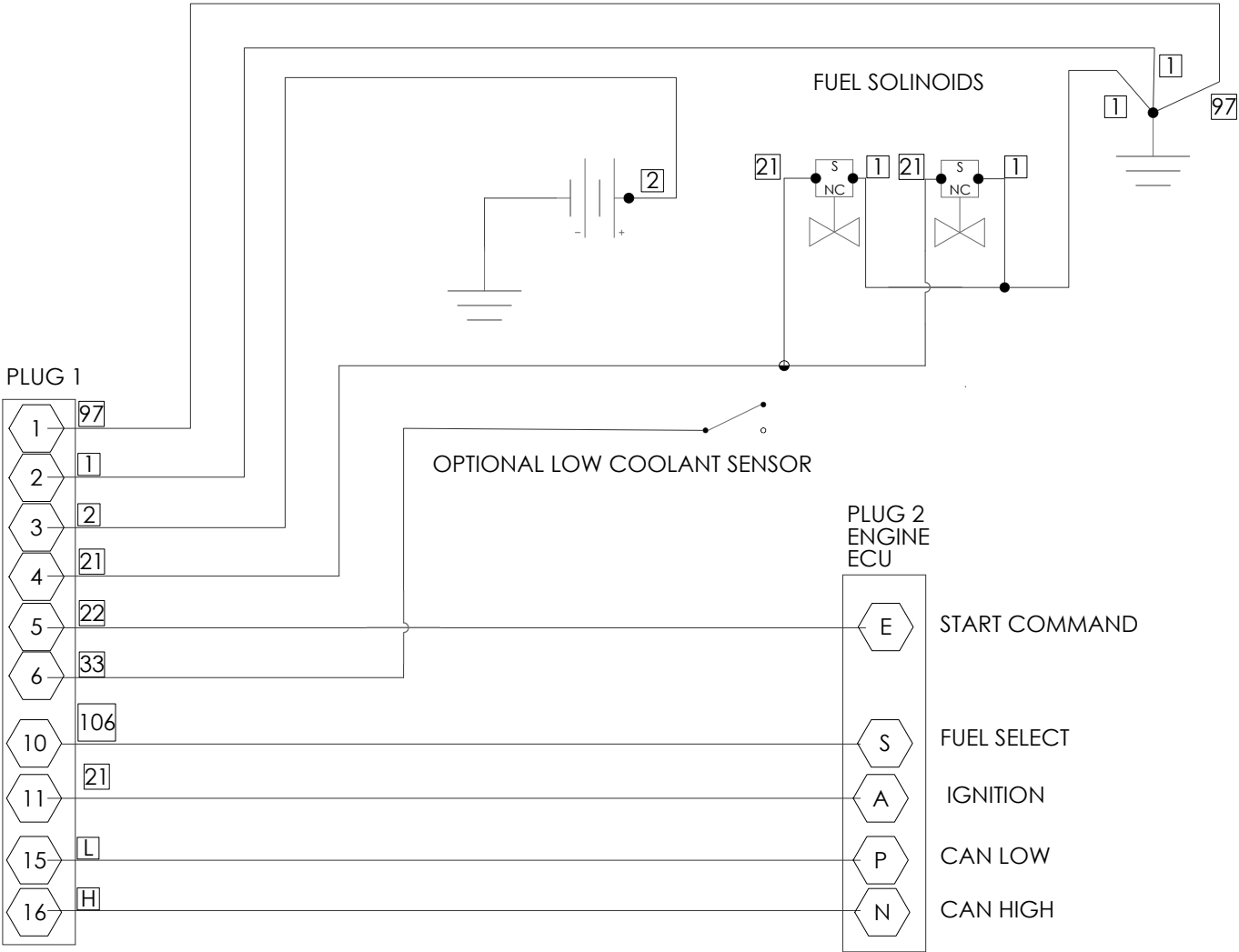


SINGLE PHASE AC WIRING - 4 LEAD

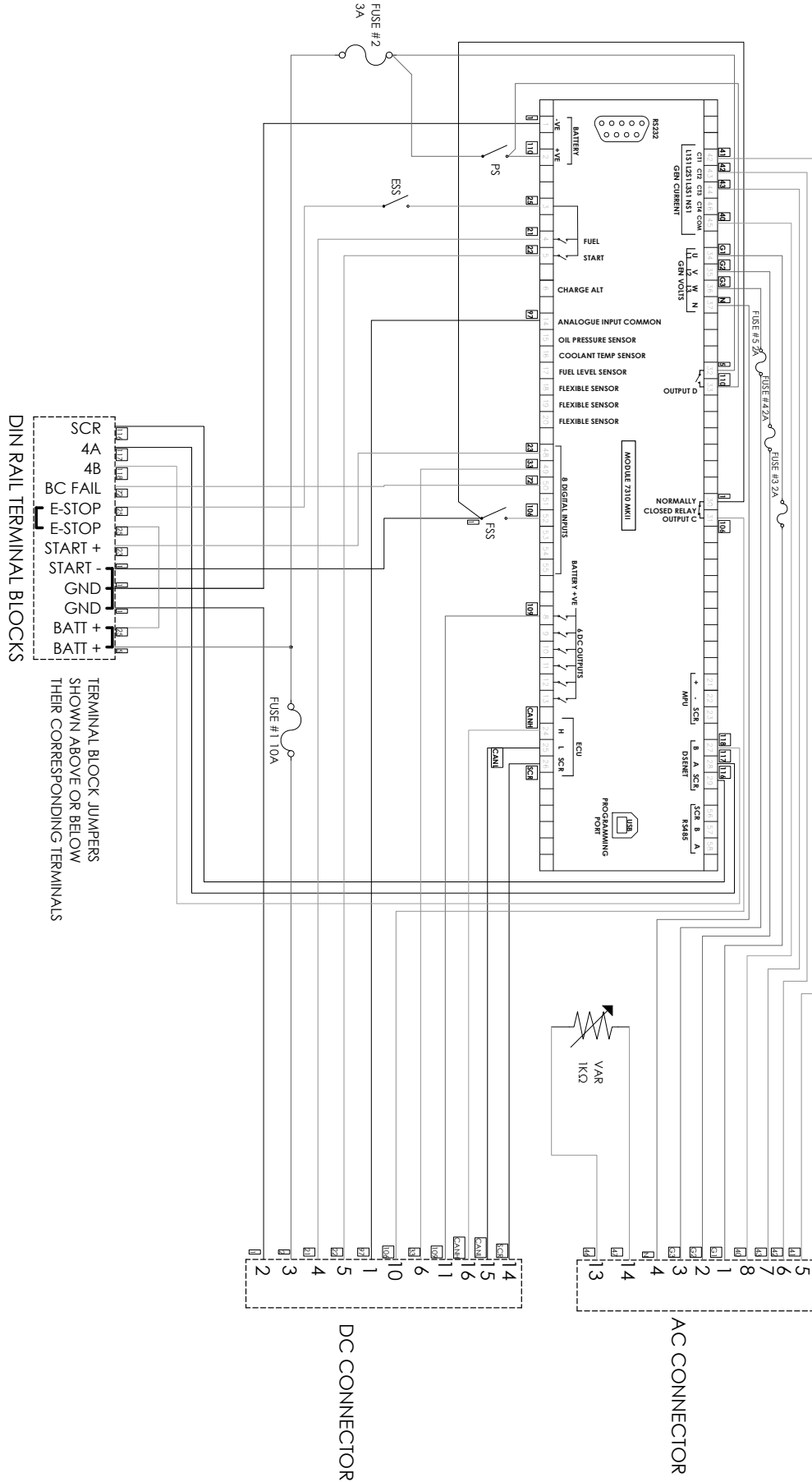
SINGLE PHASE 120/240V



ENGINE HARNESS SCHEMATIC



DSE 7310 MKII WIRING DIAGRAM





24 MONTH LIMITED WARRANTY

WINCO warrants to the original purchaser for 24 months or 2000 hours, whichever 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 and applicable codes.

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 the warranty period, to your nearest WINCO Authorized Service Center or to WINCO in Le Center Minnesota.

Duration For Standby Applications

Parts, Travel, & Labor: 24 Months

EXCLUSIONS:

- Warranty is for standby applications only. Prime/Mobile applications are not covered under this warranty.
- Normal maintenance consumables or labor.
- This warranty only covers travel time that has been pre-approved by the WINCO Service Department. Mileage or labor for removal or re-installation of WINCO product from its application is not covered.
- Normal wear and tear.
- Costs of rental equipment.
- WINCO does not warrant engines. Engines are covered exclusively by the warranties of their respective manufacturers.
- 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.
- WINCO does not warrant products which have been subjected to misuse and/or negligence or have been involved in an accident. Proof of proper maintenance must be furnished upon request.

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