



## RAIL PRODUCTS CATALOG

**T.EL.FER. srl**  
**Loc. Sille, 17**  
**38045 Civezzano (TN)**  
**ITALY**  
**Tel. +39 0461 1590084**  
**E-mail [info@telfer.it](mailto:info@telfer.it)**  
**[www.telfer.it](http://www.telfer.it)**



## DC MULTIFUNCTION PROTECTION RELAY FOR RAILWAYS TF-RP21

**TF-RP21**



### PROTECTIONS

2x	overvoltage levels $V_{M1}$ and $V_{M2}$
2x	undervoltage levels $V_{m1}$ and $V_{m2}$
2x	max overhead line temperature $T_{M\>}$
4x	overcurrent forward/reverse/bidirectional programmable thresholds $I_{M1\>}$ , $I_{M2\>}$ , $I_{M3\>}$ , $I_{M4\>}$
1x	thermal image protection of the cable/line threshold $I_{TM1}$
1x	Maximum $I^2t$
2x	Maximum current variation
2x	current steps with di/dt dependance thresholds $I_G1$ and $I_G2$
2x	impedance monitoring with di/dt dependance thresholds R1 and R2
2x	overvoltage with 100 Hz component thresholds $V_{100}1$ and $V_{100}2$
2x	switchboard or cable earth fault protection thresholds (64)
2x	Maximum current gradient G

High speed circuit breaker diagnostic relay for :  
nr. of mechanical procedures – nr. of electric openings – nr. of electric interruptions

### MEASURES

Overhead line current (with sign)	Earth current
Overhead line voltage	Maximum voltage
Power	Minimum voltage
Environment temperature	Maximum current
Overhead line temperature (computed)	Maximum power

### COUNTERS / RECORDERS

ANALYSIS INTERVAL: 1 min / TOTAL RECORDING TIME: 3 months	ANALYSIS INTERVAL: 1 hour / TOTAL RECORDING TIME: 18 months
Supplied energy [kWh]	Supplied energy [kWh]
Input energy [kWh]	Input energy [kWh]
Peak power [kW]	Peak power [kW]
Maximum voltage [V]	Maximum voltage [V]
Minimum voltage [V]	Minimum voltage [V]
Maximum current [A]	Maximum current [A]
Minimum current [A]	Minimum current [A]
	Maximum Overhead line temperature [°C]
	Maximum 100 Hz value [%]

### COMMUNICATION PROTOCOLS

IEC 60870-5-103 over RS485 ( PC_01 OR PC_04)*
Modbus over RS485 ( PC_02)
Modbus over TCP-IP (PC_03)

### OTHER FUNCTIONS

Autodiagnostic
Oscillographic recording of all I/O with local display of the last 10 and storage of the last 60 with 123µs resolution
Time sync through GPS signal or through NTP protocol
Timing functions
Optional programmable IEC 61131-3 PLC

### COMMUNICATION PORTS

1x	RS232 (PC_00)
1x	Optical fiber serial port (PC_04)*
2x	RS485 (PC_01 / PC_02)*
1x	Ethernet 10/100Mbps (PC_03)

\* PC\_01 & PC\_04 are mutually exclusive

### POWER SUPPLY

85 . . 353V <sub>DC</sub>
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### WEIGHT

3,6kg
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T.EL.FER. s.r.l. - Head and registered office: Loc. Sille, 17 – 38045 – Civezzano (TN)

VAT n. 02275860068 Corporate capital € 120.000,00 i.v.

**THE QUALITY SYSTEM OF T.EL.FER. SRL HAS BEEN FOUND TO COMPLY WITH THE REQUIREMENTS OF UNI EN ISO 9001:2015**

**TF-RP21  
BIF**



**DC MULTIFUNCTION PROTECTION RELAY FOR RAILWAYS  
TF-RP21-BIF ( BIPOLAR FILTER)**

**PROTECTIONS**

3x	overvoltage levels $V_{M1}$ , $V_{M2}$ , $V_{filt}$
3x	overcurrent forward/reverse/bidirectional programmable thresholds $I_{M1>}$ , $I_{M2>}$ , $I_{M3>}$
1x	Maximum current gradient G
2x	overvoltage with 100 Hz component thresholds $V_{100}1$ and $V_{100}2$
2x	switchboard or cable earth fault protection thresholds (64)

High speed circuit breaker diagnostic relay for :  
nr. of mechanical procedures – nr. of electric openings – nr. of electric interruptions

**MEASURES**

Overhead line current (with sign)	Earth current
Overhead line voltage	Maximum voltage
Power	Minimum voltage
	Maximum current
	Maximum power

**COUNTERS / RECORDERS**

ANALYSIS INTERVAL: 1 min / TOTAL RECORDING TIME: 3 months	ANALYSIS INTERVAL: 1 hour / TOTAL RECORDING TIME: 18 months
Supplied energy [kWh]	Supplied energy [kWh]
Input energy [kWh]	Input energy [kWh]
Peak power [kW]	Peak power [kW]
Maximum voltage [V]	Maximum voltage [V]
Minimum voltage [V]	Minimum voltage [V]
Maximum current [A]	Maximum current [A]
Minimum current [A]	Minimum current [A]
	Maximum Overhead line temperature [°C]
	Maximum 100 Hz value [%]

**COMMUNICATION PROTOCOLS**

IEC 60870-5-103 over RS485 ( PC_01 OR PC_04)*
Modbus over RS485 ( PC_02)
Modbus over TCP-IP (PC_03)

**OTHER FUNCTIONS**

Autodiagnostic
Oscillographic recording of all I/O with local display of the last 10 and storage of the last 60 with 123µs resolution
Time sync through GPS signal or through NTP protocol
Timing functions

**COMMUNICATION PORTS**

1x	RS232 (PC_00)
1x	Optical fiber serial port (PC_04)*
2x	RS485 (PC_01 / PC_02)*
1x	Ethernet 10/100Mbps (PC_03)

\* PC\_01 & PC\_04 are mutually exclusive

**POWER SUPPLY**

85 . . 353Vdc
---------------

**WEIGHT**

3,6kg
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**TF-RP21  
NM**





**DC MULTIFUNCTION PROTECTION RELAY FOR RAILWAYS  
TF-RP21-NM ( NEGATIVE AND MEASURES)  
WITH RECORDING CAPABILITY ON REMOVABLE MEMORY FOR VOLTAGE,  
CURRENT AND ENERGY WITH RESOLUTION DOWN TO 1 MILLISECOND**

PROTECTION FUNCTIONS	
2x	earth overcurrent T0ccM
2x	earth overcurrent T0ccE
2x	earth overcurrent T0ccN
1x	Function 64M
MEASURES	
Line current (signed)	earth overcurrent T0ccM
Line voltage	earth overcurrent T0ccE
Power	earth overcurrent T0ccN
COUNTERS/RECORDERS	
INTERNAL MEMORY	
ANALYSIS INTERVAL: 1 min TOTAL REGISTRATION INTERVAL: 3 months	ANALYSIS INTERVAL: 1 hour TOTAL REGISTRATION INTERVAL: 18 months
Delivered energy [kWh]	Delivered energy [kWh]
Incoming energy [kWh]	Incoming energy [kWh]
Maximum power [kW]	Maximum power [kW]
Maximum voltage [V]	Maximum voltage [V]
Minimum voltage [V]	Minimum voltage [V]
Maximum current [A]	Maximum current [A]
Minimum current [A]	Minimum current [A]
REMOVABLE MEMORY	
support type: USB 2.0 only with SLC technology	
maximum capacity: 32GB (standard provisioning nr. 1 usb key 1GB SLC)	
Generated file type: CSV	
Adjustable sampling interval: 1 . . 10000 ms, step 1 ms	
<u>Interval 1 . . 499 ms</u> 1 file / hour recorded measures: voltage , current	
<u>Interval 500 . . 10000 ms</u> 1 file / day recorded measures: voltage , current, energy	
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IEC 60870-5-103 over RS485	
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<b>TF-RP21</b>  <b>LR</b>	  	<b>LINE RECORDER FOR RAILWAYS</b>																																																																											
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## DC MULTIFUNCTION PROTECTION RELAY FOR RAILWAYS

### FUNCTIONS

- Line protection against failures and overcurrents
- Measure of line voltage and current and of other relevant parameters
- Oscillographic recording of events
- Self diagnostic
- Modbus interface
- Simple user interface thanks to an intuitive set of commands and menus
- Big recording memory
- Alphanumeric display with 2 lines of 16 characters for an easy reading of values and events
- Capture of oscillographic recording of events with pre and post trigger
- Visualization of oscillographic recordings through an external PC
- Wide parametrization allows an easy adaptation to the installation requirements
- Continuous self test with remote signalling of malfunctions

### INPUTS AND OUTPUTS

- 3 analog inputs 0..20 mA / 4..20 mA
- n.1 watchdog relay output for self-test, missing power supply, unconnected cable
- n. 3 relays outputs with double throw, double pole. Each relays is freely programmable for N.O. or N.C. contacts
- n. 1 power supply output (+/- 15Vcc) for external Hall effect sensor for ch. 64

### COMMUNICATION PORTS AND PROTOCOLS

- n. 1 x RS485 (Modbus)
- n. 1 x RS232

### POWER SUPPLY

- 100 .. 353Vdc



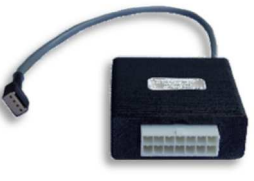



### WEIGHT

- 1,1kg





**TF-RP1X**

DEVICE		FUNCTIONS	INPUTS
TF-RP12	76	Max current	0-20mA / 4-20mA (Function 76)
	32	Reverse current	0-20mA / 4-20mA (Function 32)
	64	Switchboard/Cable earth	0-20mA / 4-20mA (Function 64). TA through TFC
TF-RP13L	76	Max current	0-20mA / 4-20mA (Function 76)
	76'	Max current - 10In input	0-20mA / 4-20mA (Function 76')
	64	Switchboard/Cable earth	0-20mA / 4-20mA (Function 64). TA through TFC
		High speed breaker diagnostics	
		Inhibition of functions after breaker closure	
		Thermal image protection of the cable/line	
		Max current variation di/dt relate Max I <sup>2</sup> t	
TF-RP14	64	Switchboard/Cable earth	0-20mA / 4-20mA (Function 64). TA through TFC or TFCB
	64'	Switchboard/Cable earth	0-20mA / 4-20mA (Function 64). TA through TFC or TFCB
	32	Reverse current	0-20mA / 4-20mA (Function 32)
TF-RP16	76	Max current	0-20mA / 4-20mA (Function 76)
	64'	Switchboard/Cable earth	0-20mA / 4-20mA (Function 64). TA through TFC
	64	Switchboard/Cable earth	0-20mA / 4-20mA (Function 64). TA through TFC
TF-RPAL	27	Minimum Voltage	0-20mA / 4-20mA (Function 27)
	32	Reverse current	0-20mA / 4-20mA (Function 32)
	64	Switchboard/Cable earth	0-20mA / 4-20mA (Function 64). TA through TFC

<b>PROBE V</b>		<b>VOLTAGE TRANSDUCER</b>
		<p>Voltage transducer  Redundant acquisition channel with real-time congruency check  Fiber optic communication  8.1 kHz sampling rate, 16 bit A/D  Range : -8000 . . + 8000 V  20 kV insulation  Power supply: 85 . . 265VDC</p>
<b>PROBE I</b>		<b>CURRENT TRANSDUCER</b>
		<p>Current transducer  Redundant acquisition channel with real-time congruency check  Fiber optic communication  8.1 kHz sampling rate, 16 bit A/D  Range : 60mV - 80 mV shunt  20 kV insulation  Power supply: 85 . . 265VDC</p>
<b>TFC</b>		<b>VOLTAGE TO CURRENT CONVERTER</b>
		<p>Translates a 0..8 Volt signal from an Hall effect current sensor into a 4..20 mA signal.  Power supply: ±15VDC</p>
<b>TF-IT</b>		<b>THERMAL IMAGE RELAY FOR LINE TEST</b>
		<p>Measures the current flowing into a load resistor through a Hall sensor, calculates the temperature reached by the resistor and signals the trespassing of a programmable threshold.  Programmable physical characteristics of the resistor.  Environment temperature sensor  Power supply: 100 . . 353VDC</p>
<b>TF-CONV TF-CONV-D</b>		<b>CURRENT / VOLTAGE RECEIVERS</b>
		<p>6 digit high brightness display  Fiber optic receiver  Triple individually programmable current outputs (-20..+20mA, -20..-4 +4..+20 mA, -12..+20 mA)  Minimum voltage/current output with programmable threshold  Maximum voltage/current output with programmable threshold  Fully programmable on site  Power supply: 100 . . 353VDC</p>
<b>TF-LP-I W TF-LP-V W TF-LP-IV W</b>		<b>CURRENT, VOLTAGE AND CURRENT / VOLTAGE TRANSDUCERS</b>
		<p>Current(-I), Voltage (-V) and Current+Voltage (-IV) transducer  Fiber optic communication (double fiber for TF-LP-IV)  8.1 kHz sampling rate 13 bits A/D  Range : 60mV - 80 mV shunt on site programmable  Range : -8000 . . + 8000 V  <b>INCREASED SUPPLY RANGE :</b> Power supply: 80 . . 260V  <b>INCREASED INSULATION:</b> 18 kV insulation (-15) or 24 kV Insulation (-40)</p>

ALL T.EL.FER. PRODUCTS ARE **CE** MARKED AND MEET ALL SAFETY PROVISIONS OF THE LOW VOLTAGE DIRECTIVE N° 2014/35/UE, AND ELECTROMAGNETIC COMPABILITY DIRECTIVE N° 2014/30/UE T.EL.FER. CAN VARY THE PRODUCTS SPECIFICATIONS IN ANY MOMENT WITHOUT NOTICE GENERAL CONDITIONS OF SALE ARE IN OUR DOCUMENT GEN/CGV/001

<p><b>TF-RV</b></p>		<p align="center"><b>MINIMUM VOLTAGE RELAY</b></p> <p>8.1 kHz sampling rate 13 bits A/D  Range : 0. . + 1600 V (-15) or 0..+3200 V (-30)  12 kV insulation (-15) or 20 kV Insulation (-30)  50 Volt step threshold  Two watchdog outputs  Three on site programmable N.E. or N.D. output contacts  Power supply: 85 . . 250VDC</p>
<p><b>TF-UI 0505</b></p>	 <p align="center"><b>NEW!</b></p>	<p align="center"><b>ULTRA HIGH INSULATION DC/DC CONVERTER</b></p> <p>1.7W DC/DC converter  INPUT : 4,8..6,5 VDC  OUTPUT : 5 VDC +/- 1%  INSULATION : <b>25 kV AC RMS</b>  OPERATING TEMPERATURE : -20..+70°C</p>
<p><b>TF-RVMM</b></p>	 <p align="center"><b>HOMOLOGATED BY RFI</b></p> <p align="center"><b>NEW!</b></p>	<p align="center"><b>MINIMUM/MAXIMUM VOLTAGE RELAY</b></p> <p>COMPLIANT WITH RFI TE-155-1997 specs.  On site programmable threshold 1500..3900 V<sub>DC</sub>  OPERATING TEMPERATURE : -10..+55°C  Power supply: 85 . . 250VDC</p> 