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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 $16\frac{2}{3}$ 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. $16\frac{2}{3}$ CPS means a current flowing $16\frac{2}{3}$ 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 $16\frac{2}{3}$ 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 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.

Traction 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

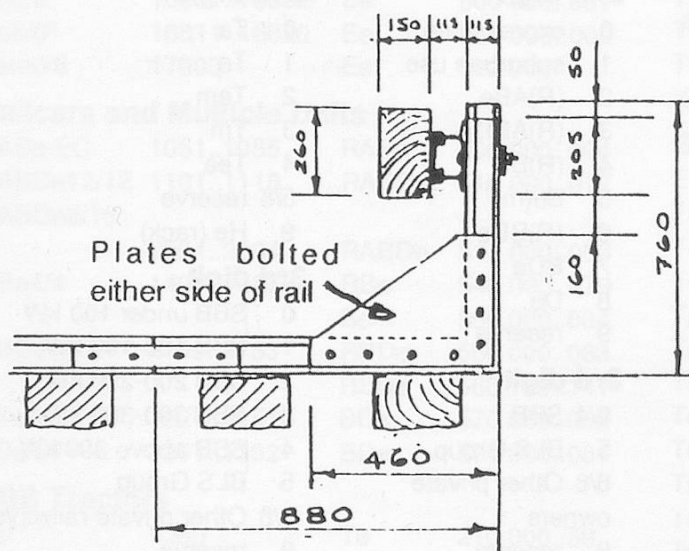
This is generated at the industrial frequency of 50 cps in Europe, when applied interlinked in three phases displaced at 120° equals rotary current.

True power : *Wirkstrom*

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

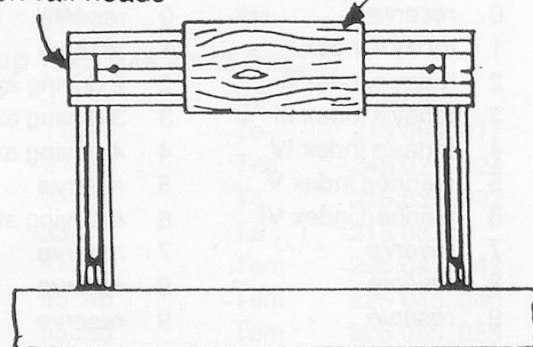
Voltage, volt : *Spannung*

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

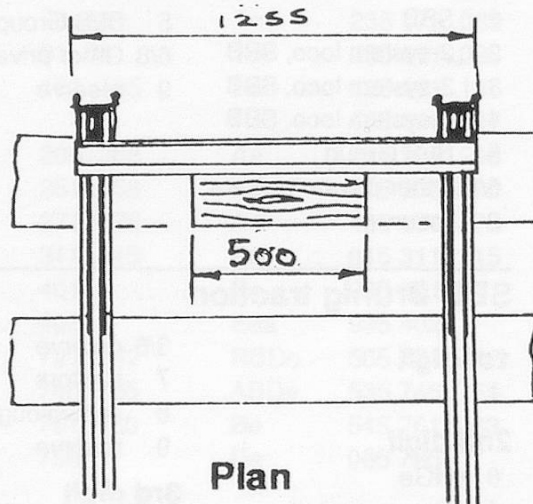


Side Elevation

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