

**Zeitschrift:** Swiss express : the Swiss Railways Society journal  
**Herausgeber:** Swiss Railways Society  
**Band:** 3 (1991-1993)  
**Heft:** 9 [i.e. 10]  
  
**Register:** Glossary

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# Glossary

This glossary was originally prepared by the President as a footnote to his article on converter locomotives. At the editor's request, he had added the German equivalents of the English terms, this we trust will help members translate articles in *Eisenbahn Amateur* and other German language texts.

**Adhesion : *Haftreibungskraft***

Friction force with which a locomotive adheres to the rails.

**Adhesion coefficient : *Reibwert***

Tractive effort/weight ratio obtained by dividing the tractive effort in kg by the adhesion in kg. With modern locomotives this coefficient is in the range 0.35-0.38.

**Amplitude : *Amplitude***

The highest value of the variable size of an electric wave.

**Ampere : *Stromstärke***

Unit of measurement of the strength of an electric current.

**Asynchronous motor : *Asynchronmotor***

Electric motor for rotary current. The latter produces revolving magnetic fields in the excited field windings. The short circuited windings of the rotor follow this rotating magnetic field. The 3 phases of the supply are displaced by 120°.

**Brake : *Bremse***

A device for (hopefully) stopping a train at the desired place, and for holding it there.

**Brushes : *Kollektorbürsten***

Motor components made of carbon or metal, used to feed current to the commutator.

**Collector : *Kollektor***

Also commutator, reverses current in motors.

**Commutator : *Kommutator***

See collector.

**Conventional locomotive :*****bisherige Lokomotive***

Term used for locomotives using single phase AC at 16<sup>2</sup>/<sub>3</sub> cycles per second; the conventional Swiss (and German + Austrian) approach.

**Converter locomotive :*****Umrichter-Lokomotive***

Electric locomotive where the supply current is converted once or twice (ie to DC or 3-phase AC).

**Cycles per second (CPS) :*****Frequenz pro Sekunde***

Describes one period in which AC flows first in one and then in the opposite direction. 16<sup>2</sup>/<sub>3</sub> CPS means a current flowing 16<sup>2</sup>/<sub>3</sub> times per second forth and back again.

**Direct motor locomotive :*****Direktmotor-Lokomotive***

Term used for a locomotive where the current is not converted, but consumed directly, in the case of Swiss 16<sup>2</sup>/<sub>3</sub> cycle supply, with transformer reduced voltage.

**Energy balance : *Energiebilanz***

The energy consumed in a given time with a given load on a given railway line. The lower the consumption of idle power and energy for auxiliary equipment and the higher the recuperation of energy, the better the energy balance.

**Four quadrant regulator :*****Vierquadrantensteller***

Supply side converter with GTO-thyristors for regulating the intermediate circuit's voltages and shaping the supply side alternating current in a sinusoidal form to obtain any desired temporal displacement between the voltage and the phase (control of true and idle power).

**Frequency : *Frequenz***

The number of cycles per second.

**Gate turn off thyristor :*****Beliebig ein- und abschaltbarer Thyristor***

Special semiconductor which is turned on and off at any required moment of the half wave. Modern thyristors switch with a

frequency of over 200 cycles per second.

**Harmonic waves : *Oberwellen-Verzerrungen***

Waves with frequencies of multiples of the basic frequency. These often interfere with the frequencies of signal and communication circuits.

**HP : *PS (Pferdestärke)***

Unit of work equalling 75 mks, ie, the power needed to lift 75 kg 1 metre in one second. Replaced since 1 January 1978 by the Watt. 1 HP = 735.5 W, or 1 KW = 1.36 HP.

**Idle power : *Blindleistung***

Share of power which is not being consumed by an electric appliance operating on AC.

**Intermediate circuit : *Zwischenkreis***

This stabilised the direct current voltage by smoothing out the  $33\frac{1}{3}$  frequency. serves as an accumulator for the compensation of currents between the input and output converters in both directions.

**kW : *Kilowatt***

1 kW = 1000 Watt, the measuring unit for electric power. 1 W = 1 V x 1 A. The power of an electric locomotive can be calculated by the formula:

$kN \times \text{Speed (km/h)} / 3.6$

For example:

$300 \times 84 = 22500 / 3.6 = 7000 \text{ kW}$  (BLS converter locomotive).

**kN : *Kilonewton***

Kilo Newton or 1000 Newtons, the measuring unit for force. 1 N produces an acceleration of  $1 \text{ m/s}^2$  on a body on 1 kg. Used also to indicate the tractive effort of a locomotive, 300 kN = 30000 kg. The exact value is 29700 but a factor of 10 is acceptable according to UIC.

**Macroslid range : *Makroschlupf-Bereich***

The range of wheel revolutions or peripheral speed just before slipping. This depends on the rail conditions, type of motor, axle load distribution and anti-skid counter measures.

**Microprocessor control :**

***Mikroprozessor-Steuerung***

Integrated circuits acting as central pro-

cessing units (CPU) of small computers. In Class 460, used for all locomotive functions.

**Motor power : *Motorleistung***

Power measured in kW at the motor shaft; this is higher than the engine power measured at wheel rims, due to losses in the drive unit.

**Phase angle control : *Anschnittsteuerung***

The thyristors of rectifier locomotives produce a wave shaped direct current (also called mixed current), which can be 'cut' by the turn-on electrode at any moment and angle of the half wave. The higher the sector covered by the angle, the higher the power.

**Pulsing torque : *pulsierendes Drehmoment***

Due to the pulsations of AC, the torque is pulsing at double the supply frequency. The torque is the power turning the body, for example, if you touch a turning shaft, the torque tries to turn your hand. which is why this is not a very good idea.

Torque equals the turning force times the vertical distance from the turning axis ( $T = \text{radius} \times \text{force}$ ).

**Rectifier locomotive :**

***Gleichrichter-Lokomotive***

Locomotive in which the AC supply is converted and rectified to DC (direct current).

**Recuperative brake : *Rekuperationsbremse***

An electric brake in which the motors act as generators. Converter locomotives have the same brake force as the starting tractive force.

**Self steering, shifting action drive bogie : *selbselenkendes Drehgestell mit Schiebelagerantrieb***

A bogie with low unsprung mass and transversely decoupled axles, trapezoidally arranged links between the motor and a central girder to provide radial adjustment of the wheels.

**Series wound commutator motor :**

***in Serie geschalteter Kollektor-motor***

A motor consisting of a fixed field, rotor, commutator and brushes, wound in series to



obtain a high starting torque.

### Single phase alternating current (AC) :

#### *Einphasen-Wechselstrom*

Produced by special generators in power plants for railway traction.  $16\frac{2}{3}$  cycles AC was chosen by the SBB at the beginning of the century because the arcing problems with commutators are easier to control than with the industrial 50 cycles supply.

### Tap changer : *Stufenschalter*

Connects the transformerappings on the secondary windings with the terminal motor feeders. It serves to regulate voltages and therefore power and speed.

### Thyristor : *Thyristor, Halbleiter*

A semiconductor that works as a contactless switch, it conducts electricity only when an impulse is applied to an electrode.

### Tractive effort : *Zugkraft*

The force which a locomotive produces when hauling a train. It is given in N or kN and measured at the wheel rims.

### Three phase alternating current :

#### *Dreiphasen-Wechselstrom*

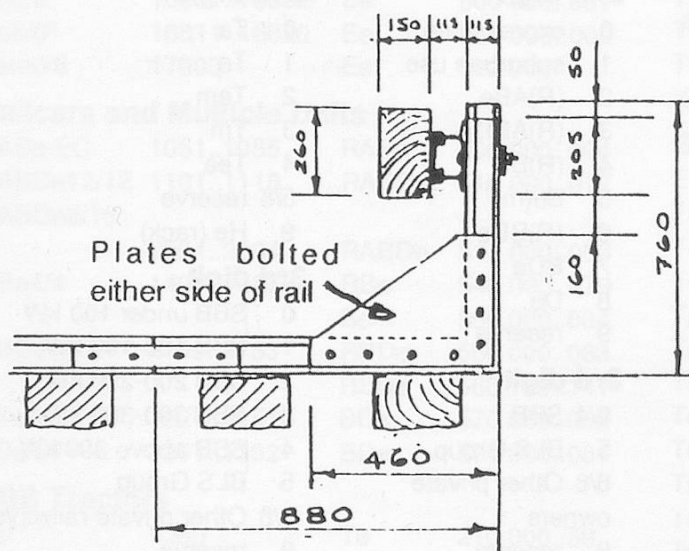
This is generated at the industrial frequency of 50 cps in Europe, when applied interlinked in three phases displaced at  $120^\circ$  equals rotary current.

### True power : *Wirkstrom*

Product of the current, voltage and power factor; the share of power available for conversion to mechanical work.

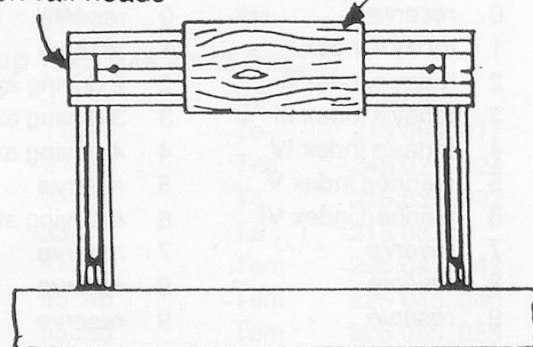
### Voltage, volt : *Spannung*

Unit of measurement for the electromotive force (EMF) with which the current is flowing. 1 Volt = 1 Amp x 1 Ohm.

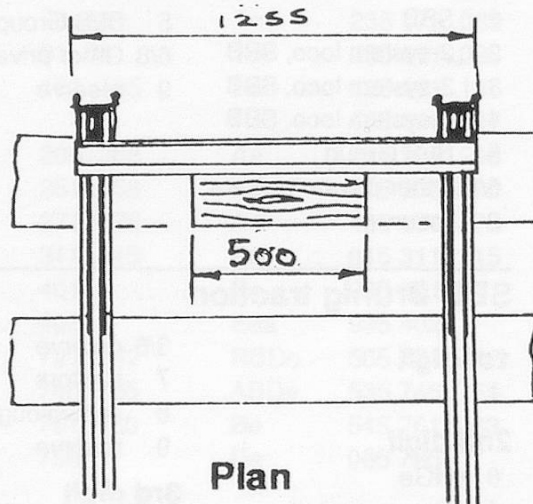


Side Elevation

Small spacer plate welded between rail heads  
Wood block bolted to cross rails



Front Elevation



Plan

**Disentis Station**  
**Buffer stops**  
**to carriage siding**  
adjacent to FO carriage shed  
Drawing by David Yule  
not to scale