ES52EI

Auto Start Engine Controller

Installation and User Manual for the ES52EI Auto Start Engine Controller.

Full Version

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READ MANUAL BEFORE INSTALLING UNIT

Receipt of shipment and warranty return information

Upon receipt of shipment, carefully remove the unit from the shipping container and thoroughly examine the unit for shipping damage. In case of damage, immediately contact the carrier and request that an inspection report be filed prior to contacting the COMPANY.

All returned items must be shipped prepaid and include a return material authorization (RMA) number issued by the COMPANY. RMA forms are available by contacting the COMPANY.

Limited Warranty

The COMPANY (DynaGen Technologies Inc.) warrants the product with specifications as explained herein. The COMPANY shall repair or replace any ES52EI controller, which prove to be defective under normal and proper use within three years from the date of shipment. This constitutes the only warranty and no other warranty shall be implied.

For questions or comments regarding this product, contact:

DynaGen Technologies Inc.
Phone (902) 562 0133
Fax: (902) 567 0633
Email: sales@dynagensystems.com
WEB SITE: www.dynagensystems.com

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INTRODUCTION

The ES52EI provides automatic start/stop and protection control for all types of engine-driven equipment. Simplicity of use, safety, features, versatility and over-all quality are paramount, providing the most cost-effective and reliable solution available. Ours came to be one of the smallest controllers available, with the best value per dollar-cost, backed by a 3 year warranty.

- "No speed signal" detection: Should the frequency of the speed sensing signal go to zero while the engine is running, or fail to appear during cranking, a No Speed Failure is asserted, and specifically indicated.
- Differential speed sensing inputs (for twisted-pair connection): Very effective interference prevention by means of noise cancellation.
- Excellent EMI handling: Software detection of, and recovery from, noise corruption.
- REPLACEABLE RELAYS; Replaceable relays provided within on board sockets. Relays Rated 20 Amps at 30 VDC
- REPLACEABLE FUSE; On board replaceable 20A fuse, mini-fuse (standard automotive type).
- Reversed supply protection; No requirement for series diode on supply.
- 3.3V to 30V, -40ºc. to +85ºc. operation: Works anywhere, anytime .
- *Zero Speed Restart*™: Prevents starter pinion wear by ensuring that no engagement of the starter is possible unless the speed is zero.
- Oil Bypass Failure: Waits 15 seconds from start for 3 - 5 crank tries, and 20 seconds for 7 - 9 crank tries, before enabling Low Oil pressure monitoring. Requires no user setting.
- Rest-Time indication: Provides feedback between crank attempts.
- SMALL SIZE; 3.302” x 3.342” x 1.842” 0.67lbs

SPECIFICATIONS

Operating VDC limits:	(3.3VDC min.- 30VDC max.)
Standby current draw:	12mA at 12VDC (12mA at 24VDC)
Operating current draw:	140mA at 12VDC (80mA at 24VDC)
Reverse polarity protected:	Internal protection will prevent damage to unit under a reverse polarity condition. Re-connect power leads properly, and normal operation will resume.
Speed sensing input accepts:	Generator AC output directly
Speed sensing maximum rating:	Withstands Line voltage (300 V.A.C.)
Operating temperature range:	$-40\,^{O}$ C $\Rightarrow$ $+85\,^{O}$ C
Operating humidity range:	0 $\Rightarrow$ 95% non-condensing
Fuel & Crank contact output:	10 Amps max. each Continuous sourcing(+bat) output
Annunciation outputs:	Sourcing (+bat) outputs (300ma max. per output)
Lamp Test terminal:	Close to + Battery to test LEDs
Actual unit weight:	0.67 lb. (0.30kg)
Shipping weight:	1 lb. (0.45kg)
Unit dimensions:	3.302” x 3.342” x 1.8”
Shipping dimensions:	4” (10.16cm) x 4” (10.16cm) x 3” (7.62cm)

WIRING INSTALLATION GUIDELINES

Danger: The controller does not generate a warning prior to *automatic* engine start. Do not work on the engine while power is applied to the unit. It is recommended that warning signs be placed on engine equipment indicating the above.

INSTRUCTIONS

Following these instructions will help avoid common installation problems during wiring and setup.

- Battery must be disconnected before any wiring connections are made.
- Wire length from the engine to the controller should not exceed 6 meters (20 feet).

Wiring size and type should be as specified below. **Use stranded wire,** since solid wire has a tendency to crack, break and loosen over time.

TYPES AND SIZES

Terminal	Wire Size	Current max.	Function
CON 1	Harness supplied	100mA	Speed signal connection via on board connector
1	18	100mA	LED test switch
2	18	7mA	Oil pressure switch
3	18	7mA	High Temperature switch
4	18	7mA	Auxiliary Input switch
5	14	10 A	Starter solenoid/pilot relay
6	12	20 A	Battery negative (-)
7	12	20 A	Auto switch
8	12	20 A	RSC1 (remote start contact connection)
9	12	20 A	RSC2 (remote start contact connection)
10	12	20 A	Start/Stop connection
11	14	10 A	Fuel solenoid/pilot relay
12	18	300mA	Preheat output
13 $\Rightarrow$ 18	18	300mA	Annunciation outputs
19		0	Not Used
20	18	300mA	Annunciator Common ground Only **(DO NOT use this as main ground connection)**

WIRING GUIDELINES

1. DO NOT use wire smaller than 18 AWG.

2. The connections supplying DC power to the ES52EI panel should preferably run directly from the battery posts with no splices or other connections. Avoid, as much as possible, using chassis (aluminum or iron engine parts) as return conductor for battery negative voltage; copper wiring is recommended. Failure to follow the above may result in erratic operation, due to large voltage drops across wiring connections.

3. DO NOT short Crank output or Fuel outputs to ground, as this will cause on board 20Amp fuse to blow and may result in damage to ES52EI on board relays.

4. When replacing fuse, removable terminals and relays, only use factory recommended parts.

5. DO NOT use AC coil slave relays from controller outputs. Use intermediate relays of suitable size and coil rating.
NOTE: All ES52EI engine controllers are shipped standard with 12VDC coil relays for +12 VDC systems. If the engine controller is used in a +24 VDC system, the onboard relays MUST be replaced with 24VDC coil relays.

6. DO NOT exceed the maximum rated current and voltage on each of the controller outputs. Do not exceed 10 amps for the Fuel output and 10 amps for the Crank output, and 300ma for the annunciation and timer outputs.

7. The annunciation and preheat outputs are internally protected against overload and short circuit (fault) NOTE: When a fault appears on one of the annunciation outputs, only that specific output becomes un-operable, all other annunciation outputs and all the front panel LED's continue to operate. When fault is removed, the unit is restarted, and the output resumes proper operation.

8. Two wires must be connected for the speed signal NOTE: A mating connector complete with 8 feet of cabling is provided as standard with each unit.

9. Diodes are provided across Fuel, Crank, and annunciation outputs, to protect the outputs from inductive kick-back. Diodes should be placed across slave relay contacts when used to actuate any inductive loads, such as solenoids, to protect the contacts from damage caused by arcing. In addition to prolonging the useful life of the relays, placing such diodes will help reduce generated electrical noise.

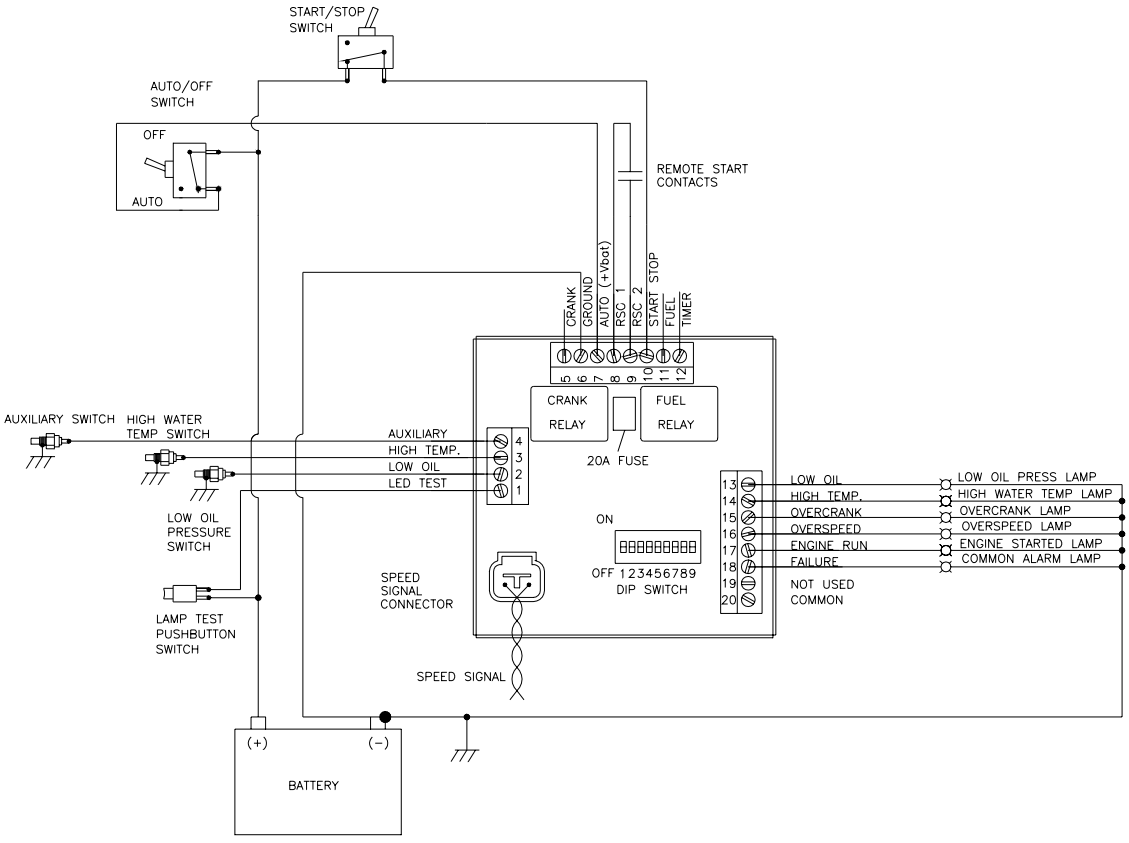
10. To verify the operation of engine controller outputs, measure voltage (i.e. meter in volts) when outputs should be ON.

TERMINAL DESCRIPTION

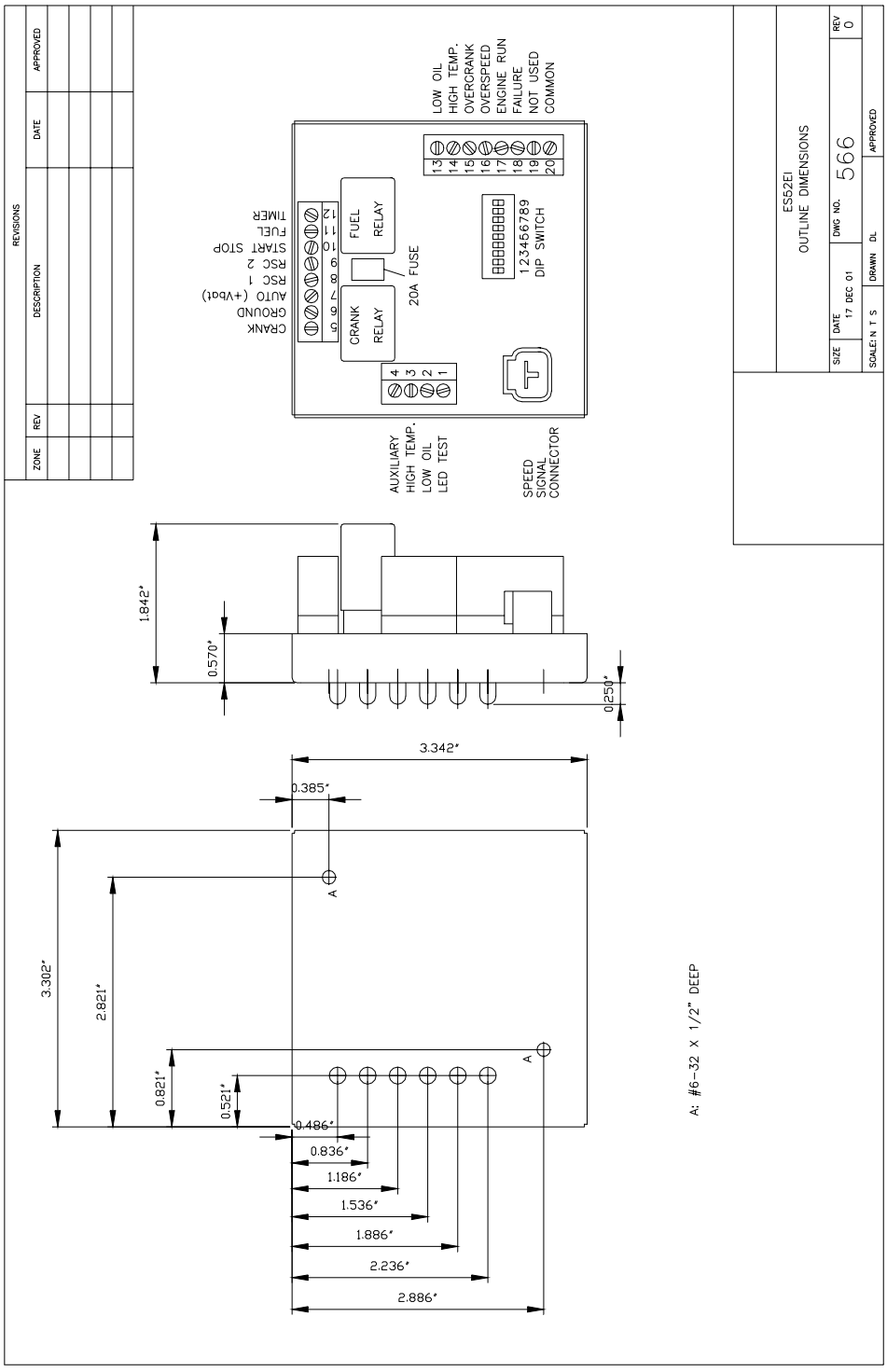
Term #	Description
CON1	Speed signal input for crank disconnect, engine run, and over-speed sensing. Be sure to use twisted pair wiring for this connection. An 8-foot wiring harness is supplied as standard. 300 VAC max. input voltage.
1	Lamp test. Connecting +12/24 VDC to lamp test activates all the front panel LED's. NOTE: Annunciation outputs DO NOT activate under led test.
2	Oil pressure switch. For proper operation, oil input must be connected to ground or +12/24 VDC via an oil switch. This switch **must** be the N.O. type, close on failure (low pressure)
3	Temperature switch. For proper operation, temperature input must be connected to ground or +12/24 VDC via a temperature switch. This switch **must** be the N.O. type, close on failure (high temperature).
4	The Auxiliary input. For proper operation, Aux. Input must be connected to ground or +12/24 VDC via a sensor switch. This switch **must** be the N.O. type, close on failure.
5	Crank output provides 10A maximum. Crank output closes to +12/24 VDC during cranking, and opens when the engine has started, or during crank rest.
6	Battery ground connection for the controller module. A good ground connection, **directly from the battery**, is required for proper operation.
7	Auto terminal. When +12/24 VDC is applied; the controller is in the standby mode waiting for a Start/Stop signal (+12/24 VDC applied to Start/Stop).
8	RSC1, provided for the connection of one lead from the remote start contacts
9	RSC2, provided for the connection of other lead from the remote start contacts
10	(Start/Stop) terminal. When +12/24 VDC is applied, the controller proceeds to starting the engine.
11	Fuel output provides 10A maximum. Fuel output closes to +12/24 VDC when start signal is actuated, and opens when either an Engine failure is detected or when stop signal is applied.
12	The Preheat output provides 300mA maximum. This output has one of four possible functions (Glow Plug, Slow, Air-gate, Choke). This output closes to +12/24 VDC when activated.
13	Low Oil pressure output provides 300mA maximum. Oil output closes to +12/24 VDC when the engine shuts down due to a Low Oil pressure condition. Flashing Low Oil output indicates an Auxiliary Input failure.
14	High water temperature output provides 300mA maximum. Temperature output closes to +12/24 VDC when the engine shuts down due to a high temp condition.
15	Over-crank output provides 300mA maximum. Over-crank output closes to+12/24 VDC when the engine shuts down due to an Over-crank failure.
16	Over-speed output provides 300mA maximum. Over-speed output closes to +12/24 VDC on an Over-speed failure and is open otherwise. Flashing output indicates Loss of Speed Signal.

17	Engine running output provides 300mA maximum. Engine Running output closes to+12/24 VDC when the engine starts (speed > crank disconnect setting), and opens when the engine stops. Flashing output indicates Crank Rest period.
18	Engine failure output provides 300mA maximum. Engine failure output activates on any failure (closes to +12/24 VDC when activated).
19	Not Used
20	Common ground- for annunciation outputs only. **DO NOT USE AS MAIN GROUND TO CONTROLLER UNIT.**

General Wiring Diagram



GENERAL WIRING DIAGRAM


REVISIONS
ZONE
REV
DESCRIPTION
DATE
APPROVED
LOW OIL
HIGH TEMP.
OVERCRANK
OVERSPEED
ENGINE RUN
FAILURE
NOT USED
COMMON
13
14
15
16
17
18
19
20
CRANK
GROUND
AUTO (+Vbat)
RSC 1
RSC 2
START STOP
FUEL
TIMER
12
11
10
9
8
7
6
5
FUEL RELAY
CRANK RELAY
20A FUSE
123456789
DIP SWITCH
4
3
2
1
AUXILIARY
HIGH TEMP.
LOW OIL
LED TEST
SPEED
SIGNAL
CONNECTOR
ES52EI
OUTLINE DIMENSIONS
SIZE
DATE
17 DEC 01
DWG NO.
566
REV
0
SCALE: N T S
DRAWN
DL
APPROVED
1.842"
0.570"
0.250"
3.342"
0.385"
A
3.302"
2.821"
0.821"
0.521"
0.486"
0.836"
1.186"
1.536"
1.886"
2.236"
2.886"
A: #6-32 X 1/2" DEEP

DIP SWITCH CONFIGURATION

The ES52EI contains a nine-position DIP switch, with the following configuration:

DIP SWITCHES 1& 2: DIP Switches 1 & 2 are used to configure the number of crank tries for the engine controller. The 4 possible settings, indicating the number of crank tries, are as follows:

DIP Switch 1	DIP Switch 2	# OF CRANK TRIES
OFF	OFF	3
OFF	ON	5
ON	OFF	7
ON	ON	9

DIP SWITCHES 3& 4: DIP Switches 3 & 4 are used to configure the under-speed and over-speed conditions of the engine. The under-speed condition is enabled 30 seconds after the controller enters the engine running state, allowing the engine to reach normal operating speed. The failure condition is indicated by the illumination of the under-speed/over-speed LED on the Engine Controller. The 4 possible settings, indicating the under-speed and over-speed ranges, are as follows:

DIP Switch 3	DIP Switch 4	Under-Speed (Hz)	Over-Speed (Hz)
OFF	OFF	57	63
OFF	ON	55	65
ON	OFF	53	67
ON	ON	50	70

NOTE: A flashing under-speed/over-speed LED indicates a loss of speed while running.

DIP SWITCH 5: Not Used

DIP SWITCH 6: DIP Switch 6 is used to enable and disable the preheat option. When DIP Switch 6 is set to the ON position, the preheat is set for 10 seconds. When DIP Switch 6 is set to the OFF position, the preheat is disabled.

DIP SWITCHES 7 & 8: DIP Switches 7 & 8 are used to configure the Cool-Down time of the engine controller. The Cool-Down feature allows the engine to cool down for a pre-determined time. The 4 possible settings for Cool-Down are:

DIP Switch 7	DIP Switch 8	Cool-Down Time (In Minutes)
OFF	OFF	No Cool-Down
OFF	ON	2 Minutes
ON	OFF	4 Minutes
ON	ON	5.5 minutes

DIP SWITCH 9: DIP Switch 9 is used to configure the Crank Rest time.
There are 2 possible settings for the Crank Rest time.

DIP Switch 9	Crank Time (in seconds)	Rest Time (in seconds)
ON	15	20
OFF	10	15

UNIT SETTINGS

1: CRANK DISCONNECT

The Crank Disconnect is fixed at 22 Hz for the ES52EI Engine Controller.

2: LOSS OF SPEED CONDITION

The ES52EI Engine Controller is equipped with the Loss of Speed condition while the controller is running, but **NOT** while the controller is cranking.

LED INDICATIONS

FRONT PANEL LED INDICATIONS

What the LED's look like	Condition/Failure
No LED's ON.	"Ready" unit waiting for start signal, +12/24 VDC to Auto terminal.
	"OFF", no +12/24 VDC to Auto terminal.
Low Oil, steady	Low Oil Pressure Failure
Low Oil, flashing	Auxiliary Input Failure
High Temperature, steady	Over-temperature Failure
Over-crank, steady	Engine would not start after specified Crank tries.
Under-Speed/Over-Speed, steady	Speed Signal present above or below Under-Speed/Over Speed setting
Engine Running, steady	Engine Controller is in running mode of operation.
Engine Running, flashing	Crank-rest period. Cranking will resume soon.

TROUBLESHOOTING GUIDELINES

TROUBLE	POSSIBLE CAUSE	SUGGESTED ACTION
Unit does not operate when powered to test mode	Power leads to unit are reversed	Confirm correct wiring for ground and +bat, and re-attempt testing.
	Bad ground connection from engine to controller unit.	Run wire directly from battery - to the ground terminal #6 on controller unit.
Engine does not crank	Battery is low or terminals are dirty	Clean terminals and re-charge battery (change battery if necessary)
	Crank circuitry wiring improperly connected	Refer to engine control wiring section and check crank connections
	Bad ground connection from engine to controller	Run wire directly from battery - to the ground terminal #6 on controller unit.
	Crank relay damaged. Or on board fuse blown	Check wiring, on board 20A fuse and relay. Replace fuse, relay and re-test controller again
Engine cranks but does not start	Out of fuel	Check fuel level, add fuel if necessary
	Ignition control wiring not installed properly	Refer to engine control wiring section and check ignition connections
	Fuel relay damaged	Check fuel relay and replace if damaged.
Engine starts but shuts down after "*Oil Bypass*^{TM} period" due to low oil/high temp/extra	Oil/temp/extra input wiring improperly connected.	Check wiring for proper connections.
Engine starts, but running LED does not illuminate.	Fault (short or overload) on one of the annunciator outputs	Check for fault, once fault is corrected then operation resumes.
Annunciation output not working	Fault (short or overload) on one of the annunciator outputs	Check for fault, once fault is corrected then annunciation operation resumes.
Timer LED works O.K. but timer output does not activate	Fault (short or overload) on preheat output.	Check for fault, once fault is corrected then output operation resumes.
Flashing Over-speed LED	Speed signal improperly connected, missing, or damaged.	Check speed signal wiring; replace damaged speed signal source.