Monorail Trolley Controller

Lower system costs
Improved control

New Trolley Controller—from SABO Switzerland

Introducing the new Trolley Control System from SABO Switzerland. Our new approach offers you the benefits of:

- Lower cost implementation
- Modular approach with increased input/ outputs of varying configuration – vastly simplifying the process of configuration
- Improved ability to conform to specialised system requirements
- Reduce sensor count
- 32 input signals from busbars

The controller backplane organises data to and fromthe busbar, with an increased range of 32 input signals from the busbars instead of the old 3 signals

Also new is the Present-Busbar. Up to 32 signals from the busbar to the central controller—saving handshake sensors. These traditionally have to be fitted separately on the trolley. (Example functions: loading complete, unload complete ...)

Advantages over other controllers:

- Easily adapted to existing systems
  - Compatible with all controllers
- Standard hardware
- Software based on Siemens S7 (Step 7)
- Variable frequency inverter operating range down to 1Hz
- Exact positioning on block and trolley move back to block in case of missed block
- Remote diagnostic for Trolley control fault, or software update via VPN

Szabo Software Engineering Ltd

Delivery of turn-key monorail systems. Design, Installation, Commissioning and Maintenance.
SABO GMBH Switzerland—offer an intelligent and reliable Trolley control solution.

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Safety

- International standards
- Central safety controller
- Multiple emergency stop points
- Full safety risk analysis included in design phase

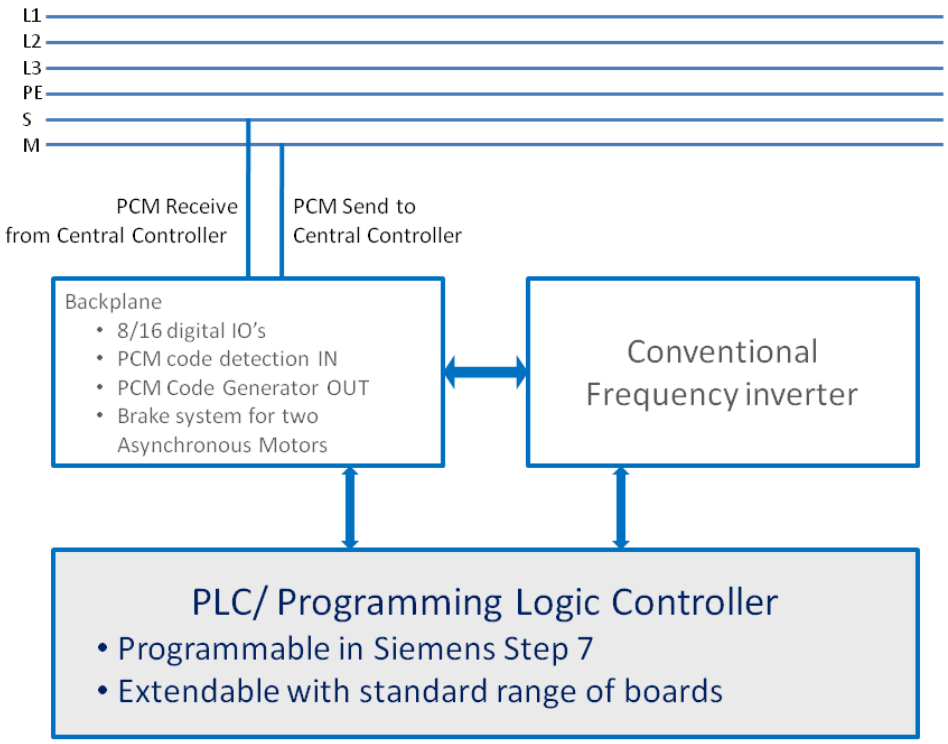
Maintenance

- Maximise up-time
- Minimise disruption
- Plan maintenance activities
- Minimise maintenance cost
- Condition based maintenance option—extend operational life

Delivering the Business Case

- Maximise traffic
- Straightforward ROI model
- Proven industrial technology
- Low construction risk

Trolley Controller—Block Diagram



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Options

Distance-Sensor:

Applications:

- Defining operating distances between monorail trolleys.
- A distance of up to 20m can be separated into three sectors:
  - Distance to to Diamond Grade Reflective tape greater than the taught-in distances Q1 and Q2
  - Distance to to Diamond Grade Reflective tape between Q1 and Q2
  - Distance to to Diamond Grade Reflective tape shorter than Q1
- DS 60 DTR IR distance to Diamond Grade Reflective tape - infrared laser.
- 2 digital inputs must be allocated to the distance-sensor - Q1 and Q2.

Options:

- Additional Digital Inputs 24VDC
- Additional Digital outputs 24VDC 0.5A
- Optional Relay outputs max. 2A
- SSI - interface for absolute encoders

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Pilot rail:

- The pilot rail carries pulse code modulation (PCM) signals used to control the carriage
- Up to 64 different commands, including:
    - travel speed forward / reverse, variable speed in assembly areas
    - lift / lower, unload loaded / etc
- Free configuration of PCM commands to controller functions

Message rail:

Used for confirmation of:

- Operating messages / error messages.
- Fault messages such as: Emergency Stop, PTC drive motor, drive failure, load error, etc.
- Operational messages such as: finished hoist up / down loading / unloading, etc.

Display and messages:

- 7 Segment Display for fault and function display

Inverter:

Main functions are:

- Starting, speed control
- Energy conservation
- PI controller
- Protection of the motor and the inverter
- Ramp and set point
- Catch on the fly with speed detection (flying start)
- Automatic control of operating time at low frequency
- Meet the requirements of the European low voltage (73/23/EEC and 93/68CEE) and EMC Directives (89/336/EEC) and are CE marked.

Electromagnetic compatibility EMC

- Filters are integrated into the inverter and are sized to conform with the following industry standards: EN 1800-3 61800-3/IEC

Digital inputs:

- 8 or 16 digital inputs 24VDC (see diagram)

Digital outputs:

- 8 digital outputs 24VDC 0.5 A – freely configurable. (See diagram)

Szabo— Monorail Solutions

Safety

Safety is a primary requirement which is never compromised. Safety standards are internationally accepted with overall system responsibility for safety assigned to a central safety controller, emergency stop points placed throughout the system and control point inputs provided for external safety related inputs—such as fire alarm systems.

Maintenance

Design concepts include comprehensive maintenance schedules to prevent operational disruption. Planned replacements and inspections can be conducted in scheduled down-time. Scope exists to remove individual trolleys from service when required for maintenance and repairs. Optionally, condition based maintenance practices can be included in the design concept.

Delivering the Business Case

With an emphasis on the throughput and routing, return on investment calculations are simple and easy to justify. The technology used has an excellent track record in industrial applications—reducing the implementation risks substantially.

Configuration

- **Flexible operation**
- **Interaction with other processes and plant**
- **Feely configurable routing and control algorithms**
- **Maximise through-put without com-promising safety**

Control

- **Precise location tracking**
- **Synchronised operation**
- **Perfect timing—every time**

Unique Benefits

- **Multiple levels, precise control**
- **Unique combination of powerful control algorithms and holistic systems**
- **Delivering the func-tional outcome**

New: Also new is the Present-Busbar. Up to 32 signals from the busbar to the central controller—saving handshake sensors. These traditionally have to be fitted separately on the trolley. (Example functions: loading complete, unload complete ...)

Example options:

- Digital Inputs 24VDC
- Digital outputs 24VDC 0.5 A
- Relay outputs max. 2A
- SSI interface for absolute encoders
- etc.

Technical data:

- PLC technology with 32 bit microprocessor CPU MC68340
- Software programming with STEP 7 from Siemens – offering the benefits of a standard programming language together with widespread end-user acceptance
- Variable Watchdog, program status, etc.
- The following components are included in the basic module:
- 64 different PCM code detection for control signals
- Up to 32 feedback outputs
- 8 or 16 Digital inputs depending on the type of controller
- 8 digital outputs 0.5A 24VDC
- Motor PTC evaluation
- 1 SSI interface for absolute encoders, depending on the type
- Monitoring of supply voltage and supply current

Busbars:

- 1 L1
- 2 L2
- 3 L3
- 4 PE
- 5 Z1 presence
- 6 Z2 Z-Stop
- 7 Pilot rail with PCM code
- 8 Message rail with PCM code

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