

**APPLICATION NOTES:**

[101](#)

**APPLICABLE SOCKETS:**

[S302](#)

**FEATURES**

- Small size and weight
- High-reliability design
- Hermetically sealed
- High transient immunity
- Long life
- Low-power consumption
- Reverse Polarity Protection

**PRINCIPLE TECHNICAL CHARACTERISTICS**

Seal: Hermetic Tested per MIL-STD-883, Method 1014 Condition B, C

**1x10<sup>-8</sup> atm, cm<sup>3</sup>/s max leakage**

Finish: per MIL-T-10727

**Tin Plate**

Terminals:

TDH 6051 (Tin Plate)  
 TDH 6050 (Gold Plate)

**Solder-lug  
 Plug-In**

Weight

**1.9 Ounce max.**

**DESCRIPTION**

The TDH-6050/51 Time Delay Relays have been designed with thick film hybrid microelectronics timing circuits and MIL-PRF-6106 relays, packaged in a hermetically sealed military style enclosure. The TDH-6050/51 series are designed to withstand severe environmental conditions encountered in military/aerospace applications. These relays are suited for use in power control, communication circuits and many other applications where power switching and high reliability are required over a wide temperature range.



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Data sheets are for initial product selection and comparison. Contact Esterline Power Systems prior to choosing a component.

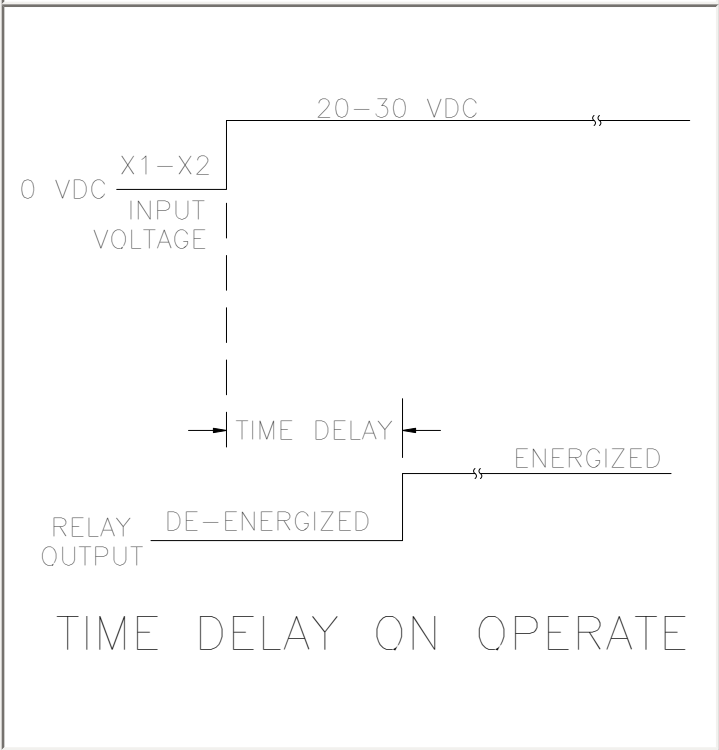
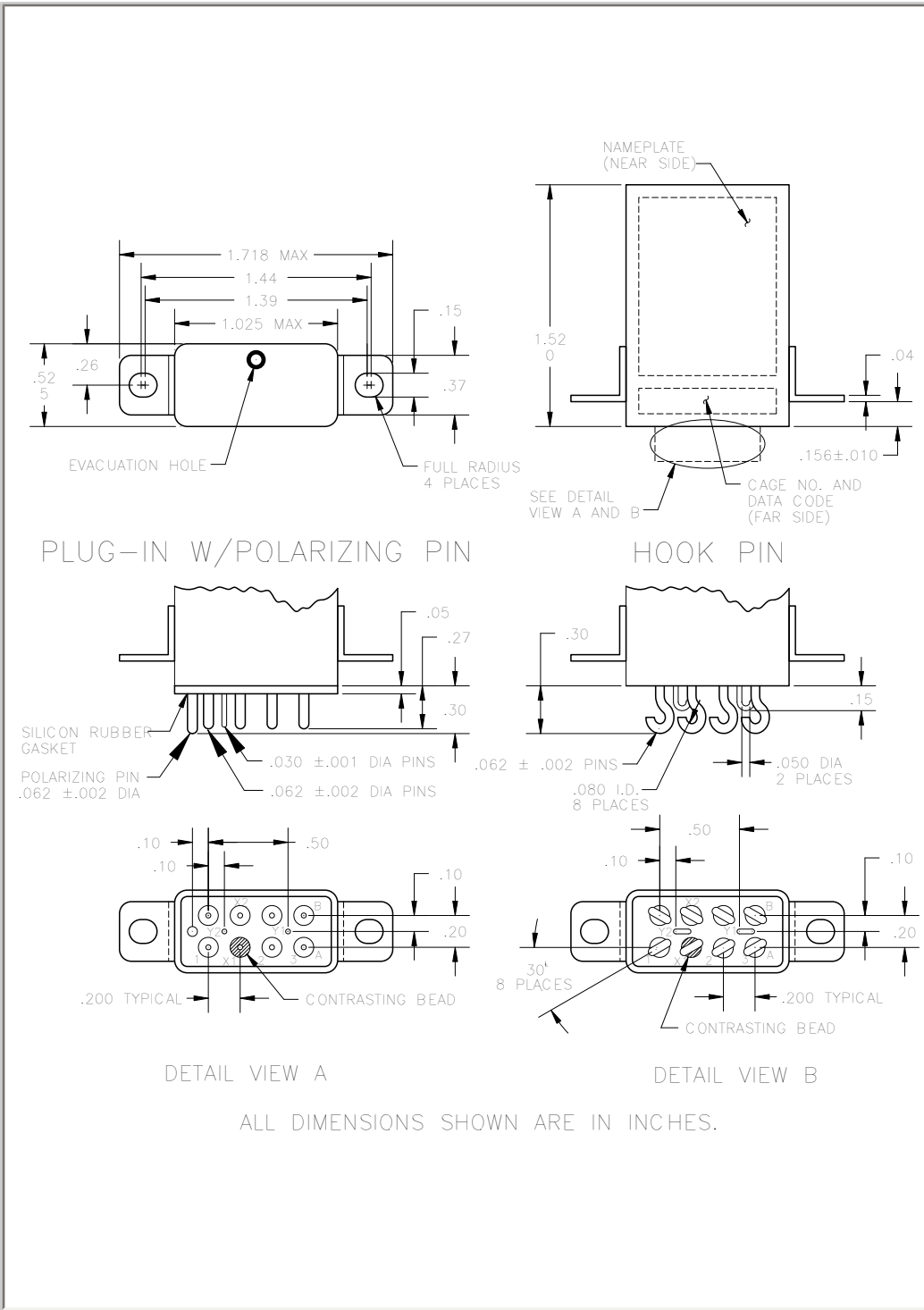
<b>Input (Control) Parameters</b>	
Timing: a. Operation, Time Delay on b. Method c. Range d. Accuracy	Operate Fixed Period 0.1 to 600 Seconds [6] ±10% [1]
Recycle Time	50 ms, Max [5]
Operations: (X1-X2) a. Input & Control Voltage b. Operating Current	20-30 Vdc 150 mA, Max @ +25° C
Transients: a. Positive, MIL-STD-704A, Figure9, Limit 1 b. Spike, MIL-STD-704A, 0-10 µs c. Self-Generated d. Susceptibility	+80 Volts Max ±600 Volts Max ±50 Volts Max +80; -600 Volts Max
Electromagnetic Interference Per MIL-STD-461A	Class 1D [3]
Power Loss	500 Microseconds [2]
<b>Output (Load) Parameters</b>	
Contact Form Contact Rating: a. Resistive b. Inductive c. Motor d. Lamp	2 PDT  10 Amperes 8 Amperes 4 Amperes 2 Amperes
Dielectric Strength: a. @ Sea Level, 60 Hz b. @ 80,000 ft., 60 Hz	1000 Vrms [4] 350 Vrms
Insulation Resistance @ 500 Vdc	1000 M Ω [4]

**GENERAL CHARACTERISTICS**

Ambient Temperatures Range: a. Operating b. Non-Operating	-55 to +125° C -65 to +125° C
Vibration:	
a. Sinusoidal, 10-2000 Hz	20 G
b. Random: 50-2000 Hz, MIL-STD-810	0.2 G <sup>2</sup> /Hz
Shock @ 6 ± 1 MS, 1/2 Sine, 3 Axis	100 G
Acceleration, in any Axis	20 G
Life at Rated Resistive Load; Minimum	100,000 operations

**NUMBERING SYSTEM**

Plug-in Terminal	Solder Hook Terminal
<u>TDH-6050</u> - <u>1001</u>	<u>TDH-6051</u> - <u>1001</u>
1     2     3	1     2     3
<p>1. Model Number.                  2. Pin Style Number.                  3. Timing Range, Fixed: 100 milliseconds to 600 seconds. (See Note 6).</p>	



NOTES

- [1] The accuracy specification applies for any combination of operating temperature and voltage. For units with a timing range less than 1 second, add  $\pm 10$  milliseconds to the  $\pm 10\%$  tolerance.
- [2] Transient and power loss specification are based on a maximum duty cycle of 1/50.
- [3] EMI test limits will not be exceeded during the timing interval or when continuously energized under steady state conditions, per paragraph 3.23, MIL-PRF-83726B.
- [4] Terminals X1 and X2 must be connected together during the test. Dielectric withstanding voltage and insulation resistance are measured at sea level between all mutually insulated terminals and between all terminals and case.
- [5] Recycle time is defined as the minimum time power must be removed from terminal X1 to assure that a new cycle can be completed within the specified timing tolerance.
- [6] A four digit number defines the time delay in milliseconds. The first three digits are significant figures, used to define the specific time delay. The fourth digit represents the number of zeros to follow the first three digits.  
 Examples: - 1001 = 1 second (1,000 milliseconds)  
 - 2502 = 25 seconds (25,000 milliseconds)  
 - 5000 = 0.5 seconds (500 milliseconds)

## DERATING OF CONTACTS FOR DC VOLTAGES ABOVE NOMINAL RATING

To establish a standard for the derating of relay contacts is, at best, a subjective practice. Limitations are governed by the type of relay, contact gap, maximum voltage capabilities of the relay contact system, and the contact material.

The most common method is to derate the contacts by use of the Power Formula, using the known current and voltage.

This method is valid only for **Resistive Loads**, and is an approximation only; keeping in mind the limitations mentioned above.

$$\text{Power} = IE \text{ (Current x Voltage)}$$

$$I_2 E_2 = 2/3 I_1 E_1$$

Example:

A designer is working with a 55 volt DC system and has a relay rated at 10 amps resistive at 28 volts DC. What is the maximum current that can be switched at 55 Vdc.

$$I_1 = 10 \text{ Amperes}$$

$$E_1 = 28 \text{ VDC}$$

$$E_2 = 55 \text{ VDC}$$

$$I_2 = ? \text{ (Current ratings at 55 VDC Resistive)}$$

$$I_2 E_2 = 2 I_1 E_1 / 3$$

$$I_2 = 2 I_1 E_1 / E_2 \cdot 3$$

$$= 2 (10 \times 28) / 55 \times 3$$

$$= 560 / 165$$

$$I_2 = 3.4 \text{ Amperes at 55VDC}$$

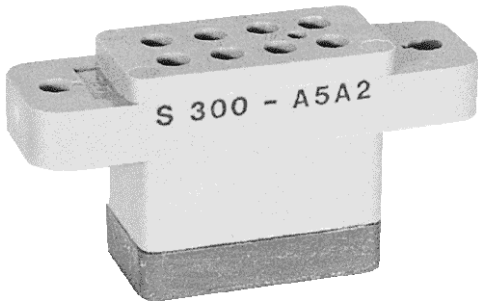
In addition, the user should always be concerned about the following:

1. Derating contacts that are rated for less than 10 Amperes at nominal voltage.
2. Derating contacts for use in system voltages above 130 Volts DC

# S300, S301, S302

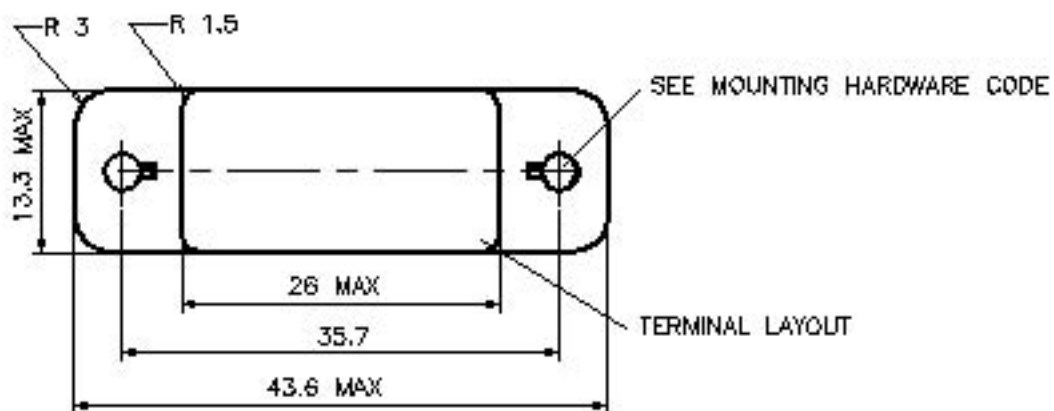
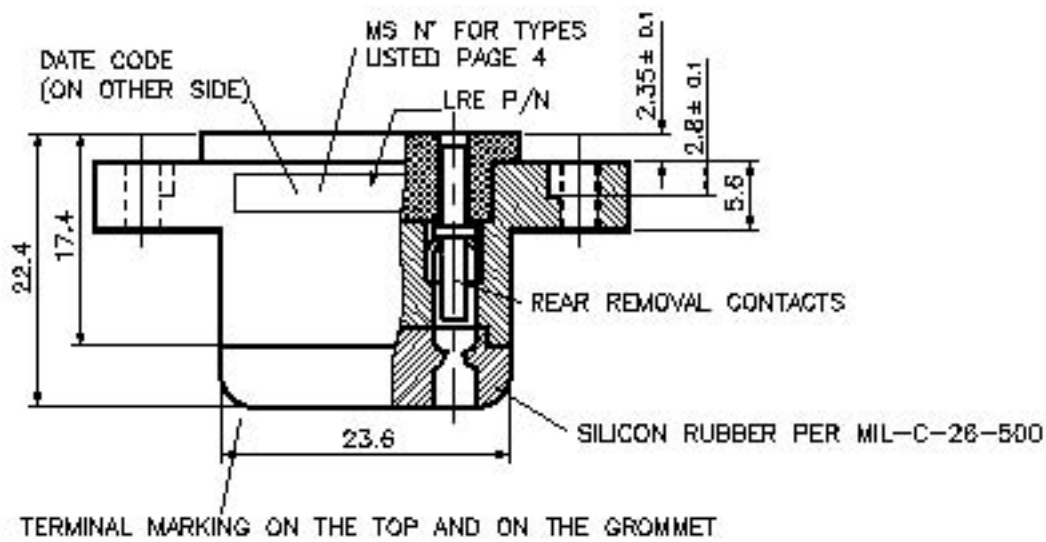
## ENGINEERING DATA SHEET

RELAY SOCKET  
10 AMP



BASIC SOCKET SERIES DESIGNATION FOR:

**Series M300 (DC Coil), M301 (DC Coil),  
M302 (DC Coil), FD300, FLS300, FLR300**



### GENERAL CHARACTERISTICS

Crimp tool contact #22	M 22520/2-01 with turret M 22520/2-14.
Insertion and extraction tool #22	M 81969/14-01.
Crimp tool contact #16	M 22520/1-01 with turret M 22520/1-02 or MS 3191-1.
Insertion and extraction tool #16	M 81969/14-03 .
Weight	35g max.
Temperature range	70° C to +125° C.



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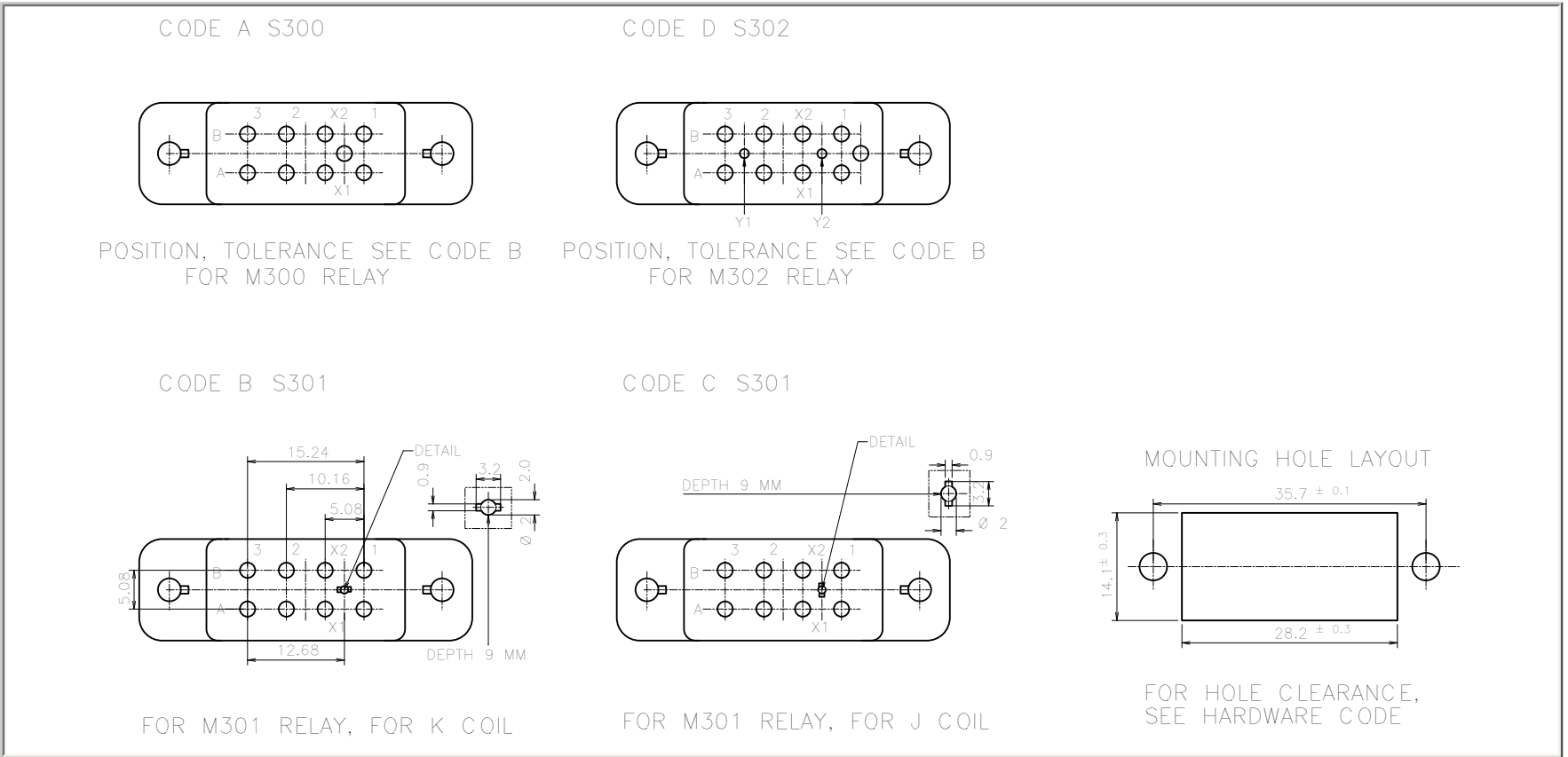
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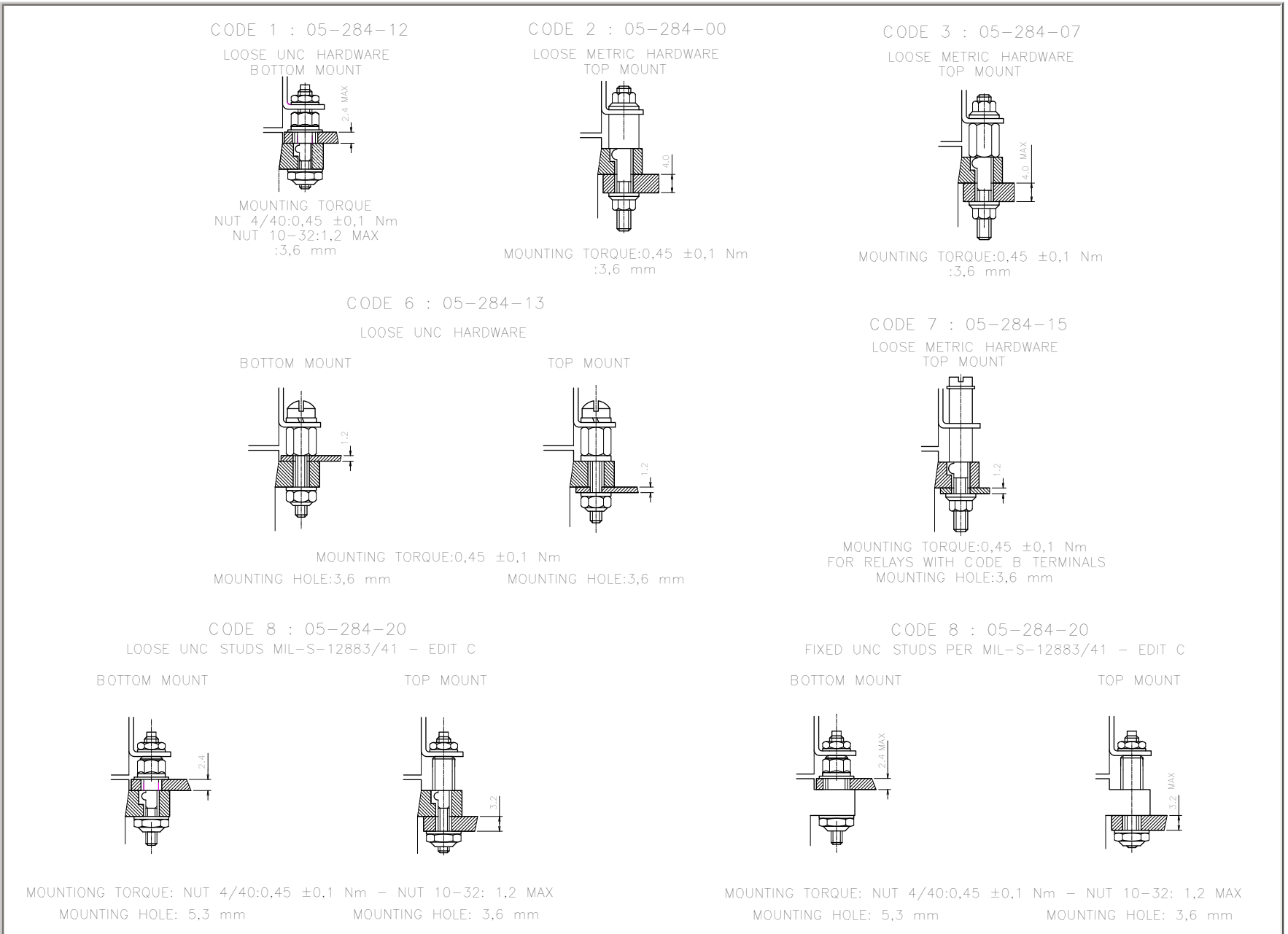
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# TERMINAL LAYOUT

S300, S301, S302



# MOUNTING HARDWARE



<p><b>Code A</b></p> <p>Recommended for contact code 2 contact code 8 <b>Dia: 1.2 .....2.4mm</b></p>	<p><b>Code B</b></p> <p>Recommended for contact code 3 contact code 9 <b>Dia: 0.8 .....1.6mm</b></p>
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**CONTACT SIZE AND STYLE**

<p>Y1-Y2 Crimpend to accomodate AWG22 05 912 00 (for product code 2+3)  31 036 00 <u>Contact mating end dia 0.8mm</u> (for contact code 8+9) MIL-C-39029/92-531 Bin Code colour bands or Bin Code numbering on crimpside  <u>Contact mating end dia 0.8mm</u></p>	<p>Code 2 05 911 00</p>	<p>Crimpend to accomodate AWG16-18-20</p>	<p>Code 3 05 911 10</p>	<p>Crimpend to accomodate AWG20-22-24</p>
	<u>Contact mating end #16</u>		<u>Contact mating end #16</u>	
<p>Code 0 Without contacts</p>	<p>Code 8 30 315 00</p>	<p>Crimpend to accomodate AWG16-18-20  MIL-C-39029/29-533 Bin Code colour bands or Bin Code numbering on crimpside</p>	<p>Code 9 30 315 10</p>	<p>Crimpend to accomodate AWG20-22-24  MIL-C-39029/29-534 Bin Code colour bands or Bin Code numbering on crimpside</p>
	<u>Contact mating end #16</u>		<u>Contact mating end #16</u>	

**SOCKET NUMBERING SYSTEM**

	S300	A	1	A	2
1-Basic socket designation_____					
2-Terminal Layout_____					
3-Mounting Hardware_____					
4-Grommet to seal on wire insulation_____					
5-Contact size and style_____					



**MS/LEACH CROSS PART NO. AND MATING RELAYS**

**S300, S301, S302**

	<b>MS - Number</b>	<b>LEACH P/N</b>	<b>Contacts to accomodate wire #</b>		<b>Applicable for relays</b>
<b>MIL-S-12883/41</b>	-01	S300-A6A2	16-18-20	Loose terminals Above/below panel mounting	M300-D4A /-L/-N/-B/-C
	-04	S300-A6B3	20-22-24		M 301-D4F/-K
	-02	S301-B6A2	16-18-20		M 301-D4E/-J
	-03	S301-C6A2	16-18-20		
	<b>MS - Number</b>	<b>LEACH P/N</b>	<b>Contacts to accomodate wire #</b>		<b>Applicable for relays</b>
<b>MIL-S-12883/41B</b>	-11	S300-A1A2	16-18-20	Loose terminals below panel mounting	M300-D4A /-L/-N/-B/-C
	-14	S300-A1B3	20-22-24		M 301-D4F/-K
	-12	S301-B1A2	16-18-20		M 301-D4E/-J
	-13	S301-C1A2	16-18-20		
	<b>MS - Number</b>	<b>LEACH P/N</b>	<b>Contacts to accomodate wire #</b>		<b>Applicable for relays</b>
<b>MIL-S-12883/41C</b>	-11S	S300-A8A8	16-18-20	Loose terminals Above/below panel mounting	M300-D4A /-L/-N/-B/-C
	-14S	S300-A8B9	20-22-24		M301-D4F/-K
	-12S	S301-B8A8	16-18-20		M301-D4F/-J
	-13S	S301-C8A8	16-18-20		M302-D4A/ -L/-N/-B/-C
	-15S	S302-D8A8	16-18-20		
<b>MIL-S-12883/41C</b>	-16S	S300-A9A8	16-18-20	Fixed terminals Above/below panel mounting	M300-D4A /-L/-N/-B/-C
	-19S	S300-A9B9	20-22-24		M 301-D4F/-K
	-17S	S301-B9A8	16-18-20		M 301-D4E/-J
	-18S	S301-C9A8	16-18-20		M 302-D4A/ -L/-N/-B/-C
	-20S	S302-D9A8	16-18-20		



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