

On-Line Monitoring System OLM2



The OLM2 monitor is a measuring data acquisition unit optimized for on-line analysis of high-voltage circuit breakers. The electronic circuit is fitted into an EMC shielded aluminum profile housing. The aluminum housing has screw terminals for all external connections.

The OLM2 units have a limited data storage capacity. To fully use the flexibility of the OLM System, a data storage device (server computer) is required at the substation level. Communication to and from the monitoring units within a substation is done through an OLM-bus (a modified RS 485 bus), using a twisted pair shielded cable suitable for RS 485. One bus can handle 31 OLM2 units.

From the substation to the location where detailed analysis is performed, data can be transmitted using any existing communication means compatible with the RS 232 signal standard. External systems, such as SCADA can easily make use of the data obtained through the OLM.

Data acquisition starts when an OLM2 is triggered by either a coil input (trip or close) or an input to the motor of the operating mechanism. For each operation of the circuit breaker a complete image of the recorded parameters is stored into the unit, including local time and temperature (ambient and inside operating mechanism). The stored data is then transferred to the server computer and is then accessible for remote analysis using the OLM Explorer software. With this software a detailed analysis of all circuit breaker

parameters is possible including trend analysis.

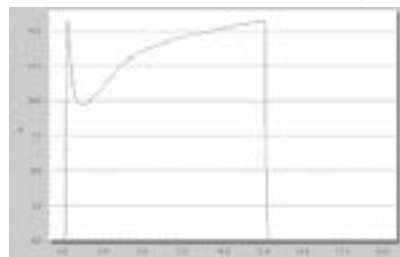
The following parameters may be monitored: operating times, coil currents, contact travel (giving information about speed, over-travel and damping), motor current including spring charging time, SF₆-density. Phase currents can be measured as an option to determine the contact erosion.

Design

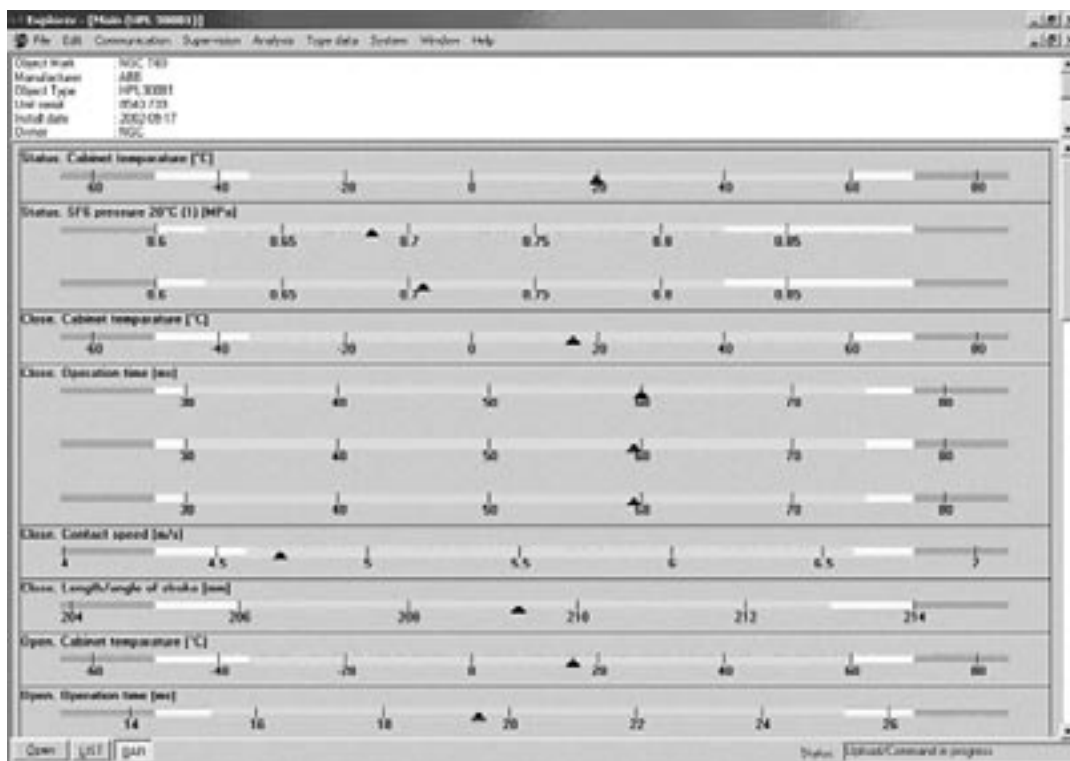
An OLM2 unit consists of a signal processor with programmable logic. Most internal functions can be modified by software changes, which means that it can easily be adapted to any type of equipment. The OLM2 units have their own internal watchdog with alarm function.

The software provided together with the OLM consists of three parts:

- **OLM Installer**, used for installation of the individual units
- **OLM Server**, used for communication with the individual OLM2 units on a bus and a server (usually a PC in the substation);
- **OLM Explorer**, the data analysis and supervision tool. The OLM Explorer software also hosts a server engine that communicates with server computers.



Example of the presentation of the motor current



Example of the presentation of different parameters

Monitored data

OLM2-unit:
Internal temperature
Power supply voltage and current
Coil circuit and operating currents
Motor circuit, operation current and time
Operating times
Time between operations
Monitoring equipment functions (watchdog)
Storage capacity OLM2-unit:
Last 32 alarm status records
Last 8 contact status records
Last 16 motor operation records
Monitored function categories through OLM Explorer:
Status signals (circuit breaker open or closed)
Closing operation
Opening operation
Close-open operation
Motor operation

From the function categories the following parameters are derived and supervised :
Operating times
Operating speeds
Coil armature time
Coil peak current
Damping time
Overtravel and rebound
Counters recording the number of operations and number of motor operations;
Motor peak current and spring charging time;
Internal temperature of the operating mechanism;
Ambient temperature;
Power supply voltages and currents (OLM2 unit and heaters);
SF ₆ density, with trend analysis;
Contact wear (optional);
Contact stroke and contact position.

The software is delivered with the OLM System and it contains a feature for automatic update of the software free of charge.

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1. Scope of supply

The following components are included in the delivery of the OLM System.

1.1 Hardware

1.1.1 OLM cubicle

The cubicle containing the OLM2 unit as well as the wiring of all hardware included in the cubicle.

Cable glands for cable entry in the operating mechanism are included.

1.1.2 Current transformers for trip and close coil currents

2 pcs. current transformers, one for measurement of close coil current and one for measurement of trip coil current, located in the OLM cubicle.

1.1.3 Shunt for motor current

1 shunt for measurement of motor current is located in the OLM cubicle.

1.1.4 Travel transducer

Incremental transducer for measurement of contact travel including hardware for fixing and cable. The travel transducer is fitted to the circuit breaker during installation of the OLM System.

1.1.5 Temperature sensors

Two PT 100 (including cable) for measurement of ambient temperature internal temperature of the operating mechanism.

The temperature sensor for the ambient temperature is fitted to the underside of the OLM cubicle and connected to the OLM2 unit. The temperature sensor for the internal temperature needs to be fitted during installation of the OLM System.

1.1.6 SF₆ density sensor

One or three SF₆ density sensors depending on whether the circuit breaker is three-pole or single-pole operated.

The density sensors are fitted during installation of the OLM System.

1.2 Software

The OLM2 System is delivered with a CD-ROM containing the following software:

- OLM Installer with user manual;
- OLM Explorer with user manual;
- Configuration file for the individual OLM2 units;
- Configuration file for OLM Explorer;
- The installation manual.

1.3 Drawings

When the OLM System is delivered together with the circuit breaker, the circuit diagram and wiring table are adapted to the receive the wiring from the OLM cubicle.

2. Items not included in the delivery

2.1 Current transformers for line current measurement

Line current measurement is an option and the current transformers necessary are not included in the standard delivery.

2.2 Server computer

Necessary for storage of data retrieved from OLM units.

2.3 Field bus converter

Connection to the field bus (OLM bus) requires a converter. There are two ways to connect the converter, through the serial RS 232 port or through the USB port.

2.3.1 RS converter

Connection of a PC to the OLM bus requires a RS-422/486 to RS-232 converter.

2.3.2 USB to RS converter

When connection of the OLM-bus to a PC is done through a USB port, a USB to RS converter should be used.

2.4 Connection between OLM and central data storage unit

A shielded, twisted pair cable suitable for RS-485 is recommended.

Alternative: optical fiber (requires optical modems at both ends).