

A high-speed train with a red and white livery is traveling along a track that curves through a snowy mountain landscape. The train is moving towards the right, and the tracks lead into the distance. The background features steep, snow-covered mountains under a blue sky with some clouds. Overhead power lines and poles are visible along the track.

Compact frequency drives for railway applications

PRODUCT OVERVIEW · GA500 RAILWAY SERIES

VERSATILE DRIVES FOR RAILWAY APPLICATIONS

Compact frequency drives for auxiliary systems and specialised railway machinery - engineered for reliable operation, flexible integration and long service life.

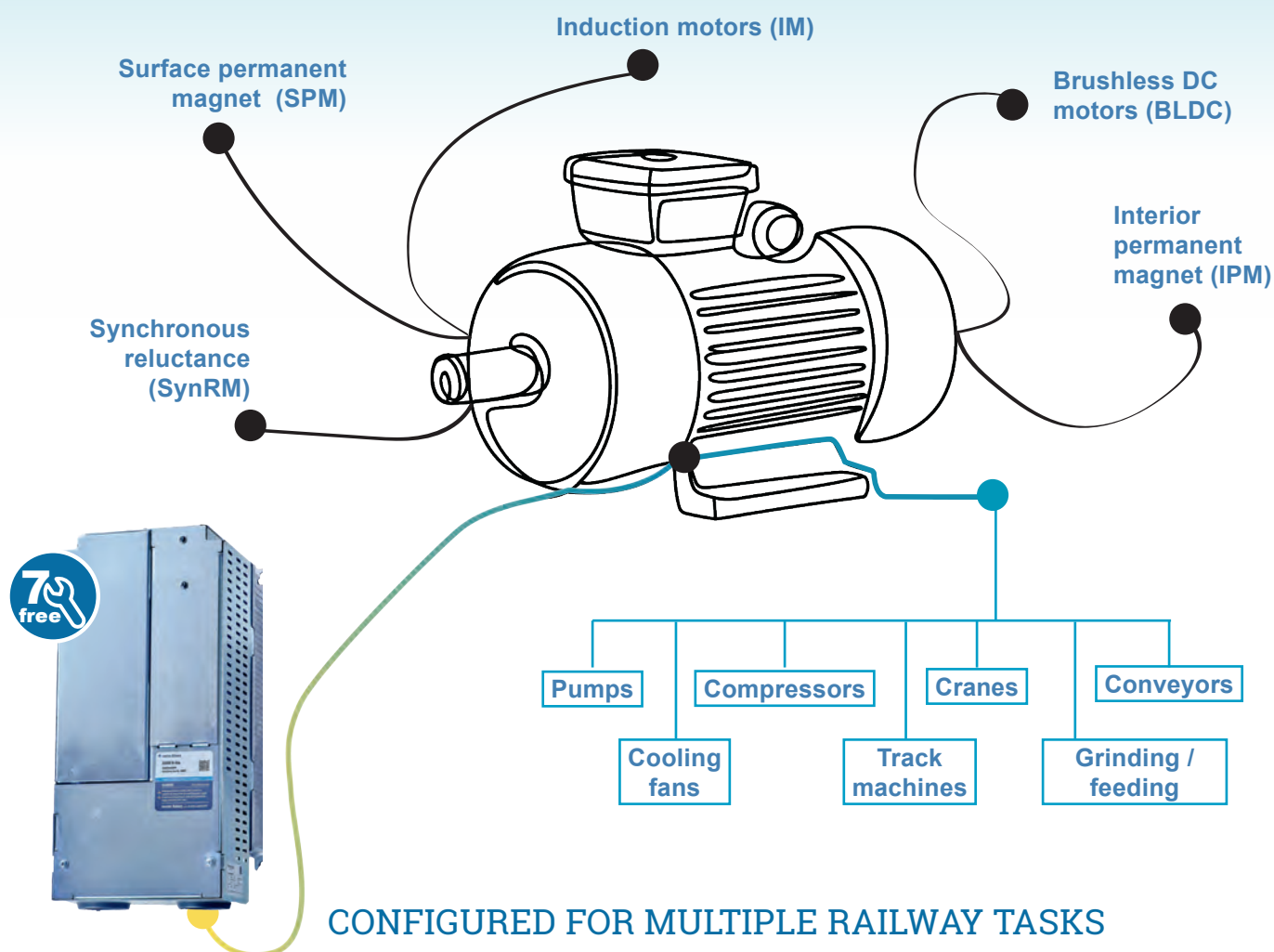
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One single drive platform. Multiple motor technologies.

FLEXIBLE MOTOR CONTROL FOR DIVERSE RAILWAY APPLICATIONS

The GA500 railway series controls a wide range of motor technologies from a single drive platform. This flexibility enables efficient solutions for railway auxiliary systems as well as specialised railway machinery.



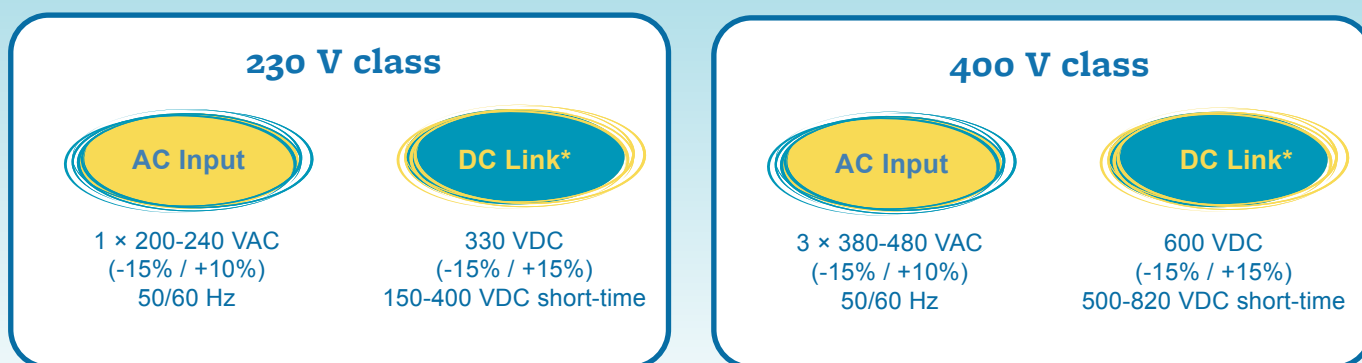
CONFIGURED FOR MULTIPLE RAILWAY TASKS

From auxiliary systems to demanding machinery, the platform can be parameterised for a broad range of motor-driven applications.

FLEXIBLE SUPPLY. PRECISE MOTOR CONTROL.

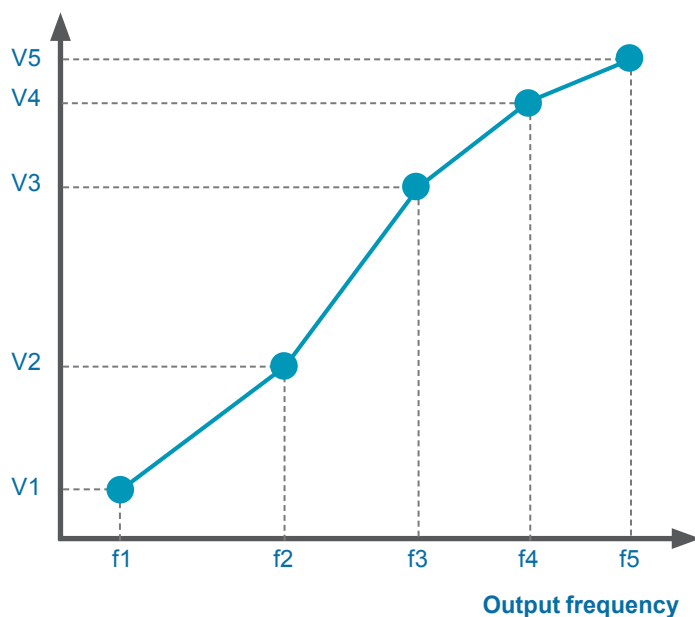
AC input and DC-link supply, always available

All GA500 railway product lines are available in 230 V and 400 V supply classes. Both voltage classes support AC input as well as direct supply through the corresponding DC link.



***Direct DC-link supply:** The drives do not include an integrated step-up or step-down converter. The achievable motor output voltage depends on the applied DC-link voltage.

Output voltage (V)



Freely configurable V/f characteristic

HIGH-PERFORMANCE MOTOR CONTROL

- » Multiple open-loop vector control modes
- » Open-loop zero-speed and torque control for PM motors
- » High switching frequencies for quiet operation

RELIABLE OPERATION IN DEMANDING ENVIRONMENTS

Certified railway performance with additional thermal flexibility

All GA500 railway product lines are certified to temperature class OT1 according to EN 50155. K-line and M-line additionally support up to 60 °C as standard, without power derating.



EXTENDED TEMPERATURE RANGE

Forced ventilation of the drive area allows the temperature range to be extended beyond the EN 50155 baseline. Actual limits depend on installation conditions, airflow, cooling method and duty profile.

OT1 baseline

Up to 60 °C without derating
K-line and M-line

Extended with cooling
and derating assessment

INTELLIGENT CONTROL AND MONITORING FUNCTIONS

From process control to diagnostics – all integrated as standard

- » **Process control:** Integrated PID controller, speed search and automatic restart
- » **Condition monitoring:** Fans, IGBTs, capacitors and charging circuit
- » **Protection:** Stall, overload and overtemperature protection
- » **Diagnostics:** Alarm history, trace functions and USB parameterisation

DRIVEWIZARD 10

Connect via USB for online or offline configuration and process logging. DriveWizard 10 lets you configure, monitor and diagnose your drive – with integrated oscilloscope and automated reporting.



GA500 K-line

THE SIMPLE ONE WITH RAILWAY APPROVAL

ADVANTAGES

- » Cost effective, industry oriented plastic enclosure
- » Meets temperature, humidity and vibration standards
- » Rated power range: up to 22 kW
- » Protection class IP20 for control cabinet mounting
- » Available in 230 V and 400 V supply classes
- » AC input or direct DC-link supply



Operating temperature
EN50155, Level OT1



Temperature shock
EN60068



7 years maintenance-
free operation



Vibration | EN61373
Cat. 1/class B



Humidity | EN50155

TECHNICAL DATA

Model	kW	A	W × H × D [mm]	kg	Input voltage	Common data
B010	1.4	6.2	108 × 128 × 154	1.5	230 V class 1 × 200-240 VAC	Direct DC-link supply Output frequency up to 590 Hz Protection IP20 / NEMA
B018	2.4	10.5	168 × 128 × 180	2.9		
4002	0.55	1.8	108 × 128 × 99	0.9	400 V class 3 × 380-480 VAC	
4009	2.5	5.8	108 × 128 × 154	1.5		
4018	5.0	11.4	140 × 260 × 140	3.0		
4023	7.0	15.2	140 × 260 × 140	3.2		
4031	10.0	20.0	180 × 300 × 143	4.6		
4038	12.0	24.7	180 × 300 × 143	4.8		
4044	15.0	28.6	190 × 350 × 204	6.5		
4060	22.0	39.5	190 × 350 × 204	6.5		

The list of the various filter models can be found on page 10.

GA500 M-line

THE ROBUST ONE WITH FIRE PROTECTION

ADVANTAGES

- » Metal enclosure to reduce combustible material and EMC emissions
- » Rated power range: up to 22 kW
- » Available in 230 V and 400 V supply classes
- » AC input or direct DC-link supply
- » IP20 / NEMA 1 for control-cabinet mounting
- » Fulfils the most important railway standards



Operating temperature
EN50155, Level OT1



Temperature shock
EN60068



Vibration | EN61373
Cat. 1/class B



Humidity | EN50155



Fire Protection
EN45545-2, HL3



7 years maintenance-free operation



EMC | EN50121-3-2
with external filter



TECHNICAL DATA

Model	kW	A	W × H × D [mm]	kg	Input voltage	Common data
B010	1.4	6.2	108 × 186 × 185	3.0	230 V class 1 × 200-240 VAC	Direct DC-link supply Output frequency up to 590 Hz Protection IP20 / NEMA
B018	2.4	10.5	168 × 190 × 190	4.0		
4002	0.55	1.8	108 × 186 × 146	2.5	400 V class 3 × 380-480 VAC	
4009	2.5	5.8	115 × 180 × 185	3.0		
4018	5.0	11.4	140 × 300 × 155	4.5		
4023	7.0	15.2	140 × 300 × 145	4.7		
4031	10.0	20.0	180 × 340 × 160	6.6		
4038	12.0	24.7	180 × 340 × 160	6.6		
4044	15.0	28.6	190 × 400 × 215	9.0		
4060	22.0	39.5	190 × 400 × 215	9.0		

The list of the various filter models can be found on page 10.

GA500 S-line

THE MODULAR ONE – HIGHEST FLEXIBILITY WITHOUT RESTRICTIONS

ADVANTAGES

- » Motor power up to 12 kW
- » IP54 or higher
- » Configurable connectors from various suppliers
- » Configurable heat sink: forced- and natural-air cooling, water cooling
- » Configurable DAIOs and fieldbus
- » Optional EMC line-filter
- » Optional motor filters, such as sine filters or motor chokes
- » Easy to install due to plug-in connections



Operating temperature
EN50155, Level OT1



Temperature shock
EN60068



Vibration | EN61373
Cat. 1/class B



Humidity | EN50155



Fire Protection
EN45545-2, HL3



7 years maintenance-free operation



EMC | EN50121-3-2

TECHNICAL DATA

Model	kW	A	Input voltage	Common data
B010	1.4	6.2	230 V class 1 × 200-240 VAC	Direct DC-link supply Output frequency up to 590 Hz Protection IP20 / NEMA
B018	2.4	10.5		
4002	0.55	1.8	400 V class 3 × 380-480 VAC	
4009	2.5	5.8		
4018	5.0	11.4		
4023	7.0	15.2		
4031	10.0	20.0		
4038	12.0	24.7		

**POWER TYPES**

up to 12 kW

230 VAC / 330 VDC
400 VAC / 600 VDC**CONNECTORS**Harting
Phoenix Contact
Customer-specified**FILTERS**EMC line filter
AC line choke
Motor choke
du/dt
sine**COOLING**Natural convection
Forced air
Water cooling**ENCLOSURE**Robust aluminium
≥ IP54
Dimensions per configuration**INTERFACES**Digital and analogue I/O
EtherNet/IP
CANopen
Modbus RTU and TCP

Line filters

MATCHED EMC PERFORMANCE FOR GA500 RAILWAY DRIVES

Matched filter solutions support railway and industrial EMC requirements while providing robust performance under demanding environmental conditions.



FS41785-5-07
5 A
footprint mounted



FS41785-15-07
15 A
footprint mounted



FS41785-25-07
25 A
footprint mounted



FR41785-80-07
60 A
separate mounting

TECHNICAL DATA

Filter type	Max. current	Power supply	Footprint mounted	W × H × D [mm]	kg	Drive model
FS41785-5-07	5 A	3 × 400 VAC	yes*	114 × 169 × 45	0.8	GA50C4009
FS41785-15-07	15 A	3 × 400 VAC	yes*	137 × 304 × 56	1.0	GA50C4018 to 4023
FS41785-25-07	25 A	3 × 400 VAC	yes*	175 × 340 × 65	2.7	GA50C4031 to 4038
FR41785-80-07	60 A	3 × 400 VAC	no	111 × 168 × 44	0.7	GA50C4044 to 4060

*The filter is designed to be installed behind the drive unit (with the same footprint).



Operating temperature
EN50155, Level OT1



Vibration | EN61373
Cat. 1/class B



Fire Protection
EN45545-2, HL3



Temperature shock
EN60068



Humidity | EN50155

“Line filters for the 230 V class are selected according to the application. Please contact us for the appropriate configuration.”

Network integration and local operation

FLEXIBLE COMMUNICATION AND INTUITIVE ACCESS TO YOUR DRIVE

Communication options are available for all GA500 railway product lines and can be selected according to the application and system architecture.

CONTROL SYSTEM CONNECTION

Fieldbus communication options

EtherNet/IP™

CANopen®

Modbus

EXTERNAL GRAPHICAL OPERATOR

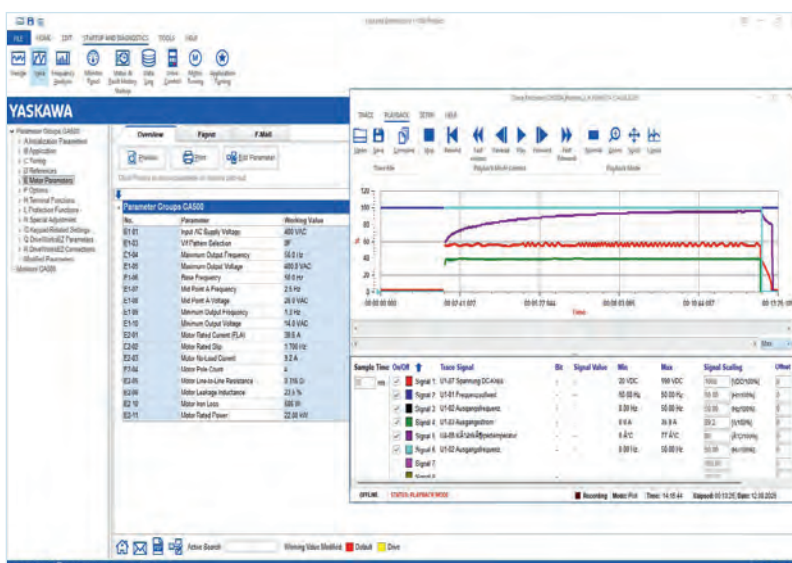
- » Full-text menu
- » Setup Wizard
- » Parameter backup and verification
- » Real-time clock
- » RJ45 connection



ENGINEERING AND DIAGNOSTICS

DriveWizard 10

Configure, monitor and troubleshoot via USB or network connection. See page 5.



“Our frequency drives are supplied as standard with 24 VDC ($\pm 10\%$). An input voltage range compliant with EN 50155 is available as an option.”

ELECTRICAL INTERFACES

Shared control platform for GA500 M-line and K-line

230 V class

1 × 200-240 VAC

400 V class

3 × 380-480 VAC

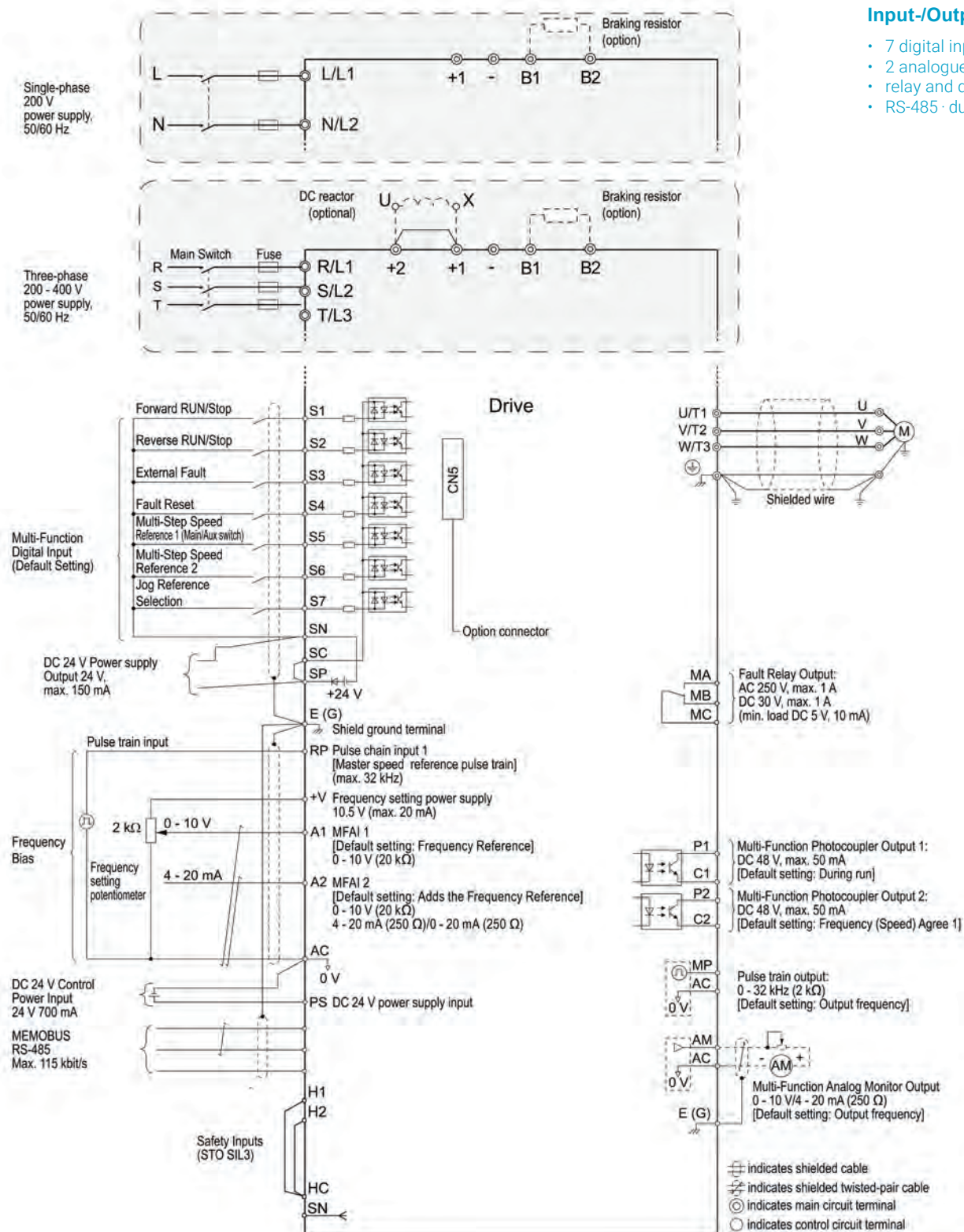
Direct DC-link supply

330 VDC nominal · 600 VDC nominal

No integrated step-up or step-down converter

Input-/Output options:

- 7 digital inputs
- 2 analogue inputs
- relay and digital outputs
- RS-485 · dual-channel STO



Railway qualification overview

STANDARD QUALIFICATION, SYSTEM-LEVEL PERFORMANCE AND PROJECT-SPECIFIC OPTIONS

The qualification scope depends on the product line, selected components and final configuration.

Standard	Description	GA500 K-line	GA500 M-line	GA500 S-line	Option: Line filter
EN 50155	Temperature and climate level	OT1	OT1	OT1	OT1
	Low storage temperature	-40 °C	-40 °C	-40 °C	-40 °C
EN 60068	Temperature shock	✓	✓	✓	✓
EN 61373	Shock and vibration protection	Cat.1 / Class B	Cat.1 / Class B	Cat.1 / Class B	Cat.1 / Class B
EN 50121-3-2	EMC (railway)	✗	(✓) ¹	✓	✓
	• Conducted and radiated emissions	✗	(✓) ¹	✓	✓
	• Immunity to conducted and radiated emissions	✗	(✓) ¹	✓	✓
	• Immunity to overvoltage and transients	✗	(✓) ¹	✓	✓
EN 61800-3	EMC (industry)	(C1) ¹	(C1) ¹	C1	C1
EN 45545-2	Fire protection (hazard level)	✗	HL3 ²	HL3 ²	HL3

Legend:

- ¹ In combination with a suitable FS line filter
- ² Taking into consideration the mounting situation according to the installation instructions

Scope notes

K-line: with a suitable line filter, fulfils industrial EMC and the conducted-emission limits of EN 50121-3-2, but does not have a complete railway EMC qualification.
M-line: railway EMC performance is achieved as a defined system with the specified line filter and documented installation concept.
S-line: OT1 minimum and EN 61373 Category 1, Class B from the baseline. EMC, fire safety and higher requirements are project-specific.



SwissDrives Engineering

APPLICATION ENGINEERING AND LIFECYCLE SUPPORT
FOR RAILWAY DRIVE SYSTEMS

SwissDrives combines proven frequency drives technology with application engineering, mechanical design and system integration. We support railway auxiliary systems and specialised machinery from initial concept through to lifecycle service.

Application engineering

Motor and drives selection, dimensioning, parameterisation, interfaces, cooling concepts and mechanical integration.

Verified for railway environments

Solutions are verified against selected railway requirements. The exact scope and applicable editions are shown in the qualification overview.

Preventive maintenance and refurbishment

Ageing components and wear parts are assessed and replaced where required. Each serviced unit undergoes a documented functional test.



SOLUTION TYPES

Engineered to fit your installation



Application-specific drives

Designed for restricted installation spaces and defined railway interfaces.



Customer-specific drives

Compact enclosed design with plug-in connectors and application-specific integration.



Motor-mounted drives

Decentralised drive concept for compact installation directly at the motor.

PROVEN IN THE FIELD

An application-specific solution for roof-mounted equipment

For the Giruno high-speed trainset, SwissDrives engineered a compact, application-specific enclosed drive solution for roof-mounted installation. Limited installation space, combined with demanding thermal and mechanical conditions, called for a robust design with reliable transformer cooling.

- » **Compact integration:** Customer-specific design optimised for restricted roof equipment space
- » **Lifecycle support:** Preventive maintenance, refurbishment and documented functional testing



The Giruno from SBB has been in service on the Basel – Zurich – Milan route since the end of 2019



ABOUT US

SWISSDRIVES – MORE THAN DRIVE TECHNOLOGY

As a Yaskawa partner, we offer more than high-performance frequency drives for the railway sector – our full range spans the entire spectrum of industrial automation, from servo drives to robotics and welding technology.

In particular, our robotic welding solutions are an increasingly sought-after topic for railway suppliers and vehicle manufacturers.

We see ourselves as a high-end partner for forward-thinking plant and machine builders, cultivating long-term, collaborative relationships with our customers. We look forward to providing straightforward consultation — and are happy to discuss topics beyond drive technology.



LET'S ENGINEER YOUR RAILWAY DRIVE SOLUTION.

From standard railway drives to application-specific stand-alone solutions, SwissDrives supports your project from initial concept to lifecycle service.

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 Brochure

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