

Security system QM5000

Interface QME-1

User manual

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I. QMaster basic characteristic

QMaster is a control application for complex protection against eavesdropping. QMaster is a part of QM5000 system which consists of control PC, interface QMI-2 or QME-1, RS485 bus with audio link and a number of DMC-3Q and MRA-5Q devices. QM5000 allows connection of up to 9 QMI (COM) buses and up to 200 QME (Ethernet) buses.

II. Minimum HW configuration

- CPU: Pentium III 500 MHz and higher
- 128 MB RAM
- Interface: free serial port UART 16550 and higher, audio input/output supported by operation system
- Resolution: min. 1024x768 pixels
- Operation system: Windows 2000/XP and higher

III. Control of QMaster and system setting

Basic concept

QMaster is designed in a way that allows most frequently used functions to be accessible quickly and easily by pressing a button or activating other control element. Besides efficiency of control activation the priority lies in a transparent display of actual state of the controlled devices including detailed information about the currently selected device.

The main window is split vertically in two parts: on the left there is the *bus window*, on the right there is the *device window*. The bus window lists the currently registered devices including their actual state, control buttons for working with the bus (e.g. adding/removing device), information about communication on the bus, and control elements for working with audio records. The device window contains detailed information about the currently selected device and controls for working with the device (tuning, measuring frequency, background inspection, working with alarms). The main menu contains supplementary functions for working with the current device. Additionally the main allows to change the application settings, save/load projects and invoke application help. All application elements are equipped with tooltips that give online context sensitive help.

Using mouse on graphical elements

QMaster contains several graphical windows depicting channels of radio background, results of frequency spectrum analysis and the alarm history. You can use mouse to control these windows as follows:

- right button: select a region to zoom-in
- left button, double click: activate the corresponding frequency/channel (only frequency based windows)
- mouse wheel: zoom +/-

IV. QME-1 user manual

The QMaster works like a server receiving connection requests from interfaces QME-1 which are connected via Ethernet (internet). The control PC has to have fixed IPv4 address. This fix address together with communication port number must be set in the interface QME-1 (using QME buttons and display). After connection to the Ethernet the QME-1 obtains its own IP address (if the fix address is not also set in the QME-1) and then the QME-1 tests to connect to the QMaster PC. The QME-1 is repeating the connection request until the connection is established.

PC / Server communication setting

1. Set the fix IP address at the Qmaster PC, do not use public IP address
2. Make sure that the communication port is open for TCP/IP (Transmission Control Protocol / Internet Protocol) and UDP (User Datagram Protocol). Default protocol setting is 4242
3. Be sure with the settings particularly if there is any firewall in the network or a router with NAT (Network Address Translation). In this case the configuration must be done by the IT specialist who will open selected port for communication and will set correct data steaming to the QMaster server. It can be achieved e.g. by unblocking of selected ports in Windows firewall or by NAT configuration to stream any packets sent to specific port to the QMaster server.

Note: The QME and PC port numbers can be different, but it must be ensured that the packets will reach the proper destination.

QME-1 setting:

1. Set the IP address and port on the QME-1 by service buttons and connect to Ethernet.
Buttons left to right: MODE OK DOWN UP
The QME-1 can use DHCP protocol and in this case the QME-1 obtains its IP address automatically.
If there is no DHCP server in the network the IP and network gate must be set manually.
2. The QMaster does not need to know IP of QME-1, but all QME-1 must be properly adjusted. It means that the QME-1 can be simply connected to the network after firewall or NAT.
3. If the QMaster receives connection request from a QME-1 which has not been connected before a special dialog window is asking if the new QME should be connected. This dialog window is displaying MAC address which is corresponding with the QME-1 label. If the connection request is accepted the new QME-1 is add to the bus list.

Control elements, input outputs:

1. Connector POWER - power voltage 12V DC
2. Connector LAN RJ45 - connection to LAN or internet
3. DEVICE BUS 1 - CAN 9, bus for connection of MRA-5Q or DMC-3Q
4. DEVICE BUS 2 - CAN 9, parallel connected to BUS 1, for connection of second bus
5. 2 x 16 alphanumeric display
6. button RESET - processor reset, same function like power off / power on
7. trim VOLUME – earphone volume setting
8. EARPHONE – earphone connection for audio monitoring (2x 32ohm)
9. LED OK (green) – indicates correct communication
10. LED POWER (red) – indicates power supply

Example of QME-1 setting - displayed information

1. Switching ON (after reset):

QME-1 v 1.2
BUS ID = 61

Introductory info, SW version 1.2
Assigned bus ID = 61
Red LED POWER light

2. Connecting to LAN (or LAN disconnected):

ETH CABLE CHECK
BUS ID = 61

Connection of Ethernet cable testing
Assigned bus ID = 61
Red LED POWER light

3. LAN cable connected:

DHCP REQUEST
BUS ID = 61

Checking IP address using DHCP protocol
Assigned bus ID = 61
Red LED POWER light

4. LAN cable connected:

**ARP REQUEST
BUS ID = 61**

Checking connection to server using ARP protocol
Assigned bus ID = 61
Red LED POWER light

5. Control PC switched ON (IP address 11.2.0.3):

**CONNECTING TO
011.002.000.003**

Connecting to server IP 11.2.0.3
Red LED POWER light

6. Running QMaster on the control PC:

**CONNECTED #1234
UDP READY #1234**

Correct function, correct communication
Green LED OK and red LED POWER light
Data stream increments the upper number
Audio transmission increments lower number
UDP READY – UDP audio streaming is ready

7. Qmaster ON, control PC switched OFF:

**DISCONNECTED
UDP READY #1234**

Disconnected
Red LED POWER light

8. Communication breakdown:

**ARP REQUEST
BUS ID=61**

Red LED POWER light
Display and green LED OK is responding with delay, system is trying to restore communication

9. LEDs on RJ45 connector

-yellow = server connected

-green = data stream

QME-1 communication parameters settings

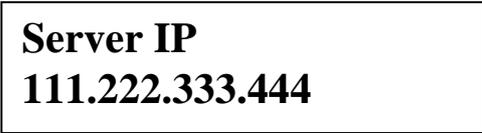
Communication parameters are set by buttons which have following functions left to right:
MODE OK DOWN UP

Buttons are accessible after opening the box (4 screws) or by a match (max. 2,9mm) through 4 holes above left part of the display (after adjustment should be covered by supplied label)

Setting of control PC's or server's IP address

(this setting can be done with disconnected LAN)

1. Push MODE



First three numbers are flashing, using UP/DOWN buttons adjust desired number

2. Push OK – second three numbers are flashing, adjust desired number

3. Push OK – third three numbers are flashing, adjust desired number

4. Push OK – fourth three numbers are flashing, adjust desired number

Note (example): IP address 11.2.0.3 is set like 011.002.000.003

5. Push MODE



Confirm yes (recommended) if DHCP server is ready in local network. The server assigns IP address and sets gateway.

If “no” is selected, the IP address of QME, gateways and masks must be set manually. Setting is similar like for IP server (see above)

6. Push MODE



Setting port for UDP and TCP/IP communication.

Confirm default = 04242 (the same default port is set in the bus manager in QMaster).

Different setting of the port can be needed if the device or server is behind firewall which is blocking port 04242. In this case consult with local IT specialist.

7. Push MODE

The QME-1 setting is finished, display returns to normal status and QME-1 is trying to establish communication with remote QMaster. In case of communication problems please consult with IT specialists at both ends of communication channel.

8. Stick on the label on the button holes to avoid any manipulation with the QME-1 settings

V. Device bus

The bus is connected to connectors CAN 9 marked DEVICE BUS 1 and 2. Buses 1 and 2 are parallel connected, usually is used only one (any) of them. The second is designated for e.g. test device or a device on a short bus.

The bus carries the following signals:

- 1) Supply voltage for MRA-5Q devices, 12–17V
- 2) RS485 signal pair with proprietary data protocol
- 3) Audio line (switched on selectively by MRA-5Q or DMC-3Q)

Layout of the device bus (QMI/MRA cable):

CAN 9 pin	Wire color	Signal	MRA-5Q
1	yellow	AUDIO	OPTIONS middle
2	gray	GND	CHARGER -
3	white	GND	CHARGER -
4	red	+14 V	CHARGER +
5	NC		
6	shield	GND	CHARGER -
7	green	RS485 -	OPTIONS right channel
8	orange	RS485 +	OPTIONS left channel
9	NC		

When extending the bus the following wires should be paired:

audio	1 and 2
power	3 and 4
RS485	7 and 8

A non-stabilized DC adapter 12V / 0.3-1A (max.20V) shall be connected to the POWER connector (the maximum current depends on the number of devices on the bus). The bus can be as much as 1200m long, wired from one device to another. If the bus is longer than 20m it is necessary to use a termination resistor at the most distant device (120 to 220 ohm connected between the green and the orange line, i.e. RS485+ and RS485-). The length of the audio cable to the PC (3.5mm jack) is not critical. If more devices (MRA-5Q and DMC-3Q) are used additional power supplies can be used along the bus.

Note: Because there are usually a large number of different IT devices connected to the LAN a number of parasite signals can go through to the MRA-5Q. The MRA-5Q is a very sensitive receiver and should be connected via as long as possible cable to the QME-1 to limit transfer of parasite receptions.

VI. Technical specification of QME-1:

- PC data interface RJ45 10/100Base T
- Device bus RS485 + audio line 300mV eff + power 12V
- Number of connected devices up to 128x MRA-5Q (with additional power supply)
- Bus length max. 1200m, parallel line configuration
- RS485 termination 120 to 220 ohm at the most distant device
- Number of bus wires 3 pairs (6 wires) + shielding
- Power current for MRA-5Q max 1A (32 devices)
- Current consumption 70mA + current according to number of MRA&DMC
- Input power voltage unstabilized 12 - 20V DC
- Audio filtering 300 - 3000 Hz
- Size 117 x 114 x 30 mm
- Weight 295g