DOPRAVNÝ ÚRAD
TRANSPORT AUTHORITY

Document title:	**List of sensors of axes operating on Železnice Slovenskej republiky (ŽSR) lines and reference document for assessing the electromagnetic compatibility (EMC) of rolling stock with them**

NRD Section:	**8.4.2.2.1**
Name of the parameter:	**Electromagnetic fields/induced voltages on/under the vehicle**

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Sensor type	Manufacturer	EMC Reference Document
ZK24	ALTPRO	Method of evaluation according to EN 50592:2016 with the limits below
ZK24-2	ALTPRO	Method of evaluation according to EN 50592:2016 with the limits below
ZK24-2FM	ALTPRO	ERA/ERTMS/033281 Ver. 5
RSR110	FRAUSCHER	ERA/ERTMS/033281 Ver. 5
RSR122	FRAUSCHER	Method of evaluation according to EN 50592:2016 with the limits below
RSR123	FRAUSCHER	ERA/ERTMS/033281 Ver. 5
RSR123 GS06	FRAUSCHER	ERA/ERTMS/033281 Ver. 5
RSR180	FRAUSCHER	ERA/ERTMS/033281 Ver. 5
RSR180 GS05	FRAUSCHER	ERA/ERTMS/033281 Ver. 5
HIC43	Siemens	ERA/ERTMS/033281 Ver. 5
EN 30	ALCATEL	ERA/ERTMS/033281 Ver. 5
UniAS[2]	VOESTALPINE	ERA/ERTMS/033281 Ver. 5

EMC limits for RSR122 sensors:

Sensor type	Medium frequency, tolerance range kHz	Filter bandwidth 3 dB/20 dB kHz	The order of the filter used for the evaluation (Butterworth)	X-directional magnetic field (RMS) dBµA/m	Magnetic field in the Y direction (RMS) dBµA/m	Magnetic field in direction Z (RMS) dBµA/m	Integration period T_{int} ms
RSR122 SYS1	1130 ± 15	± 3,0/± 10,0	4	99,7	78,6	61,7	2
RSR122 SYS2	1035 ± 15	± 3,0/± 10,0	4	99,8	78,3	61,8	2

Affected parts of ŽSR network equipped with sensors RSR122:

Railway line number for ŽSR	Section of the line	Station
127C	Bratislava-Nové Mesto – Bratislava-Ústredná nákladná stanica	
118D	Radvaň – Banská Bystrica	
118D		Banská Bystrica
124A		Nové Košariská
124A		Kvetoslavov
124A		Lehnice
124A		Orechová Potôň
124A		Dunajská Streda
124A		Zlatná na Ostrove
124A		Zemianska Olča
124A		Veľký Meder
124A		Dolný Štál

EMC limits for ZK24 sensors:

Sensor type	Medium frequency, tolerance range kHz	Filter bandwidth 3 dB/20 dB kHz	The order of the filter used for the evaluation (Butterworth)	X-directional magnetic field (RMS) dBµA/m	Magnetic field in the Y direction (RMS) dBµA/m	Magnetic field in direction Z (RMS) dBµA/m	Integration period T_{int} ms
ZK24 (ch-L)	166,9 ± 5,0	± 0,48/± 3,82	2	63,4	59,3	60,8	2,2
ZK24 (ch-H)	190,7 ± 5,0	± 0,42/± 3,55	2	63,2	60,8	62,1	2,2

Affected parts of ŽSR network equipped with ZK24 sensors:

Railway line number for ŽSR	Section of the line	Station
114C	Turzovka – Vysoká nad Kysucou	
126C	Zohor – Vysoká pri Morave	
129A	Čachtice - Vaďovce	

EMC limits for ZK24-2 sensors:

Sensor type	Medium frequency, tolerance range kHz	Filter bandwidth 3 dB/20 dB kHz	The order of the filter used for the evaluation (Butterworth)	X-directional magnetic field (RMS) dBµA/m	Magnetic field in the Y direction (RMS) dBµA/m	Magnetic field in direction Z (RMS) dBµA/m	Integration period T_{int} ms
ZK24-2 (ch-L)	166,9 ± 5,0	± 0,48/± 3,82	2	109	110	108	2,2
ZK24-2 (ch-H)	190,7 ± 5,0	± 0,42/± 3,55	2	108	110	108	2,2

Affected parts of ŽSR network equipped with ZK24-2 sensors:

Railway line number for ŽSR	Section of the line	Station
119A	Šahy - Tupá	

Demonstrating the compatibility of a rail vehicle with the above-mentioned limits of the ZK24, ZK24-2, and RSR 122 sensors can be achieved using one of the following procedures:

a) Documented proof of compatibility through an operational test on the ŽSR network*);

b) Documented proof of compatibility through a rail vehicle testing centre under the following conditions:

   i. The rail vehicle testing centre is qualified and authorized (designated) to conduct rail vehicle testing activities in the relevant area;

   ii. The methodology for the functional test must be pre-approved by ŽSR;

   iii. The final report on the functional test, including the protocol with measured interference values, must be submitted to ŽSR; ŽSR reserves the right to use the measured results to adjust the interference limits of the ZK24, ZK24-2, and RSR122 axle sensors.

If the rail vehicle does not meet the specified limits, it may be authorized with restrictive conditions concerning the performance of the central power source or access to certain tracks.

*) Operational test on the ŽSR network:

The ŽSR infrastructure manager will determine the conditions for the operational test. The costs associated with conducting the operational test are borne by the applicant seeking proof of compatibility. As part of this test, the applicant is obligated to provide the ŽSR infrastructure manager with the measured interference values of the relevant rail vehicle and grants the ŽSR infrastructure manager the right to use this data to adjust the compatible interference levels. This obligation also applies if a third party conducts the operational test.

Contact persons at ŽSR:

1. Mr. Marian PIPIS – Pipis.Marian@zsr.sk
2. Mr. Peter DITTRYCH – Dittrych.Peter@zsr.sk