Remote Monitoring and Control Unit

REC 501

Product Guide

ABB

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1MRS750430-MBG

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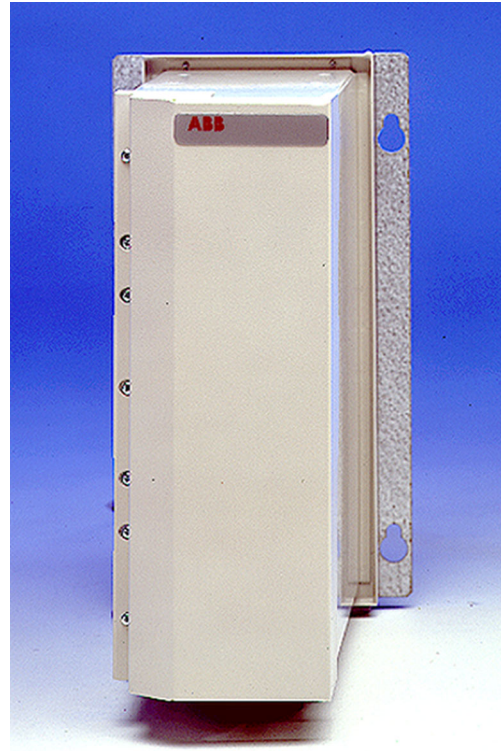
Features

- Remote control and monitoring unit for the control of medium voltage disconnectors, switches, ring-main units and other substation secondary equipment

- Extensive, bidirectional information exchange between the power system process and the network control centre

- Communication via radio telephone, radio link, fixed lines, leased lines, public telephone lines and mobile phones (NMT/GSM)

- Operation, communication and reporting secured during power outages by means of maintenance-free batteries

- Power supply unit including charger with integrated compensation for the battery temperature

- Automatic heating control for low temperatures and humid environments

- Management via network control system, e.g. S.P.I.D.E.R. MicroSCADA

- Continuous self-supervision of hardware and software

- Member of the ABB's Substation Automation system

Application

The remote monitoring and control unit REC 501 is designed to be used for remote and local control, condition monitoring, supervision and automation of secondary substations in medium voltage networks. It can be used with various remote terminal units (RMUs), air-insulated and SF_6-insulated disconnectors, switches and other remote-controlled secondary substation equipment. The modern technology applied in the unit extends the flexibility of the total power system.

The ABB Distribution Automation system includes a complete range of protection relays, feeder terminals, control units, annunciator units, Substation Monitoring Systems (SMS) and Substation Control Systems (SCS).

Design

The basic unit consists of the micro-processor and power supply charger board (PSC) and an optional plug-in modem. The PSC board includes a processor, a switching mode power supply unit with a temperature-compensated battery charger, five binary inputs, four relay outputs and an RS232 serial interface for communication. All inputs and outputs are galvanically isolated, and thus the I/Os have wide operating voltage ranges, which allow the unit to be used in a variety of remote control applications.

The monitoring and control unit is used for remote control and remote measuring in the application where it is used.

Control

The unit includes binary inputs and relay outputs for the control of two disconnectors, switches or other objects. The objects can be controlled remotely over the network control system or locally via push-buttons, which normally are placed in a separate enclosure. Disconnector and switch status indication is obtained via the binary inputs. One of the outputs can be used for the control of an external heater and one output can be used for internal fault (IRF) indication.

Voltage and temperature measurement

The unit measures the battery voltage and ambient temperature. The temperature measurement is calibrated to measure the ambient temperature of a unit mounted in an enclosure. Further, the temperature information is needed to control the charging voltage of the batteries and for switching the heating on and off in cold or humid environments.

Energy measurement

The monitoring and control unit incorporates a pulse counter input. The input can be used for measuring energy by means of an optional energy meter, which is provided with a pulse output.

Condition monitoring

The condition of the batteries is secured by periodic condition monitoring tests. The unit measures the battery voltage continuously, also during the condition monitoring test. The minimum voltage value will be recorded in the memory. The condition and lifetime of the batteries can be estimated on the basis of the minimum values recorded.

Regular reinitialization is used for monitoring the condition of the optional plug-in modem and the external modem. The monitoring and control unit reinitializes the modem even though there has not been any successful communication within a certain period of time.

The number of operations of the disconnectors, circuit breakers and other devices is recorded by two operation counters. The operation counters facilitate the condition monitoring of the equipment and indicate the need for maintenance.

Monitoring of the pressure of SF_6 gas insulated primary equipment can be obtained by wiring the pressure sensor contact to one of the binary inputs.

The monitoring and control unit is programmed using the setting emulator software, SMS 010 tool, CAP 5xx configuration and programming tool, terminal emulators with SPA parameters, and remotely via MicroSCADA. The parameters can be set off-line in the tool and downloaded via the communication system.

Battery backup

The battery backup of the station can be arranged by using two 12 V, 17 Ah or 24 Ah, sealed lead acid batteries in the monitoring and control unit. The integrated temperature-compensated switched-mode battery charger charges the batteries under normal conditions and supplies the power needed by the unit during power outages. Thus the operation of the unit and the communication between the substation and the network control centre are always secured.

Optional modem

The optional plug-in modem incorporates a public/leased line modem for telephone line interfaces with pulse and tone dialling and a radio telephone/fixed cable modem for radio interface with radio keying and for the two- or four-wire fixed cable connection. The communication transfer rate is 14400 bps (V.32bis). The modem is specially designed for harsh conditions, such as in most unheated secondary substations. The wide application range of the modem covers the common communication ways, thus facilitating system engineering.

Mounting

Depending on the application, the monitoring and control unit can be mounted in different ways. It can, for instance, be fitted into a UEMC-A2 enclosure together with all the components needed for the automation of RMUs, disconnectors or switches. This assembly includes the enclosure, the monitoring and control unit, a radio telephone, local control push-buttons, a local/remote switch, miniature circuit-breakers, contactors and a heating element. The assembly can be mounted on the wall of the RMU, switchgear or in a disconnector pole.

Data communication

For communication purposes the REC unit is provided with an RS232 serial port and the optional plug-in modem with an RJ12 telephone connector and a screw connector.

The RS232 serial port with SPA protocol or network control protocol is used for connecting a PC to be used for setting, and for the communication with SMS/SCS over a serial communication cable, radio modems, external modems for public lines, leased lines and NMT/GSM telephones, a DLC or fibre-optic cables.

The RJ12 telephone connector of the optional plug-in modem is used for the communication with SMS/SCS over public telephone lines, leased telephone lines or NMT/GSM telephones, whereas the screw connector is intended to be used for the communication with SMS/SCS over radio telephones or fixed cables.

The supported field bus protocol is the SPA bus. Network management protocols supported are ANSI X3.28, RP570, IEC870-5-101, DNP3.0 and MODBUS. Other protocols can be developed on request.

Self-supervision

The unit is provided with an internal hardware and software self-supervision system which continuously monitors the condition of the unit. The self-supervision system includes standard micro-processor watchdog functions, checksum verification of registers and hardware supervision.

Technical data

Table 1: General

Rated frequency f_n	50 Hz or 60 Hz

Table 2: Binary inputs

Number of inputs	5
Input voltage range	18…265 V dc; 80…265 V ac

Table 3: Pulse counter inputs

Number of inputs	2 Note! Two of the five binary inputs can be programmed as pulse counter inputs.
Counter range	0…999999 pulses
Max. counting frequency	25 Hz

Table 4: Relay outputs

Number of output relays	4
Rated contact voltage	250 V ac/dc
Continuous contact carry	5 A
Make and carry for 0.5 seconds	30 A
Make and carry for 3 seconds	15 A
Breaking capacity for dc, when the control circuit time constant L/R < 40 ms, at the control voltages 48/110/220 V dc	5 A/3 A/ 1 A
Contact material	$AgCdO_2$

Table 5: Power supply

| Auxiliary voltage		80…265 V ac/dc or 18…80 V dc
Temperature-compensated battery charger	Rated voltage	27.6 V dc, 20°C
	Output power	15 W
	Temperature compensation	~0.04 V/°C
	Temperature measurement	-40…+60°C, ±3°C
Power supply for external communication device	With batteries	12 V dc, 7 A peak
	Without batteries	12 V dc, 1 A peak

Table 6: Standard tests

Immunity tests	EN 50082-2 IEC 255-22-1…4
Mechanical tests	IEC 255-21-1…3
Environmental tests	IEC 68-2-1 IEC 68-2-2 EC 68-2-30
Emission tests	EN 50081-2 EN 55011

Table 7: Environmental conditions

Specified service temperature range		-10…+55°C
Specified service temperature range with external heating element		-40…+55°C
Transport and storage temperature range		-40…+70°C
Degree of protection to IEC 529	wall-mounted, flush-mounted and rack-mounted	IP 20
	fitted in a UEMC-A2 enclosure	IP 54
Dimensions		148 (w) x 265 (h) x 250 (d) mm

Block diagram
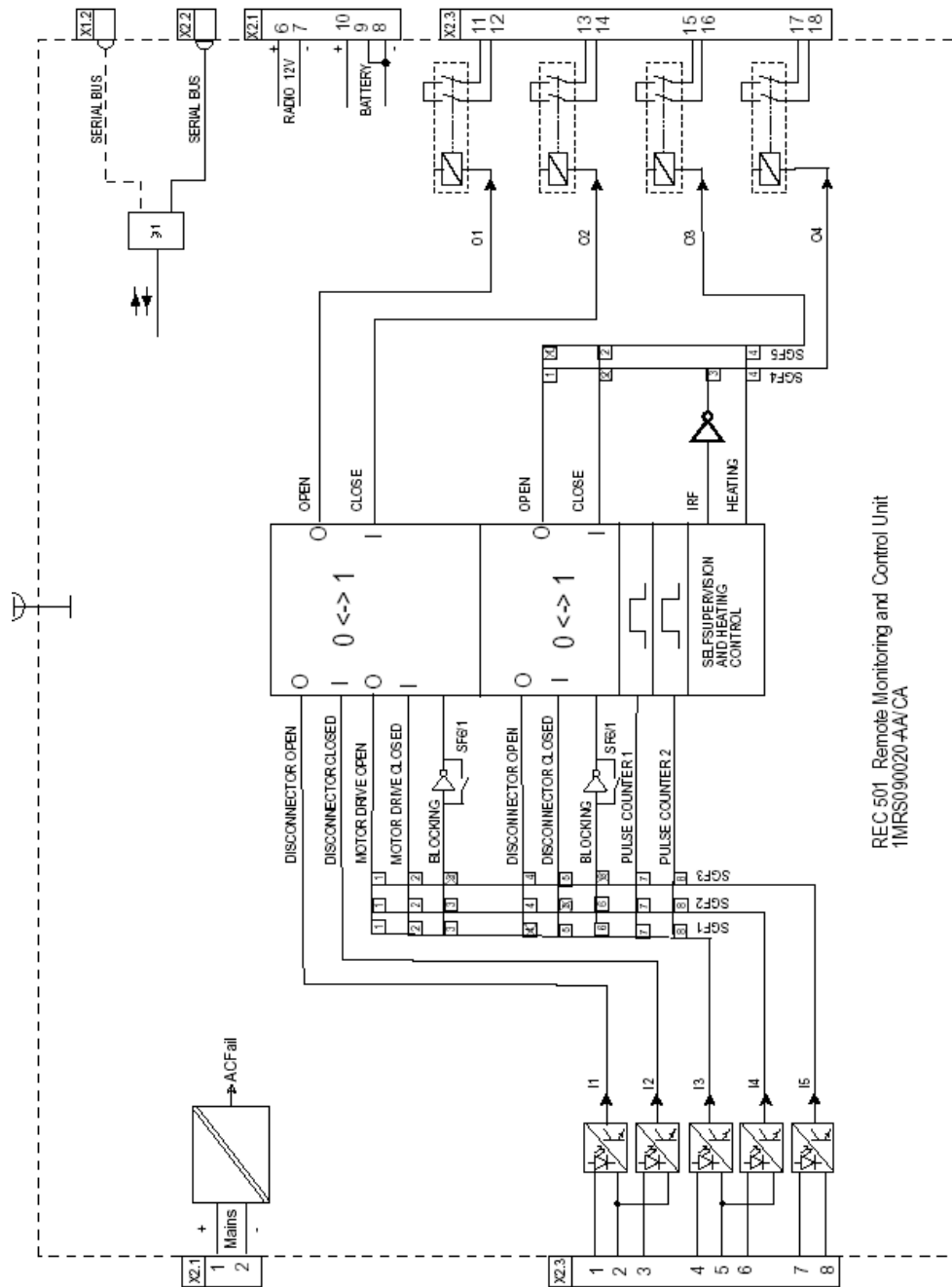
Fig. 1   Block diagram

Ordering

When ordering, please specify:

Ordering information	Ordering example
1. Type designation and quantity	REC 501, 5 pieces
2. Hardware order number	1MRS 090020-AA
3. Rated frequency	f_n = 50 Hz
4. Auxiliary voltage	U_{aux} = 110 V dc
5. Accessories	RS232 cable, 15 m (1MRS 120507), 1 piece
6. Software order number	Protocol MODBUS (1MRS 118009), 1 piece
7. Special requirements	-

Order numbers

Monitoring and control unit REC 501	
110…240 V ac / 110…220 V dc, surface mounting	1MRS 090020-AA
110…240 V ac / 110…220 V dc, flush-mounting	1MRS 090021-AA
18…80 V dc, surface mounting	1MRS 090020-CA
18…80 V dc, flush-mounting	1MRS 090021-CA

Software	
Protocol ANSI X3.28	1MRS 118006
Protocol RP570	1MRS 118007
Protocol IEC 870-5-101	1MRS 118008
Protocol MODBUS	1MRS 118009
Protocol DNP 3.0	1MRS 118010

Optional accessories	
Programming cable	1MRS 120500
RS232 cable, 15 m	1MRS 120507
Plug-in modem, temperature range +5…+50°C	1MRS 119000-Axx *)
Plug-in modem, temperature range -20…+60°C	1MRS 119000-Bxx *)
Plug-in adapter module with RS 485 and plastic fibre cable interfaces	1MRS 050248
Plug-in adapter module with RS 485 and glass fibre cable interfaces	1MRS 050249
*) xx = country code, country of destination must be specified	

References

Additional information

Bus connection modules and fibre-optic cables	1MDB 11010-EN
Brochure	1MDS 750501-MDS EN
User's manual	1MRS 750568-MUM EN
ANSI X3.28 Half-Duplex Protocol Description	1MRS 750750-MUM EN
RP 570 Protocol Description	1MRS 750751-MUM EN
DNP3.0 Protocol Description	1MRS 750781-MUM EN
MODBUS Protocol Description	1MRS 750780-MUM EN
IEC 870-5-101 Protocol Description	1MRS 750779-MUM EN

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