e-terra*gridcom* DIP

High-reliability multi-support teleprotection

Comprehensive digital teleprotection for power networks

Telecommunication networks and protection devices have undergone significant change in recent years, partly due to the massive deployment of optical fibre.

With that change has come an increase in complexity, which can compromise the level of control exercised over critical information such as protection signals from power utilities. It also becomes harder to identify responsibilities in the event of failure.

The solution is to specify maintenance-free equipment that is easy to commission and offers a high level of flexibility for installation within the substation.

To address this need, ALSTOM Grid has developed solutions that integrate with our new digital teleprotection **e-terra***gridcom* **DIP**, enabling supervision of the telecom network and enhancing the security of the protection system.

The role of Teleprotection

Teleprotection is designed to transfer protection commands coming, in most cases, from distance protection relay contacts to one remote location through a communication medium. Communication between teleprotection equipment is a point-to-point communication.

Three key considerations for teleprotection:

- **Transfer time:** When a fault occurs, the damage sustained by HV equipment is determined by the fault clearance time. The transfer time of the teleprotection equipment - i.e. the time between receiving a protection signal and initiating remedial action at the other end - must be kept to a minimum to minimize the damage incurred.
- **Reliability/dependability:** Electromagnetic interference in a high voltage environment can corrupt communication signals. Therefore, it is vital to maintain the integrity of teleprotection signals and minimise the risk of losing a signal. This value is known as a Probability of missing command (Pmc).
- **Security:** Teleprotection systems are frequently used to protect 'strategic' lines, where a shut-down would have serious consequences for end users. Consequently, the system must ensure that any command to disconnect an HV line is a true command and not caused by noise from the HV environment. This value is expressed as a Probability of unwanted command (Puc).

Unrivalled speed, security and dependability

Using the latest digital signalling processing technology and advanced coding algorithm, the **e-terra***gridcom* **DIP**, offers the highest level of security (Probability of Unwanted Commands) and dependability (Probability of Missing Commands) for all protection schemes. These include direct tripping, permissive and blocking, with transmission speeds far better than international criteria.

Customer Benefits

- Reduce drastically the cost of optical infrastructure
- Reduced cost of ownership
- Easy to install and commission
- Extensive monitoring features
- Highly modular
- Wide range of communication interfaces
- Easy to manage

Minimizing commissioning and maintenance costs

ALSTOM Grid's extensive experience of telecommunication networks shows that the main costs relate to commissioning. **e-terra***gridcom* **DIP** teleprotection has been designed to minimize commissioning and reduce overall cost of ownership.

Lower commissioning costs

e-terra*gridcom* **DIP** includes embedded, user-friendly commissioning tools running on Windows operating systems.

All configuration can be performed off line on a PC and then downloaded to the **e-terra***gridcom* **DIP** equipment on site - either via a direct connection or via a remote network connection.

e-terra*gridcom* **DIP**'s flexible interface provides tools for testing not only the equipment but also the communication channel, using real time BER indication. This feature provides fast verification of the communication link without the need for costly testing tools.

In addition, the software enables the performance of extended testing of command transfers, such as forcing of a command and loop test.

All of these actions are password protected so that only experienced commissioning engineers can access the system. Inclusion of warning messages further decreases the risk of mistakes.

Monitoring facilities

Using its enhanced digital technology, **e-terra***gridcom* **DIP** performs continuous testing of the equipment and the communication link. Alarms can be set to monitor parameters such as Bit Error Rate, transfer time or non-operation of fault clearance schemes.

e-terra*gridcom* **DIP** HMI

- Commissioning
- Maintenance
- Upgrade

e-terra*sentinel*

- Supervision
- Remote maintenance

Any alarm will activate contacts for remote indication to an RTU or a Sequence of Event recorder or the possibility to send the information to a SNMP based Monitoring system like the **e-terra***sentinel* by using a TCP/IP protocol converter.

The **e-terra***gridcom* **DIP** also provides alarm and event recorder files with a 1ms accuracy . These files can be downloaded to a computer from local or remote equipment without interrupting operation of the equipment

Managing the teleprotection network

Nowadays,with higher requirements in terms of fault prevention and operational cost reduction the monitoring and remote management of the power utility infrastructure is no longer optional.

For this purpose Altsom Grid has developed a SNMP based solution for power utilities, the **e-terra***sentinel*.

Such management network allows :

- an easy fault localization without equipment expertise,
- an end-to-end availability monitoring and measurement,
- a remote operation capability

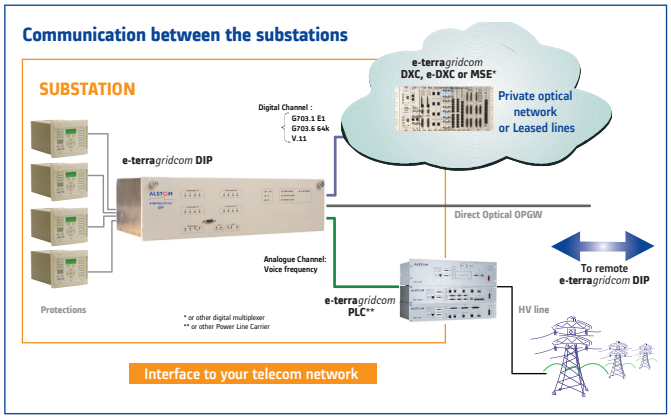
Adapatabilty to customer requirements

e-terra*gridcom* **DIP** includes a wide range of tools for customising the unit for the specific requirements of each project. These include the ability to set temporisation on command input/output and alarm contacts as well as the capacity to perform logical combinations of inputs.

Technical data

General features

- Modular hardware with modules that can be exchanged by the customer
- 2, 4 or 8 independent commands with solid state output - configurable as blocking, permissive or direct tripping
- Large number of communication interfaces, V11, G703 64 kbps, E1 and optical interface for multimode and single mode fiber with backup possibility from optical to digital communication
- Optical distance up to 250km
- Bidirectional transmission on a single fiber, instead of two
- Analogue interface with up to 4 independent commands
- Large range of power supplies from 24 to 290 VDC
- Possibility of redundant power supply
- User friendly interface
- 2 x RS 232 ports for connection to a PC or dial up modem . IP and LAN connection with optional module
- Recording of up to 1785 dated events and alarm with 1ms time accuracy
- IRIG B for time synchronisation
- SNMP Network Management System compatibility



Communication interfaces

- G703.1 64 kbit/s
- E1 : 2 Mbit/s
- V11/ V35 (RS 422) (X24 protocol) from 32 to 256 Kbit/s
- Direct optical interface at 256 Kbit / 1310 nm and 1550 nm more than 200 km range
- Analogue interface 4 wire 600 ohms or high impedance programmable within 300 to 3780 Hz
- IEEE C37.94 optical interface

Input / Output boards

- 2, 4 or 8 commands with digital interface 2 or 4 commands with analogue interface
- 1 copy normally open contact per input and output (up to 300 VDC , 12 W)
- Command acquisition by voltage (48, 127 or 250 VDC) with optoelectronic decoupling
- Command restitution by normally open contact (up to 300 VDC , 650W/5A)
- Security and dependability in all schemes exceeding IEC 60834-1 requirement for the worst protection scheme

Operating condition

- Power supply voltage 24 to 250 VDC -30 to +25%
- Operating temperature - 10°C / +55°C as per IEC 60068-2-1 and 60068-2-2
- Max relative humidity 95% at 40°C as per IEC 60068-2-3
- Storage Temperature - 25°C < T < +70°C

Applicable standard

IEC end European norms

- IEC 60834-1
- IEC 61000-4-2 Class 4
- IEC 61000-4-3 Class 3
- IEC 61000-4-4 Class 4
- IEC 61000-4-5 Class 3
- IEC 61000-4-6 Class 3
- IEC 61000-4-8 Class 5
- IEC 61000-4-12 Class 3
- EN 60950
- EN 61010-1 / 60204-1 / 61131-2 / 60335-1
- EN 55011 / EN 55022
- EN 50204 /EN 50082-2

IEEE standard

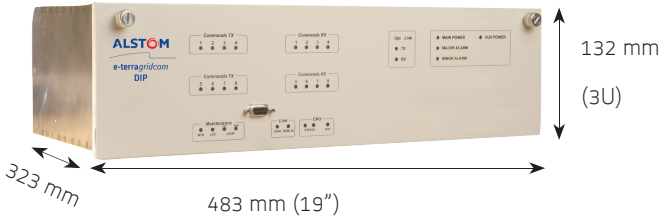
- ANSI C37.90.1 (1989)
- ANSI C37.90.2 (1995) (35 V/m)
- ANSI C37.1 (1994)

The equipment is CE compliant

Accessories

- Electrical V24 to optical 1310 nm converter **e-terra***gridcom* **OCM**
- IP / LAN converter to access **e-terra***gridcom* **DIP** through a TCP/IP protocol

Mechanical characteristics

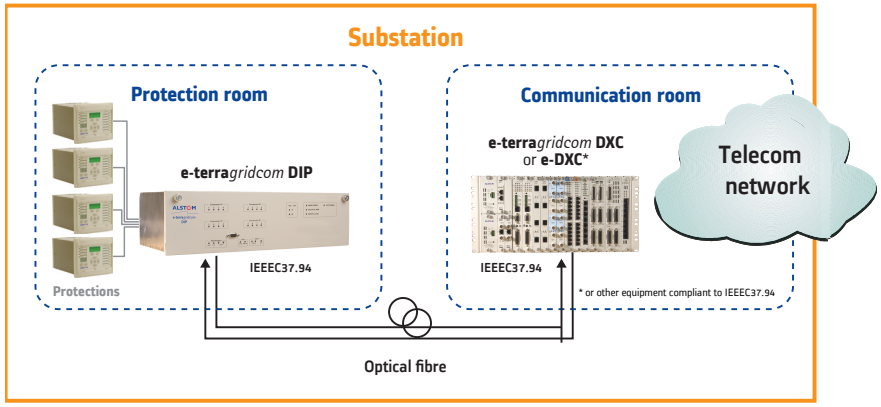


e-terra*gridcom* DIP at a glance

- Reduced cost of ownership
- Easy to install and commission
- Extensive monitoring features
- Highly modular
- Comprehensive range of software and Hardware
- Wide range of communication interfaces with 1+1 communication capacity
- IP/LAN ready
- Teleprotection Monitoring by using **e-terra***sentinel*

Optical communication in the substation

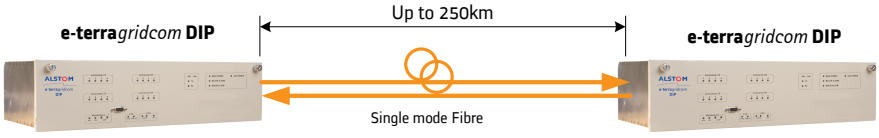
Imunity to electromagnetic and radiofrequency interference



Optical communication

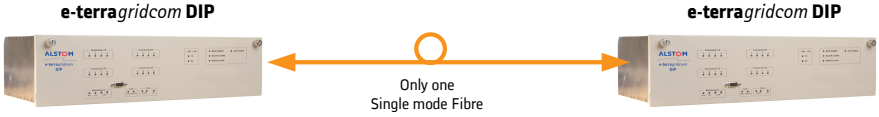
- **Ultra long haul communication**

No intermediate device to cover long distance



- **Bidirectional communication**

New network architecture design possibilities



World class expertise

- **e-terra***gridcom* **DIP** brings an outstanding level of reliability and quality of service to access networks, ensuring fast, simple and reliable installation and configuration
- Encompassing the products and service for global solutions, ALSTOM Grid's Telecom offering gives complete peace of mind
- We have 50 years' experience of designing, manufacturing and supplying a complete range of telecommunication equipment. Anywhere in the world, our experts can provide the solution for all of your telecom requirements, enabling you to focus on your core business

UNRIVALLED EXPERTISE

- With its fifth generation of teleprotection, ALSTOM Grid brings unrivalled expertise to the teleprotection market
- **e-terra***gridcom* **DIP** brings an outstanding level of reliability and quality of service to teleprotection, ensuring fast, simple and reliable installation and configuration

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