DUAL COIL SOLENOIDS INSTALLATION INSTRUCTIONS

GENERAL: Dual coil solenoids have an extremely high work output for their size due to the high amperage "pull" winding. The solenoids also have a separate low amperage "hold" winding.

CAUTION: If fitted with internal contacts and the plunger does not "bottom" or complete its stroke, the internal switch contact will not disconnect the high current winding. The solenoid will burn out in 30 seconds. On all model solenoids, improper wiring can cause burn out which is not covered in the warranty.

1. MECHANICAL ASSEMBLY INSTRUCTIONS

(a) Bolt in place using a bracket which is vibration and shock resistant.

(b) Connect linkage using a spherical rod end, ball, swivel joint or bead chain. The linkage or chain must exert negligible side force on plunger. Side forces cause solenoid bobbin wear, reduced pull force due to binding and plunger hang up. The plunger must "bottom" at the end of its stroke to actuate solenoids with internal switch contacts.

(c) Install a de-energized plunger "stop" in the system to limit the plunger stroke to its specified value or less. Equipment vibration may cause the plunger to move out resulting in an excessive stroke and binding of the plunger so the solenoid may not pull when it is energized.

(d) Models with an "S" suffix (ABS, ABCS, or BS) should have an internal spring which can be removed should your application not require it. To remove the internal spring, pull the rubber boot from the solenoid body, remove the spring from the plunger and re-assemble.

2. ELECTRICAL ASSEMBLY INSTRUCTIONS

Solenoid Series	**1502**		**1504**		**2001**		**2003**	
Length of Stroke	1" (25.4mm)		1" (25.4mm)		1" (25.4mm)		1" (25.4mm)	
DC Volts (rated)	12	24	12	24	12	24	12	24
Pull Amperes	30	17	41	22	43	23	60	37
Hold Amperes	0.7	0.25	0.75	0.35	0.6	0.3	0.8	0.4
Solenoid Series	**1751/1756**		**1753/1757**		**2370**			
Length of Stroke	1" (25.4mm)		1" (25.4mm)		1.5" (38.1mm)			
DC Volts (rated)	12	24	12	24	12	24		
Pull Amperes	44	25	30	18	58	31		
Hold Amperes	1.1	0.5	0.8	0.4	1.7	0.6		

MAXIMUM WIRE LENGTH - FEET (METERS)

Series Solenoid	**1502/1753/1757**		**1504/1751/1756/2001**		**2003/2370**	
Volts	12	24	12	24	12	24
Wire Gauge						
16 or 1.5mm^2						
14 or 2.5mm^2	12 (3.6)	40 (12)	9 (2.7)	34 (10)	5 (1.5)	19 (6.0)
12 or 4.0mm^2	18 (5.8)	64 (19)	14 (4.2)	54 (16)	9 (2.7)	34 (10)
10 or 6.0mm^2	28 (9.0)	102 (31)	23 (7.0)	86 (26)	14 (4.2)	54 (16)

FUSE OR CIRCUIT BREAKER RANGE IN AMPS

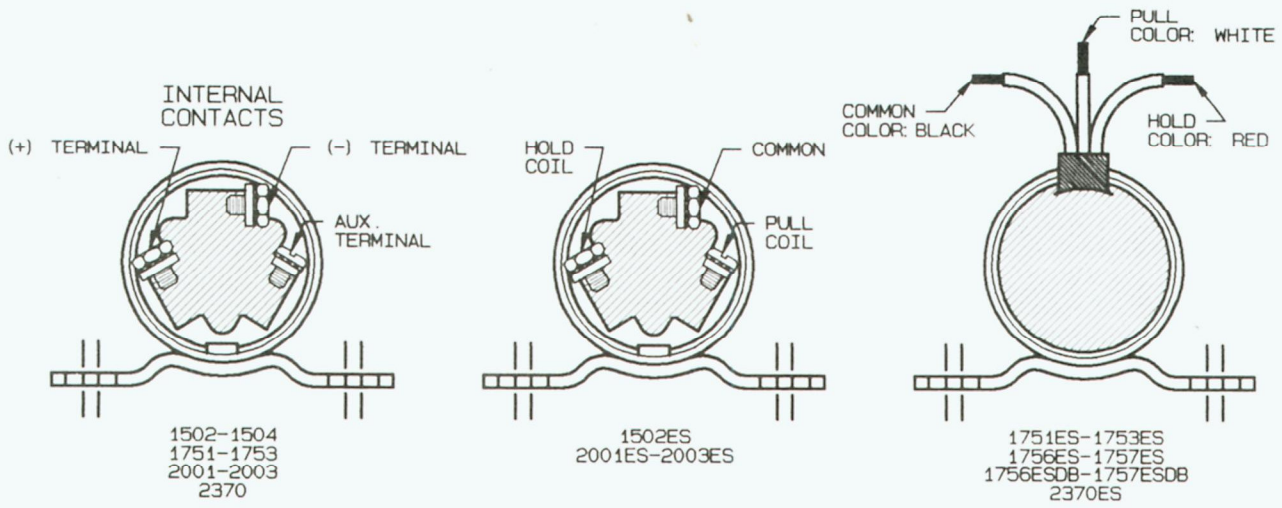
Solenoid Series	**1502/1753/1757**		**1504/1751/1756/2001**		**2003/2370**	
Volts	12	24	12	24	12	24
Slow Blow Fuse Type 3AG	8	6	8	7	20	8
Breaker (AMPS) Max	8	6	12	6	15	12
10 Sec Trip (AMPS) Min	6	4	9	4.5	12	9

WOODWARD

Woodward
(Formerly Synchro-Start Products, Inc.)
6250 West Howard Street • Niles, IL 60714 USA
Phone: +1 (847) 967-7730 • Fax: +1 (847) 967-7832
E-mail: info_niles@woodward.com

I-SAL-004 Rev E 2/04

TERMINAL LOCATIONS



3. **SOLENOID CONNECTIONS**
   - **(a)** Wire Size - The chart on Page 1 indicates the total wire length (to and from) the battery and the solenoid.
   - **(b)** Circuit Breaker - An overload protection device with minimum voltage drop is recommended to protect against solenoid burn out if the plunger fails to bottom out on internally switched units. Select a continuous ampere rating per the above chart having a trip characteristic of 0.1 to 2 seconds.
   - **(c)** Control - Due to the intermittent "Pull Current" requirement. ON-OFF and other control devices may be continuous duty rated at 1/3 the "Pull Current".

4. **TEST PROCEDURE TO DETERMINE PLUNGER HAS BOTTOMED**
   - **(a)** On units with an auxiliary terminal, connect a voltmeter or appropriate light (voltage rating) between auxiliary and "+" terminals. When the solenoid is energized and the plunger bottoms, the voltmeter will indicate the battery voltage or the light is energized.
   - **(b)** Visual Method - Push the plunger to the full bottomed position and measure the plunger extension length from the solenoid body before the linkage is connected. Connect linkage and energize the solenoid. If the plunger has fully bottomed, the plunger extension lengths should be the same.

5. **TEST PROCEDURE TO DETERMINE ADEQUATE VOLTAGE**
   Connect a DC Voltmeter across the solenoid terminals and manually hold the plunger so that it cannot bottom. Energize the solenoid just long enough to obtain a voltmeter reading, then connect the same voltmeter across the power source and manually hold the plunger so that it cannot pull in just long enough to obtain a voltmeter reading. The difference between the two voltmeter readings is the voltage reduction due to wiring which should normally be less than 7% of rated voltage.

6. **CORRECTIVE ACTION**
   If the power source voltage is low, check for partially discharged battery, etc. If the solenoid voltage is low, check for undersized hookup wire, high resistance connections and underrated control device contacts.

7. **WARRANTY**
   Proper installation is extremely important. The plunger must bottom to actuate the pull coil on internally switched units. If the contacts fail to open and the circuit is not protected against continuous high amperage, the pull coil will burn out. Solenoid operation more than 6 times per minute will cause solenoid overheating. Coil damage due to improper installation or excessive repetitive operation is not covered in the warranty.

8. **E.E.C. DIRECTIVE COMPLIANCE**
   All parts supplied by Synchro-Start Products are classified as components and therefore are not "CE" marked. Please contact factory direct for details on specific product compliance of 89/336/EEC and 89/392/EEC directives.

NOTICE

If you do not complete the installation of our product, please ensure that these instructions, and any other design information, literature or drawings relating to the installation of this product are given to the person who does do the installation.