Solutions

Mining Machinery
ABOUT CARLO GAVAZZI

Carlo Gavazzi Automation is a multinational electronics group active in designing, manufacturing and marketing of electronic equipment targeted at the global markets of industrial and building automation.

Our history is full of firsts and our products are installed in a huge number of applications all over the world. With more than 80 years of successful operation, our experience is unparalleled.

We have our headquarters in Europe and numerous offices around the world.

Our R&D competence centres and production sites are located in Denmark, Italy, Lithuania, Malta and the People’s Republic of China.

We operate worldwide through 22 of our own sales companies and also selected representatives in more than 65 countries, from the United States in the West to the Pacific Rim in the East.

Our core competence in automation spans four product lines: Sensors, Switches, Controls and Fieldbuses.

We focus our expertise on offering state-of-the-art product solutions in selected market segments.

Our customers include original equipment manufacturers of packaging machines, plastic-injection moulding machines, food and beverage production machines, conveying and material handling equipment, door and entrance control systems, lifts and escalators, as well as heating, ventilation and air-conditioning devices.

Our wide array of products includes sensors, monitoring relays, timers, energy management system, solid state relays, safety devices and fieldbus systems.
DESIGNED TO MEET MARKET REQUIREMENTS

The global mining equipment market is primarily driven by factors such as increasing mining activities in developing countries and the rising demand for technically advanced solutions across the globe. Several large projects planned in Brazil, Russia, Australia, Africa and other regions are expected to drive the mining equipment industry in the coming years. Coal mining and other underground mining activities taking place in the emerging markets, especially in the Americas and Asia Pacific, are leading to a huge demand for mining equipment in these regions.

Carlo Gavazzi offers its DuplineSafe system to monitor long conveyors in order to control the operation and check the safety status. DuplineSafe is based on the Dupline® fieldbus, a system that has been used in more than 120,000 installations worldwide in the harshest industrial environments. Dupline® is especially in demand due to its reliability, simplicity and ability to transmit signals over long distances - no need for special network modules or special handling. This is one of the main reasons why DuplineSafe is the leading safety bus system worldwide for long conveyors in mines, tunnels, cement factories, stone mills etc. In addition, Carlo Gavazzi offers a wide range of soft starters and variable frequency drives to control starting/stoppage, torque, ramp-up and ramp down of pumps in de-watering plants, as well as the soft start and stop of the motors in crushers, conveyors and other equipment used in mining production sites.
Along bulk material conveyors in mines, tunnels, cement factories etc. there are several emergency stop switches connected to a pull-wire, enabling the workers to stop the belt at any point in case of an emergency situation or a fault on the belt. In order to reduce costly downtime of the belt, it is important that the location and nature of the problem is identified as quickly as possible.

The traditional wiring solution does not provide the diagnostics, it merely stops the belt. Parallel wiring is a high-cost solution, since long conveyors may have more than 50 switches installed.

DuplineSafe represents a simple, flexible and cost-effective solution. A single two-wire bus cable is pulled along the conveyor. At each pull-wire safety switch, a small DuplineSafe input module is connected to the two bus wires and to the normally closed contact set of the safety switch. The input module continuously transmits the status of the safety switch in a dynamic way using the DuplineSafe address assigned to the module. The power supply for the input module is derived from the two-wire bus, hence no local power supply is required.

In the machine room, a DuplineSafe relay output module is continuously monitoring the bus and the status of all the safety switches. If one of the safety switches is activated, the DuplineSafe relay output module will initiate the necessary actions to stop the conveyor safely and efficiently.
switches is activated, or if a bus fault is detected, the output module will deactivate its safety relay and thereby stop the belt. The status of the safety switches can be monitored from e.g. a HMI or LED mimic panel, providing fast and precise diagnostics. The signals can also be monitored from a PLC or PC, for example by using the Profinet gateway or the Modbus interface. The new Dupline® Profinet gateway allows the use of Dupline® and DuplineSafe as a field level sub-system under Profinet, and also allows for accurate integration in a Profinet based PLC environment. Up to 7 Dupline® master generators can be plugged into the Profinet main unit.

DuplineSafe keeps up production and makes your plant safer

- Immediate and precise diagnostics
- Up to 5 km (3.1 miles) transmission distance without a repeater
- Bus-powered input modules
- Easy to design, install and expand
- Multiple safety relays can read the same inputs
- TÜV-approved
We know how crucial the control of conveyor belts is for material handling in ore and mining productivity. In a coal mine the ore is transported via a series of conveyors for thousands of metres (yards) from trains to stockpile areas.

If a conveyor motor fails, there is loss of production. The Carlo Gavazzi range of monitoring relays can provide an easy way to keep the main source of possible problems under control: DTA relays monitor motor temperature, the DPD can be used either for motors or for generators as it can monitor both 3-phase voltage and frequency as well as asymmetry. DIB and DWB relays can guard from overloads by monitoring current, cosφ and active power.

<table>
<thead>
<tr>
<th>Motor thermistor relays</th>
<th>Multifunction monitoring relay with NFC</th>
<th>Current monitoring relay</th>
<th>Load guard monitoring relays</th>
<th>Earth leakage relay</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTA04</td>
<td>DPD02</td>
<td>DIB</td>
<td>DWB01</td>
<td>DEB71</td>
</tr>
</tbody>
</table>
In mining applications there is often a lot of moisture in the environment and this makes it very important to monitor earth current leakage. DEB71 is a Modular Residual Current monitoring relay which, together with the external CTG Core Balance Transformer, is able to detect any current leakage and provide protection according to the EN60947-2 Annex M Norm.

The measured earth current leakage can be shown by the LED bar indicator on the front face of the relay itself. A Pre-alarm output is provided at 60% of the set trip threshold in order to pre warn before the alarm tripping takes place.

Conveyors are typical applications where variable frequency drives offer a number of advantages. The Carlo Gavazzi RVLF variable frequency drives are used for speed control of conveyors for optimal process control, as well as high starting torque whilst reducing stresses on the belts and shafts. The products conform to EMI radio standard and EMC immunity standard EN 61800-3 for the second environment (Industrial sites).
Pumping systems and services

The reliability of pumping equipment is crucial for removing water in an effective mining operation. The RSWT soft starters are designed with a dedicated and self-learning algorithm to ensure that the pump starts and stops smoothly. The algorithm is self-learning, so as to remove as many settings as possible. In fact, we are the first to come up with a soft-starter which requires just a 1-knob setting for complete soft-starting and soft-stopping.

The Carlo Gavazzi product range, to ensure the reliable operation of pumping systems, includes the RSGD series soft starters and the RVLF variable frequency drives. The DLA71/DLA73 monitoring relays are specifically made for pumping systems where two or three pumps have to work in parallel: they manage the signals from the inputs, sequentially activating the working cycle of the pumps. In addition, Carlo Gavazzi products are used for the control of ventilation plants, as well as the monitoring of energy parameters and consumption.
Mining crusher machines are extremely important to the mining process, in order to reduce the material to a fine consistency for the processing and using of precious excavated resources. Jaw crushers are very robust and they have sufficient torque to break the stone. They use over dimensioned electric motors and large flywheels to accumulate kinetic energy.

The load characteristics in the case of jaw crushers continuously vary, due to the various sizes of the rock entering the feed. The motor goes to overload peaks and comes down. Starting needs to be smooth to minimize mechanical stresses and eliminate high starting currents.

The RVLF variable frequency drives provide an effective way to meet the smooth starting requirements and motor speed variations, by automatically adjusting the torque. Inductive sensors ICB series, certified Class 1, Division 2 for hazardous environment, are also used in these plants.

The MOF S142 photoelectric sensors with an amplifier can be used to detect stones on conveyor belts.

The safe operation of the crushers is also guaranteed by preventing undesired access to the control panel, which could lead to malfunctions and potential hazardous situations. The protection is usually performed with emergency stop buttons and safety magnetic switches (MC36) protecting the door opening, in conjunction with a safety module (SMS31) to stop the operation of the equipment.
## Mining Machinery

### Our product range

<table>
<thead>
<tr>
<th>Safety relay output module</th>
<th>Profibus DP gateway</th>
<th>Input modules</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GS3830</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Dimensions: 77 x 144 x 70 mm</td>
<td>• Monitors up to 63 safety input modules</td>
<td>• cULus approved</td>
</tr>
<tr>
<td>• For mounting on DIN-rail (EN50022)</td>
<td>• 230 VAC power supply</td>
<td>• Approved by TÜV Rheinland Group according to IEC/EN 61508-SIL3, IEC/EN 62061-SIL3 and ISO/EN 13849-1 PL e</td>
</tr>
<tr>
<td>• 230 VAC power supply</td>
<td>• Approvals/Marks: cULus approved</td>
<td>• Easy coding and testing with a handheld programming tool</td>
</tr>
<tr>
<td>• Automatic or manual restart</td>
<td>• Status output for external equipment</td>
<td>• Easy configuration and testing with a handheld programming tool</td>
</tr>
<tr>
<td>• Easy configuration and testing with a handheld programming tool</td>
<td>• Easy configuration and testing with a handheld programming tool</td>
<td>• Automatic or manual restart</td>
</tr>
<tr>
<td><strong>GS3891</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Dimensions: 77 x 144 x 70 mm</td>
<td>• Profibus-DP slave according to EN50170</td>
<td>• cULus approved</td>
</tr>
<tr>
<td>• For mounting on DIN-rail (EN50022)</td>
<td>• 230 VAC power supply</td>
<td>• Approved by TÜV Rheinland Group according to EC/EN 61508-SIL3, IEC/EN 62061-SIL3 and ISO/EN 13849-1 PL e</td>
</tr>
<tr>
<td>• 230 VAC power supply</td>
<td>• Approvals/Marks: cULus approved</td>
<td>• Easy coding and testing with a handheld programming tool</td>
</tr>
<tr>
<td><strong>GS7510</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Dimensions: 36 x 57.5 x 16.4 mm</td>
<td>• Powered by the bus</td>
<td>• Easy coding and testing with a handheld programming tool</td>
</tr>
<tr>
<td>• IP67 rating</td>
<td>• Power supply</td>
<td>• Small dimensions (57.5 x 36.0 x 16.4 mm) for decentralized installation at the actual location of the safety switch</td>
</tr>
<tr>
<td>• Approvals/Marks: cULus approved</td>
<td>• Approvals/Marks: cULus approved</td>
<td>• Small dimensions (57.5 x 36.0 x 16.4 mm) for decentralized installation at the actual location of the safety switch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Easy coding and testing with a handheld programming tool</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Handheld programming and test tool</th>
<th>Optical converters</th>
<th>Modbus RS485 gateway</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GS7380</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Dimensions: 145 x 90 x 28 mm</td>
<td>• Runs on optical multimode fibre pairs (50/125, 62.5/125)</td>
<td>• Dimensions: 55 x 70 x 15 mm</td>
</tr>
<tr>
<td>• Used for address coding of GS75102101 and configuration of GS38300143230</td>
<td>• ST type connector</td>
<td>• Enables monitoring of safety signals from text displays, touchscreens, PLCs and PCs</td>
</tr>
<tr>
<td>• Battery-powered</td>
<td>• For mounting on DIN-rail (EN50022)</td>
<td>• Power supply from bus and text display</td>
</tr>
<tr>
<td>• Battery-powered</td>
<td>• AC power supply</td>
<td>• Approvals/Marks: cULus approved</td>
</tr>
<tr>
<td><strong>GS3492 / GS3493</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Dimensions: 77 x 72 x 70 mm</td>
<td>• Runs on optical multimode fibre pairs (50/125, 62.5/125)</td>
<td>• Power supply from bus and text display</td>
</tr>
<tr>
<td></td>
<td>• ST type connector</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• For mounting on DIN-rail (EN50022)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• AC power supply</td>
<td></td>
</tr>
<tr>
<td><strong>GSTI50</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Dimensions: 55 x 70 x 15 mm</td>
<td>• Enables monitoring of safety signals from text displays, touchscreens, PLCs and PCs</td>
<td>• Easy coding and testing with a handheld programming tool</td>
</tr>
<tr>
<td>• Power supply from bus and text display</td>
<td>• Several GSTI50s can be connected to the same bus</td>
<td>• Small dimension housing for mounting directly to the text display</td>
</tr>
<tr>
<td>• Approvals/Marks: cULus approved</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.
# Our product range

<table>
<thead>
<tr>
<th>Dupline® profinet gateway</th>
<th>Dupline® master channel generator</th>
<th>Graphical displays</th>
</tr>
</thead>
</table>

## GS3391
- Dimensions: 90 x 35 x 58.5 mm
- 24 VDC power supply
- For mounting on DIN-Rail
- Profinet-DP slave
- Approvals/Marks: CE - cULus - UL60950

### MAIN FEATURES
- Makes DuplineSafe diagnostics available on Profinet-DP
- Up to 7 master generators can be connected via the HS RS485 bus (side connector)
- Built-in mini-webserver
- Interfacing with PLCs and PCs

## GS3390
- Dimensions: 90 x 35 x 58.5 mm
- 24 VDC power supply
- For mounting on DIN-Rail
- Module that generates 128 Dupline® channels and power to the bus modules
- Extended digital output mode for Profinet
- Approvals/Marks: CE - cULus - UL60950

### MAIN FEATURES
- Generates Dupline® carrier signal
- Supports digital I/O, Analink I/O, Mux BCD I/O, 8-digit I/O

## BTM-T4 / BTM-T7
- 4” / 7” colour display
- Easy setup of graphic pages and functions with the powerful software Wizard
- Activation of internet links through touch buttons
- Support viewing from IP cameras

### MAIN FEATURES
- Ethernet connection
- BACnet protocol available
- USB port, SD memory, Modbus RTU serial port
- KNX compatibility plug-in

## 3-phase pump and ventilator soft starters

### RSWT
- Motor rating: up to 45 kW (90 A)
- 3-phase controlled and internally bypassed
- Operational voltage: RSWT40: 220 - 400 VAC, RSWT60: 220 - 600 VAC
- PTC input, Alarm - Top of Ramp - Run relay indication
- Approvals/Marks: cULus - CCC - EAC

### MAIN FEATURES
- Easy to use and set up
- Self-Learning algorithm to improve pump starts/stops
- Integrated overload protection (Class 10)

## 3-phase general purpose soft starters

### RSVD
- Operational voltage range: 187 - 440 VAC, 187 - 660 VAC
- Operational current range: 12 AAC up to 100 AAC
- Control voltage: 24 VAC/DC, 110 - 400 VAC
- Serial communication (Modbus 2-wire) (RSGD 75 mm models)
- Approvals/Marks: cULus - CCC - EAC

### MAIN FEATURES
- Easy to use and set-up
- Self-Learning algorithm to adapt to different loads
- Auxiliary relays for top of ramp and alarms

## Variable frequency drives

### RVLF
- Compact dimensions, with ratings up to 11kW
- V/F and SLV control inbuilt
- Drive voltage ratings: 100 - 120 VAC, 200-240 VAC, 380-480 VAC
- Drive kW rating: 0.4 kW - 11kW (0.5 HP - 15 HP)
- Approvals/Marks: CE - cULus

### MAIN FEATURES
- Ease of use with minimal settings
- Precision low speed control with SLV algorithms
- Inbuilt filters on most models to reduce harmonics disturbance

## Graphical displays

### BTM-T4 / BTM-T7
- 4” / 7” colour display
- Easy setup of graphic pages and functions with the powerful software Wizard
- Activation of internet links through touch buttons
- Support viewing from IP cameras

### MAIN FEATURES
- Ethernet connection
- BACnet protocol available
- USB port, SD memory, Modbus RTU serial port
- KNX compatibility plug-in

### BTM-T4 / BTM-T7
- 4” / 7” colour display
- Easy setup of graphic pages and functions with the powerful software Wizard
- Activation of internet links through touch buttons
- Support viewing from IP cameras

### MAIN FEATURES
- Ethernet connection
- BACnet protocol available
- USB port, SD memory, Modbus RTU serial port
- KNX compatibility plug-in
## Mining Machinery

### Our product range

<table>
<thead>
<tr>
<th>Inductive sensors</th>
<th>Inductive sensors</th>
<th>Photoelectric sensors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ICB12 / ICB18 / ICB30</strong></td>
<td><strong>ICS12 / ICS18 / ICS30</strong></td>
<td><strong>MOFT / MOFR</strong></td>
</tr>
<tr>
<td>M12, M18 and M30 NPB housing in short or long barrel lengths</td>
<td>M12, M18 and M30 stainless steel housing</td>
<td>Ø 10 mm polycarbonate housing or M12 or M14 stainless steel</td>
</tr>
<tr>
<td>Standard, double and triple distance sensing ranges</td>
<td>Sensing distance from 2 mm up to 22 mm</td>
<td>Range: 20 m or 50 m</td>
</tr>
<tr>
<td>Output functions: NO or NC, PNP or NPN</td>
<td>Degree of protection: IP67, IP68 and IP69K</td>
<td>For amplifier series S142 and S143</td>
</tr>
<tr>
<td>Two metre oil resistant PVC cable or M12 plug version</td>
<td>Approvals/Marks: CE - cULus - cCSAus</td>
<td>Modulated infrared light</td>
</tr>
<tr>
<td>Approvals/Marks: CE - cULus - cCSAus</td>
<td></td>
<td>Degree of protection: IP 66 / IP 67</td>
</tr>
<tr>
<td><strong>MAIN FEATURES</strong></td>
<td><strong>MAIN FEATURES</strong></td>
<td><strong>MAIN FEATURES</strong></td>
</tr>
<tr>
<td>CSA certified for hazardous location - Class 1 Division 2</td>
<td>CSA certified for hazardous location - Class 1 Division 2</td>
<td>Water proof; for dirty environment, i.e. water, dust, steam</td>
</tr>
<tr>
<td>High precision and reliability thanks to microprocessor technology</td>
<td>Extended temperature range: -40°C to +80°C (-40°C to +85°C for ICS30)</td>
<td>High immunity to ambient light</td>
</tr>
<tr>
<td>Laser engraved information on the front cap, permanently legible</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Photoelectric amplifiers</th>
<th>Motor thermistor relays</th>
<th>Earth leakage protection relays</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S142</strong></td>
<td><strong>DTA04 / DTA72</strong></td>
<td><strong>DEB71</strong></td>
</tr>
<tr>
<td>µ-Processor controlled, amplifier relay for photoelectric switches</td>
<td>80 x 22.5 x 99.5 mm (DTA04); 1 x 35.5 x 67.2 mm (DTA72); DIN-rail housing</td>
<td>81 x 35.5 x 67.2 mm; DIN-rail housing</td>
</tr>
<tr>
<td>Rated operational voltage: 24 VAC/DC, 24 VAC, 115 VAC or 230 VAC</td>
<td>2 SPDT 8A (DTA04), 2 SPDT 8A (DTA72) Relay Outputs</td>
<td>2 SPDT 5 A Relay Outputs</td>
</tr>
<tr>
<td>Self-diagnostic functions</td>
<td>For motor protection with builtin PTC sensors</td>
<td>LED leakage level indicator</td>
</tr>
<tr>
<td>Approvals/Marks: CE - UL - CSA</td>
<td>Power supply 24 V - 240 V/DC</td>
<td>Power supply 24 - 240 VAC</td>
</tr>
<tr>
<td><strong>MAIN FEATURES</strong></td>
<td><strong>MAIN FEATURES</strong></td>
<td><strong>MAIN FEATURES</strong></td>
</tr>
<tr>
<td>Automatic or manual emitter power regulation</td>
<td>Multicolour LED with alarm discrimination</td>
<td>Adjustable Trip Current Setting from 30 mA to 30 A</td>
</tr>
<tr>
<td>Self-diagnostic function</td>
<td>Auto or manual, local or remote reset and test function</td>
<td>Remote Test / Reset push button input</td>
</tr>
<tr>
<td></td>
<td>Ready for reset function</td>
<td>Waring indication and output</td>
</tr>
</tbody>
</table>

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## Our product range

<table>
<thead>
<tr>
<th>Core balance current transformers</th>
<th>Fully programmable 3-phase voltage relay</th>
<th>3-phase monitoring relays</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTG</td>
<td>DPA51 / DPA52</td>
<td></td>
</tr>
<tr>
<td>• 6 Sizes from 35 mm to 210 mm</td>
<td>• 81 x 17.5 x 67.2 mm; DIN-rail housing</td>
<td></td>
</tr>
<tr>
<td>• Solid round core type</td>
<td>• Phase sequence and phase loss, regenerated voltage detection</td>
<td></td>
</tr>
<tr>
<td>• Screw terminals connection</td>
<td>• 3 phase AC (own power supply)</td>
<td></td>
</tr>
<tr>
<td>• Approvals/Marks: CE - UL - CSA</td>
<td>• Power supply 208 - 480 VAC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Approvals/Marks: CE - UL - CSA</td>
<td></td>
</tr>
<tr>
<td><strong>MAIN FEATURES</strong></td>
<td><strong>MAIN FEATURES</strong></td>
<td><strong>MAIN FEATURES</strong></td>
</tr>
<tr>
<td>• 1:1000 current reduction ratio</td>
<td>• Up to 10 configurable set points</td>
<td>• Motor protection from reverse running and phase loss</td>
</tr>
<tr>
<td>• Single and three phase</td>
<td>• Apps for Android and Windows PC</td>
<td>• 1 DIN module width. Suitable for NORM panels</td>
</tr>
<tr>
<td></td>
<td>• 208 to 480VAC mains voltages</td>
<td>• No setup needed (plug&amp;play)</td>
</tr>
</tbody>
</table>

### CTG
- 6 Sizes from 35 mm to 210 mm
- Solid round core type
- Screw terminals connection
- Approvals/Marks: CE - UL - CSA

### DPA51 / DPA52
- 81 x 17.5 x 67.2 mm; DIN-rail housing
- Phase sequence and phase loss, regenerated voltage detection
- 3 phase AC (own power supply)
- Power supply 208 - 480 VAC
- Approvals/Marks: CE - UL - CSA

## Current monitoring relays

<table>
<thead>
<tr>
<th>DIA / DIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 80 x 22.5 x 99.5 mm; DIN-rail housing</td>
</tr>
<tr>
<td>• Over or under current relay</td>
</tr>
<tr>
<td>• 1 phase AC or DC</td>
</tr>
<tr>
<td>• Power supply from 24 to 48 VAC/DC or 115/230 VAC</td>
</tr>
<tr>
<td>• Approvals/Marks: CE - UL - CSA</td>
</tr>
</tbody>
</table>

### DIA / DIB
- 80 x 22.5 x 99.5 mm; DIN-rail housing
- Over or under current relay
- 1 phase AC or DC
- Power supply from 24 to 48 VAC/DC or 115/230 VAC
- Approvals/Marks: CE - UL - CSA

### DWB01
- 80 x 45 x 99.5 mm; DIN-rail housing
- TRMS load guard for 1-phase or 3-phase balanced applications
- Measure if the power factor is within set limits
- LED indication for relay, alarm and power supply ON
- Approvals/Marks: CE - UL - CSA

### DPA51 / DPA52
- 81 x 17.5 x 67.2 mm; DIN-rail housing
- Phase sequence and phase loss, regenerated voltage detection
- 3 phase AC (own power supply)
- Power supply 208 - 480 VAC
- Approvals/Marks: CE - UL - CSA

### DLA71 / DLA73
- 81 x 35.5 x 67.2 mm; DIN-rail housing
- Pump alternating relay for 2 or 3 pumps
- Galvanically separated power supply, 24/48 VAC or 115/230 VAC
- 2x or 3x 5 A SPST output
- Approvals/Marks: CE - UL - CSA

### DLA71 / DLA73
- 81 x 35.5 x 67.2 mm; DIN-rail housing
- Pump alternating relay for 2 or 3 pumps
- Galvanically separated power supply, 24/48 VAC or 115/230 VAC
- 2x or 3x 5 A SPST output
- Approvals/Marks: CE - UL - CSA

### DLA71 / DLA73
- Built-in function for automatic rotation of the pumps
- Built-in delay for the second or third pump in case of simultaneous activation is required
- Built-in function for automatic rotation of the pumps

### CTG
- 6 Sizes from 35 mm to 210 mm
- Solid round core type
- Screw terminals connection
- Approvals/Marks: CE - UL - CSA (when used with DEA71 and DEB71)

### DPA51 / DPA52
- 81 x 17.5 x 67.2 mm; DIN-rail housing
- Phase sequence and phase loss, regenerated voltage detection
- 3 phase AC (own power supply)
- Power supply 208 - 480 VAC
- Approvals/Marks: CE - UL - CSA

### DPA51 / DPA52
- 81 x 17.5 x 67.2 mm; DIN-rail housing
- Phase sequence and phase loss, regenerated voltage detection
- 3 phase AC (own power supply)
- Power supply 208 - 480 VAC
- Approvals/Marks: CE - UL - CSA

### DLA71 / DLA73
- 81 x 35.5 x 67.2 mm; DIN-rail housing
- Pump alternating relay for 2 or 3 pumps
- Galvanically separated power supply, 24/48 VAC or 115/230 VAC
- 2x or 3x 5 A SPST output
- Approvals/Marks: CE - UL - CSA

### DLA71 / DLA73
- Built-in function for automatic rotation of the pumps
- Built-in delay for the second or third pump in case of simultaneous activation is required
- Built-in function for automatic rotation of the pumps

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- Built-in delay for the second or third pump in case of simultaneous activation is required
- Built-in function for automatic rotation of the pumps
# Mining Machinery

## Our product range

<table>
<thead>
<tr>
<th>Multifunction safety modules</th>
<th>Multifunction safety module</th>
<th>Multifunction safety module</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SMS31</strong></td>
<td><strong>CM22D0A</strong></td>
<td><strong>CM40D0A / CM30D1A</strong></td>
</tr>
<tr>
<td>- Dimensions 110,8 x 17,5 x 121,1 mm DIN-rail housing</td>
<td>- Up to 4 OSSD safety outputs</td>
<td>- 4 OSSD safety outputs (CM40D0A)</td>
</tr>
<tr>
<td>- Auto, manual or monitored manual start</td>
<td>- Up to 2 OSSD auxiliary outputs</td>
<td>- 3 OSSD safety outputs + 1 auxiliary output (CM30D1A)</td>
</tr>
<tr>
<td>- 3 NO safety relay outputs</td>
<td>- Selectable delayed safety output</td>
<td>- Safety solution for basic machines, equipment and production lines</td>
</tr>
<tr>
<td>- 1 NC auxiliary relay output</td>
<td>- Compact dimension, 1 DIN, W x H x D: 18 x 90 x 63 mm</td>
<td>- Compact dimension, 1 DIN, W x H x D: 18 x 90 x 63 mm</td>
</tr>
<tr>
<td>- Detachable screw terminals</td>
<td>- Approvals/Marks: CE - cULus - TÜV</td>
<td>- Approvals/Marks: CE - cULus - TÜV</td>
</tr>
<tr>
<td>- Approvals/Marks: CE - cULus - TÜV</td>
<td><strong>MAIN FEATURES</strong></td>
<td><strong>MAIN FEATURES</strong></td>
</tr>
<tr>
<td><strong>CMM</strong></td>
<td><strong>Configurable I/O expansion modules</strong></td>
<td><strong>Configurable Speed monitoring modules</strong></td>
</tr>
<tr>
<td>- 4 non-safety test outputs for sensor monitoring</td>
<td>- Wide range of Input/Output, Input only or Output only (both OSSD and standard relays) expansion units to serve different application requirements</td>
<td>- Exp. units to monitor speed (Ple): Zero speed, Max speed, Speed range, Motion direction, rotation / translation</td>
</tr>
<tr>
<td>- 2 non-safety programmable digital signal outputs</td>
<td>- Models offer a variety of non-safety Inputs/Outputs such as: inputs for Start/Restart interlock and EDM, test outputs</td>
<td>- RJ45 for encoder connections and terminal blocks for connection to proximity switches (up to 2 proximity switches per module)</td>
</tr>
<tr>
<td>- 2 non-safety inputs for Start / Restart interlock and EDM</td>
<td>- Approvals/Marks: CE - cULus - TÜV</td>
<td>- Inputs frequency: Encoder up to 500 KHz (300 KHz for HIL), Proximity up to 5 KHz</td>
</tr>
<tr>
<td>- LOG file with 5 configuration modifications</td>
<td><strong>MAIN FEATURES</strong></td>
<td>- Approvals/Marks: CE - cULus - TÜV</td>
</tr>
<tr>
<td>- Connection with other exp. unit via rear bus</td>
<td>- Also usable as a stand-alone device, able to control any other expansion unit</td>
<td><strong>MAIN FEATURES</strong></td>
</tr>
<tr>
<td>- Approvals/Marks: CE - cULus - TÜV</td>
<td>- 8 safety digital inputs</td>
<td>- The modules allow to configure up to 4 speed thresholds for each logic output (axis)</td>
</tr>
<tr>
<td><strong>C I/O</strong></td>
<td><strong>CMM</strong></td>
<td>- Each module integrates two logic outputs configurable via the MSD and is capable to control up to two independent axes</td>
</tr>
<tr>
<td>- Dimensions 110,8 x 17,5 x 121,1 mm DIN-rail housing</td>
<td>- 2 safety OSSD pairs (400 mA Output)</td>
<td></td>
</tr>
<tr>
<td>- Auto, manual or monitored manual start</td>
<td>- Cat.4, PL e (ISO 13849-1), SIL 3 (IEC 62061), SILc3 (IEC 61508)</td>
<td></td>
</tr>
<tr>
<td>- 3 NO safety relay outputs</td>
<td>- 2 OSSD, 4 OSSD</td>
<td>- Cat.4, PL e (ISO 13849-1), SIL 3 (IEC 62061), SILc3 (IEC 61508)</td>
</tr>
<tr>
<td>- 1 NC auxiliary relay output</td>
<td>- 2 relay Outputs, 4 relay Outputs</td>
<td>- Manual or automatic start selectable</td>
</tr>
<tr>
<td>- Detachable screw terminals</td>
<td><strong>MAIN FEATURES</strong></td>
<td><strong>MAIN FEATURES</strong></td>
</tr>
<tr>
<td>- Approvals/Marks: CE - cULus - TÜV</td>
<td>- Configurable pre-set delayed safety outputs, set via the hex-switch.</td>
<td>- Can be used in applications with: e-stop, e-gate, limit switch, non-contact switch, safety light curtains, safety light beam and safety mat</td>
</tr>
<tr>
<td><strong>Multifunction safety module</strong></td>
<td><strong>Multifunction safety module</strong></td>
<td><strong>Multifunction safety module</strong></td>
</tr>
</tbody>
</table>

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.
## Our product range

### Safety hinges

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimensions: 110 x 30 x 15 mm</th>
<th>Integrated safety circuit</th>
<th>Conforms to IEC / EN Standards: ISO 13849-1 (SIL3, PI e)</th>
<th>Stainless steel components</th>
<th>Contact configurations: 2NO + 2NC / 1NO + 3NC</th>
<th>Approvals/Marks: CE - UL - CSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS38H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Pull wire limit switch

<table>
<thead>
<tr>
<th>Model</th>
<th>Metal body</th>
<th>Max. wire length 16 m</th>
<th>Cable gland PG13.5, M20, 1/2” NPT with reset for Emergency stop</th>
<th>IP 66</th>
<th>Approvals/Marks: CE - UL - CSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS31R/PS43R</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Safety magnetic sensors

<table>
<thead>
<tr>
<th>Model</th>
<th>Rectangular plastic housing: 36 x 26 x 13 mm</th>
<th>Assured switching distance (Sao) 5 mm</th>
<th>Assured switch-off distance (Sar) 15 mm</th>
<th>Output functions: 2 NO or 1 NO + 1 NC</th>
<th>2 meter PVC cable or M8 plug version</th>
<th>Approvals/Marks: CE - cULus</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC36CH / MC36CM</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### MAIN FEATURES

- Five different configurations for connection
- Minimum installation width: 30 mm
- Slow/snap action contact block
- Compact dimensions
- Up to Cat. 4, PI e in accordance with EN ISO 13849-1, with suitable safety module
- Flexibility: left or right exit connection versions
- LED version available for all variants

### Modular power analysers

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimensions: 96 x 96 mm</th>
<th>Panel mounting housing</th>
<th>Accuracy 0.2 % (voltage, current)</th>
<th>Universal power supply</th>
<th>Front protection degree IP65, NEMA4X, NEMA12</th>
<th>Approvals/Marks: CE - cULus</th>
</tr>
</thead>
<tbody>
<tr>
<td>WM30 / WM40</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### 3-phase power analysers

<table>
<thead>
<tr>
<th>Model</th>
<th>96 x 96 mm panel mounting housing</th>
<th>Accuracy 0.5 % (voltage, current)</th>
<th>Class 1 EN62053-21 and Class B EN50470-3 (MID)</th>
<th>Self or aux. power supply</th>
<th>Digital output and serial port</th>
<th>Optical port</th>
<th>Approvals/Marks: CE - MID (for 3-phase with Neutral and Aaron connections) - cULus approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>WM15</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

### MAIN FEATURES

- Energy analysis of each single load
- Energy bill evaluation
- Alarms control with automatic e-mailing and SMS management
- Modular housing to build the instrument according to the real application needs
- Modbus (RTU and TCP/IP), BACnet (MS/TP and IP) and Ethernet/IP and Profinet DP/VD communication ports available
- Suitable to measure generated and consumed energy, with relevant hour meters
- Easy and error-proof programming
- Fast commissioning, in a few minutes, thanks to UCS software or Android App freeware

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CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.
### Mining Machinery

#### Our product range

<table>
<thead>
<tr>
<th>3-phase energy analysers</th>
<th>3-phase power transducers</th>
<th>Switching Power Supply</th>
</tr>
</thead>
</table>

#### EM24
- Dimensions: 90 x 72 x 67 mm
- 1-phase and 3-phase energy meters with direct connection
- Current rates up to 65 A
- Class 1 (kWh) acc. to EN62053-1
- Pulse open collector output or Modbus (RTU or TCP/IP) or M-bus (wired or wireless with integrated or external antenna) port

**MAIN FEATURES**
- Direct measurement in a very compact housing to save space
- Enables and simplifies energy cost allocation
- MID Annex D certification available retransmission (optional)

#### CPT DIN
- Dimensions: 83.5 x 45 x 98.5 mm
- DIN-rail housing
- Accuracy 0.5 % (voltage, current)
- Measurement by CT and VT
- Front protection degree IP20
- Analogue, digital, pulse or serial outputs available

**MAIN FEATURES**
- Very compact size power transducer
- Provides: electrical variables set to a PLC to manage compressors and other loads
- Suitable for on-board panel installation

#### SPD
- Output power 5W to 480W
- Universal input range of 110-240VAC, or, up to 370VDC
- Short circuit, overload and overvoltage protection
- PFC > 100W
- Approvals/Marks: CE - cULus - cURus - UL1310 Class 2 (up to 90W) - ISA 12.12.1 CLASS I DIV2 - TÜV - CCC

**MAIN FEATURES**
- 150% power boost for up to 3 seconds
- In-built active-PFC
- Parallel connection selection switch

#### SPDM
- Output power 30W to 240W
- Universal input range of 110-240 VAC, or, up to 370 VDC
- Short circuit, overload and over temperature protection
- Plastic and metal enclosures
- Approvals/Marks: CE (all) - cULus (all except 240 W) - cURus (only 120 W) - UL1310 Class 2 (up to 72 W, for 72 W only for 24 VDC models)

**MAIN FEATURES**
- Save up to 20% panel space
- High efficiency and wide operating temperature
- Screw and spring terminal connectors

#### SPDC
- Output power: 120 W / 240W / 480 W
- Universal input 90VAC~264VAC / 127VDC~370VDC
- Output voltage: 120W - 12/24VDC; 240W - 24VDC; 480W - 24/48VDC
- High efficiency >90%
- Approvals/Marks: CE - cULus - cURus

**MAIN FEATURES**
- DC OK signal
- Parallel connection
- Screw, spring or detachable terminal connectors

#### SPUBC / SPUC
- Power supply, UPS and battery charger “All in one” (SPUBC), UPS controller (SPUC)
- 12 or 24 VDC 5 A output (up to 30 A SPUC)
- Power boost up to 2 times rated output, permanent (SPUC)
- Built-in battery status, complete diagnosis (SPUBC)
- Approvals/Marks: CE - cULus (all) - cULus (SPUC only) - TÜV (SPUC only)

**MAIN FEATURES**
- Power supply independent from charger (SPUBC), to be used in addition to 12 or 24 V power supply (SPUC)
- Remote indication for battery operation and battery low
- “Start from battery” and “Empty battery charging” features (SPUBC)
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Zejtun

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Belluno

**LITHUANIA**  
UAB Carlo Gavazzi Industri Kaunas  
Kaunas

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