



DC SIMOTRAPS Required Input Data Format for Multi-Train Electrodynamic simulation

Applicable to SIMOTRAPS Rev: 9.0.0 to 10.1.2

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1 Track Plan and Profile

Plan and profile is required to retrieve the following information:

1.1 Station positions and operation data

position [m]	Station name	UpTrack dwelltime [s]	DownTrack dwelltime [s]	Headway [s]	Station Length (m)	UpTrack Passenger Weight (Kg)	DownTrack Passenger Weight (Kg)

It is required to enter Name of different stations with their position, dwell time in each direction per station, Headway is required just for the first column as it is not variable in different stations, station length and if passenger weight is available in each station per direction, SIMOTRAPS can simulate with considering passenger weight instead of considering full load passenger for all stations.

1.2 Speed Limit information

The limitation of the speed shall be specified for SIMOTRAPS to be able to consider for the trains along the line.

Position [m]	speed limit [km/h]

1.3 Slope data

The next important required data than can be retrieved from plan and profile of the line is slope data. It shall be filled in the below table.

Position [m]	slope [%]

1.4 Track Curve radius data

As the curves along the line lead moving resistance for the trains, it is required to have the curve radius data from plan and profile document.

position [m]	radius [m]

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2 Traction Substation required data

2.1 Traction Substation Capacity and Name

SIMOTRAPS get the traction substation place, rectifier numbers in each substation, Rectifier no load voltage, rectifier full load voltage, full load current and insulation gap position (for 3rd rail) in the track.

name	rectifier [-]	Ud0r [V]	UdNr [V]	IdNr [A]	Insulation Gap Position [m]

2.2 Cable feeders position and resistance

SIMOTRAPS needs to know the resistance of positive and negative feeders in addition to the position of their connection place to the 3rd rail and running rails.

feedname	position [m]	Pfeed Res [Ohm]	Nfeed Res [Ohm]	sst_name

3 Rolling Stock input data

The following data are required for each type of train in the simulation.

3.1 Train Electrical Data

Train Electrical data includes train nominal voltage, minimum and maximum working voltages, amount of Auxiliary power consumption and specifying that the train can regenerate power to the DC network or not?

name	type [M/T/B]	Uvn [V]	Uvmin [V]	Uvmax [V]	Paux [kW]	Regen [Y/N]

3.2 Tractive and Braking Effort curves

SIMOTRAPS able to accept tractive and braking effort curves in two different ways. The first way is filling some efforts for standard curves and second way is numeric values in different speeds.

c1 [kN]	c2 kN/[km/h]	c3 kN/(km/h)^2	v1 [km/h]	v2 [km/h]	c4 [kN]	c5 [kN/(km/h)]	v3 [km/h]	v4 [km/h]	vmax [km/h]

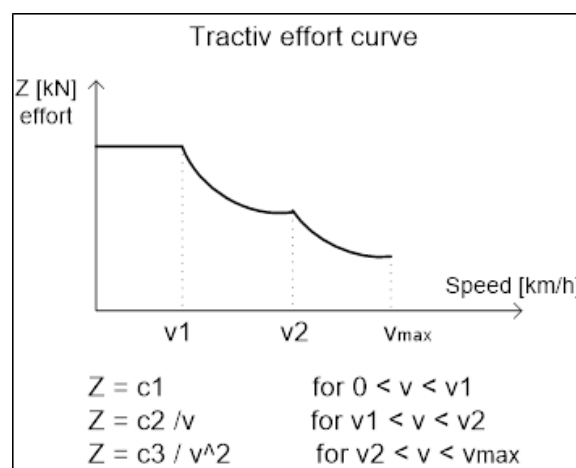
c1 : Constant defined as in the tractiv effort diagram [kN]

c2 : Constant defined as in the diagram above [kN*km/h]

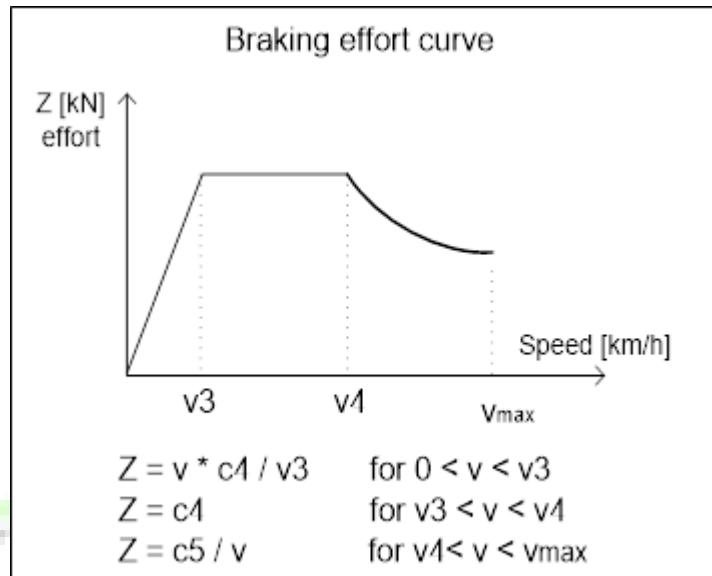
c3 : Constant defined as in the tractiv effort diagram [kN*(km/h)^2]

v1 : Constant defined as in the tractiv effort diagram [km/h]

v2 : Constant defined as in the tractiv effort diagram [km/h]



- C6 :** Constant defined as in the breacking effort diagram [kN]
- C7 :** Constant defined as in the breacking effort diagram [kN*km/h]
- V3 :** Constant defined as in the breacking effort diagram [km/h]
- V4 :** Constant defined as in the breacking effort diagram [km/h]



Note: in the train's traction and braking efforts are not fit in the standard curve format, it is possible to deliver the efforts in different speeds from zero to maximum train speed to the SIMOTRAPS software.

3.3 Train moving resistance

Train moving resistance normally can be get from davis formula:

$$R_{av} = f_1 + f_3 \cdot v + f_5 \cdot v^2 \quad [N]$$

$$R_{av} = f_2 + f_4 \cdot v + f_5 \cdot v^2 \quad [N/t]$$

Normally, rolling stock specifications provide davis formula in N or N/t units. SIMOTRAPS is able to accept both units as below table.

f1 [N]	f2 [N/t]	f3 [N/kph]	f4 [N/t/Kph]	f5 [N/kph^2]

3.4 Other Mechanical parameters

There are some other train parameters that are requires for SIMOTRAPS input data:

Masse [t]	accmax [m/s ²]	accmin [m/s ²]	Rmf [-]	length [m]	Load [t]	Mechanic Brake [KN]	Jerk

Mass [t]: Empty train mass in ton
 Accmax[m/s²]: Train's Maximum propulsion acceleration.
 Accmin[m/s²]: Train's maximum negative acceleration in braking.
 Rmf: Train's Rotating Mass Factor
 Length [m]: Train's length in meter
 Load [t]: Maximum total passenger's weight in ton. Usually AW3
 Mechanic Brake [KN]: Train's maximum pneumatic/ hydraulic brake force in KN
 Jerk: Maximum permissible Jerk for passenger comfort

3.5 Electrical and mechanical efficiency

SIMOTRAPS needs to have train's mechanical and electrical efficiency percent in different speeds.

speed [km/h]	Electrical efficiency [%]	Mechanical efficiency [%]

4 Power transmission/ Running rail Electrical parameters

4.1 Resistance parameters

The required data as are presented in below table.

The running rail to ground resistance is the electrical resistance of one track to earth per km.

The second column is the longitudinal resistance of power transmission (OCS / 3rd Rail) per km.

The third column is the running rail resistance of one track in Ω/Km .

Rail To Ground Resistance(Ω)	OCS/3 rd Rail Resistance(Ω/Km)	Rail Resistance(Ω/Km)

4.2 OCS temperature calculation required input data

SIMOTRAPS needs the following data from all parallel conductors that transmit power to the train.

For example, if the OCS system consists of two messenger and one contact wire, the following table shall be filled in three different rows that present the conductors required specifications.

Parallel Conductor No.	Contact/ Messenger/ Third Rail	Material	Surface of the Section [mm ²]	Weight [Kg/Km]	Resistance [Ohm/Km]	Conductor Density [gr/cm ³]	Heat Capacity [J/Kg.C]	Temperature coefficient of resistance [1/K]	Environment Temperature [C]