



Intrinsically Safe Conveyor Control and Monitoring System Incorporating Remote Isolation

General Overview

Austdac supplied communication systems are designed to integrate with all our other communications equipment.

Austdac offers a complete network of communications, covering Longwalls, Conveyors and Roadways.

Mine Public Address Amplifier Systems

Austdac provides the amplifier audio public address systems. These are in wide use throughout the underground coal industry and also the tunnelling industry. The amplifier system is a “building block” module that readily integrates and expands to provide a full communication network.

The amplifier system is used to provide the following features:

- Provision of emergency communication even in the event of a power failure.
- Provide Pre-start alarm warnings.
- Allow Public address announcements such as emergency evacuations.
- Provide a control and monitoring and pre-start alarm system for conveyors.
- Announce Voice Message alarms.
- Connection into the mine’s telephone system thus providing a dial in and dial out facility along the amplifier system.

Main Control Unit

The Main Control unit consists of a very compact designed pcb and enclosure which controls all the latest functions available to control and monitor conveyor belts.

The main features include:

- Voice Communications along the Conveyor.
- Coverage of 6km of Conveyor and up to 8km with repeater.
- Pre-Start alarms.
- Signalling Tones.
- Surface Communications (Telephone or unique standalone station).
- Control Relays.





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The range of Austdac ancillary devices allows functions on the conveyor such as emergency stop, remote isolation, sequencing of down line apparatus, and transmission of analogue signals such as vibration monitoring or temperature monitoring to be achieved using only the lanyard cable as a transmission medium.

The Austdac conveyor control system has been independently assessed to AS1755-2000 and AS4024.1 for machine guarding. The SILBUS system also has the Australian C-tick for EMC compatibility.

1 Channel Generator

There is only one channel generator per system. The heart of the operation is the channel generator. This device provides the driving signal and encodes the information from the transmitters to the receivers.

2 Remote Isolation

For remote isolation purposes each control station has two (2) switches. One switch being of the lanyard type, and the isolation switch being an on-off switch which can be padlocked in the off position only. There is a transmitter inside each switch.

3 Transmitters

128 transmitter and receiver channels may be placed at various points on the cable. Multiplexing modules may increase system capacity beyond the 128 channels.

These devices are relatively simple devices and briefly operate as follows.

Each transmitter comprises a counter that is reset by the synchronising pulse. The counter then begins counting each positive edge of the waveform driven by the channel generator.

The count value is compared to the plug in code module at the front of the transmitter.

Inside this code module is a binary count value encoded with diodes.

When the count value from the channel generator equals the count value from the code module, the transmitter becomes active and places a short on the two wire as soon as the signal is low and if it's corresponding inputs are made. If its inputs are not made then it has no effect on the two wire.

4 Receivers

These are also simple devices that operate almost identically to the transmitters. They too have internal counters that compare their value to the plug in code module, but instead of placing a short on the line they have a sensing circuit that checks for the duration of the low signal. If the low signal is a wide pulse then their corresponding output is latched on and if it is a narrow pulse then the corresponding output is latched off. For a receiver to change state it must receive two consecutive signals that are the same logic. This gives a maximum data update time of approximately 300 milliseconds.



SILBUS 8 channel digital transmitter



SILBUS single channel transmitter



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5 PullSwitches

The pullswitch provides stopping and signalling facilities for conveyors. The pullswitch is of polycarbonate construction with latching or non latching versions available.



The pullswitch utilises fully sealed gold plated microswitches and is water and dust resistant to IP65.

6 The Signal Cable

The lanyard cable has been specifically designed to meet all of the requirements of the relevant standards with particular attention given to durability and wear characteristics under the most extreme operating conditions.



The cable is designed to ensure failsafe operation of the emergency stop switches on long distance conveyor applications.

7 Belt Stations

Austdac has various belt stations available, depending upon the requirements for your conveyors. These options consist of remote isolation, interrogation button, visual indication, and telephone interface.

The belt stations are positioned along the belt at nominated distances. They are all interconnected by a pullwire cable (lanyard) and a communication cable, all of which are usually plugged and socketed.

8 Amplifier

Austdac has designed a new intelligent amplifier which is totally compatible and interchangeable with the existing unit presently used in conveyors and longwalls throughout NSW and Queensland.

The new amplifier has been changed with full fault diagnostics and to improve the general appearance and operation of the overall system.

The system design improvements which can be displayed on the new LCD screen are as follows:

- Local internal battery voltages level.
- Local battery charge current.
- Inbound and outbound PSA Tones to dictate cable line faults and location.
- Easy menu driven displays.
- Durable membrane.
- Volume level setting (PSA & local override).
- Optional remote headset facility.
- Noise cancelling microphone.
- Individual speaker fault indication "Left Speaker Faulty" "Right Speaker Faulty".
- Back lit LCD display.
- Better battery life (6 months battery life left when battery is disconnected from the line).
- Lower charge current.
- Ingress protection IP66.



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Intrinsically Safe Amplifier/PullSwitch Stations

The amplifier/pullswitch stations consist of:-

- Amplifier module will give a pre-start warning and allow full speech functionality along the conveyor and to the surface.
- Remote isolation lockable switch .The isolation can be confirmed via a voice message repeatable by interrogation button or optional visual indication.
- The amplifier can incorporate an interrogate button to reinitiate the “stop messages” if the conveyor has stopped. The pullswitch also has reflective ‘eyes’ when in a lockout position as a further indication of a locked out belt.
- The amplifier/pullswitch station is usually positioned along the conveyor walkside only and alternated with pullswitch stations.
- A remote amplifier/pullswitch station telephone keypad is available. This unit can be positioned at the drivehead or at a strategic position along the conveyor. A single pair would then be taken from this unit, connected into a surface “TARA” unit, and linked into your PABX as a separate extension. This allows direct telephone link onto your conveyor.



Amplifier conveyor station complete with telephone keypad, pullswitch, interrogate button, and remote isolation



Amplifier



Emergency stop switch



Amplifier conveyor station complete with pullswitch, interrogate button, and remote isolation



Amplifier conveyor station complete with pullswitch

Termination Unit

The Termination unit is used when its pre-start alarm facility is required. This unit monitors the pre-start alarm signal and cable cores to ensure integrity of the system, for compliance with AS1755 and AS4024.

The Termination unit has a voltage indication and PSA Rx/Tx LED to aid fault finding and increase systems reliability.



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Intrinsically Safe PullSwitch Stations

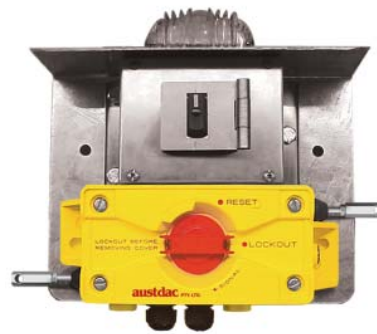
The pullswitch panels can be used on the non walkside and walkside sections of the conveyor and spaced between 120 to 150 metres apart. These stations can also incorporate an LED strobe if required, and the pullswitch stations can include the interrogation facility if this option is required.

The pullswitch stations consist of:-

- A pullswitch complete with SILBUS transmitters, utilising a fully sealed, gold plated micro switch.
- A remote isolation lockable switch.
- All modules pre-wired and mounted on a galvanised mounting plate.
- The pullswitch also has reflective 'eyes' when in the lockout position.
- The pullswitch/strobe stations will be positioned along the entire length of the conveyor non walkside only.
- These stations can also be fitted with visual indicators activated upon lockout or pre-start alarm.



Pullswitch conveyor station mounted on a galvanised mild steel plate



Pullswitch conveyor station mounted on a galvanised mild steel plate complete with strobe and remote isolation switch



Pullswitch conveyor station mounted on a galvanised mild steel plate complete with strobe

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PullSwitch/Peizo/Strobe/Remote Isolation Stations

These stations can be used in place of the communications belt stations and use a high audio peizo alarm alert for pre-start (fully monitored).

They can also incorporate visual alarms and remote isolation (lockable) if required.

These pullswitch stations consist of:

- Two peizo modules will give a pre-start warning along the conveyor.
- Remote isolation lockable switch. This indication and confirmation will be via an LED strobe.
- The pullswitch also has reflective 'eyes' when in a lockout position as a further indication of a locked out belt.
- The pullswitch/peizo/strobe stations will be positioned along the entire length of the conveyor walkside only.
- The above is pre-wired and mounted on a galvanised mounting plate for ease of installation.



Pullswitch conveyor station mounted on a galvanised mild steel plate complete with audible alarm



Pullswitch conveyor station mounted on a galvanised mild steel plate complete with visual and audible alarm