

KRS Drive Systems

SIL2 Rated Intelligent Footswitch Control Unit

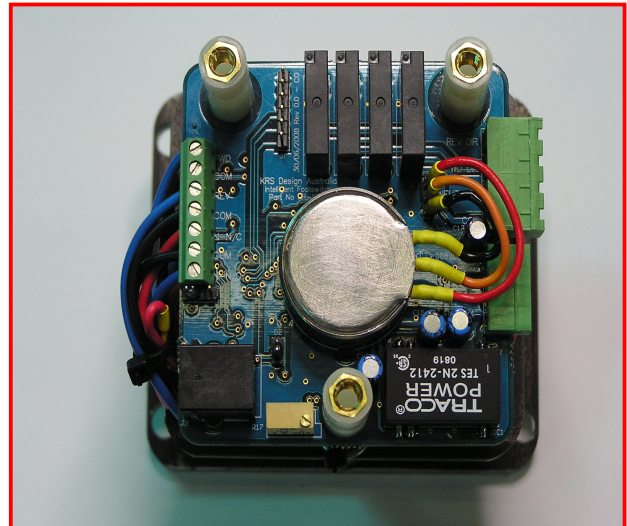
AC & DC SHUTTLE CAR REBUILDS

Utilizes Hall Effect Shaft Positioning Encoder

Our second generation Footswitch control unit is used as the accelerator unit for Traction Motor Drive Systems which are incorporated into mining vehicles such as shuttle cars.

KRS Drive Systems is the Australian Agent for Cableform Inc which designs and builds specialist Digital D.C. Drive Systems for Traction applications, Industrial Machinery including DC Cranes, Magnet Controls and Locomotive Controls.

The Footswitch can also be incorporated into other make drive systems using different software. For example a Saminco Drive unit that requires a control voltage of 0V to 4V DC input.



The Footswitch unit is intelligent, with on board microchip that generates all the necessary outputs to drive the machine when the Footswitch is actuated by the driver.

The KRS Footswitch offers a higher level of integrity than previously found on older types of footswitch units.

The Hall Effect Transducer has an operational life of up to 50 million actuations as compared to a normal resistance potentiometers currently used, which only

have an operational life of less than 1 million actuations.

The Foot Switch features intelligent software to monitor the limit switches and Hall Effect Sensor and then in turn, outputs the correct signals to the Drive system and the shuttle car electrics. If an error is detected the software will disable the outputs which in turn will stop the vehicle.

The Electronic hardware also has a micro monitor watch dog system which checks the health of the microchip and the program running inside it. There is also a power up check that is carried out, that will disable all the outputs if the software finds an error in the footswitch or if it is not in the neutral position. The software will disable all the outputs (Forward, Reverse, Neutral and the Analogue Control Output) from the footswitch.

Cableform Inc
Distributor

KRS Technologies Pty Ltd T/A

KRS Drive Systems
38 Hamilton Street
Dapto NSW 2530
ABN 43 390 350 272

Ph 02 4262 2572
Fax 02 4262 1212
Email sales@krs-design.com
Mobile 0402 156 140

Also featured within the Footswitch is an **Optional** serial port which allows the end user to interface directly with the vehicle's controller PLC if available. This then allows the user more information for a higher level of diagnostic capability than before.

The Footswitch unit is packaged complete with the mechanical arrangement so that it can be installed directly into most existing enclosures found on typical underground mining machines and is also easily integrated into above ground machinery requiring this type of control.

The internal centering spring automatically returns the footswitch to the neutral position when the operation force is removed. The centering spring works in conjunction with external centering springs and linkages found on most shuttle cars.

KRS Footswitch Specifications

<input type="checkbox"/> Power Supply Requirements	24VDC +/- 10% @ 100mA
<input type="checkbox"/> Operating Temperature Range	0 to 60 Deg C
<input type="checkbox"/> Relay Output Contact Ratings	5A @ 240V AC Max
<input type="checkbox"/> Analogue Output	Isolated 0 – 3.5 V DC - Cableform Drive System
<input type="checkbox"/> Analogue Output	Isolated 0 – 4.0 V DC – Saminco Drive System
<input type="checkbox"/> Analogue Output Isolation	1500V DC
<input type="checkbox"/> Shaft Angle position Sensor	Hall Effect Device – 50 Million Operations
<input type="checkbox"/> Back up Limit Switches	> 5 Million Operations @ 5VDC / 5mA
<input type="checkbox"/> Control Method	Proprietary Micro Controller & Software.
<input type="checkbox"/> Hardware / Software Protection	Hardware watch dog protection
<input type="checkbox"/> Optional Serial Port	RS 485 – Consult Factory
<input type="checkbox"/> Dimensions	See Dimensional details
<input type="checkbox"/> Weight	Approx 1 Kg

Applicable Drawings

EE907-11	General Application Information
EE907-12	Dimensional data

Footswitch SIL Summary Data:

Architectural SIL Claim Limit (SILCL) = SIL2

Probability of Dangerous Failure Per Hour (PFH) = 5.7×10^{-7}

(assumes proof-test / inspection interval of three (3) months or less).

A detailed report is available.

KRS-10-01-A Rev.1(23rd March 2010): KRS Technologies Pty. Ltd. - Intelligent Footswitch Control Unit -

Failure Modes, Effects and Diagnostic Analysis (FMEDA), Safe Failure Fraction (SFF) and Probability of Dangerous Failure Calculation.

Author: Marcus Punch Pty. Ltd.

Contact KRS Drive Systems

“The DC Motor Control Specialists”

- Cableform Drive Integration details.
- Supervisory Systems.
- Shuttle Cars have now been running in the Hunter Region for 6+ years.

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Dapto NSW 2530	Email	sales@krs-design.com
ABN 43 390 350 272	Mobile	0402 156 140