
ENVILINE™ TCR

Traction Controlled Rectifier
for DC rail transportation



ENVILINE TCR – Traction Controlled Rectifier

Maximizing the distance, balance and stability of the DC line

Three-phase power supply is the most often used electricity source nowadays. However, most urban public transportation infrastructures powered by electrical energy utilize direct current. Therefore to be able to power trains, metros, trams and trolleybuses, it is necessary to use an electronic power converter — traction rectifier, converting alternate current into direct current.

However, simple AC to DC conversion offered by the most popular diode rectifiers is not enough in some applications where the voltage versus current characteristic has to be adjusted to meet individual needs. This feature is offered by ENVILINE Traction Controlled Rectifiers. The DC voltage control allows longer distance between substations, reduces losses in rolling stock and can even prevent interruptions caused by undervoltage. ABB has vast experience in the design, construction and start-up of controlled rectifiers used in many branches of industry as well as in traction applications.

The thyristor converters can also be used as inverters to recuperate energy of braking trains back to the AC network. ABB offers four-quadrant converters to provide bidirectional energy flow in the substation. Controlled converters could be used in parallel to the existing diode rectifiers.

Key benefits

- **High reliability and flexibility**
ABB's vast experience, proven thyristor technology and high performance control system minimize risks, providing high reliability and high flexibility.
- **Cost effective solution**
ABB's flexible and tailored approach is optimized to minimize the total solution cost.
- **Dedicated support**
ABB's localized support, along with global footprint, mitigates technical and executional risks for customers.
- **Over 50 years of experience**

Key features

- Proven robust technology
- Minimal operational and maintenance costs
- Easy maintenance
- Natural cooling or forced adaptive cooling
- High overload capability
- High level of conformity with individual requirements as well as international standards
- Compatible with all DC supply systems
- Rectifier, Inverter or bidirectional units

General information

ENVILINE TCR converters are compliant with EN 50328, IEC 60146 and offer overload class according to these standards. These converters are designed for natural cooling or adaptive forced cooling that ensures low noise and demands very little maintenance.

Protection philosophy

Rectifier design provides following levels of main circuit protection:

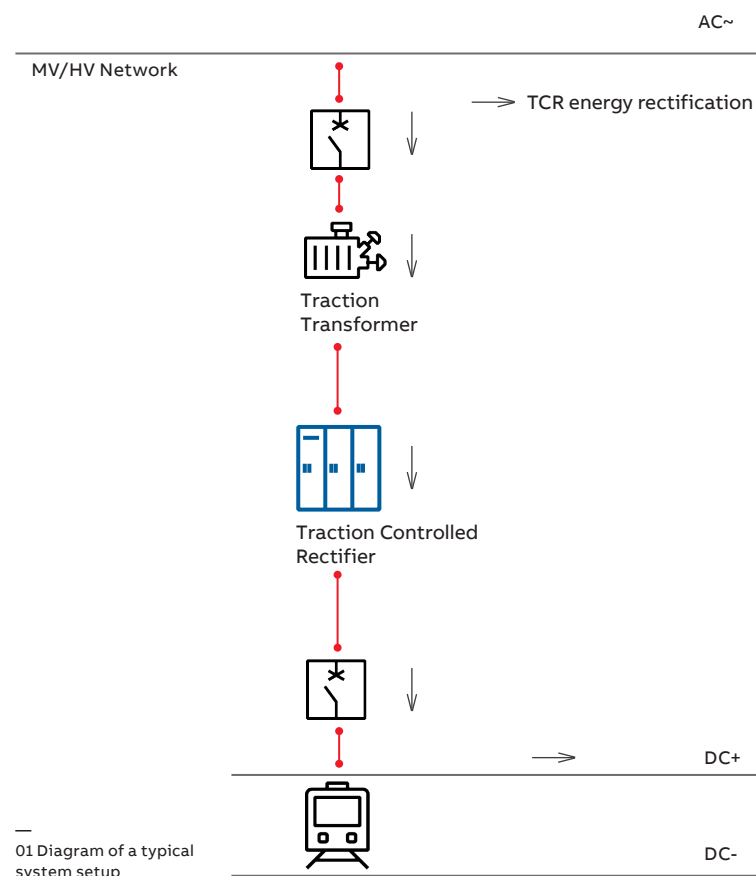
- The overload current versus time characteristic (thermal model of converter)
- The internal high speed current control loop, which limits and stabilizes the output current at pre-set level and time (DC voltage is reduced respectively)

01 Traction
Controlled Inverter



ENVILINE

Reliability and efficiency on track



- Immediate overcurrent protection (firing pulses blocking)
- Fuses constitute protection against shorted thyristors and final protection against DC short circuit current

Each thyristor module is protected by an RC circuit. Two levels over temperature protection and many other protective options are available.

Control and diagnostics

The control and diagnostic system is based on AC 800PEC, which provides the optimum solution for the high-speed control requirements of power converters. The AC 800PEC is a high performance controller belonging to ABB's AC 800 product line. The controller combines a very powerful CPU and a large Field-Programmable Gate Array, which allows the AC 800PEC to control demanding power electronics systems. The PP800 family touch panel is used for local control and diagnostics.

Additional equipment

A variety of additional equipment can be added like inter-phase transformer, DC disconnecting switch, smoothing reactor(s), ANSI relays, communication, interlocks, door limit switches and many others.

Technical data	ENVILINE TCR 750	ENVILINE TCR 1500	ENVILINE TCR 3000
Nominal TPS (Traction Power Supply)	600 / 750 V _{DC}	1500 V _{DC}	3000 V _{DC}
Converter power range	0.5 to 5 MW	0.5 to 8 MW	1 to 8 MW
Pulsation	6, 12, pseudo 24 pulses	6, 12, pseudo 24 pulses	6, 12, pseudo 24 pulses
Overload capability	Class VI (others on request)	Class VI (others on request)	Class VI (others on request)
Operating voltage range	500 to 1000 V _{DC}	1000 to 2000 V _{DC}	2000 to 4000 V _{DC}
Efficiency	Typically > 99.5 %	Typically > 99.5 %	Typically > 99.5 %
Cooling	Air natural / Air forced	Air natural / Air forced	Air natural / Air forced
Storage temperature	-20° to 60°C	-20° to 60°C	-20° to 60°C
Operating temperature	0° to 40°C (-20° to 50°C optionally)	0° to 40°C (-20° to 50°C optionally)	0° to 40°C (-20° to 50°C optionally)
Maximum temperature (with derating)	50° C	50° C	50° C
Elevation	1000 m (higher with derating)	1000 m (higher with derating)	1000 m (higher with derating)
Enclosure	IP00, IP20 - IP33	IP00, IP20 - IP33	IP00, IP20 - IP33
Remote access	CAN / IEC61850 / MODBUS TCP/IP	CAN / IEC61850 / MODBUS TCP/IP	CAN / IEC61850 / MODBUS TCP/IP
Redundancy	Optional	Optional	Optional
Application	Rectifier, Inverter, 4Q converter	Rectifier, Inverter, 4Q converter	Rectifier, Inverter, 4Q converter
Standards	EN 50328 / IEC 60146 / ANSI	EN 50328 / IEC 60146 / ANSI	EN 50328 / IEC 60146 / ANSI

ABB Sp. z o.o.

27, Placydowska Str.
95-070, Aleksandrow Lodzki, Poland
Phone: +48 42 24 00 100
Fax: +48 42 29 93 340
Email: PL-enviline@abb.com

ABB Inc.

800 Hymus Blvd, St- Laurent
Quebec, Canada H4S 0B5
Phone: +1 438 843 6780
Email: ep.support@ca.abb.com

ABB Sécheron SA

Rue des Sablières 4-6
CH-1211 Genève, Switzerland
Phone: +41 58 586 22 11
Fax: +41 58 586 23 05
Email: info.abbsecheron@ch.abb.com

ABB Australia Pty Limited

Bapaume Rd
Moorebank, NSW, 2170, AUSTRALIA
Phone: +61 2 9738 2277
Fax: +61 3 8577 7001
Email: contact.centre@au.abb.com

abb.com/railway

ABB Malaysia Sdn. Bhd.

Lot 608, Jalan Lagoon Selatan,
Bandar Sunway
47500 Subang Jaya, Selangor Darul Ehsan,
Malaysia
Phone: +603 5628 4888
Fax: +603 5631 2598
contact.center@my.abb.com

ABB France

465, av. des Pre Seigneurs - La Boisse
F-01124 Montluel cedex, France
Phone: +0 810 020 000
Email: sales.enviline@fr.abb.com

ABB Xiamen Switchgear Co., Ltd.

ABB Industrial Park, Torch High-Tech Zone,
No. 319, Xiamen, Fujian, P.R.China
Phone: +86 0592 602 6033
Fax: +86 0592 603 0505
Zip Code: 361006
Service Hotline: 800-820-9696 400-820-9696

ABB ELEKTRİK SANAYİ A.Ş.

Organize Sanayi Bölgesi, 2.Cadde No:16 Yukarı
Dudullu
34776 Ümraniye İstanbul
Phone: 0216 528 22 00
Fax: 0216 365 29 46
Email: contact.center@tr.abb.com