# DYNALCO®

# SST7200D
# SST7400D

## Speed Switch / Transmitter

## Installation and Operation Manual
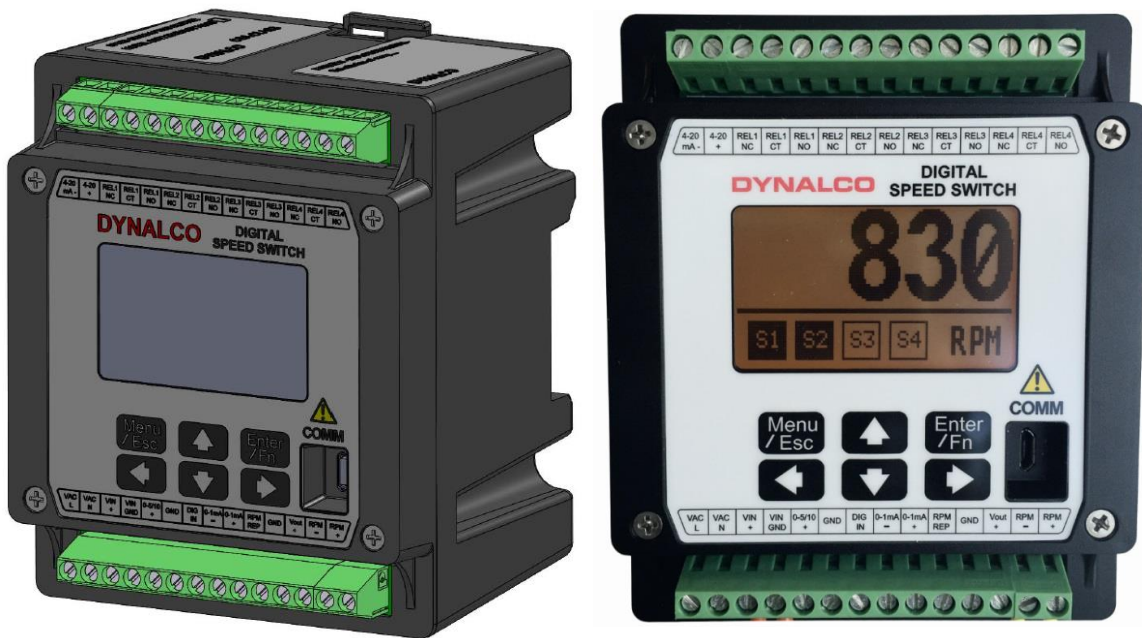


## Rev. H

## Barksdale®
### CONTROL PRODUCTS
CRANE  Barksdale, Inc./Barksdale GmbH
A Subsidiary of Crane Co.

## IMPORTANT - PLEASE READ BEFORE PROCEEDING!

The Dynalco SST7200D / SST7400D speed switches are designed for reliable and rugged operation. These products have been designed and tested to meet the demands required in many industrial and hazardous locations meeting critical CSA and EMC standards. Performance of this product is directly related to the quality of the installation and knowledge of the user in operating and maintaining the instrument. To ensure continued operation to the design specifications, personnel should read this manual thoroughly before proceeding with installation, operation and maintenance of this instrument. If this product is used in a manner not specified by Dynalco, the protection provided by it against hazards may be impaired.
Dynalco® is a Barksdale® brand.

# ⚠️ WARNING

- **Failure to follow proper instructions may cause any one of the following situations to occur: Loss of life; personal injury; property damage; damage to this instrument; and warranty invalidation.**

- **For clarification of instructions in this manual or assistance with your application, contact Dynalco as below:**
  **Tech Support: Technical-dynalco-support@barksdale.com or 1-866-227-8528**
  **Customer Care: Sales-Dynalco@barksdale.com or 1-800-835-1060**

  **Or by mail:**
  **Barksdale Inc.**
  **Barksdale® and Dynalco® Products**
  **3211 Fruitland Ave**
  **Los Angeles, CA 90058**

- **Additional manuals and CSA/CE certificates are available at www.dynalco.com**

- **Follow all warnings, cautions, and instructions marked on and supplied with the product.**

- **Use only qualified personnel to install, operate, program and maintain the product.**

- **Educate your personnel in the proper installation, operation, and maintenance of the product.**

- **Install equipment as specified in the installation section of this manual. Follow appropriate local and national codes. Only connect the product to power sources and end devices specified in this manual.**

- **Any repair is only to be performed by Dynalco using factory documented components. Tampering or unauthorized substitution of parts and procedures can affect the performance and cause unsafe operation of your process.**

- **All equipment doors must be closed and protective covers must be in place unless qualified personnel are performing maintenance.**

- **Shutdown / alarms should be tested monthly for proper operation (see page 16)**

- **Please see page 20 for CSA specific installation instructions.**

**This manual covers both models SST7200D and SST7400D:**

**SST7200D**  **Speed Switch / Transmitter w/ 4 – 20 mA Output & 2 Relay Trips**

**SST7400D**  **Speed Switch / Transmitter w/ 4 – 20 mA Output & 4 Relay Trips**

## System Overview

The SST7200D / SST7400D speed switches are DIN rail mountable products designed to convert rotational speed (RPM) to an industry standard 4 – 20 mA analog output.

Both models will accept a pulsed input from either a 2 or 3-wire speed sensor.

## Programming:

The host software allows programming of the SST7200D and SST7400D via a USB connection to a PC. The front keypad / display enables an alternate method of configuration without having to link with a PC.

## Additional Features

- Repeater Output

- 0 – 1 mA local meter output

- 0 – 5 VDC / 0 – 10 VDC selectable proportional output

- Isolated 4 – 20 mA proportional output

## How to order

Specify part number as follows:

**2 setpoints**
SST-7200D         Standard
SST-7200D-I       Isolated RPM Input
SST-7200D-AC      VAC supply power
SST-7200D-I-AC    VAC supply power & Isolated RPM input

**4 setpoints**
SST-7400D         Standard
SST-7400D-I       Isolated RPM Input
SST-7400D-AC      VAC supply power
SST-7400D-I-AC    VAC supply power & Isolated RPM input

## Specifications

**1) INPUT SUPPLY VOLTAGE:**           10 - 36 VDC, maximum 10 W

**2) FREQUENCY INPUT:**

    **a. Input Signal Frequency Range:**    0 – 50 KHz

    **b. Waveforms:**    Accepts sinusoidal or square wave (positive or zero-crossing)

    **c. Input Signal Sensitivity:**    25 mV to 1.0 VRMS (selectable), Maximum allowed is 50 VRMS

    **d. Input Impedance:**    10 K (minimum)

    **e. CSA Approved Dynalco Sensors:**    M201, M202, M231, M233, M203, M204, M205, M928 M928-24 & M951

**3) DIGITAL INPUT (1):**    Dry contact closure for resetting latched relay

**4) OUTPUTS:**

    **a. Meter Output:**    0 – 1 mA meter output for loads up to 750 ohms

    **b. Proportional Output:**    Proportional to input frequency range, configurable as:

        **i.** 4 – 20 mA into maximum 1K load

        And one of either:

        **ii.** 0 – 5 VDC into 20K load or higher or
        **iii.** 0 – 10VDC into 20K load or higher

        *Note that the 4 – 20 mA output is isolated but the 0 – 5 VDC & 0 – 10 VDC outputs are referenced to input supply ground. 0 – 1mA output is referenced to separate ground (Meter Output).*

    **c. Supply Output:**    Regulated +12 VDC ±5%; 40 mA for active pickup power.

    **d. Repeater Output:**    Square wave 12 V peak-to-peak, 10 mA max load, Zero based, positive going.

    **e. Response Time:**    50 milliseconds, 10% to 90% rise (standard) Full-scale frequency ranges below 80 Hz are proportionally slower.

        10milliseconds, 10% to 96% rise (standard) Full-scale frequency ranges below 300Hz are proportionally slower. For 10mSec response time the input frequency signal must be noise free.

    **f. Linearity:**    0.1% of full-scale (0.05%, typical) all outputs

    g. **Stability:**    Less than 0.05% of full-scale change with a 10% change in supply voltage. Temperature coefficient ±0.01% per °F (±0.018% per °C)

## 5) RELAY OUTPUTS:

**a. Type:** SPDT relay contacts (isolated dry contacts)

**b. Contact Rating:**
6.0 Amps @ 28 VDC or 115 VAC
1/8 HP @ 120 / 240 VAC (100,000 cycles)
1.5 / 0.8 Amps @ 120 / 240 VAC, Pilot Duty (100,000 cycles)
3.8 / 1.9 Amps @ 120 / 240 VAC general Use (100,000 cycles)

**c. Hysteresis:** Selectable (1% of full-scale frequency default)

**d. Setpoints:** Programmable for:

    **i.** Overspeed / under speed trip
    **ii.** Energize or de-energize when setpoint reached
    **iii.** Latching or non-latching (auto reset)
    **iv.** Underspeed setpoints are Class C Logic (active once normal)
    **v.** Latched relays are reset via digital input

**e. Stability:** Less than 0.05% of setpoint change with a 10% change in supply voltage. Temperature coefficient ±0.01% per °F (±0.018% per °C)

## 6) ALARM INDICATION:

**a. Open Pickup Alarm:** LCD indication if open pickup sensed
Option to trip relay

**b. Trip Indication:** LCD indication if a relay tripped condition

## 7) MEMORY:
All configuration parameters retained if power lost

## 8) CONNECTORS:
Removable Phoenix type

## 9) MECHANICAL:
DIN rail mount package

## 10) ENVIRONMENTAL:
**a. Operating Temperature Range:** -40 to +70 DegC
**b. Storage temperature:** -40 to +80 DegC
**c. Vibration:** Per modified Mils STD 810-E

## 11) AGENCY APPROVALs:
**CSA Class I, Div. 2, Groups A, B, C, D**
**CE for Electromagnetic Compatibility:**
Meets all EMC requirements of IEC 61326-1: 2012 &
Refer conformity certificate for more details.
*Not applicable for "-I" configurations.
Meets all RoHS requirements.

## 12) PROGRAMMING

**a. PC / Windows based:** Windows XP, Vista & Windows 7 & 8 compatible
USB port for programming, uploading & downloading

**b. Display Front Panel:** Also programmable via front keypad / LCD display

**Installation:**

The SST7200D/SST7400D series has an integral latch on the rear of the device for installation on a standard 35 mm DIN rail.

This device is OPEN type equipment that must be used within a suitable end-use system enclosure, the interior of which is accessible only through the use of a tool. The suitability of the enclosure is subject to investigation by the local Authority Having Jurisdiction at the time of installation.
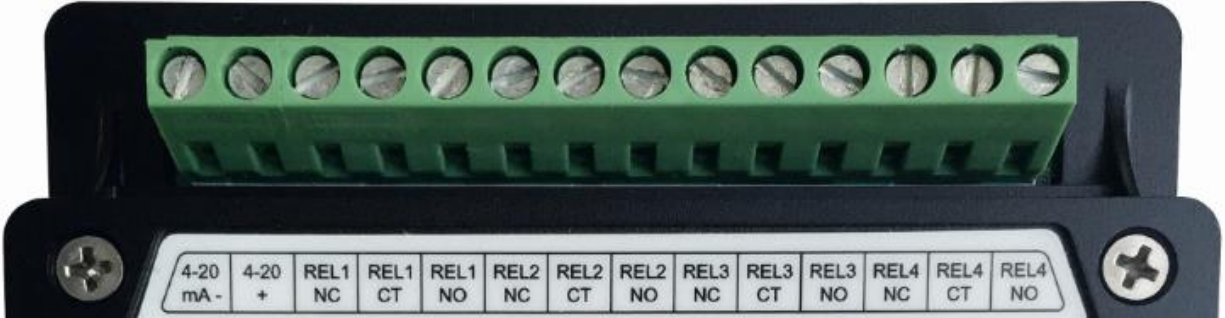
Wiring to or from this device, which enters or leaves the system enclosure, must utilize wiring methods suitable for Class I, Division 2 Hazardous Locations, as appropriate for the installation.
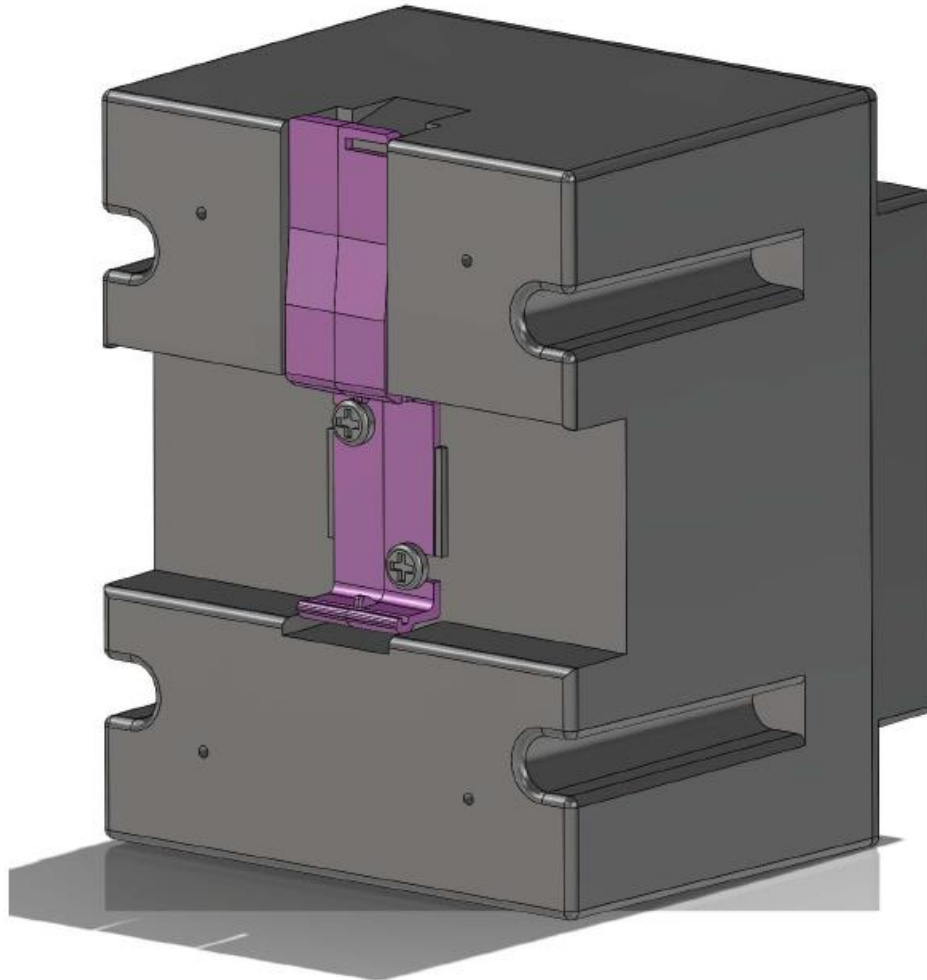
**Terminal Connections**

All connections are made via the terminal blocks on the front of the unit.

**Top Terminal Block Connections**



| PIN | Description |
|---|---|
| 4-20 (-) | 4-20 mA Proportional Output (-) |
| 4-20 (+) | 4-20 mA Proportional Output (+) |
| REL1 NC | Normally-Closed Relay Contact |
| REL1 CT | Relay Common |
| REL1 NO | Normally-Open Relay Contact |
| REL2 NC | Normally-Closed Relay Contact |
| REL2 CT | Relay Common |
| REL2 NO | Normally-Open Relay Contact |
| REL3 NC | Normally-Closed Relay Contact |
| REL3 CT | Relay Common |
| REL3 NO | Normally-Open Relay Contact |
| REL4 NC | Normally-Closed Relay Contact |
| REL4 CT | Relay Common |
| REL4 NO | Normally-Open Relay Contact |
| | |

**Bottom Terminal Block Connections**

| PIN | Description |
|---|---|
| VAC L | 120 VAC (Hot) |
| VAC N | 120 VAC (Neutral) |
| VIN (+) | 10 - 36 VDC Supply (+) |
| VIN GND | Supply Ground (-) |
| 0-5/10 (+) | 0-5 or 0-10 VDC Proportional Output (+) |
| 0-5/10 GND | 0-5 or 0-10 VDC Proportional Output (-) |
| DIG IN | Digital Input for resetting latched relay |
| 0-1mA (-) | 0-1 mA local meter output (-) |
| 0-1mA (+) | 0-1 mA local meter output (+) |
| RPM REP | Repeater Output (+) (pulsed square wave) |
| 12V GND | Ground for 3-wire pickups |
| 12V (+) | Power source for 3-wire pickups |
| RPM (-) | Signal Input (-) from speed sensor |
| RPM (+) | Signal Input (+) from speed sensor |



⚠️
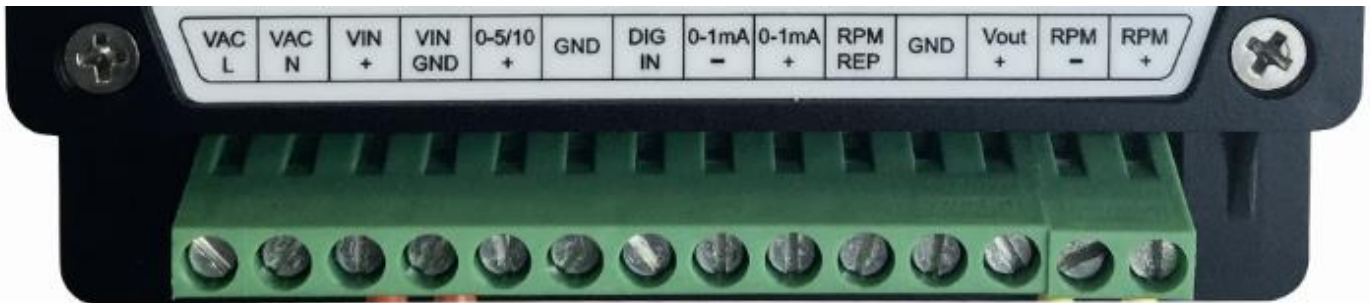
*Terminal screws to be tightened to 4 inch-pounds torque.*

**Outline Dimensions**
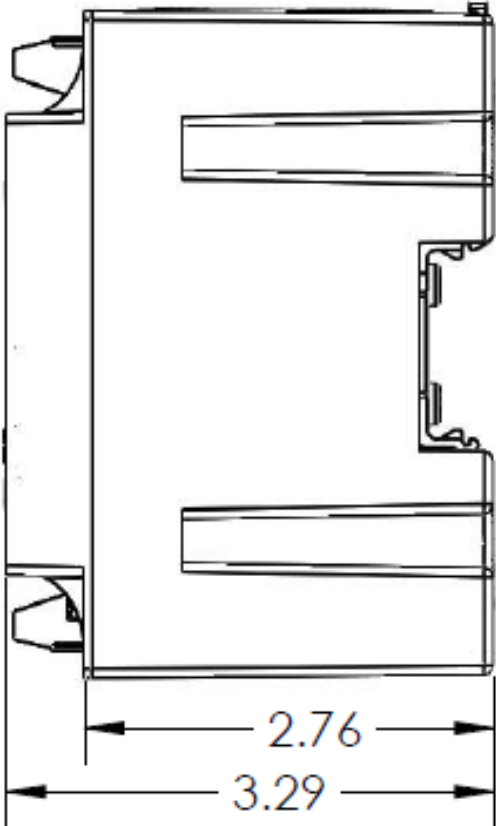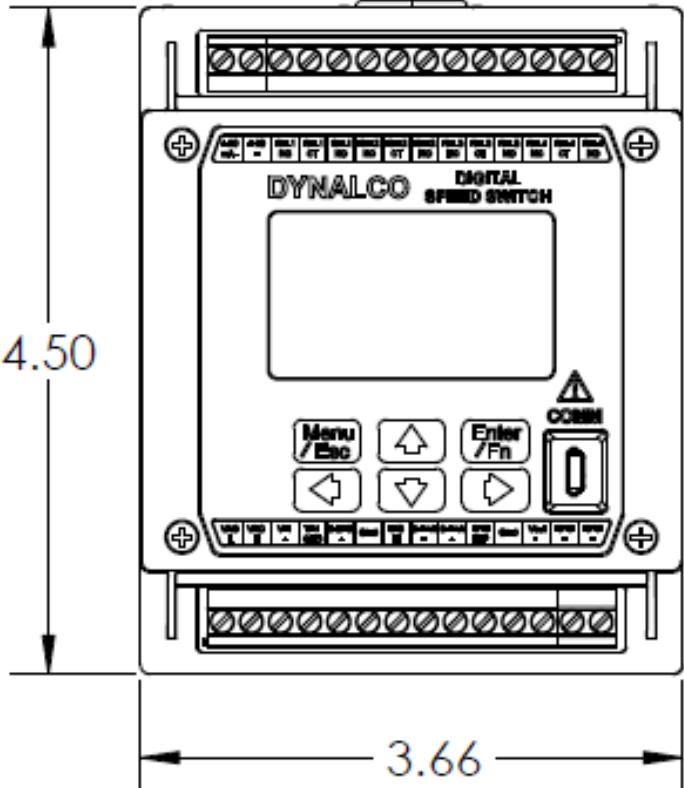
**Dynalco SST7200D & SST7400D Software**

The Dynalco host software provides serial communication between a PC or laptop and the SST7200D & SST7400D. The software is compatible with Windows XP, Vista and Windows 7 operating systems. The SST7200D & SST7400D must be connected via provided Dynalco **P/N 270A-105574** serial communication cable.

The Dynalco host software is available as a free download from our website:

www.dynalco.com/downloads

Following installation, a shortcut will be installed on your PC desktop. This application software allows access to various screens for configuration of input signal sensitivity, proportional output and relay logic / setpoints. Once the configuration parameters are set, they can be programmed into the SST7200D & SST7400D and a spec file can be saved to the PC. This saved spec file can then be loaded into another SST7200D & SST7400D if desired. Additionally, there is an import function allowing uploading of the spec file from an SST7200D & SST7400D to the PC.

PC configuration consists of the steps described in the following pages:

**RPM Signal**

The RPM Signal needs to be programmed prior to all other settings.

The SST7200D & SST7400D are capable of accepting input signals from 2-wire (also known as variable reluctance) magnetic pickups as well as 3-wire (powered, TTL or hall-effect) type sensors. The output from 2-wire pickups is an AC signal where the 3-wire type will normally have a positive-going (non zero-crossing) square wave output.

- Gear Teeth
    - Required to convert RPM to Hz for proper calibration

- Sensitivity Level
    - Set for Med-High for most applications
    - Higher level will allow greater sensitivity if needed for low speed applications
    - Lower level will be less sensitive to noise
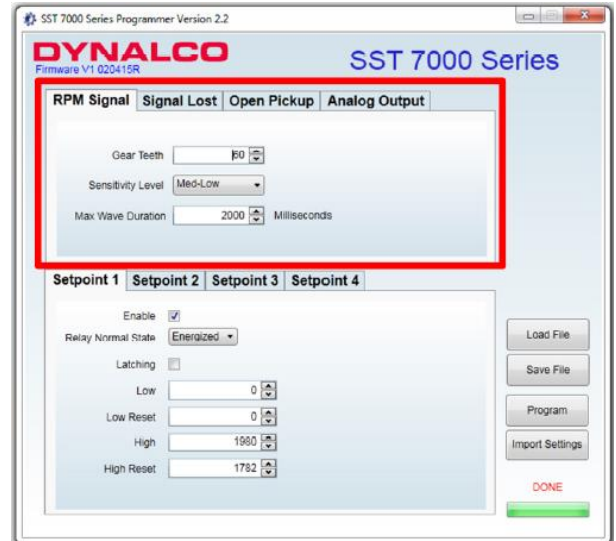


- Max Wave Duration
    - The Max Wave Duration is defined as the maximum time allowed between input signal pulses before a sensor fault is declared. For example, a shaft with 2 keyways turning at 0 – 10 RPM would have an extremely low frequency range, calibrated below:

        Frequency    = RPM X # teeth / 60
                         = 10 X 2 / 60 = 0.333 Hz

        Then, the period (time in seconds between pulses) is calculated as:

        Period        = 1 / Frequency
                         = 1 / 0.333 = 3 seconds

        In this example, the pulses would be received in time intervals of once every 3 seconds or longer. The Max Wave Duration can be configured to a maximum value of 10,000 milliseconds (10 seconds) to allow for this low speed range. Any pulse not received within 10 seconds would be considered a sensor fault.

    - Note that the default value of 1000 Milliseconds (1 second) is correct for most applications.

**Signal Lost**

The Signal Lost function is defined as the absolute maximum allowable period (time between input pulses in milliseconds) before an under speed relay is tripped. Similar to the Max Wave Duration described in the previous step, the Signal Lost setting is necessary for low speed applications where there is a programmed under speed trip. This setting should be set longer than the period (in milliseconds) of the under speed setpoint.

- Enable
    - Check this box to enable Signal Lost
    - If there is no under speed setpoint, leave un-checked

- Timeout
    - This is the maximum time (in milliseconds) allowed before an under speed trip is initiated.

- Trip
    - Select either Setpoint 1 or 2 for the SST7200D
    - Select either Setpoint 1, 2 ,3 or 4 for the SST7400D

## Open Pickup

The Open Pickup tab allows the user to select which relay (if any) will activate if an open pickup is sensed.
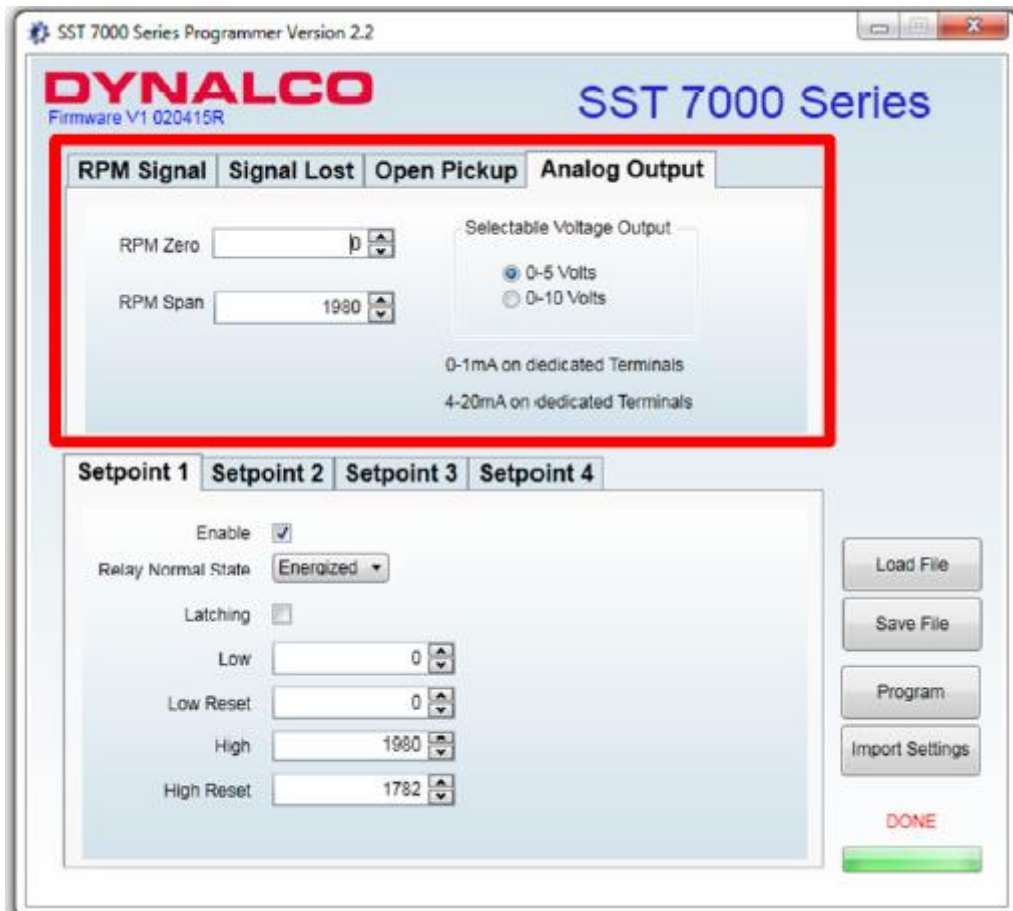
- Enable
    - Check this box to enable Open Pickup option

- Trip
    - Select either Setpoint 1 or 2 for the SST7200D
    - Select either Setpoint 1, 2 ,3 or 4 for the SST7400D
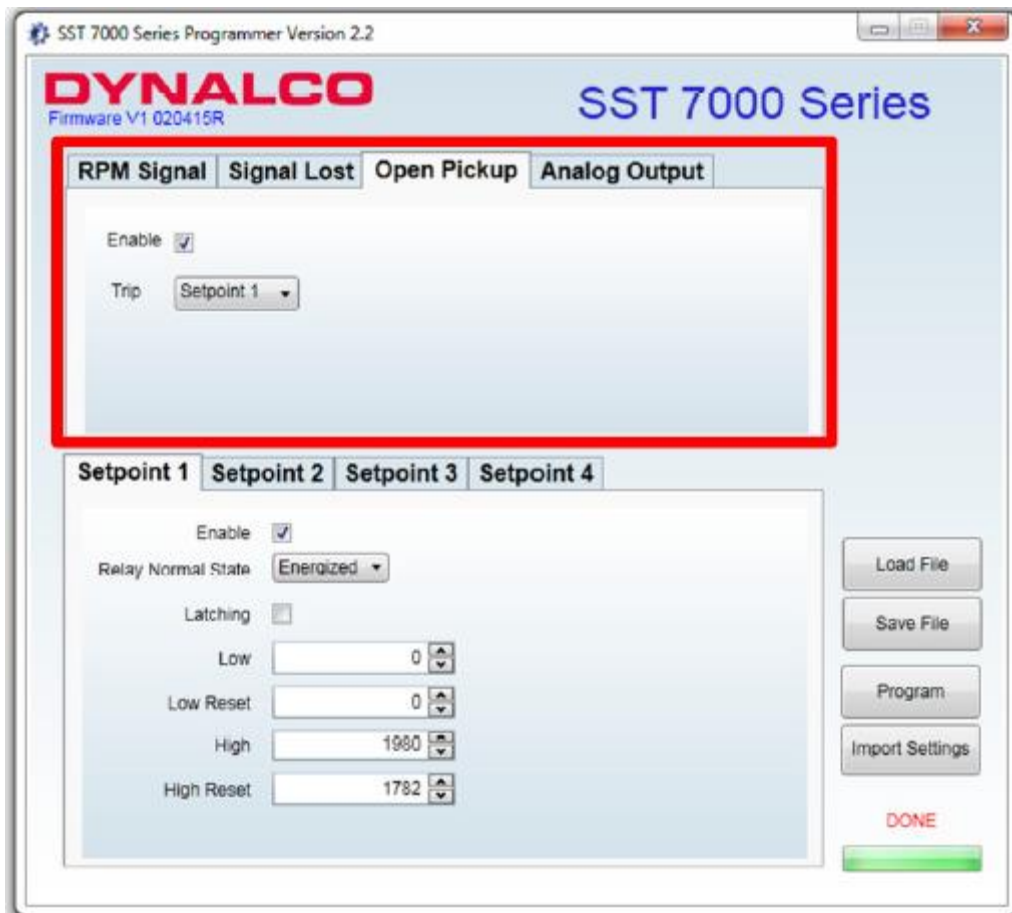
**Analog Output**

The analog output tab is used to define the RPM range of the proportional 4 – 20 mA output.

- RPM Zero
    - Set to the RPM value corresponding to 4 mA output.
    - Normally set to 0 RPM but can be set to any value as long as it is lower than the RPM span.

- RPM Span
    - Set to the RPM value corresponding to 20 mA output.

**Setpoints 1 & 2 (plus 3 & 4 for SST7400D)**

The Setpoint tabs allow configuration of relay setpoints and relay logic.

- Enable
    - Check this box to enable each setpoint

- Relay Normal State
    - This is the normal relay state when not tripped
    - Either select normally Energized or normally De-Energized

> ⚠ **WARNING:**
>
> **For critical applications, it is highly recommended to configure the Relay Normal State as "normally Energized." This configuration will cause the contacts to switch in the event of a relay coil failure.**

- Latching
    - Un-check this box to select non-latching relay (auto-reset following trip)
    - Check this box to select latching relay (must be manually reset following trip)
    - A momentary contact from DIG IN (digital input) to VIN GND (supply ground) will reset latching relay

- Low
    - Selects under speed setpoint
    - Set to 0 if no under speed setpoint required

- High
    - Selects over speed setpoint

- Low Reset
    - Defines the reset value following an under speed trip
    - Must be set at least 1% higher than Low RPM value to prevent relay chatter
    - Set to 0 if no under speed setpoint required

- High Reset
    - Defines the reset value following an over speed trip
    - Must be set at least 1% lower than High RPM value to prevent relay chatter
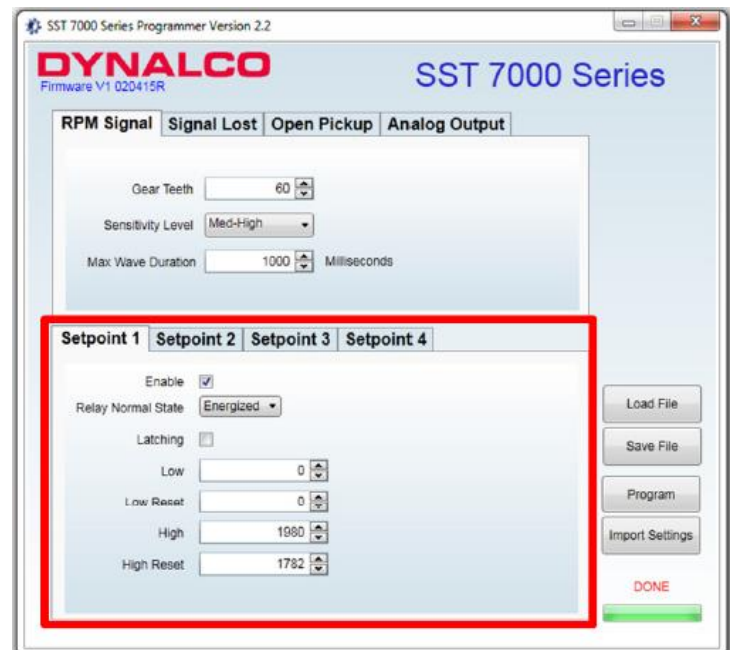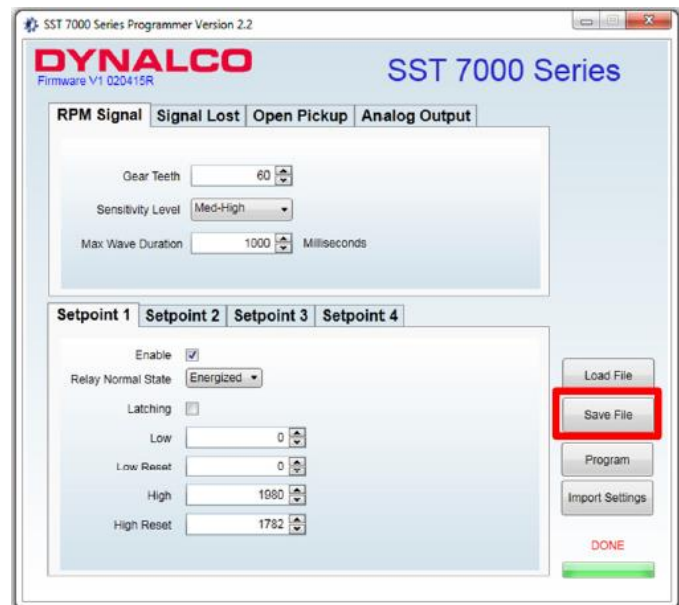
## Program

Following initial configuration of the unit or any setting changes, you will need to select "Program" to program the new settings to the SST7200D / SST7400D.
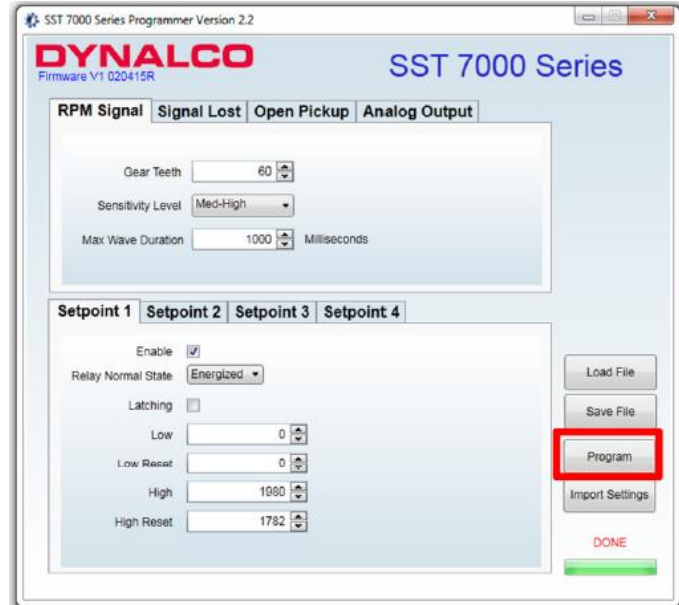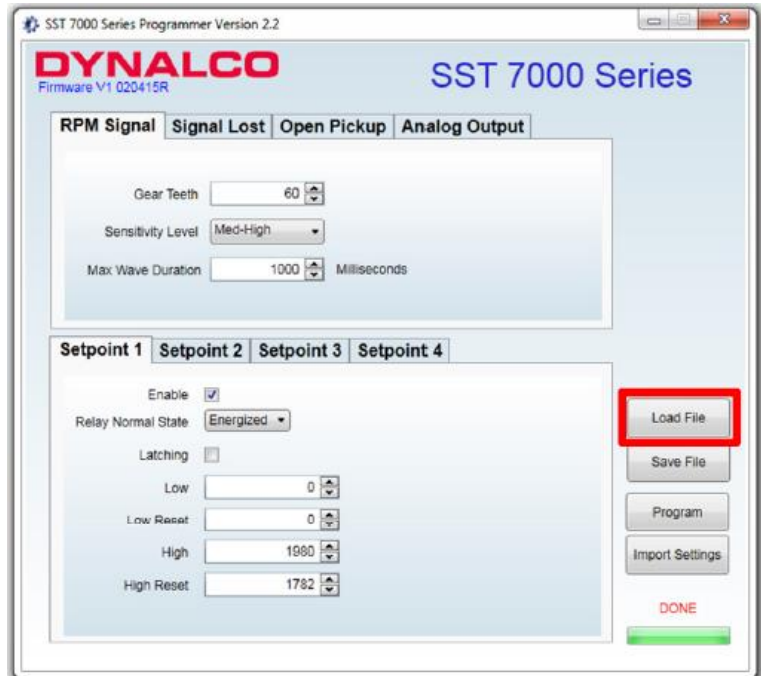


## Save File

Selecting "Save File" allows the new settings to be saved to a file location on the PC.
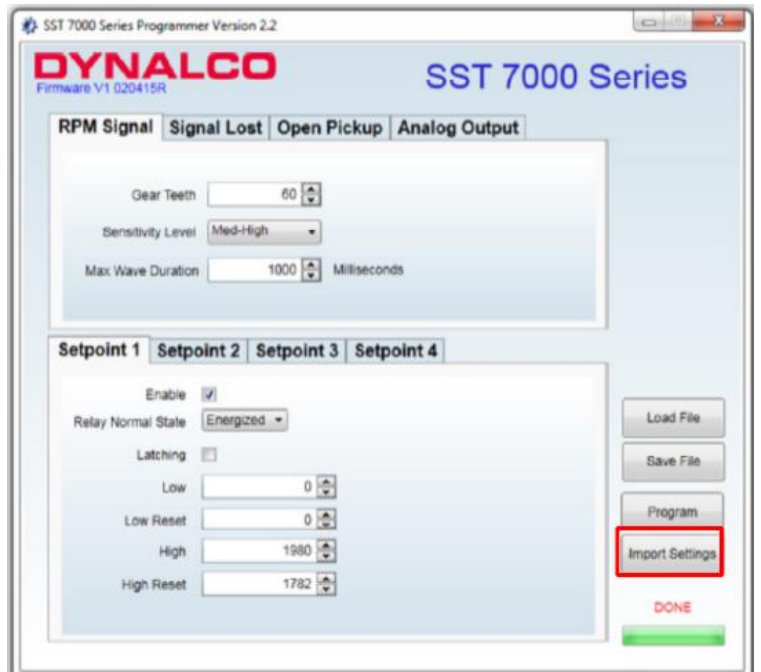
## Load File

Any spec files that have been saved to the PC can be loaded to the SST7200 application by selecting "Load File."

Following this, you will need to select "Program" to write the new configuration to the SST7200D & SST7400D.



## Import Settings

Selection of "Import Settings" will upload the current settings to be read by the SST7200D & SST7400D software.

> ⚠️ **WARNING:**
>
> **The relay output on the SST7200D/SST7400D should be tested monthly for proper operation, especially if being used for engine overspeed shutdown or other critical function.**

### Dynalco SST7200D / SST7400D Keypad Configuration

The front keypad / display offers configuration of all parameters without having to link with a PC. This is a useful option when either a PC is not available or in cases where the speed switch is already installed and needs to have the setpoint changed, for example.

Below is a brief description of each key.

**Menu /Esc**          Press to enter or exit the configuration screens

**Enter /Fn**          Press to enter or accept values

↑          Select up or increment current value

↓          Select down or decrement current value

←          Go back one screen

→          Select and advance to next screen

When pressing the  **Menu /Esc**  key, the following menu icons will appear from left to right:

⚙ RPM Signal Settings     - for entering input signal information

🔔 Setpoint Settings       - for entering setpoint values / relay logic

📄 Setpoint Logs          - for viewing trip events

⚡ Analog Settings         - for defining zero & span of proportional output

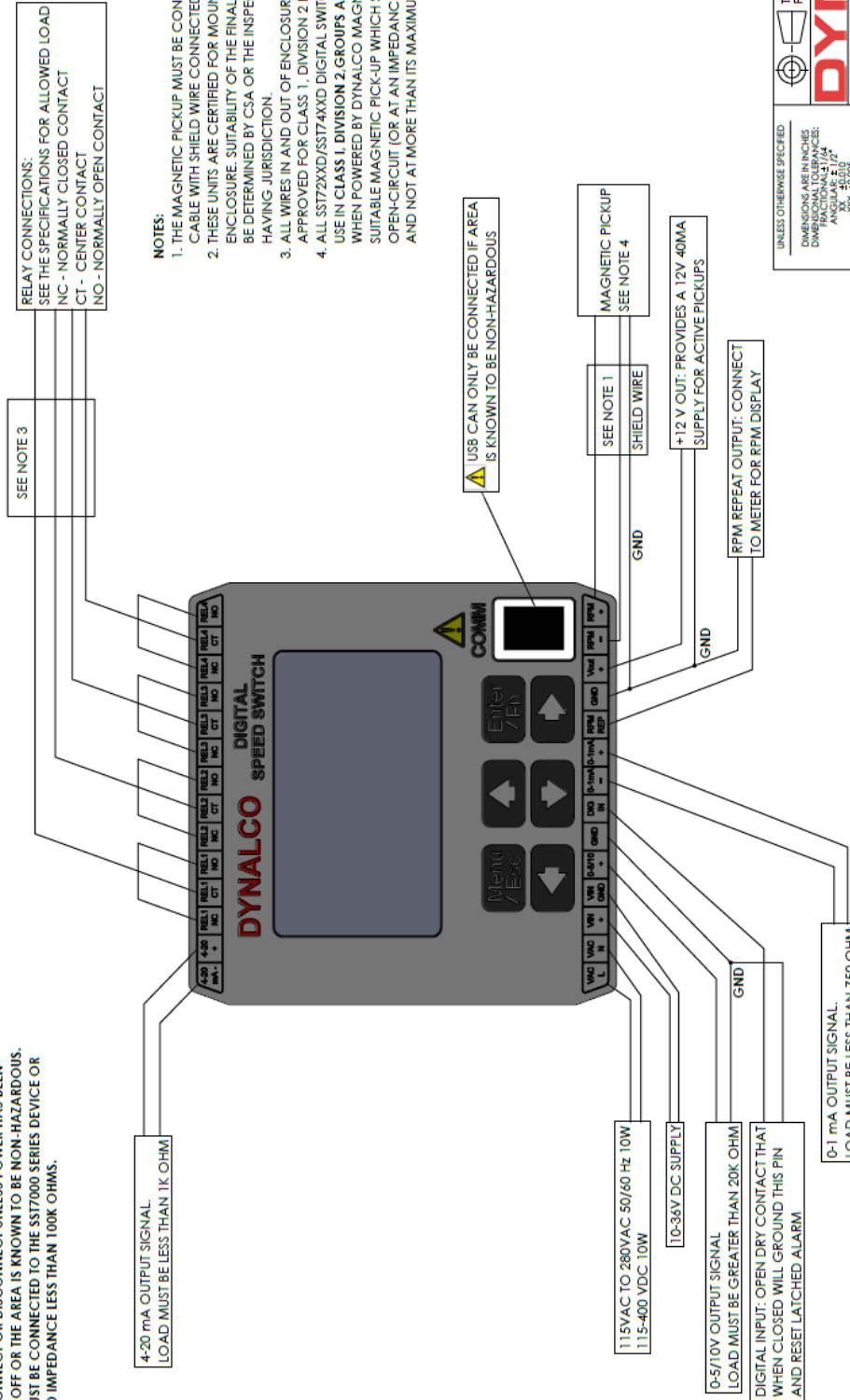🛠 System Settings        - allows display options, security option & relay test

- o **This equipment is suitable for installation in Class I, Division 2, Groups A, B, C, and/or D hazardous locations, or nonhazardous locations only.**

- o **"WARNING - EXPLOSION HAZARD - Substitution of components may impair suitability for Class I, Division 2."**

- o **"AVERTISSEMENT - RISQUE D'EXPLOSION - La substitution de composants peut rendre ce matériel inacceptable pour les emplacements de Classe I, Division 2."**

- o **"WARNING - EXPLOSION HAZARD - Do not connect or disconnect while circuit is live unless area is known to be nonhazardous."**

- o **"AVERTISSEMENT - RISQUE D'EXPLOSION - Ne pas brancher ou débrancher tant que le circuit est sous tension, à moins qu'il ne s'agisse d'un emplacement non dangereux."**

- o **"WARNING - EXPLOSION HAZARD - Do not use USB port (COMM port) unless area is known to be non-hazardous."**

- o **"AVERTISSEMENT - RISQUE D'EXPLOSION - Ne pas utiliser le port USB (port "COMM") à moins que la zone est connue pour être non dangereux."**

| REV | ECN | REVISION RECORD | DATE | DR | CK |
|---|---|---|---|---|---|
| A | 9462 | INITIAL RELEASE | 01/29/2015 | - | JLR. |
| B | - | NOTES UPDATED | 05/16/2018 | SS | PV |

**CONNECTIONS FOR SST72XXD/SST74XXD WITH ISOLATION AND INPUT VAC FUNCTIONS**

**WARNING - EXPLOSION HAZARD:**
SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

**WARNING:**
DO NOT CONNECT OR DISCONNECT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS. PICKUP MUST BE CONNECTED TO THE SST7000 SERIES DEVICE OR TO A LOAD IMPEDANCE LESS THAN 100K OHMS.

**WIRING DIAGRAM**
**APPLIES TO ALL MODELS**

RELAY CONNECTIONS:
SEE THE SPECIFICATIONS FOR ALLOWED LOAD
NC - NORMALLY CLOSED CONTACT
CT - CENTER CONTACT
NO - NORMALLY OPEN CONTACT

SEE NOTE 3

**NOTES:**
1. THE MAGNETIC PICKUP MUST BE CONNECTED USING SHIELDED CABLE WITH SHIELD WIRE CONNECTED TO GND TERMINAL.
2. THESE UNITS ARE CERTIFIED FOR MOUNTING IN A SUITABLE ENCLOSURE. SUITABILITY OF THE FINAL COMBINATION IS TO BE DETERMINED BY CSA OR THE INSPECTION AUTHORITY HAVING JURISDICTION.
3. ALL WIRES IN AND OUT OF ENCLOSURE MUST FOLLOW METHODS APPROVED FOR CLASS 1, DIVISION 2 HAZARDOUS LOCATION
4. ALL SST72XXD/SST74XXD DIGITAL SWITCHES ARE CSA CERTIFIED FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C, & D LOCATIONS WHEN POWERED BY DYNALCO MAGNETIC PICKUP OR ANY SUITABLE MAGNETIC PICK-UP WHICH SHALL NOT BE OPERATED OPEN-CIRCUIT (OR AT AN IMPEDANCE HIGHER THAN 100K Ω), AND NOT AT MORE THAN ITS MAXIMUM RATED FREQUENCY.

USB CAN ONLY BE CONNECTED IF AREA IS KNOWN TO BE NON-HAZARDOUS

MAGNETIC PICKUP
SEE NOTE 4

SEE NOTE 1

SHIELD WIRE

GND

+12 V OUT: PROVIDES A 12V 40MA SUPPLY FOR ACTIVE PICKUPS

GND

RPM REPEAT OUTPUT: CONNECT TO METER FOR RPM DISPLAY

COMM

**DYNALCO**
**DIGITAL SPEED SWITCH**

4-20 mA OUTPUT SIGNAL.
LOAD MUST BE LESS THAN 1K OHM.

115VAC TO 280VAC 50/60 Hz 10W
115-400 VDC 10W

10-36V DC SUPPLY

0-5/10V OUTPUT SIGNAL
LOAD MUST BE GREATER THAN 20K OHM

GND

DIGITAL INPUT: OPEN DRY CONTACT THAT WHEN CLOSED WILL GROUND THIS PIN AND RESET LATCHED ALARM

0-1 mA OUTPUT SIGNAL.
LOAD MUST BE LESS THAN 750 OHM.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
DIMENSIONAL TOLERANCES:
ANGULAR: ± 1/2°
FRACTIONAL: ± 1/64
.XX ± 0.010
.XXX ± 0.005

THIRD ANGLE PROJECTION

**DYNALCO®**

MODEL: DIGITAL SPEED SWITCH    DRAWN JR
PATH: N:\PRODUCTS\DSS\DWG\800-13140   APPROVED
TITLE: INTERCONNECTION DRAWING FOR CSA CERTIFIED UNITS

| SIZE B | DWG. NO. 800-13140 | REV B |
|---|---|---|

SCALE 1:1 | WEIGHT | SHEET 1 OF 1

DATE: 03/05/2015

MATERIAL: -
FINISH: -

DO NOT SCALE DRAWING

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