Communication with
EuroProt-IED
Multifunctional intelligent devices

The intelligent multifunctional EuroProt devices made by Protecta - parallel to the development in the power system protection and the microprocessor technology - keep pace with the development of the communication technology as well. Following the first data exchange with computers using Protecta communication protocol, the international communication standards (IEC 60870-5-101, IEC 60870-5-103, IEC 60870-5-104) have been realised in quick sequence after each other, and as an example for co-operation with devices of other manufacturers, the ABB SPA protocol has been applied too. As the result of the latest development activities, the EuroProt – IED (intelligent electronic devices) can be involved in the communication system according to the international IEC 61850 standard. (See Fig. 1)

Meeting the requirements of the IEC 61850 standard means that the EuroProt – IED devices can participate in the information exchange of the devices from other manufacturers, applying this international standard.

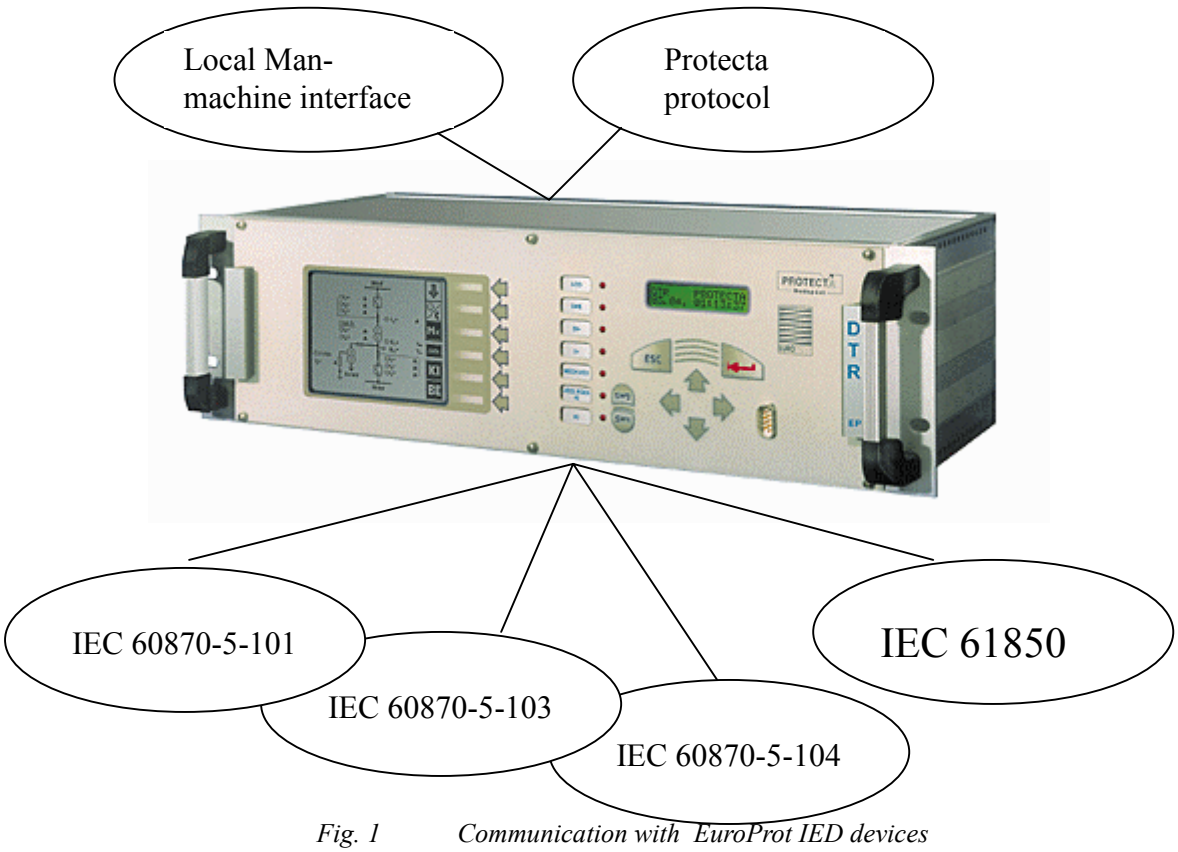

Fig. 1 Communication with EuroProt IED devices

Fig. 2 shows one step of the factory configuration procedure for the EuroProt multifunctional intelligent devices: the protocol selection.

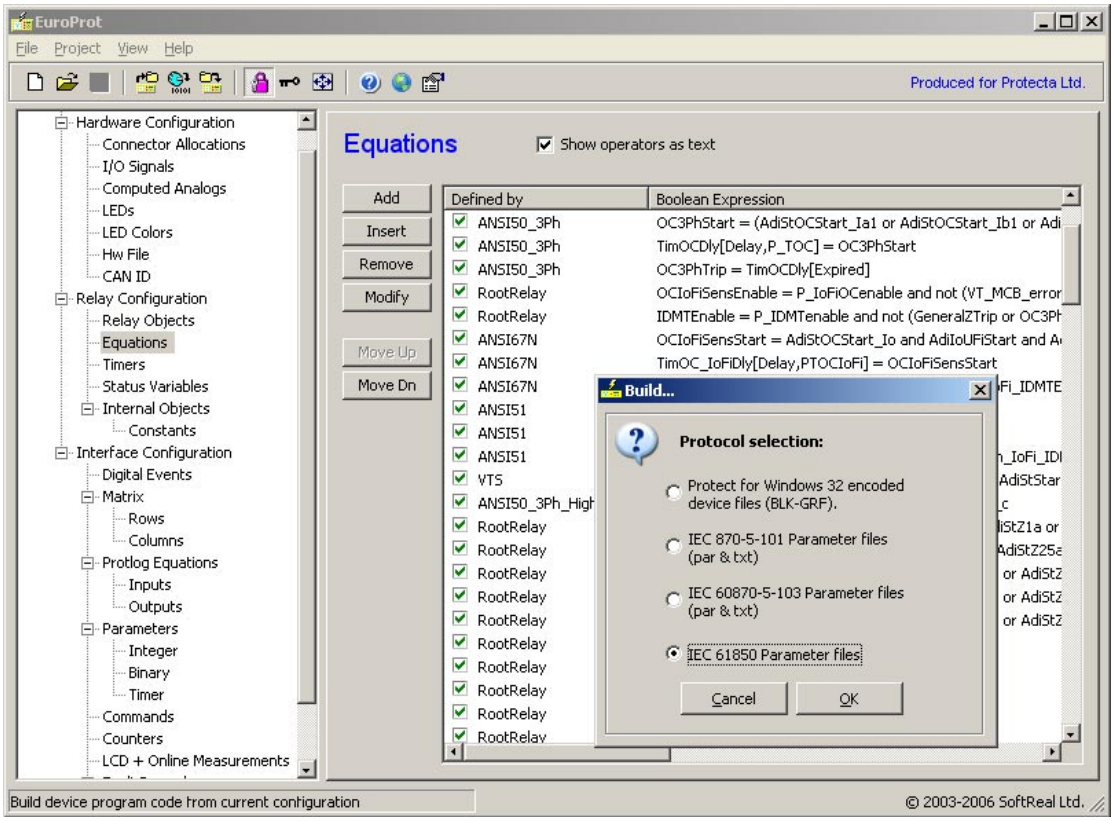

Fig. 2 Protocol selection in the factory configuration process of the EuroProt IED devices

This brochure summarises the possibilities of communication with EuroProt intelligent multifunctional protective devices.

Local man-machine interface

Tasks of the local man-machine interface:

- Parameter setting,
- Parameter supervision,
- Displaying on-line measured values one-by-one,
- Request of the stored event log,
- Displaying messages.

The local man-machine interface is located on the front side of the device (see Fig.1); it consists of an alphanumeric or graphic display, of eight push-buttons and of seven LED-s. The configuration of the front side can be extended with a large graphic display as well, which provides additional six programmable push-buttons too.

The alphanumeric display and its menu system are shown on Fig.3, the small graphic LCD on Fig.4. The front cover of this brochure shows a device, which is configured with a large graphic display and six additional push-buttons.

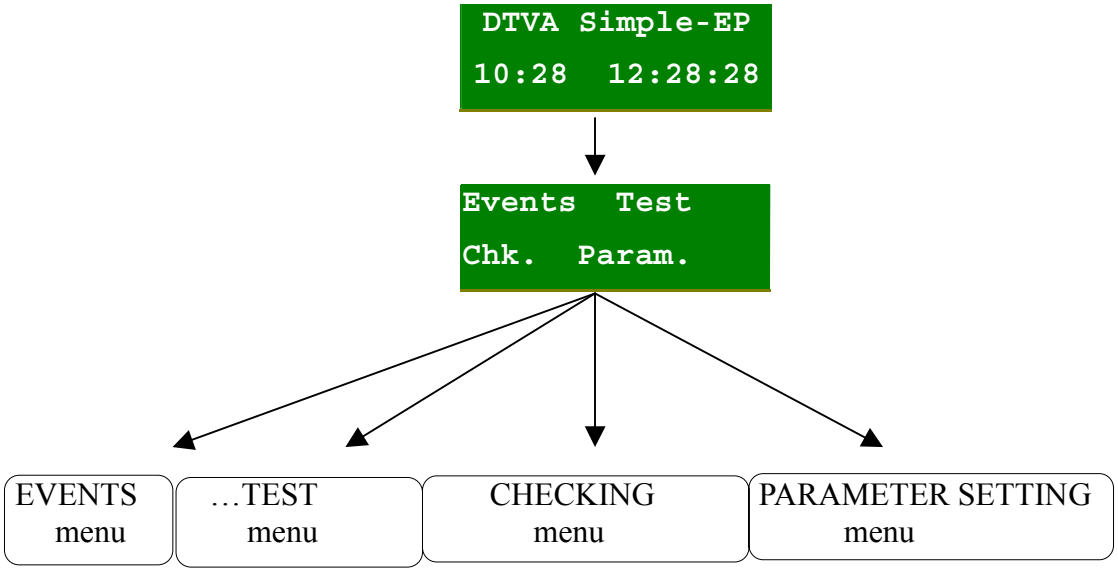

Fig.3 The alpha-numeric display and the associated menu system (in a possible configuration)

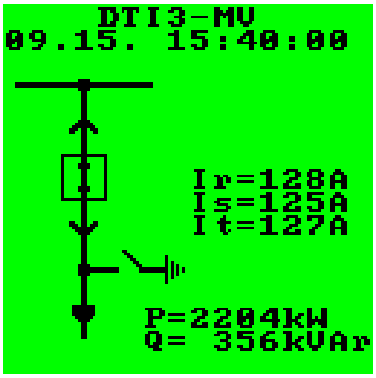

*Fig.4 The 128*128 pixel LCD display (in a possible configuration)*

	Version 1	Version 2	Version 3
2*16 character alpha-numeric display	√		√
128*128 pixel graphic display		√	
320*240 pixel graphic display			√

Table 1 The possible combinations of the displays

Operation with computers using Windows operating system

The operation of the device is more convenient if additionally to the local man-machine interface a serial connector or an Ethernet interface is used as well, which connects the device to a computer running under Windows operating system, and using the „**Protect for Windows**" operating software. The protocol of this communication is the own protocol, developed by Protecta.

The various types of the physical interfaces are summarised in Table 2.

	Version a	Version b	Version c
RS232 connector on the front panel of the device	√	√	√
A pair of fibre optic connectors on the rear side of the CPU module	√	√	√
RJ45 connector		√	√
RJ45 connector with RJ/ST converter module			√

Table 2 The versions of the serial connectors

The RS232 interface provides direct interconnection to a computer. When this is used, a large amount of information can be displayed on the screen of the computer, enabling easy survey of the measured and acquired data, and assures convenient operation of the device. This connection enables all services, which are available on the local man-machine interface as well.

In the harsh environment of a substation the fibre optic data communication is preferred rather than the conventional serial cable. The fibre optic cable interface is located on the rear side of the CPU module, accessed from the rear side of the device. For this kind of connection Protecta provides an RS232 / fibre optic converter, which can be connected to the serial interface of a computer. Another possibility is the fibre optic / USB converter, produced by Protecta as well. This method can be used with computers equipped with USB port.

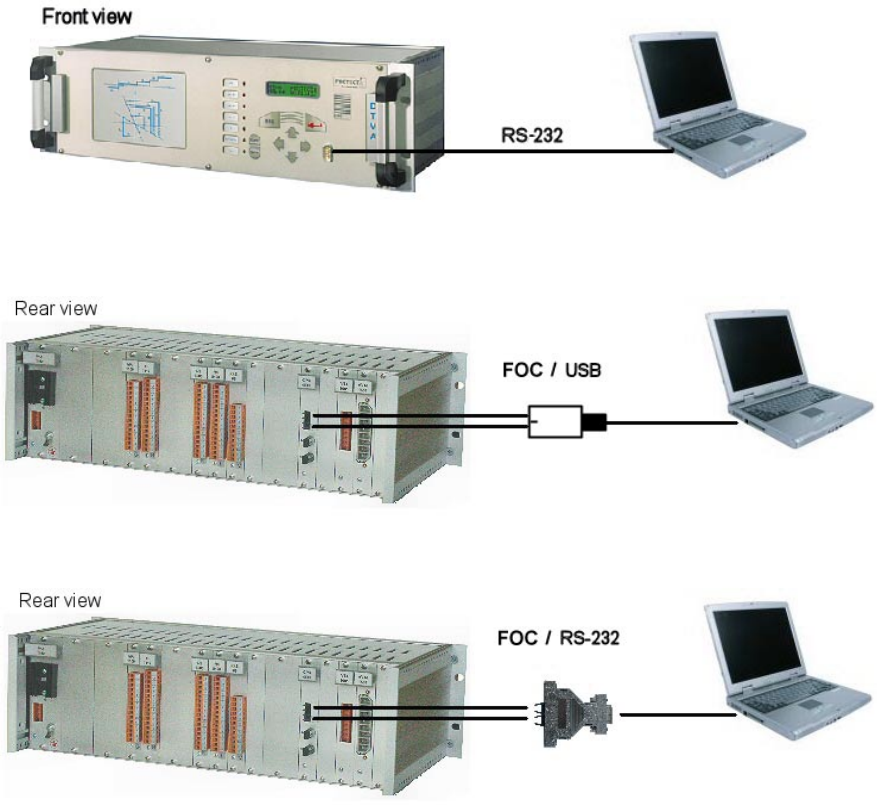

Fig.5 Communication with a supervising computer

Using fibre optic communication media, not only the basic operation functions can be realised as they are mentioned above, but this is the way of uploading and evaluation of disturbance recorder records, and this connection provides possibility to upgrade the programs of the processors, stored in the flash memory of the CPU module. The picture of the withdrawn CPU module is shown on Fig. 6.

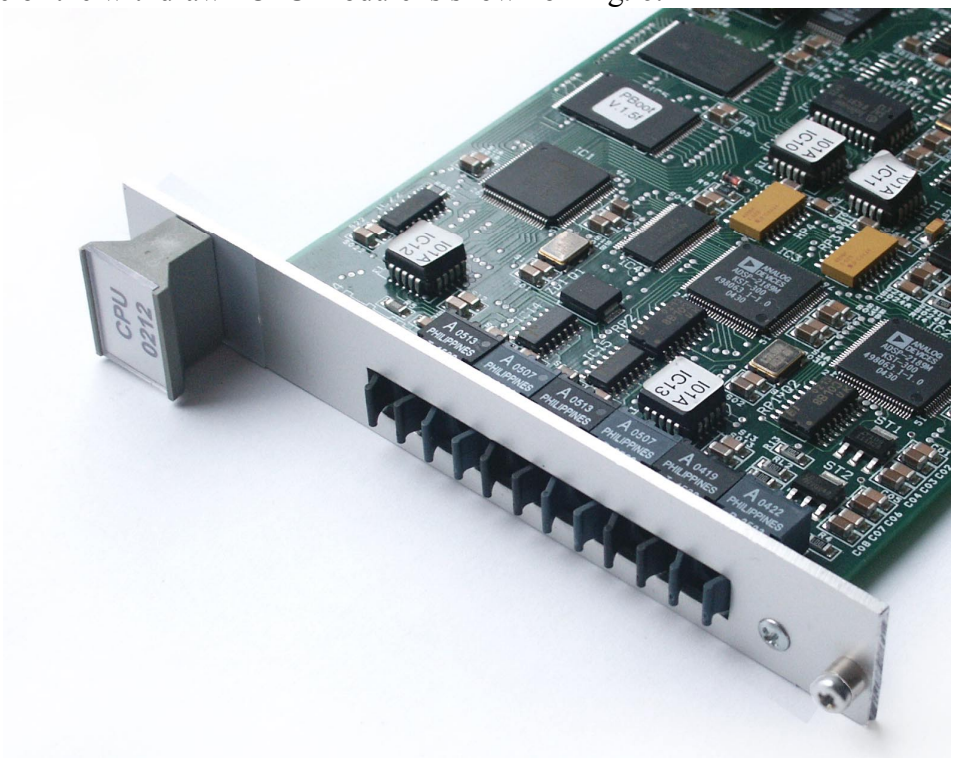

Fig.6. A CPU module with fibre optic connectors for plastic cables

Using the fibre optic interface several (max.20) devices can be connected in a loop. Based on the internal address, these devices can be accessed one-by-one by the supervising computer. The construction of a fibre optic loop is shown on Fig.7.

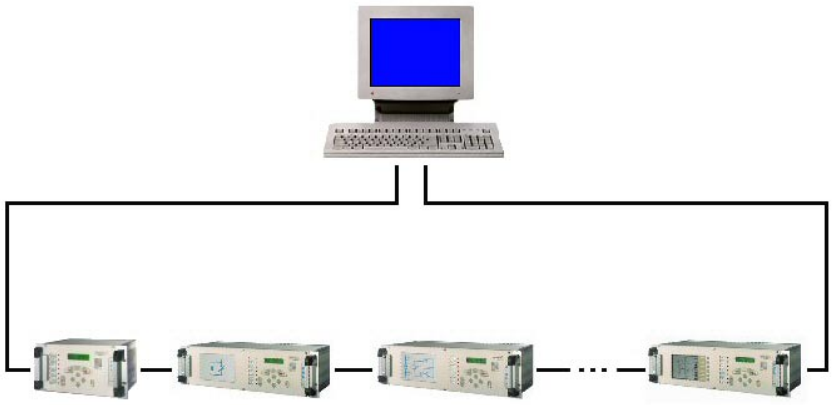

Fig. 7. Operation of the EuroPro- IED devices in a fibre optic loop

When using the DCS type star coupler produced by Protecta, a higher reliability can be achieved as compared to the communication using fibre optic loop. With this

method the failure of the individual devices does not influence the communication with the healthy devices. The application of the DCS star coupler is shown on Fig. 8.

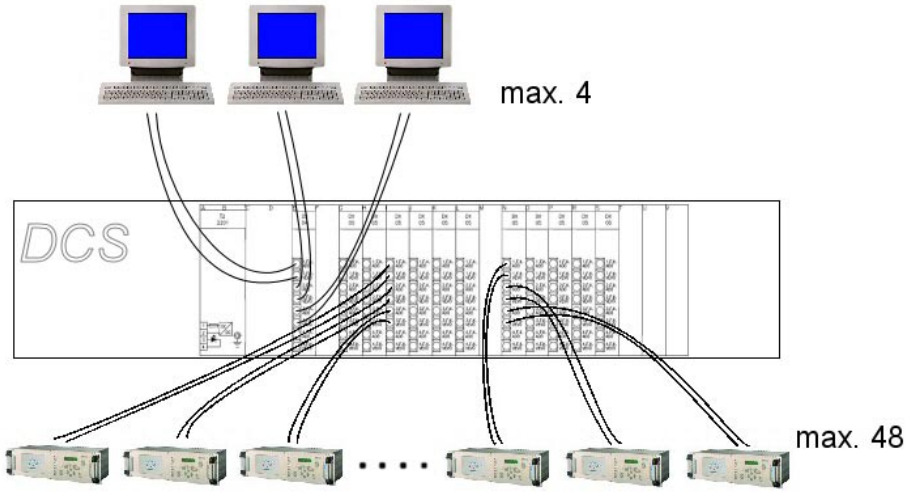

Fig.8 EuroProt-IED devices with DCS type star coupler

If an Ethernet network is available, then the devices equipped with RJ45 connectors can be connected to this network too. The RJ45 version of the CPU module is shown on Fig. 9, the connection to an Ethernet bus is drawn on Fig.10. The cabling in substation environment is preferred with STP (shielded) twisted wires instead of UTP (unshielded) cables.

Fig.9 The RJ45 connectors version of the CPU module

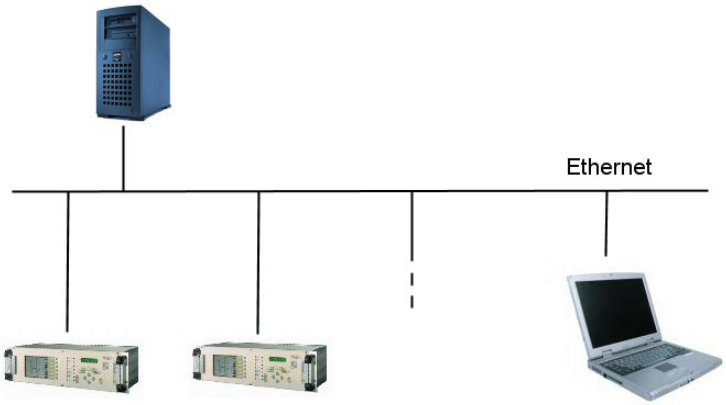

Fig. 10 EuroProt-IED devices in the Ethernet network

If the selected housing of the devices enables extension, then the application of the RJ45/ST converter module provides long distance fibre optic cable connection as well.

The EuroProt-IED multifunctional device in the substation monitoring and supervising system

In the EuroProt-IED multifunctional device a dedicated processor provides substation monitoring and supervising functions (data acquisition, control functions, interlocking, etc.) as well. This functionality is involved in the substation system by a dedicated serial connection. The connector for this purpose is located on the rear side of the CPU module. The physical connection possibilities are summarised in Table 3.

	Version A	Version B	Version C	Version D	Version E
A pair of fibre optic connectors on the rear side of the CPU module	√				
Dual fibre optic connectors on the rear side of the CPU module		√			
Multimode glass fibre optic connectors (See Fig. 11)			√		
RJ45 network connector (See Fig. 9)				√	√
RJ45 network connector with RJ/ST converter module					√

Table 3 The physical connection possibilities

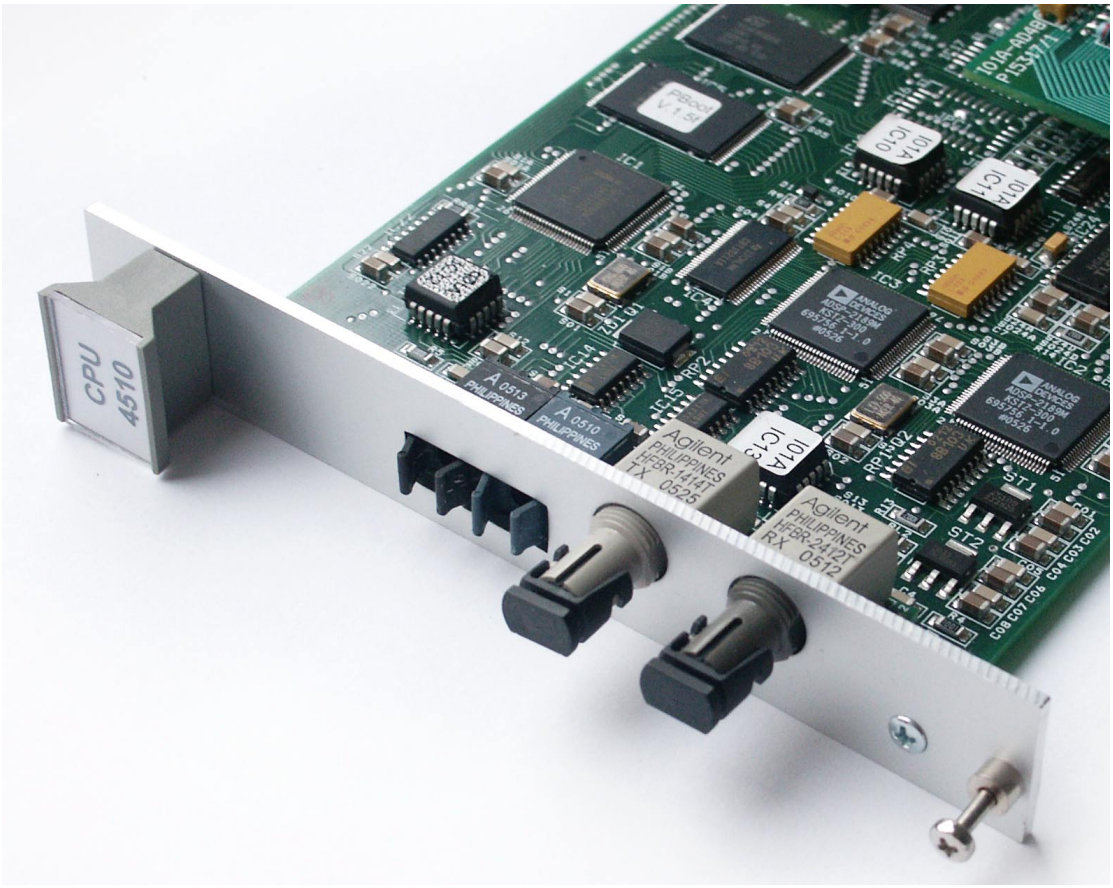

Fig. 11 Multimode glass fibre optic cable connection

The realised protocols of the communication for supervisory and control purposes are summarised by physical connectors in Table 4.

Protocol	IEC 60870-5-			ABB-SPA	IEC 61850*
Physical connectors	101	103	104		
A pair of fibre optic connectors on the rear side of the CPU module	√	√		√	
Dual fibre optic connectors on the rear side of the CPU module	√	√		√	
Multimode glass fibre optic connectors (See Fig. 9)	√	√		√	
RJ45 network connector (See Fig. 7)			√		√
RJ45 network connector with RJ/ST converter module			√		√

*Available after the fourth quarter of 2006.

Table 4 The available communication protocols