# PITTS CLUTCH MODELS AND BASIC SPECIFICATIONS

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HORSEPOWER TO DRIVE A PUMP

The standard formula for calculating hydraulic (fluid power) horsepower is HP = PS x RPM / 1714. Most positive displacement hydraulic pumps have an efficiency of 85%. In the table below, HP is in the table below, the following calculations are used:

Using this table:
- The range of 500 to 5000 PSI covers most hydraulic systems, but power requirements can be determined for conditions outside the table, for which intermediate values by combining values of the nearest values of the same power and pressure will be exactly twice the figures shown for 2000 PSI. At 1714 RPM, power will be the sum of the figures shown in the 75 and 2000 PSI levels.

For systems of less than 500 PSI, horsepower calculations tend to become unrealistic because mechanical friction losses reduce pump efficiency.

Rules-of-Thumb:
- Approximate power requirements can be figured with simple mental arithmetic with this rule-of-thumb:

1 HP is required for each 1 GPM @ 1500 PSI

For example, a 5 GPM pump operating at 150 PSI would need 5 HP, or at 2000 PSI would need 10 HP. A 10 GPM pump at 1000 PSI would need 6 HP, or the same pump operating at 1500 PSI would need 10 HP, etc.

A final rule of thumb states that about 5% of the pump's maximum rated horsepower is required to idle the pump when it is "unloaded" and the oil is circulating at a high rate of turn. This amount of power is consumed in low losses plus mechanical friction losses in bearings and pumping elements.

The above data is the only data that can be used for an "average" hydraulic pump and system. For a system that may have unusual pressure spikes, non-compact motors, or other dicy properties, an additional horsepower requirement must be considered. When horsepower requirement has been calculated, refer to the chart for horsepower vs. RPM. Consultations are required by LB FT. or ton.
• LIFE: A significant degree of misalignment rapidly decreases belt life.

• MULTIPLE BELT DRIVE: When necessary to use more than one belt on a drive, use a matched set of belts. If all of the belts are not of the same length, the shorter belt will operate under more tension than the longer one and their service life may be correspondingly shortened. Therefore, if a drive is designed to use more than one belt, order the belts in matched sets. Make sure the matched set is of belts from the same manufacturer.

C. FINAL INSTALLATION INSTRUCTIONS:

A. DIRECT DRIVE CLUTCHES

1. Completely inspect the entire assembly and installation. Check and secure all areas for loose or removed components during the installation.

2. Proper connection for the clutch coil to the D.C. Electrical System is very important. Locate a circuit controlled by the vehicle ignition switch. This will prevent the clutches from being engaged when the vehicle is not in use.

3. Test the coil in the field assembly is continuous run wire. One end of the wire is connected to positive (+). The other end to negative (-) ground. If the coil has only one lead wire protruding from the housing it will be connected to positive (+) as the other end is internally grounded to the case. If two lead wires are protruding connect one to positive (+) and one to negative (-) ground. Proper clutch operation and clutch life relies on adequate supply of rated DC voltage to the field coil.

LOW VOLTAGE = CLUTCH FAILURE

The wiring circuit may vary depending whether or not a speed control device is used in the system. This schematic illustrates a simple method of connecting the D.C. Circuitry.

B. BELT DRIVE CLUTCHES

1. Important: When the system is complete, mechanically and electrically, and the pump/motor can be operated, a functional check is necessary. With the power source turned on at 1,000 to 1,200 RPM, cycle the clutch on and off a total of 5 sec on - 5 sec off for a total of 25 cycles. The ammeter plate should "snap" firmly against the cover. If not, re-check for rated voltage at the lead wire and check for proper grounding.

2. The Pitts Clutch automatically compensates for wear requiring no adjustment throughout the life of the clutch. DO NOT lubricate the unit. If the clutches begin to bind, check the electrical circuit to be sure that the proper voltage is being supplied to the clutch.

3. DO NOT attempt to make any mechanical adjustments on the clutch.

CAUTION: At all moments of engagement, the clutch must pick up all related inertia load of the clutch components and other components being put into rotary motion. This action is cumulative to dynamic torque. The larger the clutch and related components the higher the inertia load. High RPM Engagement of the clutch creates an excessive shock load and may cause breakage of the rod springs and/or clutch slippage and ultimate clutch failure. On direct drive clutches the input drive shaft may also break causing excessive damage to surrounding area. Please refer to the performance recommendations regarding maximum clutch engagement RPM.

TORQUE - HOUSING POWER - RPM RELATIONS

What size clutch do you need for your application? Determine RPM of operation at the clutch. Determine Horsepower that clutch will drive. Determine clutch torque required by using the following formula or read directly from chart below.

To find Torque: Use formula: T = HP X 5252 / RPM

CONCLUSION:

Satisfactory performance and life expectancy of your clutch drive system depends on:

1. MATCHED COMPONENTS: Pump/Clutch/Brakes and Drive Line - exactly sized to handle the job.

2. ALIGNMENT: Direct Drive Lines within 3° (3° is optimum). Belt Driven within 1° (Fleury by Fleury).

3. NO LEAKS: Hydraulic Fluid - 40 contamination in and around clutch friction surfaces and bearings - equals "Short Life".

4. ELECTRICAL: Full rated D.C. Voltage must be applied to clutch. A loss of 5 volts, or a 12 volt system, equals 9% less torque.

5. SCHEDULED MAINTENANCE: Inspect the entire drive system periodically.

6. HIGH RPM ENGAGEMENT: Refer to chart (above). Use caution when using the chart.

PERFORMANCE ASSURANCE

The performance of a Pitts electro-magnetic clutch depends upon the proper application of the product, adequate run-in, installation and maintenance procedures, and reasonable care in operation of the unit.

All torque values listed in our literature are nominal and are subject to the variations normally associated with friction devices. Adequate and reasonable service factors must be applied when selecting units. Although Pitts' application engineers are available for consultation, final selection and performance assurance on the buyer's application is the responsibility of the purchaser. The buyer should take into consideration all variables shown in the applicable specification sheets. Careful selection, adequate testing, and proper operation and maintenance of all Pitts products should aid in obtaining the best possible performance.

TORQUE:

In determining torque requirements for a given machine application, the following relationship of Torque RPM and horsepower is useful.

METHODOLOGY:

T = 5252 / HP

Where T = Torque (Foot Pounds)

HP = HorsePower

RPM = Speed (Revolutions Per Minute)

Fluid Power

Where GFR = Cubic Inch per Revolution

Psf = Pounds per Square Inch

STATIC TORQUE:

Torque is that applied during the period where the surfaces are sliding. As an example, the torque caused by a worm on a worm wheel is not considered torque. Refer to the accompanying graph.

DYNAMIC TORQUE:

Dynamic torque is that applied during the period where the surfaces are sliding into engagement. As an example, the torque caused by a worm on a worm wheel is not considered torque. Refer to the accompanying graph.

SERVICE FACTOR:

When actual clutch torque is determined for your application, a service factor (or K Factor) must be added to this value. This K factor is used in order to avoid clutch slippage caused by system pressure spikes and/or high RPM engagement shock load to the clutch. Multiply actual torque value required by the K factor listed below for your particular application.

For light machine such as drilling, where load is applied after clutch is engaged, K = 3 to 5%.

For electric motors where during overload clutch stalls the motor, use pulsed torque factor from motor manufacturer, or approximately.

For engines where clutch should be strong enough to stall engine.

For refrigerant and air compressors.

For hydraulic pumps where pressure may be applied to the system at instant of engagement.

For conveyors and augers, where static load on system must be started by slipping torque of the clutch.

The resulting torque requirement, K x T = Required torque of clutch.

EXAMPE:

25 HP Hydraulic pump load at 1800 RPM. An occasional pressure spike may occur and the pump will be in the max pressure or by pass condition. K = 3 is selected. From the chart, 25 HP at 1800 RPM Calls for 73 lb. ft, or Torque. T = 73. Then, K x T = 219. We would therefore recommend our Pitts Clutch Model 2B-2, "high torque" rated at 200 lb ft. at 1800 RPM.

Other useful formulas:

- To find Horsepower: use formula
  HP = (T x RPM) / 5252

- To find RPM: use formula
  RPM = (HP x 5252) / T

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INSTALLATION AND REMOVAL INSTRUCTIONS
PITTS’ ELECTRO-MAGNETIC CLUTCH

The following instructions are for Pitts’ 2-piece clutch with stationary mounted coil and belt driven pulley assembly.

I. Stationary Mounted Coil: (Outboard 4-hole or Inboard 3-hole Mount)
   A. Be sure that rated DC voltage of coil is same as DC voltage from supply source.
   B. Attach coil to mounting surface using “special” 1/4"-20 hex head screws in parts package supplied with clutch.
   C. Torque 1/4"-20 supplied screws to 13-17 lb-ft. (consult with manufacturer if other screws are used.)

   Note: Coil must be concentric to shaft on driven device within 0.015 TIR (Total Indicator Runout). Coil face clearance to pulley cavity face must be 3/32 inch.

II. Pulley Assembly: (Tapered or Straight Bore Hub)
   A. Thoroughly clean the shaft of driven unit.
   B. Check shaft key for proper size and location in shaft keyway.
   C. Slide pulley assembly onto shaft. Be sure that clutch hub keyway aligns with shaft key and that shaft key is properly seated and located after pulley installation.
   D. Secure pulley assembly in proper location on shaft using 5/16 inch Nylock cap screw and flat washer supplied in parts package or by using other suitable attachments. (Recommended torque for 5/16 inch supplied cap screw is 20 ft-lbs.)
   E. Hand spin the pulley and watch for any excessive runout or rubbing interference with the coil or mounting bracket areas. Correct any such problems to operation of clutch assembly.

III. Electrical Connection: (1 or 2 Lead Wire Coils)
   A. Connect coil lead wire to DC electrical circuit.
      Note: If coil has only one lead wire, the coil is internally grounded through the mounting hardware. If the coil has two lead wires, one wire is to be connected to DC electrical circuit and the other to an external grounding point.
   B. Apply rated DC voltage to the coil to engage the clutch. Engage and disengage several times. The disc should “snap” firmly against the pulley face during engagement. If not, check DC voltage circuit and correct as required.

IV. Removal:
   A. Remove shaft bolt or other attaching devices from pulley.
   B. * Taper Bore Hub – Install 5/8 inch NC (coarse thread) bolt into corresponding threads in front of hub. Turn bolt against shaft and pulley will be forced free.
      * Straight Bore Hub – The pulley may slide freely off shaft by hand applied force. If not, use a suitable pulley puller tool.

V. Operation of Clutch:
   A. When clutch is ready for functional operation and with drive belts properly installed, start the driving power source (engine, motor, etc.)
   B. Observe that all mounting hardware is secured and drive belts are in line and turning properly.
   C. Apply rated DC voltage to the coil to engage clutch. Repeatedly engage and disengage the clutch approximately 15-20 times. This procedure will “burnish in” the mating friction surfaces and allow the clutch to yield higher initial torque.

VI. Performance Assurance:
   The performance of a Pitts’ electro-magnetic clutch depends upon the proper application of the product adequate run-in, installation and maintenance procedures, and reasonable care in operation of the unit.

   All torque values listed in our literature are nominal and are subject to the variations normally associated with friction devices. Adequate and reasonable service factors must be applied when selecting units. Although Pitts’ application engineers are available for consultation, final selection and performance assurance on the buyer’s application is the responsibility of the purchaser. The buyer should take into consideration all variables shown in the applicable specification sheet. Careful selection, adequate testing, and proper operation and maintenance of all Pitts’ products should aid in obtaining the best possible performance.

SEE SERVICE INFORMATION ON REVERSE SIDE
HOW TO AVOID CLUTCH PROBLEMS

What are typical application problems that cause clutch failures? Clutch slippage is the most common complaint, but it’s not always readily obvious why the clutch slips. Low voltage and erratic torque demands are probably the most troublesome. Unfortunately, these can both be present at the same time.

When a clutch is removed from the application and set aside for examination, many of the clues to the cause of failure are lost. The best way to analyze a clutch failure is before the clutch is removed from the application as this will often reveal the true cause of failure. Nevertheless, we have experienced enough failure modes over the years to establish a pattern of these “failed clutches”.

Two things happen in these cases: (1) The clutch torque decreases due to application problems; or (2) the application load increases. A normal clutch has more than the required torque capacity to drive an approved application under high load conditions. A normal clutch is one operating with full rated voltage on an approved application (i.e., pump or compressor) in a fairly clean environment. The normal pump does not purge oil onto the clutch face or operate over the manufacturer’s rated pressures. Now, these severe conditions can become more severe. The voltage source can decrease; the ambient temperature increase; etc. Even then, it is unlikely that a clutch would slip because of the built-in safety factor.

We find that a combination of severe conditions may be superimposed. Consider the following: low voltage – a loss of 1 volt on a 12 volt unit will drop torque 9%; 2 volts may cause partial engagement and drag. High ambient temperature – a 50°F increase in temperature may drop torque 10%. A new clutch, before being cycled-in has 1/3 less torque than after it is cycled.

More unusual causes, but nevertheless serious are these: (1) Poor grounding of the clutch coil; (2) Oil from a pump or hose leak can reduce the friction drastically; (3) Severe contamination can destroy bearings and cause high friction heat and slippage; (4) Bearing failures can also be caused from excessive belt tension and misalignment or from brinelling upon forced installation to the shaft.

Many coil failures are really a result of extensive clutch slippage transferring heat to the coil face thus burning the potting compound and coil winding. If the coil is not mounted concentric to the shaft, interference will result in failure. When a shaft locks up, the clutch is forced to slip. This cause of failure is hard to analyze except by the technician who replaces both assemblies. A service report with the clutch can help in analyzing the conditions.

TROUBLESHOOTING

Some tips that will help the technician diagnose or prevent problems:

1. One tool we recommend be available, and used regularly, is a good DC volt-ohmmeter. Check the clutch voltage at the coil wire connection when the system is operating along with all other lights and accessories operating. The clutch coil must be supplied with required rated voltage. Equally as important is grounding of the clutch coil. Check this circuit as well, to assure full complete grounding.

2. When installing a clutch, be sure it seats on the shaft and key. Use a torque wrench to properly torque the field coil and shaft bolts as specified.

3. Belt tension: Drive belts that are too loose or too tight can cause a variety of problems. Use a belt tension gauge to set or adjust belt tension.

4. Cycle a new clutch as much as practical after installation (1000-1500 RPM – 5 sec on/5 sec off – 25 cycles). This increases the torque greatly.

5. The cause of rubbing of the pulley on the coil is often loose coil screws. Elongated holes, broken coil tabs, etc., may be the result of loose screws. These must be torqued as specified.

REVIEW OF POTENTIAL PROBLEMS

- Low voltage to coil.
- Inadequate coil grounding.
- Compressor seal leak.
- Clutch mounted incorrectly.
- Mounting bolts not torqued.
- Malfunction of other system components.
- Excessive engine vibration.
- Excessive ambient temperature.
- Belt tension-too high/low.

In conclusion, please remember that things are not always as they first appear and just because a failure has occurred, does not always justify blaming the part that failed.
24D75-6 CLUTCH
Hydraulic Pump Drive
12 Volt D.C. - Belt Driven

Power
48 Watts

Max RPM
5000

Weight
11 Lbs.

Static Rated Torque - 75 Lbs. Ft.

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<td>0.192</td>
<td>0.62</td>
<td>2</td>
</tr>
<tr>
<td>11669</td>
<td>N/A</td>
<td>6.00</td>
<td>0.35</td>
<td>40°</td>
<td>0.36</td>
<td>0.192</td>
<td>0.41</td>
<td>3</td>
</tr>
</tbody>
</table>

WWW.PITTSINDUSTRIES.COM
24D75-6 CLUTCH
Mounting Dimensions
AG100 CLUTCH
Heavy Duty Hydraulic Pump Drive
Taper Bore - 12 Volt 4 Amp D.C. - Belt Driven

Power 48 Watts
Max RPM 5000
Weight 11 Lbs.

Static Rated Torque - 100 Lbs. Ft.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>No of Grooves</th>
</tr>
</thead>
<tbody>
<tr>
<td>14193</td>
<td>6.700</td>
<td>0.500</td>
<td>36°</td>
<td>0.500</td>
<td>0.192</td>
<td>0.620</td>
<td>1.650</td>
<td>2</td>
</tr>
<tr>
<td>14194</td>
<td>5.800</td>
<td>0.140</td>
<td>40°</td>
<td>0.140</td>
<td>0.581</td>
<td>0.140</td>
<td>1.650</td>
<td>6</td>
</tr>
<tr>
<td>14195</td>
<td>5.308</td>
<td>0.140</td>
<td>40°</td>
<td>0.140</td>
<td>0.442</td>
<td>0.140</td>
<td>1.650</td>
<td>8</td>
</tr>
<tr>
<td>14261</td>
<td>6.000</td>
<td>0.500</td>
<td>36°</td>
<td>0.500</td>
<td>0.192</td>
<td>0.620</td>
<td>1.650</td>
<td>2</td>
</tr>
<tr>
<td>14444</td>
<td>6.115</td>
<td>0.140</td>
<td>40°</td>
<td>0.140</td>
<td>0.441</td>
<td>0.140</td>
<td>1.650</td>
<td>8</td>
</tr>
</tbody>
</table>

WWW.PITTSINDUSTRIES.COM
H-SERIES HYDRAULIC PUMP CLUTCHES

Typical applications include:

- Fishing Boats
- Wreckers
- Farm Machinery
- Mining Equipment
- Snow Plows
- Aerial Lifts
- Fire Trucks
- Fire Boats
- Packer Bodies
- Dump Bodies
- Street Sweepers
- Construction

WWW.PITTSINDUSTRIES.COM
The patented Softstart Clutch Controller offers a simple solution to all of these issues!

- **Mechanical Life**: The Softstart lessens forces to mechanical parts and improves the life of bolts, decks, brackets and other mechanical parts.
- **Belt Life**: Reduce wear and breakage for belts and improve the quality & reputation of the equipment.
- **Engine Stall**: The Softstart eliminates engine stalling and RPM droop by utilizing closed loop RPM monitoring while engaging the electric clutch.
- **Mechanical Jolt**: Smooth engagement means less jolt to the equipment and customers.
- **Engine Cost Savings**: The Softstart Clutch enables OEM’s to reduce equipment engine size to save money.

### Gas Version, Absolute Maximum Ratings - Model 1118081

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Nom</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Voltage</td>
<td>8</td>
<td>16</td>
<td></td>
<td>Volts</td>
</tr>
<tr>
<td>Max On resistance</td>
<td>0.05</td>
<td>Ohms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;On&quot; Response Time</td>
<td>220</td>
<td>250</td>
<td>280</td>
<td>mS</td>
</tr>
<tr>
<td>Soft Start Ramp Time</td>
<td>000</td>
<td>1000</td>
<td>1100</td>
<td>mS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Nom</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impedance</td>
<td>1.5</td>
<td></td>
<td>4000</td>
<td>Ohms</td>
</tr>
<tr>
<td>Input Range</td>
<td>1000</td>
<td></td>
<td>4000</td>
<td>RPM²</td>
</tr>
</tbody>
</table>

*Note: RPM Input spark pattern 1.1
(1 Pulse per Revolution, other patterns available)

### Diesel & Electric Version, Absolute Maximum Ratings - Model 1118121

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Nom</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Voltage</td>
<td>8</td>
<td>16</td>
<td></td>
<td>Volts</td>
</tr>
<tr>
<td>Max On resistance</td>
<td>0.05</td>
<td>Ohms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;On&quot; Response Time</td>
<td>220</td>
<td>250</td>
<td>280</td>
<td>mS</td>
</tr>
<tr>
<td>Soft Start Ramp Time</td>
<td>000</td>
<td>1000</td>
<td>1100</td>
<td>mS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Nom</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impedance</td>
<td>100</td>
<td></td>
<td>3000</td>
<td>Kohms</td>
</tr>
<tr>
<td>Trigger (VIL)</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trigger (VTH)</td>
<td>4.7</td>
<td></td>
<td>170</td>
<td>Volts</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>700</td>
<td></td>
<td></td>
<td>Hz²</td>
</tr>
</tbody>
</table>

*Note: Other frequency ranges available

### Protection

- **Load Dump ISO 7637-2 test pulse 5A**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Nom</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over current (13.8VDC)</td>
<td>47</td>
<td>89</td>
<td>131</td>
<td>Amps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Nom</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over current (13.8VDC)</td>
<td>47</td>
<td>89</td>
<td>131</td>
<td>Amps</td>
</tr>
</tbody>
</table>

---

Pitts Industries  P.O. Box 815968  Dallas, TX 75381-5968  www.pittsindustries.com  info@pittsindustries.com
SCM-808 SOFTSTART CLUTCH CONTROLLER

The patented Softstart controller senses the exact point at which the friction surfaces contact, then rapidly reduces the current to a level that allows the clutch to safely slip, but not release. Using engine RPM feedback, the patented controller adjusts the clutch current in a manner that drives the engine RPM to fit a desired profile.

Design Features:

- Closed loop control for consistent performance throughout the entire clutch life.
- Precise current measurement for accurate and repeatable pull-in detection.
- Closed loop PWM current control unaffected by charging system voltage.
- One controller part number
  - Ratiometric RPM control automatically scales to RPM at time of engagement.
  - On-the-fly current calibration automatically adapts to different sized clutches.
- Default to open loop control if RPM signal is unavailable.
- Optional fixed current calibration possible for special applications.
- Short Circuit protected / Load dump protected.

Operating and Environment Specs:

- Operating Temperature Range: -40 to +70C
- Vibration: 20g’s @ 10 – 80 Hz SAE J-1378
- Shock 55g’s SAE J-1378 (tested and passed to 150g’s, which is nearly 3 times the SAE specification)
- Humidity: 95% H SAE J-1378
- Salt Spray Test: MIL-STD-202G, Method 101E (5% NaCl @ 35C, 48 hrs)
- Dust: Unit is 100% encapsulated – dust cannot enter
- Immersion: ASAE EP455.5.6 level 2

Immerse controller in tap water at temperature of 18C +/- 5C to a component top surface depth of 460mm. Orient in each of 3 orthogonal planes of 5 min in each plane. Upon removal, immediately subject to a cold soak of 19C for 30 min. Return to dry atmosphere of 25C for 60 min. No impaired function, no water entry.

- Ultraviolet: Q-Sun Xe-1-UV Chamber – 720 Hours
- Thermal Shock: Controller stabilized at 70C for 30 min. Removed from oven and immediately immersed in 0C water mixed with UV sensitive dye for a minimum of 5 minutes – repeated for a total of 10 cycles. Controller stabilized at -40C for 30 min. Removed from chamber and immediately immersed into 25C water mixed with UV sensitive dye for a minimum of 5 min – repeated for a total of 10 cycles. No functional failures or ingress of water.
- Chemical: ASAE EP455.5.8.2 chemicals brush exposure.
- Chemical Test: Apply with a brush over the normally exposed surface area. Repeat once per day for three days. Check for impaired function or detrimental corrosion during the test and at end of 100 hour min interval following exposure to test condition. No defect from wiping the surface with the following chemicals at room temperature: engine oil, transmission fluid, galoline.

HOOKUP: Gas Powered, Diesel or Electric Versions PIN OUT

- A Ground
- B 12VDC Supply
- C Clutch OUT+
- D Clutch RETURN
- E RPM Tachometer trigger (for closed loop versions). Inductive for gas equipment, alternator output for diesel, other pickup options available.

OEM Features:

- Other tachometer feedback (rotating shaft, controller interface, etc.)
- Open loop soft start version with no tachometer feedback.
- Voltage input options.
- Multiple clutch engagement and tachometer profiles.

Pitts Industries  P.O. Box 815968  Dallas, TX 75381-5968
www.pittsindustries.com  info@pittsindustries.com
H24D90 CLUTCH
Hydraulic Pump Drive
12 or 24 Volt D.C. - Shaft Driven

- Power: 48 Watts
- Max RPM: 3600
- Weight: 20 Lbs.

Note:
- Drive flange bolt pattern and pilot diameter on clutch are dimensioned to correlate with “Spicer” type 1000 – 1100 series drive shaft flange connections.
- Proper drive shaft selection is important. Consult with drive shaft manufacturers specifications for each specific application requirements.
- Drive shaft alignment must be within 3°.

US Patent No. 4601378
Static Rated Torque - 90 Lbs. Ft.

<table>
<thead>
<tr>
<th>24 Volt - 2 Amp Part No.</th>
<th>12 Volt - 4 Amp Part No</th>
<th>For Pump Shaft Size</th>
<th>For Pump Mount Style</th>
<th>Pitts Mount Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>14344</td>
<td>13750</td>
<td>3/4&quot; - With 3/16&quot; Keyway</td>
<td>&quot;A&quot; 2 Bolt</td>
<td>13195</td>
</tr>
</tbody>
</table>
H24K90 CLUTCH
Hydraulic Pump Drive
12 Volt D.C. - Polly Groove "K" Section

Power
48 Watts

Max RPM
5000

Weight
14 Lbs.

US Patent No. 4601378
Static Rated Torque - 90 Lbs. Ft.

<table>
<thead>
<tr>
<th>24 Volt - 2 Amp Part No.</th>
<th>12 Volt - 4 Amp Part No</th>
<th>For Pump Shaft Size</th>
<th>For Pump Mount Style</th>
<th>Pitts Mount Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>14647</td>
<td>&quot;A&quot; Spline 9T 16/32 DP</td>
<td>&quot;A&quot; 2 Bolt</td>
<td>13195</td>
</tr>
<tr>
<td>N/A</td>
<td>13818</td>
<td>3/4&quot; - With 3/16&quot; Keyway</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WWW.PITTSINDUSTRIES.COM
H24K90S* CLUTCH
Hydraulic Pump Drive
12 Volt D.C. - Polly Groove "K" Section

Power
48 Watts

Max RPM
5000

Weight
14 Lbs.

* Note: Special 8-Groove Pulley

US Patent No. 4601378
Static Rated Torque - 90 Lbs. Ft.

<table>
<thead>
<tr>
<th>24 Volt - 2 Amp Part No.</th>
<th>12 Volt - 4 Amp Part No</th>
<th>For Pump Shaft Size</th>
<th>For Pump Mount Style</th>
<th>Pitts Mount Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>14858</td>
<td>&quot;A&quot; Spline 9T 16/32 DP</td>
<td>&quot;A&quot; 2 Bolt</td>
<td>13195</td>
</tr>
<tr>
<td></td>
<td>14859</td>
<td>3/4&quot; - With 3/16&quot; Keyway</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WWW.PITTSINDUSTRIES.COM
H24V90 CLUTCH
Hydraulic Pump Drive
12 or 24 Volt D.C. - V-Belt Driven

Power
48 Watts

Max RPM
5000

Weight
14 Lbs.

US Patent No. 4601378
Static Rated Torque - 90 Lbs. Ft.

<table>
<thead>
<tr>
<th>24 Volt - 2 Amp Part No.</th>
<th>12 Volt - 4 Amp Part No.</th>
<th>For Pump Shaft Size</th>
<th>For Pump Mount Style</th>
<th>Pitts Mount Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>13157</td>
<td>5/8&quot; - With 5/32&quot; Keyway</td>
<td>&quot;A&quot; 2 Bolt</td>
<td>13195</td>
</tr>
<tr>
<td>13817</td>
<td>13229</td>
<td>&quot;A&quot; Spline 9T 16/32 DP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13817</td>
<td>13233</td>
<td>3/4&quot; - With 3/16&quot; Keyway</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
H27V150 CLUTCH
Hydraulic Pump Drive
12 or 24 Volt D.C. - Belt Driven - Power Band "B" Belt

Power
60 Watts

Max RPM
3600

Weight
24 Lbs.

US Patent No. 4601378
Static Rated Torque - 150 Lbs. Ft.

<table>
<thead>
<tr>
<th>24 Volt - 2.5 Amp Part No.</th>
<th>12 Volt - 5 Amp Part No</th>
<th>For Pump Shaft Size</th>
<th>For Pump Mount Style</th>
<th>Pitts Mount Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>13666</td>
<td>3/4&quot; - With 3/16&quot; Keyway</td>
<td>&quot;A&quot; 2 Bolt</td>
<td>13195</td>
</tr>
</tbody>
</table>

WWW.PITTSINDUSTRIES.COM
H28D200 CLUTCH
Hydraulic Pump Drive
12 or 24 Volt D.C. - Shaft Driven

Power
72 Watts

Max RPM
3600

Weight
30 Lbs.

Inertia:
Rotor Assy..................  .39 Lb. Ft.^2
Armature Assy...............  .18 Lb. Ft.^2

US Patent No. 4601378
Static Rated Torque - 200 Lbs. Ft.

<table>
<thead>
<tr>
<th>24 Volt - 3 Amp Part No.</th>
<th>12 Volt - 6 Amp Part No</th>
<th>For Pump Shaft Size</th>
<th>For Pump Mount Style</th>
<th>Pitts Mount Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>13814</td>
<td>13394</td>
<td>&quot;B&quot; Spline 13T 16/32 DP</td>
<td>&quot;B&quot; 2 or 4 Bolt</td>
<td>13219</td>
</tr>
<tr>
<td>N/A</td>
<td>13395</td>
<td>7/8&quot; - With 1/4&quot; Keyway</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>13396</td>
<td>1&quot; - With 1/4&quot; Keyway</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WWW.PITTSINDUSTRIES.COM
H28D200 CLUTCH
Mounting Dimensions

Front View

Rear View

Note:
- Drive flange bolt pattern and pilot diameter on clutch are dimensioned to correlate with “Spicer” type 1280 – 1310 series drive shaft flange connections.
- Proper drive shaft selection is important. Consult with drive shaft manufacturers specifications for each specific application requirements.
- Drive shaft alignment must be within 3°.

WWW.PITTSINDUSTRIES.COM
H28D200G CLUTCH
Hydraulic Pump Drive, (Gresen TC)
12 or 24 Volt D.C. - Shaft Driven

Power
72 Watts

Max RPM
3600

Weight
30 Lbs.

Note:
- Drive flange bolt pattern and pilot diameter on clutch are dimensioned to correlate with “Spicer” type 1280 – 1310 series drive shaft flange connections.
- Proper drive shaft selection is important. Consult with drive shaft manufacturers specifications for each specific application requirements.
- Drive shaft alignment must be within 3°.

US Patent No. 4601378
Static Rated Torque - 200 Lbs. Ft.

Inertia:  
- Rotor Assy..................... .39 Lb. Ft."
- Armature Assy................. .18 Lb. Ft."

<table>
<thead>
<tr>
<th>24 Volt - 3 Amp Part No.</th>
<th>12 Volt - 6 Amp Part No.</th>
<th>For Pump Shaft Size</th>
<th>For Pump Mount Style</th>
<th>Pitts Mount Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>13898</td>
<td>13418</td>
<td>1&quot; Straight Keyed - 1/4&quot; Keyway</td>
<td>&quot;A&quot; 6 Bolt</td>
<td>13219</td>
</tr>
</tbody>
</table>

WWW.PITTSINDUSTRIES.COM
H28D300HT CLUTCH
Hydraulic Pump Drive
12 or 24 Volt D.C. - Shaft Driven

Power
72 Watts

Max RPM
3600

Weight
30 Lbs.

Inertia:
Rotor Assy..................  .39 Lb. Ft.\(^2\)
Armature Assy............  .18 Lb. Ft.\(^2\)

US Patent No. 4601378
Static Rated Torque - 300 Lbs. Ft.

<table>
<thead>
<tr>
<th>24 Volt - 3 Amp Part No.</th>
<th>12 Volt - 6 Amp Part No</th>
<th>For Pump Shaft Size</th>
<th>For Pump Mount Style</th>
<th>Pitts Mount Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>14729</td>
<td>14728</td>
<td>&quot;B&quot; Spline 13T 16/32 DP</td>
<td>&quot;B&quot; 2 or 4 Bolt</td>
<td>13219</td>
</tr>
</tbody>
</table>

WWW.PITTSINDUSTRIES.COM
Note:
- Drive flange bolt pattern and pilot diameter on clutch are dimensioned to correlate with “Spicer” type 1280 – 1310 series drive shaft flange connections.
- Proper drive shaft selection is important. Consult with drive shaft manufacturers specifications for each specific application requirements.
- Drive shaft alignment must be within 3°.
H28V200 CLUTCH
Hydraulic Pump Drive
12 or 24 Volt D.C. - V-Belt Driven - 5/8" Wide Belts

Power
72 Watts

Max RPM
3600

Weight
30 Lbs.

US Patent No. 4601378
Static Rated Torque - 200 Lbs. Ft.

<table>
<thead>
<tr>
<th>24 Volt - 3 Amp Part No.</th>
<th>12 Volt - 6 Amp Part No.</th>
<th>For Pump Shaft Size</th>
<th>For Pump Mount Style</th>
<th>Pitts Mount Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>13244</td>
<td>1&quot; - With 1/4&quot; Keyway</td>
<td>&quot;B&quot; 2 or 4 Bolt</td>
<td>13219</td>
</tr>
<tr>
<td>13654</td>
<td>13245</td>
<td>&quot;B&quot; Spline 13T 16/32 DP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>13246</td>
<td>7/8&quot; - With 1/4&quot; Keyway</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WWW.PITTSINDUSTRIES.COM
H28V200G CLUTCH
Hydraulic Pump Drive
12 or 24 Volt D.C. - V-Belt Driven - 5/8" Wide Belts

Power
72 Watts

Max RPM
3600

Weight
30 Lbs.

US Patent No. 4601378
Static Rated Torque - 200 Lbs. Ft.

<table>
<thead>
<tr>
<th>24 Volt - 3 Amp Part No.</th>
<th>12 Volt - 6 Amp Part No</th>
<th>For Pump Shaft Size</th>
<th>For Pump Mount Style</th>
<th>Pitts Mount Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>13500</td>
<td>13403</td>
<td>1&quot; - With 1/4&quot; Keyway</td>
<td>&quot;A&quot; 6 Bolt</td>
<td>13219</td>
</tr>
</tbody>
</table>
H28V300HT CLUTCH

Hydraulic Pump Drive
12 or 24 Volt D.C. - V-Belt Driven - 5/8" Wide Belts

Power
72 Watts

Max RPM
3600

Weight
30 Lbs.

US Patent No. 4601378
Static Rated Torque - 300 Lbs. Ft.

<table>
<thead>
<tr>
<th>24 Volt - 3 Amp Part No.</th>
<th>12 Volt - 6 Amp Part No.</th>
<th>For Pump Shaft Size</th>
<th>For Pump Mount Style</th>
<th>Pitts Mount Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>14731</td>
<td>14730</td>
<td>&quot;B&quot; Spline 13T 16/32 DP</td>
<td>&quot;B&quot; 2 or 4 Bolt</td>
<td>13219</td>
</tr>
</tbody>
</table>

WWW.PITTSINDUSTRIES.COM
H36D400 CLUTCH
Hydraulic Pump Drive
12 or 24 Volt D.C. - Shaft Driven

Power
91 Watts

Max RPM
3600

Weight
44 Lbs.

Inertia:
Rotor Ass'y ................. .79 Lb. Ft.²
Armature Ass'y .......... .48 Lb. Ft.²

US Patent No. 4601378
Static Rated Torque - 400 Lbs. Ft.

<table>
<thead>
<tr>
<th>24 Volt - 4 Amp Part No.</th>
<th>12 Volt - 8 Amp Part No.</th>
<th>For Pump Shaft Size</th>
<th>For Pump Mount Style</th>
<th>Pitts Mount Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>13856</td>
<td>13378</td>
<td>&quot;C&quot; Splined 1-1/4&quot; 14T 12/24 DP</td>
<td>&quot;C&quot; 2-4</td>
<td>13256</td>
</tr>
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H36D400 CLUTCH
Mounting Dimensions

US Patent No. 4601378

Note:
- Drive flange bolt pattern and pilot diameter on clutch are dimensioned to correlate with “Spicer” type 1350 – 1410 series drive shaft flange connections.
- Proper drive shaft selection is important. Consult with drive shaft manufacturers specifications for each specific application requirements.
- Drive shaft alignment must be within 3°.
H36D550HT CLUTCH

Hydraulic Pump Drive
12 or 24 Volt D.C. - Shaft Driven

Power
91 Watts

Max RPM
3600

Weight
44 Lbs.

Inertia:
- Rotor Ass'y: ................. .79 Lb. Ft.²
- Armature Ass'y: ............ .48 Lb. Ft.²

Static Rated Torque - 550 Lbs. Ft.

US Patent No. 4601378

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<tr>
<th>24 Volt - 4 Amp Part No.</th>
<th>12 Volt - 8 Amp Part No</th>
<th>For Pump Shaft Size</th>
<th>For Pump Mount Style</th>
<th>Pitts Mount Bracket</th>
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27
H36D550HT CLUTCH
Mounting Dimensions

Front View

Rear View

US Patent No. 4601378

Note:

- Drive flange bolt pattern and pilot diameter on clutch are dimensioned to correlate with “Spicer” type 1350 – 1410 series drive shaft flange connections.
- Proper drive shaft selection is important. Consult with drive shaft manufacturers specifications for each specific application requirements.
- Drive shaft alignment must be within 3°.
H44D700 CLUTCH
Hydraulic Pump Drive
12 or 24 Volt D.C. - Shaft Driven

Power
91 Watts

Max RPM
3000

Weight
45 Lbs.

Inertia:
Rotor Ass'y................. 1.83 Lb. Ft.\(^2\)
Armature Ass'y............ .92 Lb. Ft.\(^2\)

US Patent No. 4601378
Static Rated Torque - 700 Lbs. Ft.

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<th>24 Volt - 4 Amp Part No.</th>
<th>12 Volt - 8 Amp Part No</th>
<th>For Pump Shaft Size</th>
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WWW.PITTSINDUSTRIES.COM
H44D700 CLUTCH
Mounting Dimensions

Front View

Rear View

US Patent No. 4601378

Note:
- Drive flange bolt pattern and pilot diameter on clutch are dimensioned to correlate with "Spicer" type 1350 – 1410 series drive shaft flange connections.
- Proper drive shaft selection is important. Consult with drive shaft manufacturers specifications for each specific application requirements.
- Drive shaft alignment must be within 3°.
**H44D850HT CLUTCH**

Hydraulic Pump Drive  
12 or 24 Volt D.C. - Shaft Driven

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<td>91 Watts</td>
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<td>45 Lbs.</td>
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Inertia:
- Rotor Ass'y .......... 1.83 Lb. Ft.²
- Armature Ass'y ........ .92 Lb. Ft.²

US Patent No. 4601378  
Static Rated Torque - 850 Lbs. Ft.

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[www.pittsindustries.com]
H44D850HT CLUTCH
Mounting Dimensions

Front View

Rear View

US Patent No. 4601378

Note:
- Drive flange bolt pattern and pilot diameter on clutch are dimensioned to correlate with “Spicer” type 1350 – 1410 series drive shaft flange connections.
- Proper drive shaft selection is important. Consult with drive shaft manufacturers specifications for each specific application requirements.
- Drive shaft alignment must be within 3°.
H49D1000 CLUTCH
Hydraulic Pump Drive
12 or 24 Volt D.C. - Shaft Driven

Power
91 Watts

Max RPM
3000

Weight
76 Lbs.

US Patent No. 4601378
Static Rated Torque - 1000 Lbs. Ft.

Inertia: Rotor Assy.................. 2.76 Lb. Ft.²
Armature Assy.................. 1.88 Lb. Ft.²

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<th>24 Volt - 4 Amp Part No.</th>
<th>12 Volt - 8 Amp Part No</th>
<th>For Pump Shaft Size</th>
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33
H49D1000 CLUTCH
Mounting Dimensions

Front View

Rear View

US Patent No. 4601378

Note:
- Drive flange bolt pattern and pilot diameter on clutch are dimensioned to correlate with “Spicer” type 1410 series drive shaft flange connections.
- Proper drive shaft selection is important. Consult with drive shaft manufacturers specifications for each specific application requirements.
- Drive shaft alignment must be within 3°.

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H49D1200HT CLUTCH
Hydraulic Pump Drive
12 or 24 Volt D.C. - Shaft Driven

Power
91 Watts

Max RPM
3000

Weight
76 Lbs.

US Patent No. 4601378
Static Rated Torque - 1200 Lbs. Ft.

Inertia:  
Rotor Assy. .................  2.76 Lb. Ft.²
Armature Assy. .............  1.88 Lb. Ft.²

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<th>24 Volt - 4 Amp Part No.</th>
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WWW.PITTSINDUSTRIES.COM
H49D1200HT CLUTCH
Mounting Dimensions

Front View

Rear View

US Patent No. 4601378

Note:
- Drive flange bolt pattern and pilot diameter on clutch are dimensioned to correlate with “Spicer” type 1410 series drive shaft flange connections.
- Proper drive shaft selection is important. Consult with drive shaft manufacturers specifications for each specific application requirements.
- Drive shaft alignment must be within 3°.
H55D1500 CLUTCH
Hydraulic Pump Drive
12 or 24 Volt D.C. - Shaft Driven

Power
84 Watts

Max RPM
3000

Weight
118 Lbs.

US Patent No. 4601378
Static Rated Torque - 1500 Lbs. Ft.

Inertia:
Rotor Assy..................... 4.43 Lb. Ft.²
Armature Assy................ 2.47 Lb. Ft.²

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<th>24 Volt - 3.5 Amp Part No.</th>
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</tbody>
</table>

WWW.PITTSINDUSTRIES.COM
H55D1500 CLUTCH
Mounting Dimensions

Front View

Rear View

US Patent No. 4601378

Note:
- Drive flange bolt pattern and pilot diameter on clutch are dimensioned to correlate with “Spicer” type 1550 series drive shaft flange connections.
- Proper drive shaft selection is important. Consult with drive shaft manufacturers specifications for each specific application requirements.
- Drive shaft alignment must be within 3°.
H55D2000HT CLUTCH
Hydraulic Pump Drive
12 or 24 Volt D.C. - Shaft Driven

Power
84 Watts

Max RPM
3000

Weight
118 Lbs.

Inertia:
Rotor Assy............... 4.43 Lb. Ft.²
Armature Assy......... 2.47 Lb. Ft.²

US Patent No. 4601378

24 Volt - 3.5 Amp Part No. 12 Volt - 7 Amp Part No. For Pump Shaft Size For Pump Mount Style Pitts Mount Bracket
14739 14738 "D" Splined 1-3/4" 13T 8/16 DP "D" 2-4 14219

WWW.PITTSINDUSTRIES.COM
H55D2000HT CLUTCH
Mounting Dimensions

Front View

Rear View

US Patent No. 4601378

Note:

- Drive flange bolt pattern and pilot diameter on clutch are dimensioned to correlate with “Spicer” type 1550 series drive shaft flange connections.
- Proper drive shaft selection is important. Consult with drive shaft manufacturers specifications for each specific application requirements.
- Drive shaft alignment must be within 3°.

WWW.PITTSINDUSTRIES.COM
Model B-H24-H27
Clutch Mounting Bracket

Pitts Bracket Part No | Used On | Weight
---|---|---
13195 | H24 & H27 Series Clutches | 4 Lbs.

WWW.PITTSINDUSTRIES.COM
Model B-H28
Clutch Mounting Bracket

NOTE:
ALSO FITS GRESEN TC
(ADAPTOR RING 1051120
REQUIRED)

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Model B-H36-H49-B

Clutch Mounting Bracket

SAE "B" 2-4 Bolt

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WWW.PITTSINDUSTRIES.COM
Model B-H36-H49-C
Clutch Mounting Bracket
SAE "C" 2-4 Bolt

Pitts Bracket
Part No 13256
Used On H36 H44 H49 Series Clutches
Weight 21 Lbs.

WWW.PITTSINDUSTRIES.COM
Model B-H55
Clutch Mounting Bracket
SAE "D" 2-4 Bolt

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