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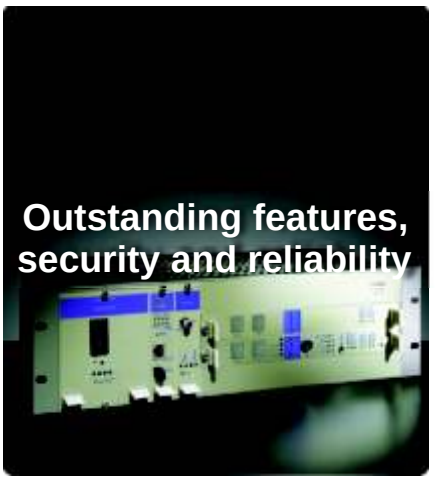
DIMAT TPC-2

analog teleprotection terminal



Communication solutions for power utilities

Analog teleprotection technology

Analog teleprotection technology enables electrical power utilities to transmit tripping and blocking signals over any analog channel, for example Power Line Carrier links over high-voltage lines, telephone cables, radio links, etc.

DIMAT TPC-2 terminal technology uses digital signal processing to generate and detect transmitted tones, and microprocessors for control and decision tasks. The use of a non-linear process for the reception of command tones enables TPC-2 terminals to keep these signals independent from the line noise, providing extremely high levels of security.

Product overview

TPC-2 terminals can be equipped to transmit and receive two or four commands. These commands can be used for blocking, permissive and direct tripping teleprotection schemes, achieving in each case an optimal combination of security, dependability and transmission time.

TPC-2 terminals register all alarms and events produced in the teleprotection link. To establish the date and time at which the alarms and/or events are produced, TPC-2 terminals have a real-time clock with the possibility of GPS synchronization by means of an IRIG-B interface.

TPC-2 terminals comply with Recommendation IEC 60834-1:1999 (second edition 1999-10) concerning teleprotection systems.

Management system

Choose between standard Windows-based management and optional integrated Web management with the possibility of a LAN connection:

Standard Microsoft® Windows® based management system

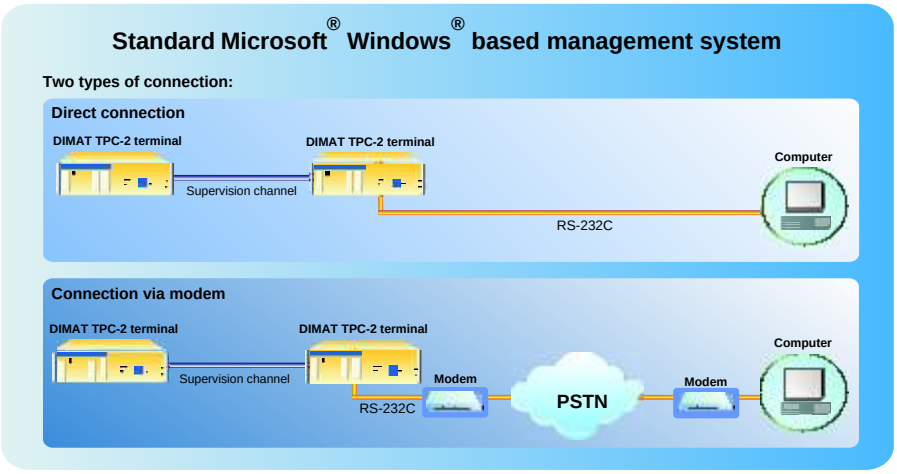
DIMAT TPC-2 terminals can be fully programmed, monitored and managed from a PC connected to the terminal via an RS-232C interface. The user interface is based on Web technology, and the required PC software is supplied with the terminals.

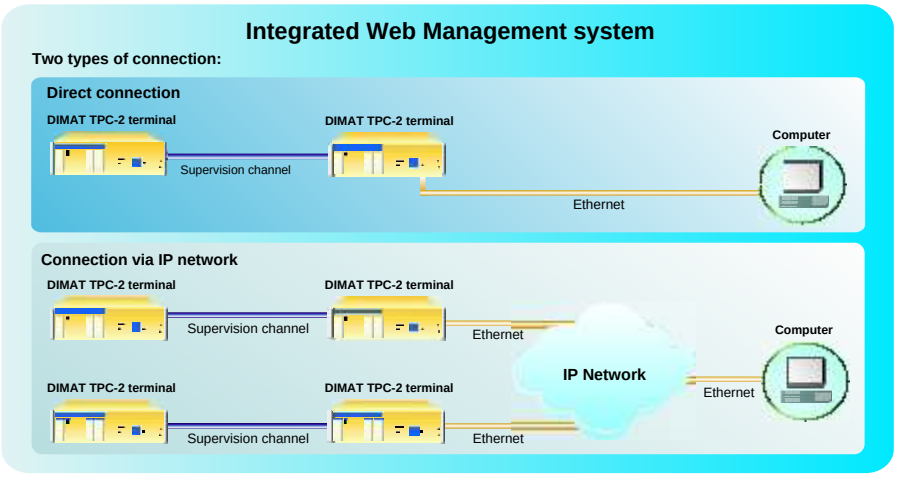
Optional integrated Web management system

DIMAT TPC-2 terminals can be equipped with an optional Web server module that integrates all HTML pages necessary for programming and monitoring, as well as Ethernet and RS-232 interfaces. With this optional module, TPC-2 terminals can be fully programmed, monitored and managed from a PC running a standard Web browser, without requiring any additional software.

The communication between the PC and terminals can be carried out by a direct connection or through an IP network.

In both cases, an internal data channel allows the collateral terminal to be supervised from the terminal connected to the management system.





Key Features

- 2-command and 4-command versions
- High dependability and extremely high security
- Intended for blocking, direct tripping and permissive tripping schemes as well as for telesignaling
- Compatible with the transmission of speech and data across the same channel
- IRIG-B port for GPS synchronization
- End-to-end supervision
- Standard Windows-based management system and optional integrated Web management system with LAN connection

Applications for TPC-2 teleprotection terminals

TPC-2 terminals can be used in teleprotection systems for blocking, direct tripping and permissive tripping schemes, as well as in telesignaling systems. They are capable of transmitting up to three independent commands simultaneously, or of working in 2+2 or 3+1 operating modes when all the four commands are used:

- Mode 2 +2: Simultaneous protection of two lines by means of two direct and two permissive trips
- Mode 3+1: Simultaneous protection of the three phases of a line by means of three permissive trips and one direct trip (which takes priority)

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DIMAT TPC-2 analogue teleprotection terminal – Technical specifications

General characteristics

Application	Blocking, direct and permissive tripping. Telesignaling
Operating principle	Transmission of a guard tone in quiescent conditions that is substituted by a command tone when a command or combination of commands needs to be transmitted
Capacity	Two or four commands
Guard and command frequencies	Within audio band and programmable from among those defined in Recs. R.35, R.37 and R.38 of the ITU-T and the frequencies: 3300 Hz, 3360 Hz, 3420 Hz, 3480 Hz, 3540 Hz, 3600 Hz, 3660 Hz, 3780 Hz and 3800 Hz
Nominal transmission time	Programmable among 7 ms (Blocking), 15 ms (Permissive tripping) and 25 ms (Direct tripping)

Security and Dependability

	Security		Dependability		
Application	**SNR**	**P_{uc}**	**T_{ac} (ms)**	**S/N (dB)**	**P_{mc}**
Blocking	Worst case	$<10^{-3}$	15	+6	$<10^{-3}$
Permissive tripping	Worst case	$<10^{-5}$	20	+6	$<10^{-5}$
Direct tripping	Worst case	$<6x10^{-8}$	40	+6	$<10^{-5}$

P_{uc}: Probability of unwanted command **T_{ac}**: Maximum actual transmission time
P_{mc}:Probability of missing command

AF Interface

Nominal impedance	600 Ω balanced
Return loss	>20 dB
Transmit level	Programmable between –30 dBm and 0 dBm
Power boosting	Programmable between 0 dB and +6 dB
Receiver sensitivity	Programmable between -40 dBm and 0 dBm

Command inputs

Number of inputs	One per command, optoisolated
Nominal activation voltage	Selectable among 24 V_{DC}, 48 V_{DC}, 110 V_{DC} and 220 V_{DC} (max. 300 V_{DC})

Command outputs

Number of outputs	One per command, solid-state relay with voltage-free contact and current limitation
Maximum current	Permanent 1A and 2 A for maximum 20 s
Maximum voltage	300 V_{DC}

Command counters Two 0 to 99 counters per command, one for transmission and one for reception

Signalling and alarm outputs

Command-transmission signalling Command-reception signalling	One per command, by relay. Contact rating: 1 A/250 V_{AC}/150 V_{DC}. The relay output contact is selectable between N.O. or N.C.
General alarm	By relay. Contact rating: 1 A/250 V_{AC}/150 V_{DC}
Receiver blocking	The relay output contact is selectable between N.O. or N.C.
Power-supply failure	By relay, changeover contact. Contact rating: 1 A / 250 V_{AC} / 150 V_{DC}

Power supply 24 V_{DC} to 48 V_{DC}
110 V_{DC} or V_{AC} to 220 V_{DC} or V_{AC}

Dimensions 482 x 133 x 320 mm

Weight 7 kg

Operating conditions

Temperature and humidity	From –5 °C to +45 °C and relative humidity not greater than 95%, in accordance with IEC 721-3-3 class 3K5 (climatogram 3K5)
Maximum temperature	+55 °C for a period no greater than 24 hours (IEC 495 cls. 3.1)
Storage conditions	In accordance with IEC 721-3-1, class 1K5

Management computer

Type	Compatible personal computer (PC) with 80486 processor or higher
Operating system	Windows 98 SE, Windows 2000 or Windows XP operating system.
Web browser	Microsoft Internet Explorer v 5.5 or higher

Management interfaces

Standard Windows-based management	RS-232C with SUB-D female 9-pin connector
Optional integrated Web management	RS-232C with SUB-D female 9-pin connector
	10Base-T/100Base-TX with RJ-45 connector
	100Base-FX with MT-RJ connector

DIMAT: A world of experience

DIMAT has 35 years of experience in the design and manufacture of communications and networking solutions for the power utilities market, worldwide. Our industry-leading reliability products range from digital and analog Power Line Carrier terminals and their accessories and digital and analog teleprotection terminals. All our products comply with IEC standards.

We aim to become the most advanced company in the world in the power utility communication market. That's why we dedicate more than 30% of our workforce to Research and Development.

DIMAT: Quality assurance you can count on

At DIMAT, we take quality as seriously as you do. Our quality assurance program aims to bring you industry-leading quality in our products and services. DIMAT is ISO 9001:2000 certified. Quality is built into our products every step of the way.

DIMAT: Full life-time service

At DIMAT, we pride ourselves on the quality of our Customer Care. Our workforce of highly qualified professionals is dedicated to developing, maintaining, and implementing the best solutions for your needs.

When you contact DIMAT, you will always talk to the right in-house expert for your query. And we offer complete after-sales assistance during the full life cycle of our products.

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