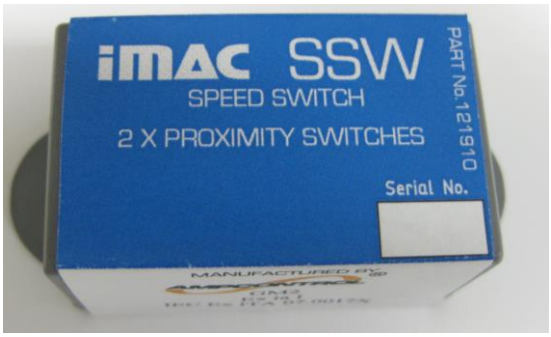
TECHNICAL INFORMATION

SSW
Speed Switch Module
IECEx ITA 07.0017x



Description

The iMAC-SSW Speed Switch Module provides belt slip protection, speed indication and sequence control for conveyor belts using the iMAC Integrated Monitoring and Control System.

The iMAC-SSW Speed Switch Module powers two proximity heads, which monitor the conveyor drive roller and a free running idler roller. The module measures the belt slip by comparing the ratios of the pulses from the two pick-up heads.

Non-volatile memory is used to store the operating parameters of the conveyor belt such as the pulse rate at full speed for both heads. The operating parameters are used to calculate the slip and speed values. Setpoints stored in non-volatile memory in the iMAC-SSW Module are compared against the slip and speed values to determine trip conditions such as Slip Trip, Over Speed Trip or Under Speed Trip.

The iMAC-SSW Module sends the slip percentage, speed percentage, absolute speed, status bits and trip bits to the iMAC Controller for display, dissemination and belt control. The Controller sends control bits to the iMAC-SSW Module for setup control, resetting of trip conditions and testing the operation of the module.

The iMAC-SSW Module and its dual proximity detectors are down line powered from the communication line. No local power is required. The Module has been approved to Exia Intrinsically Safe Standards for use in hazardous locations provided the proximity detectors comply with the approval specifications (see over for details). It is a Zone 0 device.

Features

- Single or dual proximity detector operation
- Adjustable under and over speed protection
- Adjustable true slip protection at all speeds
- Adjustable inhibit timers for slip and speed protection
- Down line powered module and proximity detectors
- OK LED indication for basic fault finding
- Data output for % slip, % Speed and absolute speed
- Data display at iMAC Controller
- On line configuration from iMAC Controller

LED Status Indication

There is provision for a single external LED to be connected to the module to indicate communication status.
Slow flash if the module is communicating to the Controller over the L1 line.
Two flashes when module is being roll called.
Three flashes if there is an address clash.

Data Mapping

The iMAC-SSW Module publishes up to five (5) addresses onto the iMAC System.

1. Status Data	16 bits of Status
2. Control Data	8 bits control, 8 bits status
3. SLIP% Data	16 bit word
4. SPEED% Data	16 bit word
5. Absolute Speed Data	16 bit word

Programming Procedures

The iMAC-SSW Module can be setup using the iMac Controller. The description details for programming from the Controller are documented in the **iMAC-SSW User Manual 118754**.

Specification

Power Supply:

Modules and Proximity Detectors are down line powered from the iMAC communication line.

Speed Range:

60 pulses per minute to 5000 pulses per minute at normal operating conveyor speed

Communication:

iMAC 2 wire Line
500 to 1000 baud

Proximity Detectors:

NAMUR or other approved two wire sensors with the following maximum input parameters:
Vi =15.5VDC
Ii = 52mA
Pi = 169mW
Ci = 22.8µF
Li = 1.23mH

Cable Parameters:
The maximum permitted cable parameters between the Module and the proximity detectors:
22.8µF

Module Dimensions:

188mH or 2730µH/ohm
31 H x 70 W x 24 D mm

The iMAC-SSW Speed Switch Module is a compact Intrinsically Safe approved module for use in mining operations for the detection of belt slip.

When two proximity detectors are used, accurate measurement of actual % belt slip is detected at any speed. The slip inhibit timer should be set to time out after the conveyor is moving and several pulses have been received from both proximity detectors. The inhibit timer for Under/Over speed protection should be set to time out after the conveyor has reached maximum speed.

In single head mode only the idler head is used (head 2) and the drive head (head 1) is ignored. SLIP protection and Under/Over Speed protection.

Both have inhibit timers and both have percentage maximums which should not be exceeded once the inhibit timers have expired. Both inhibit timers should be set so that the belt is up to speed before the timer expires.

Trip Conditions

The Trip Bit in the Status Data word (bit 0) indicates that a trip condition has occurred. A trip condition can be caused from:

1. Slip exceeding its trip setting after the Slip Inhibit Timer has expired.
2. Under/Over speed exceeding its trip setting after the Under/Over Inhibit Timer has expired.
3. Non-volatile memory corruption on power up.
4. No pulses from a proximity head after the Slip Inhibit Timer has expired.
5. A proximity head is not connected.
6. Test function is asserted

A TRIP condition can only be cleared using the Reset Function in the Controller SSW Page. A TEST function is also available which will cause the iMAC-SSW Module to Trip.

Brake Release Control

The Brake Release bit in the Status Data word (bit 1) is asserted as soon as the MC Control is asserted. The Brake bit will remain asserted through the ramp up and ramp down of the conveyor belt until the speed is less than the Brake Setpoint (usually 15%) at which point the Brake Release bit is cleared. In the case where the conveyor does not reach 15% speed before a slowing down, the Brake Release bit is cleared when the conveyor Stopped bit is asserted.

The Brake Setpoint is a number between 0 and 1000 representing a setpoint between 0 and 100%. For 15% the value for the setpoint should equal 150 (Decimal), 96 (Hexadecimal).

Sequence Control

The Sequence bit in the Status Data word (bit 2) is asserted when the speed exceeds the Sequence Setpoint (usually 65%). The Sequence bit is cleared when the speed is less than the Sequence Setpoint.

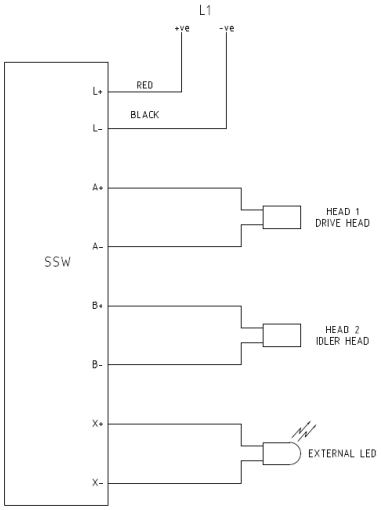
The Sequence Setpoint is a number between 0 and 1000 representing a setpoint between 0 and 100%. For 65% the value for the setpoint should be 650 (Decimal), 28A (Hexadecimal).

Speed and Absolute Speed

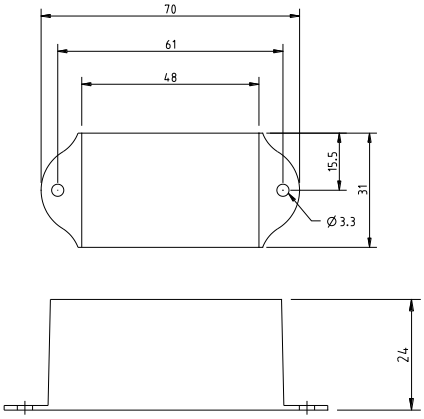
The iMAC-SSW Module calculates the percentage speed and absolute speed, which can be read by the iMAC Controller as 16 bit words. The speed variables are calculated from the idler head pulses (Head 2) and operating parameters stored during the setup procedure.
The percentage speed variable is used to determine Brake and Sequence control bits. The brake and sequence setpoints must be setup by the user.

The absolute speed is generated for display purposes only. To calculate absolute speed the iMAC-SSW Modules needs to be setup with parameters that specify the diameter of the reference roller and the number of targets on the roller.

Connection Diagram



General Arrangement



Certification / Approvals		
Intrinsic Safety		
Type	Ex ia I – for use in zone 0, 1 or 2	
Certificate number	IECEx ITA 07.0017X	
Module type	GM2	
IP rating	Must be installed in an enclosure not less than IP20 (IP54 recommended)	
Other	Must be mounted in such a manner that the encapsulation is not exposed	
I/O parameters	L1+ (red), L1- (black)	Ui = 21.5V (44.65R source resistor) Ci = Negligible Li = Negligible
	A+ (orange), A- (yellow), B+ (purple), B- (green)	Uo = 12.6V Io = 39.5mA Po = 125mW Co = 29µF Lo = 306mH L/R = 3000µH/Ω Ci = Negligible Li = Negligible
	X+ (pink), X- (grey)	Uo = 21.5V Io = 79mA Po = 426mW Co = 6.1µF Lo = 72mH L/R = 840µH/Ω Ci = Negligible Li = Negligible
Ambient temperature (Ta)	-20°C to +40°C (refer to operating environment specifications)	
This table is provided for quick reference purposes only: refer to latest issue of the Certificate of Conformity for all system designs.		
QPS		
File Number	LR1527	
Model	*121910 MOD IMAC SSW IS SPEED SW IECEx*	
Environment	Indoor use (or must be installed in a suitable outdoor enclosure with minimum IP54 rating) Altitude up to 2000m Pollution Degree 2	
The specified values approved by these standards may differ from the general specifications detailed elsewhere in this datasheet.		

Equipment List	
Part Number	**Description**
121910	MODULE IMAC SSW IS SPEED SW IECEx

Technical Support

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