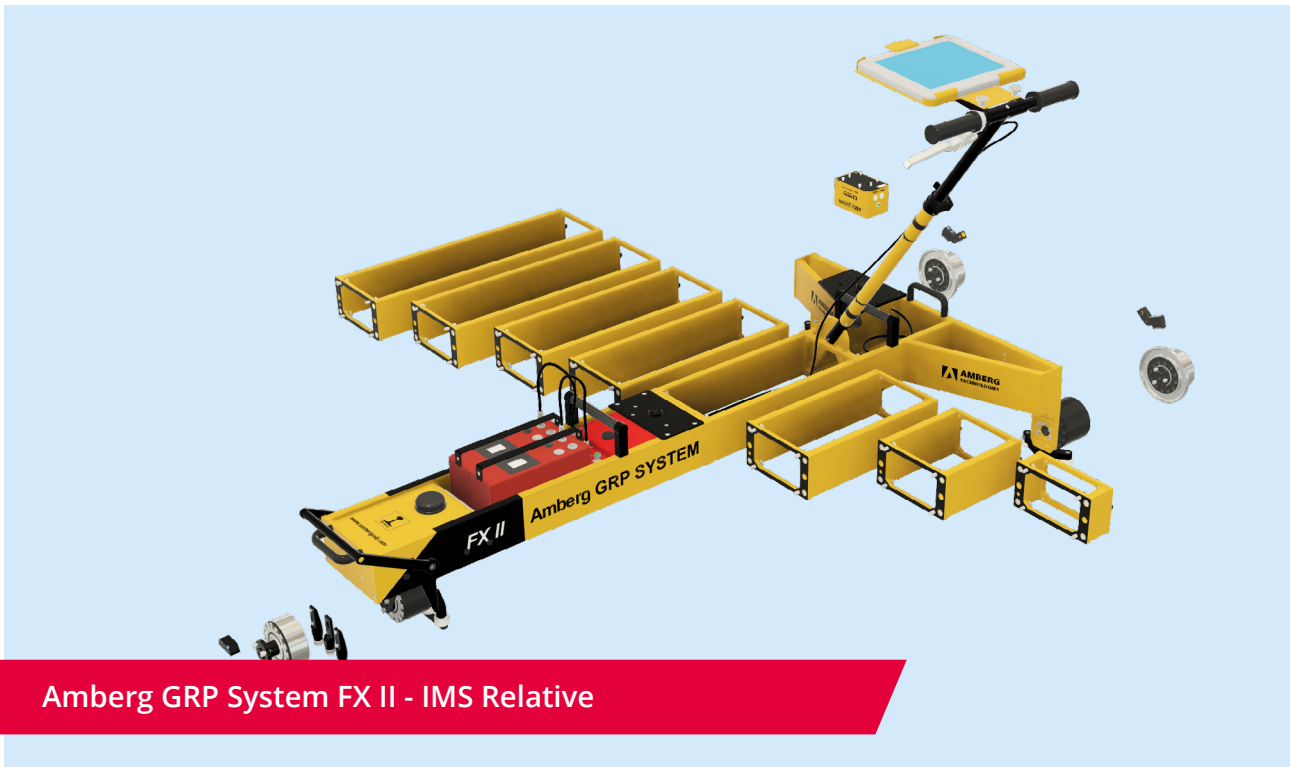


AMBERG INSPECTION

Inspection System for Railway Professionals



MEASURING SYSTEM: AMBERG INSPECTION IMS RELATIVE



Amberg GRP System FX II - IMS Relative

The Amberg GRP System FX II is a new-generation measuring system manufactured based on the well-proven GRP System FX. The IMS Relative system variant is easy to handle and transport. It is meant for hard-working conditions and lets even the least experienced user enjoy unrivalled speed and performance.

Amberg Inspection IMS Relative

- Modular, light, fast
- Robust aluminum frame
- Electrically insulated regarding bridging the left and right rails
- Set-up time to start measuring: < 5 min
- LED lighting for secure work at night
- EN-13848 compliant

Odometer Sensor

- Precision encoder

Gauge Measurement Unit

- Three-contact-point design
- Low-friction, ceramic gauge wheel
- Selectable contact reference:
14/16 mm from the top of the railhead
-

Gauge Extension Module

- Multiple gauge extensions:
1000, 1067, 1220, 1372, 1435, 1495, 1520/1524, 1600, 1668/1676 mm
- More extensions on demand

GNSS

- Suitable for map visualisation

Battery Module

- Hot-swappable
- Fast charging

MODULAR, LIGHT, FAST



Cant Sensor

- Precision cant sensor
- Temperature compensated

Onboard Computer

- Industrial computer
- High-frequency data acquisition
- Real-time processing

Push Bar

- Height adjustable
- Turnable for a quick change of working direction

Dead-Man Brake

- Auto braking system to avoid uncontrolled system rolling

Tablet Control Unit

- Ruggedized IP68 Samsung Active Pro tablet
- Wireless communication to the onboard computer

Amberg Measurement Unit

- AMU 2010 inertial measurement unit
- Protected installation
- Rigidly fixed into the frame

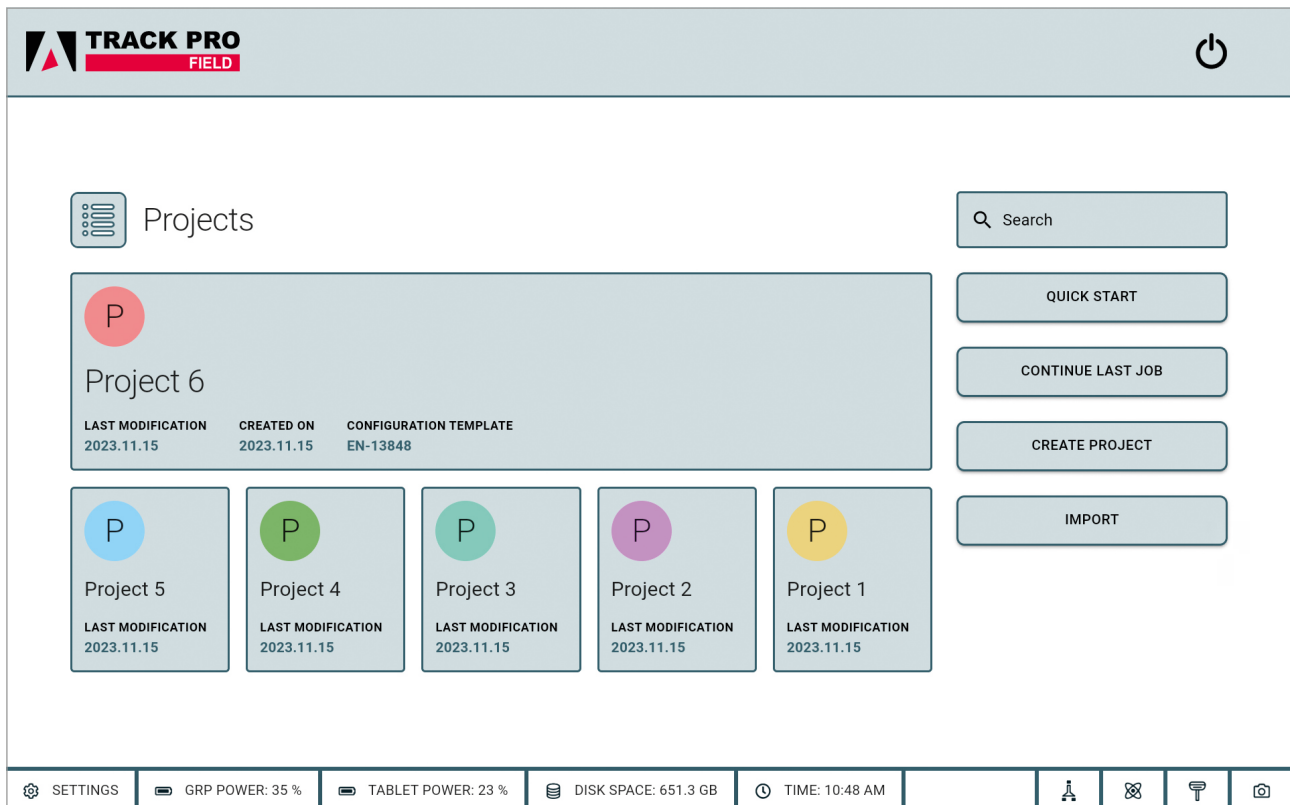
Wheels

- PET wheels with rocker system for standard rails
- Steel wheels with rocker system for standard rails
- Flanged steel wheels for tram rails

Rocker System

- Low-friction, ceramic guidance wheels
- Selectable contact reference:
14/16 mm from the top of the railhead

SOFTWARE: AMBERG TRACK PRO FIELD



The Amberg TRACK PRO FIELD software is user-friendly, modern, and intuitive. It allows the track operator to identify and report track defects in real-time.

Amberg TRACK PRO FIELD

- Friendly, modern, intuitive
- Running on Chrome browser
- Real-time calculations
- Two colour themes available
- No or little training required

EN-13848 Compliant

- The Amberg TRACK PRO FIELD software complies with the EN-13848-1 and EN-13848-4 standards in terms of repeatability and reproducibility

Measuring Parameters

- Gauge
- Cant
- Twist
- Horizontal alignment: D1, D2, versines
- Vertical alignment: D1, D2, versines

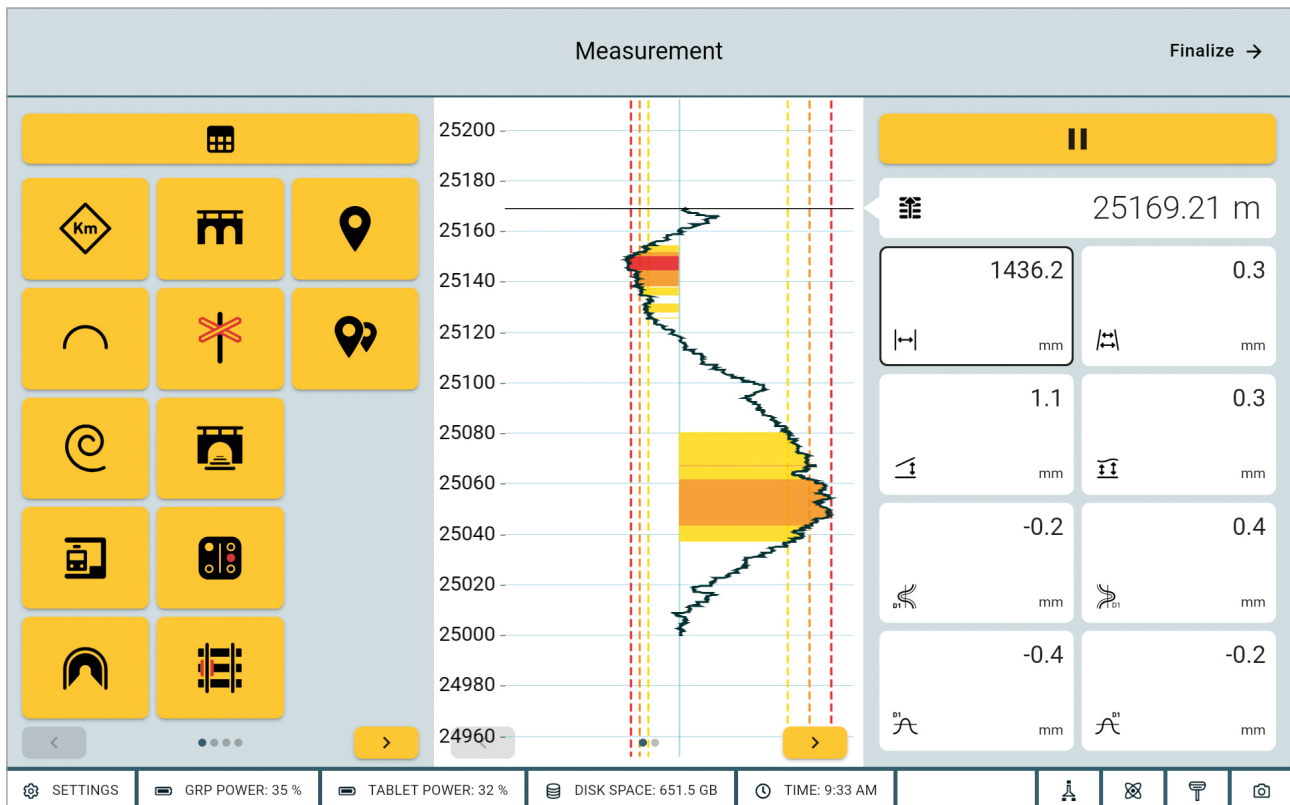
Real-time Defect Calculations

- Defects are calculated and indicated in real-time
- Three severity categories:
Alert, Intervention, Immediate Action

Event Registration

- 40+ event types available
- More on demand

FRIENDLY, MODERN, INTUITIVE



Measurement Interruption

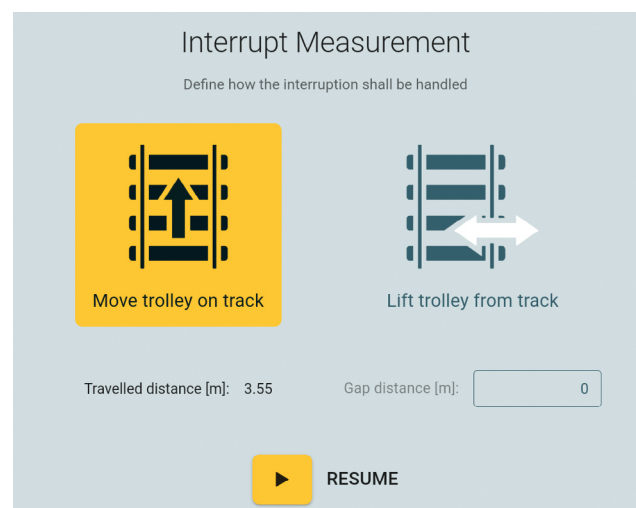
- Train passing
- Obstacle

Units

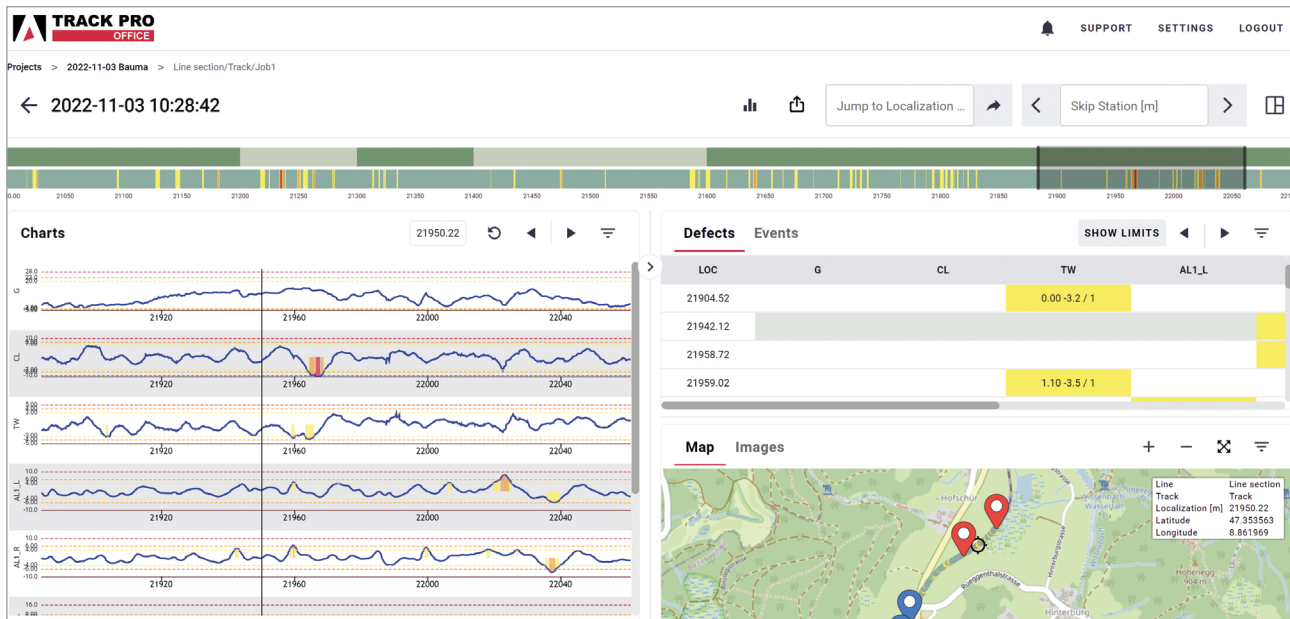
- Metric
- Imperial International
- Imperial US

Import & Export

- Import projects from the Amberg TRACK PRO OFFICE software seamlessly
- Export projects to a USB stick and analyse them in the Amberg TRACK PRO OFFICE software



SOFTWARE: AMBERG TRACK PRO OFFICE



The Amberg TRACK PRO OFFICE software is robust, modern and powerful, letting the user analyse the defects captured on track, report according to EN-13848 standards and monitor a track as time evolves.

Amberg TRACK PRO OFFICE

- Robust, modern, powerful
- Running on Chrome browser
- Project, line, track, and job management
- Striking visualisation, analysis, and reporting
- Fast onboarding

EN-13848 Compliant

- The Amberg TRACK PRO OFFICE software complies with the EN-13848-5 and EN-13848-6 standards to calculate track defects and track quality indices

Defect Visualisation & Analysis

- Gauge
- Cant
- Twist
- Horizontal alignment: D1, D2, versines
- Vertical alignment: D1, D2, versines
- Three severity categories:
Alert, Intervention, Immediate Action

Track Quality Index

- Multiple indices supported
 - Isolated defects (EN-13848-6)
 - Five-Parameter Track Defectiveness (W5)
 - Track Roughness Index (Amtrak)
 - FRA TQI
 - TUG TQI
 - Combined Standard Deviation (EN-13848-6)
 - Chinese TQI
 - J Synthetic Coefficient
 - SRT TQI
- More indices on demand

ROBUST, MODERN, POWERFUL

Design Definition

- Speed
- Curvature type: straight, curved
- Sleeper type: timber, concrete

Reporting

- Defect table
- Defect charts
- Event table
- Measurement charts
- ASCII (CSV)
- KML

Analysis


- Inspection analysis: Merge multiple measurements to inspect
- Monitoring analysis: Monitor track evolution as time progresses

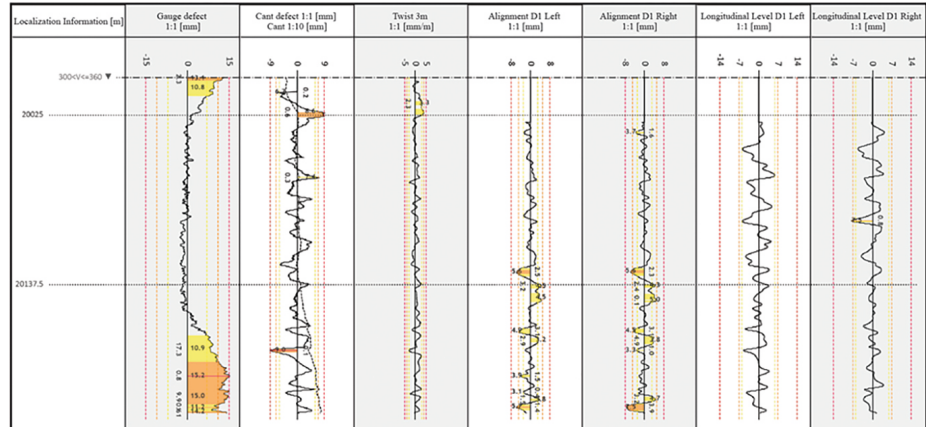
Units


- Metric
- Imperial International
- Imperial US

Import & Export

- Import seamlessly projects from the Amberg TRACK PRO FIELD software
- Import measurements from the well-proven Amberg RAIL software
- Export projects to a USB stick and import them to the Amberg TRACK PRO FIELD software

Defect Chart Report				
Customer: SBB Dep. Renovation Zurich Bahnhofstrasse 1 CH-8001 +4123456789		Line Name:	Line section	Operator: AVst
		Line Comment:	Track	Meas. System: IMS TRACK PRO
		Track Comment:		Meas. Date-Time: 2023.06.21 11:08:55
				Localization Range [m]: 20000 - 21101.94
Service Provider: Amberg Technologies AG Trockenloosstrasse 21 CH-8105 +41448709228		Design Name:	Design - Job 120 km/h	Scale: 1 : 2250
		Configuration Name:	EN-13848	Validation Date: 2023.10.13 15:48:37



Defects Report						
Customer:	SBB Dep. Renovation Zurich		Line Name:	Line section	Operator:	AVst
	Bahnhofstrasse 1		Line Comment:		Meas. System:	IMS TRACK PRO
	CH-8001		Track Comment:	Track	Meas. Date-Time:	2023.06.21 11:08:55
	+4123456789		Design Name:	Design - Job 120 km/h	Localization Range [m]:	20000.00 - 21101.94
Service Provider:	Amberg Technologies AG		Configuration Name:	EN-13848	Validation Date:	2023.10.13 15:48:37
	Trockenloosstrasse 21					
	CH-8105					
	+41448709228					

Localization [m]	Speed [km/h]	G [mm]	CL [mm]	TW 3 m [mm]	AL1_L [mm]	AL1_R [mm]	LL1_L [mm]	LL1_R [mm]	Invalid	Event	Comment
20000	300 < V ≤ 360	2.3+13.1/2									
20001.4		10.2+10.8/1									
20010			0.2+6.7/1								
20015.8				0+3.1/1							
20016.1				2.3+3.3/1							
20018.7				0+3/1							
20020.9				0+3/1							
20021.1				2.4+4/1							
20022.6			0.2+6.8/1								
20022.9			0.6+8.0/2								
20023.6			0+9.4/3	0+4.2/2							
20023.7			2.2+6.9/2	1.1+3.9/1							
20026			0+9.3/3								
20026.1			0.3+8.0/2								
20026.5			0.2+6.8/1								
20035.9						1.6+3.7/1					
20066.3			0.2+6.8/1								
20066.6			0.3+7.4/2								
20094.3								0.3+7/1			
20094.7								0.8+7.5/2			
20095.6								0.3+6.9/1			

AMBERG INSPECTION IMS RELATIVE SYSTEM

PERFORMANCE AND TECHNICAL DATA

System configuration	
Gauge [mm]	1000, 1067, 1220, 1372, 1435, 1495, 1520/1524, 1600, 1668/1676
Gauge measuring range [mm] (re nominal gauges)	-20 to +55
Weight total system [kg] (re 1000 mm gauge, single battery)	23.7

System performance ⁽¹⁾	
Typical measuring speed [km/h]	3.5
Max. measuring speed [km/h]	4.0

System accuracy ^{(1), (2)}	
Repeatability (re AMU 2010)	
Gauge [mm]	0.2
Cant [mm]	0.5
Twist [mm]	0.2
Horizontal alignment D1 [mm]	0.5
Vertical alignment D1 [mm]	0.5
Horizontal alignment D2 [mm]	1.0
Vertical alignment D2 [mm]	1.0
Reproducibility (re AMU 2010)	
Gauge [mm]	0.7
Cant [mm]	1.0
Twist [mm]	0.4
Horizontal alignment D1 [mm]	0.8
Vertical alignment D1 [mm]	0.8
Horizontal alignment D2 [mm]	1.5
Vertical alignment D2 [mm]	1.5

Power management ⁽¹⁾	
Trolley battery operating time [h]	9
Tablet battery operating time [h]	9

Environmental specifications	
Working temperature range [°C]	-10 to 50
Humidity (non-condensing)	< 80 %

System approvals	
CE Conformity	EN 50121-3-2:2016+A1:2019 EN/IEC 61000-6-4:2018 EN/IEC 61000-4-2:2008 EN/IEC 61000-4-3:2008 IEC 62236-3-2:2018 FCC 47 CRF Part 15 EN 61326-1:2021 EN 13848-4 EN 13977:2011 Directives 2014/30/EU Directives 2014/35/EU Directives 2011/65/EU

Extract of references ⁽³⁾	
<p>Amberg's railway surveying solutions have proven their high performance worldwide. Demanding projects have been successfully realized in e.g., Germany, Austria, Belgium, the Netherlands, Denmark, France, Italy, Spain, Greece, Turkey, Australia, United Kingdom, Saudi Arabia, UAE, Korea, USA and PR China.</p> <p>1) Typical experience values. They depend on project conditions. 2) The accuracy refers to the 95th percentile of repeatability and reproducibility test runs, as the EN-13848 norm specifies. The accuracy also depends on the chord and base length of the measured track parameters. 3) The references concern the GRP System FX based on which the current system has been manufactured.</p>	

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