

ORM Condition Monitor (ORM CM) Owner's Guide

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Oliotalo Oy

Lämmittäjänkatu 4 B

00880 Helsinki

Finland

Tel: +358 20 756 9400

info@oliotalo.fi

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www.oliotalo.fi [<http://www.oliotalo.fi>]

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Table of Contents

1. Introduction	1
1.1. Operating Power	1
1.2. ORM CM Connections	1
1.3. Communications	2
1.4. Data Storage	2
1.5. Operating System	2
1.6. Housing and Dimensions	2
1.7. Maintenance Connector	2
1.8. Expansion Options	2
2. ORM CM Connections	3
2.1. Vibration Inputs	3
2.2. Temperature Inputs	3
2.3. General Purpose Inputs	3
2.4. MODBUS Connection	4
2.5. Controller Area Network (CAN) Connection	4
2.6. Relay Connection	4
3. Installing ORM CM	5
3.1. Before You Start	5
3.2. Installing the SIM Card (Optional)	6
3.3. Installing the microSD Card (Optional)	8
3.4. Selecting the Mounting Location	8
4. Configuration, Management and Maintenance	10
4.1. ORM Admin	10
4.1.1. Connecting Your Computer to ORM CM and Logging In	10
4.1.2. Configuring ORM CM with ORM Admin	11
4.1.3. ORM Admin Installation Wizard	11
4.1.4. Updating ORM CM Software	11
4.1.5. System Status	12
4.1.6. Testing Tools	12
4.2. dOGMA Condition Monitoring System Server	12
4.3. ORM CM Programmer's Guide	13
4.4. Serial Number	13
4.5. Troubleshooting	13
4.6. Hardware Maintenance	14
A. Cable Pinouts and Connections	15
A.1. Connector B11: Power	15
A.2. Connector T10: MODBUS	15
A.3. Connectors T1-T2 and B1-B2: IEPE 1-4	15
A.4. Connector T9: Relay and Open Drain	16
A.5. Connector T8: Opto-Coupled Inputs and Outputs	16
A.6. Connectors B9-B10: CAN	17
A.7. Connector B3: General Purpose Sensors - Voltage Input	17
A.8. Connector T3: General Purpose Sensors - Current Input	17
A.9. Connector T11: Ethernet	17
A.10. Connectors T4-T7 and B4-B7: Pt-100	18
A.11. Connector B8: Maintenance Connector	19
A.12. Temperature Input Connections	19
Glossary	21

Chapter 1. Introduction

ORM CM is an advanced industrial terminal device for remote condition monitoring. It is typically used to measure data from, for example, vibration or temperature sensors.

ORM CM is shown in the figure below:

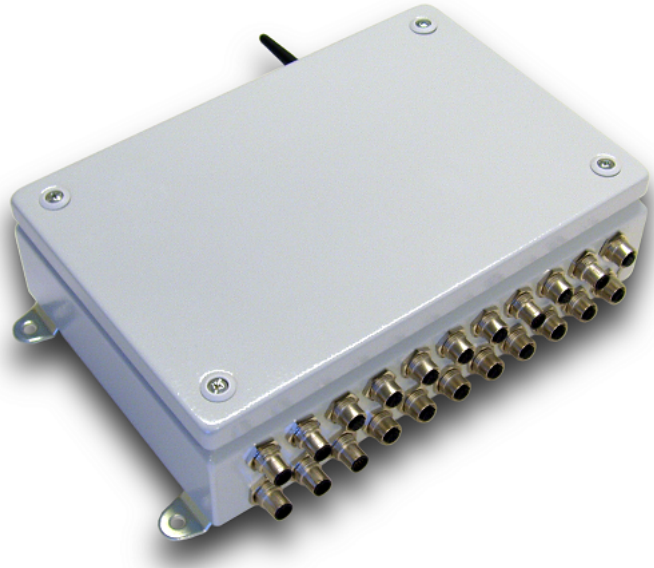


Figure 1.1. ORM CM

1.1. Operating Power

ORM CM requires an external power supply. The power supply requirements are:

- The voltage range is 10 - 30VDC.
- The power consumption can be up to 38W depending on sensor setup. The computer consumes 4W.

1.2. ORM CM Connections

ORM CM provides various inputs and outputs as follows:

- Four inputs for *Integrated Electronics Piezo Electric* (IEPE) two-wire sensors. IEPE sensors are acceleration sensors that transform the acceleration signal to an electric signal.

ORM CM has 4mA constant current available as voltage source for IEPE sensors. These inputs are for acceleration sensors with bias voltage around 12VDC.

IEPE sensor inputs of ORM CM are equipped with a software adjustable gain. This enables the use of different sensors and strengthening the sensor signal in case it is not strong enough in the first place.

- Four inputs for *Pt-100* temperature sensors. Optionally up to eight Pt-100 sensors.
- Inputs for general purpose sensors, such as a pulse sensor for RPM measurements or trigger sensors that trigger an action. There are four pieces of -10V - +10V inputs and four pieces of 0 - +20mA current channels.
- Two opto-coupled inputs and two opto-coupled outputs.
- One interface for *MODBUS* devices.
- Two relay controlled outputs for switching an outer circuit ON or OFF.

- Two open drain interfaces for general purposes.
- One *Controller Area Network* (CAN) interface.

For more information, see Chapter 2, *ORM CM Connections*



Note

The main board has a temperature triggered fuse. If it disconnects the current, see Section 4.5, “Troubleshooting”.

1.3. Communications

The basic ORM CM communicates with the dOGMA Condition Monitoring System or a customer specific server over a *General Packet Radio Services* (GPRS) connection or Ethernet.

It is also possible to equip ORM CM to use *Wireless Local Area Network* (WLAN) or 3G communications.

A *Subscriber Identity Module* (SIM) card is required for the GPRS or 3G connection.

1.4. Data Storage

ORM CM features a Secure Digital (SD) card slot that enables ORM CM to read and write data to an SD card inserted in the slot. The SD card storage size is customer specific.

Data can also be stored on a 1 GB NAND Flash mass memory.

The data itself consists of an event log on the measurement points. The log file name is `event.log`.

1.5. Operating System

ORM CM runs on a Linux operating system that is compatible with other OIotalo Oy software components.

1.6. Housing and Dimensions

ORM CM is housed in a painted stainless steel casing. The casing's International Protection Rating is IP65. The casing dimensions excluding the inlets are:

- Width: 300 mm
- Depth: 200 mm
- Height: 80 mm

1.7. Maintenance Connector

ORM CM has a maintenance connector. It is only used for service tools.

1.8. Expansion Options

ORM CM has the following expansion options:

- One additional CAN bus.
- Four additional Pt-100 connections.

For more information on expansion options, contact: sales@oliotalo.fi

Chapter 2. ORM CM Connections

The ORM CM connections are explained in more detail in the following chapters.

2.1. Vibration Inputs

Vibration input properties are listed below:

- Four IEPE channels are isolated as a group from the rest of the system.
- ORM CM has 4 mA constant current available as voltage source for IEPE sensors. These inputs are for acceleration sensors with bias voltage around 12 VDC.
- The vibration sensors are two-wire sensors.
- The input has a hardware low-pass filter at 28 kHz. The signal can be filtered to the configured range with software.
- The sampling frequency is 62.5 kHz per channel.
- The reading interval is software adjustable.
- Vibration inputs are equipped with a software adjustable gain. This enables the use of different sensors and strengthening the sensor signal in case it is not strong enough in the first place. The available gain settings are:
 - 1.0 x - This gain value forwards the signal without changes.
 - 2.0 x, 5.0 x, 10.0 x, 20.0 x, 50.0 x and 100.0 x - These gain values increase the signal strength as much as the multiplier indicates.

2.2. Temperature Inputs

The Pt-100 temperature input properties are listed below:

- The temperature measurement range is -200 - +900°C.
- The accuracy is $\pm 0.6^\circ\text{C}$.
- The reading interval is software adjustable.
- You can use 2, 3 and 4 wire Pt-100 sensors.



Important

If you use two-wire or three-wire Pt-100 sensors, connect extra current and voltage wires together outside of the casing, preferably at the sensors, as follows:

- For a two-wire sensor, connect together input wires 1 and 2 and, similarly, connect together input wires 3 and 4.
- For a three-wire sensor, connect together input wires 1 and 2.

Section A.12, “Temperature Input Connections” contains figures that further clarify the connection principles.

2.3. General Purpose Inputs

The general purpose input properties are listed below:

- For voltage inputs, the range is -10V - +10V.
- For current inputs, the range is 0mA - +20mA.
- The reading interval is software adjustable.

- General purpose inputs are software configurable as RPM inputs.

2.4. MODBUS Connection

You can use MODBUS sensors or devices with the following combination:

- Use the serial port as the physical connection (RS485).
- Use the MODBUS RTU protocol.

2.5. Controller Area Network (CAN) Connection

The CAN bus provides connectivity to CAN field buses. You can use CAN 2.0 part A and part B. Max 1 Mbit/s.

By default, ORM CM has one CAN bus, another one is available as an option.

2.6. Relay Connection

The relay connections can be used within a circuit that has values up to 30VDC and 0.5A.

Chapter 3. Installing ORM CM

This chapter describes the ORM CM installation. However, before you continue any further, read Section 3.1, “Before You Start”.

If you use GPRS or 3G connections and/or the microSD memory card, complete the steps in both of the following procedures:

1. Open the ORM CM housing.
2. Install the optional SIM card. See Section 3.2, “Installing the SIM Card (Optional)”.
3. Install the optional microSD card. See Section 3.3, “Installing the microSD Card (Optional)”.
4. Close the ORM CM housing.

If you do not use GPRS or 3G connections and/or the microSD memory card, you can skip the steps above and proceed as follows:

1. Read Section 3.4, “Selecting the Mounting Location”.
2. Fasten the ORM CM to its installation location.
3. Connect the power and sensor cables. Connect also optional cables, if any.
4. Test the ORM CM installation by checking that it collects and sends data to dOGMA Condition Monitoring System or to a customer specific server, if any.

3.1. Before You Start

Before you start, choose your method of usage. The options are:

- a. Offline
- b. Online with your own server
- c. Online with the dOGMA Condition Monitoring System server

After this selection, ensure that you have all the elements available required for a successful ORM CM installation. These elements are:

1. The power supply.
2. The ORM CM terminal.
3. Sensors. ORM CM is delivered without sensors. Purchase separately the sensors needed for the monitoring of vibration, temperature and so on.
4. Cables. ORM CM is delivered without cables. Order the required cables and connectors according to your needs. Follow the guidelines in Appendix A, *Cable Pinouts and Connections* when making the pin connections.
5. If you chose the b or c method of usage at the beginning, you will need a SIM card. ORM CM is delivered without a SIM card. If you decide to use a wireless GPRS or 3G connection, a SIM card is needed. Note the following:
 - Use active SIM cards. In other words, register the SIM cards at the mobile operator's subscriber management system. Depending on the operator, this may take some time from purchase.
 - Switch off the PIN code request. If the PIN code request is on, ORM CM cannot be used. If the PIN code request is on, use a mobile phone to inactivate the PIN code request. For more information, refer to your mobile phone documentation.

- Use SIM cards that support GPRS communication and subscriptions suitable for data transfer over GPRS or 3G.
6. Mounting accessories. Mounting accessories, such as screws or bolts, are not included in the ORM CM delivery. However, ORM CM has four pieces of 4.25 mm mount screw holes for mounting ORM CM to virtually any surface.
 7. A PZ2 screwdriver and a drill to drill holes for the mounting screws. Depending on the mounting location, you may also need cable ties, electrical tape, or other electrician tools and accessories. This equipment is not included in the ORM CM delivery.
 8. Equipment-specific interfaces, if data will be collected through such interfaces. ORM CM collects data from the equipment through electrical interfaces, which can be industry-standard or equipment-specific interfaces. ORM CM I/O connections are wired to, for example, either a standard bus of the control logic or to selected points of electric controls on the machine or device as required for the remote monitoring.
 9. Cables to the electrical interfaces.
 10. A laptop computer and an Ethernet cable for using ORM Admin (). See Section 4.1, “ORM Admin”.

You need an Ethernet cable with an RJ45 connector, and a connector described in Section A.9, “Connector T11: Ethernet”. See the cable wiring instructions therein.



Note

You will need a crossover cable when connecting your computer directly to ORM CM. Use a patch cable with uncrossed wiring when connecting your computer to ORM CM through a local network.

After you have ensured that you have all the elements available required for a successful ORM CM installation, select the ORM CM installation location. Read Section 3.4, “Selecting the Mounting Location” for installation location requirements.

3.2. Installing the SIM Card (Optional)

The figure below depicts the SIM and microSD card locations:

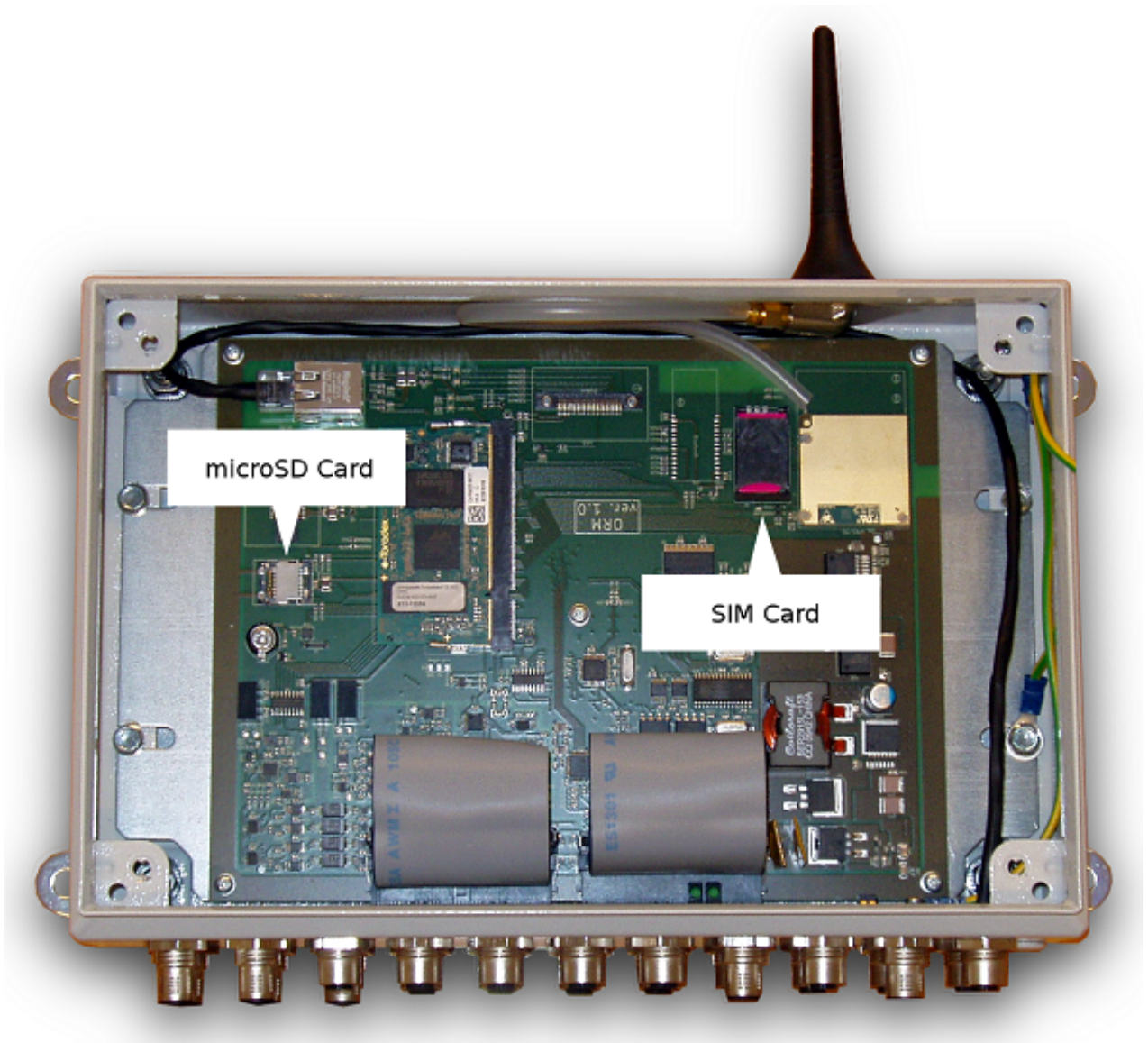


Figure 3.1. SIM and microSD Card Locations

The procedure below explains how to install the SIM card to ORM CM.

1. Unscrew the four screws from the casing lid.
2. Open the casing.
3. Press the PUSH OPEN locking clasp depicted in the figure below to open the SIM card holder.
4. Insert the SIM card to the holder as depicted in the figure below.



Note

Verify that the PIN code request is disabled or otherwise the network connection cannot be established. The PIN code request can be disabled using any mobile phone.

5. Close the SIM card holder as depicted in the figure below.
6. Place the lid back in its place.
7. Screw the four screws back in their places.

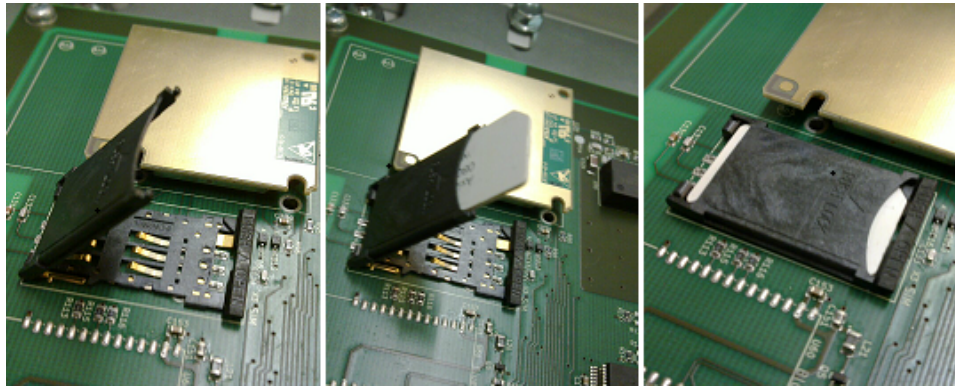


Figure 3.2. SIM Card Installation

3.3. Installing the microSD Card (Optional)

Tip

See Figure 3.1, “SIM and microSD Card Locations” for more information on the microSD card location.

The procedure below explains how to install the microSD card to ORM CM.

1. Unscrew the four screws from the casing lid.
2. Open the casing.
3. Slide the microSD card holder open. The arrow with the `UnLock` text indicates the correct opening direction. The microSD card holder is depicted in the figure below.
4. Insert the microSD card to the holder as depicted in the figure below.
5. Close the microSD card holder. The arrow with the `Lock` text indicates the correct closing direction. See the figure below.
6. Place the lid back in its place.
7. Screw the four screws back in their places.

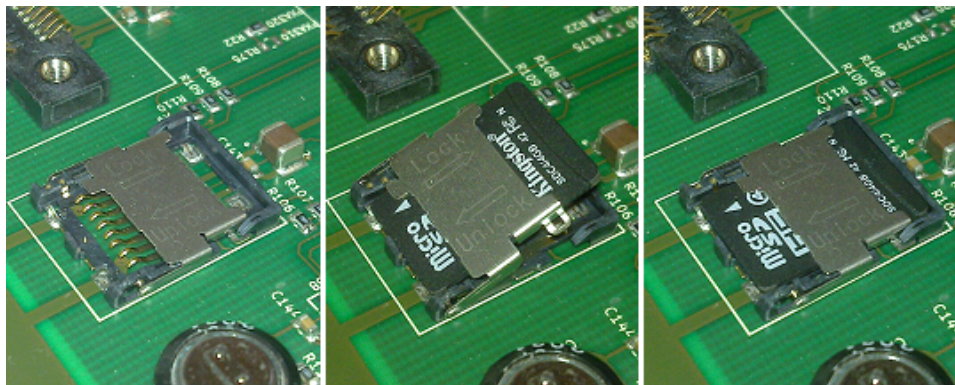


Figure 3.3. microSD Card Installation

3.4. Selecting the Mounting Location

When you are selecting the ORM CM mounting location, pay attention to the following mounting location requirements:

- Do not allow ORM CM to restrict or prevent the normal use of the equipment.

- Reserve at least 10 cm room for ORM CM connectors.
- The mounting location should allow trouble-free cabling.
- The mounting location should be such that ORM CM can be fastened properly. It should also be possible to unfasten ORM CM.
- The mounting location should be safe from accidental shocks.
- ORM CM is now ready for mounting.

Chapter 4. Configuration, Management and Maintenance

The ORM CM owner has two device management and maintenance interfaces available:

- ORM Admin is an onsite configuration tool for ORM CM.
- The dOGMA Condition Monitoring System server or a customer specific server used over a remote connection, such as GPRS, 3G or Ethernet. The dOGMA Condition Monitoring System server and a customer specific server are mutually exclusive servers.

These interfaces and the tasks they can be used to accomplish are described in the following chapters.

4.1. ORM Admin

ORM Admin is an onsite configuration tool for ORM CM. Its main purpose is to manage ORM CM settings locally for example in situations, when the remote server cannot be connected.

The ORM Admin login screen is depicted below:

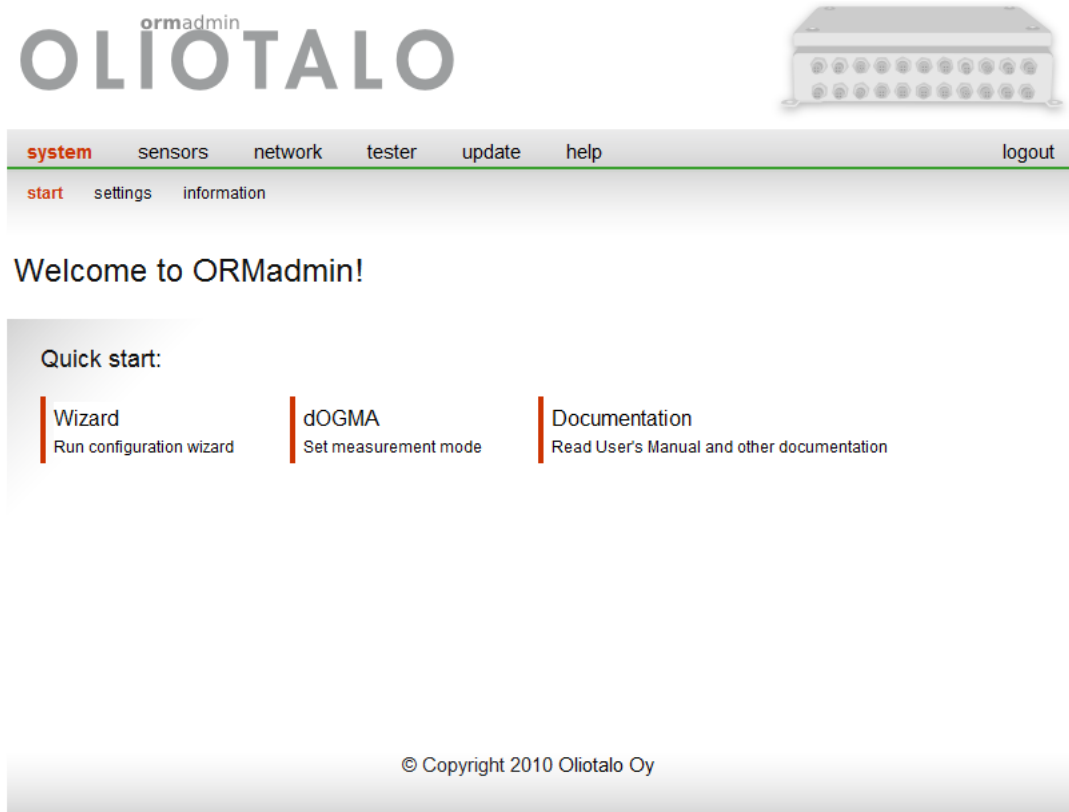



Figure 4.1. ORM Admin Login Screen

4.1.1. Connecting Your Computer to ORM CM and Logging In

You can connect your computer to ORM CM and log in as follows:

1. Connect a crossover Ethernet cable between your computer and ORM CM. If you use a network switch, hub or router use two normal Ethernet cables.

 **Tip**

ORM CM has an optional WLAN module that makes ORM Admin even easier to use. If you have the WLAN module, you can configure ORM CM for example through a mobile phone browser.

2. Open an Internet browser, such as Mozilla Firefox version 3.5 or newer or Microsoft Internet Explorer version 7 or newer.
3. Enter the ORM Admin IP address and HTTP port to the browser's address field. The complete address is:

```
http://10.10.0.5:5000
```

4. The ORM Admin login screen is opened.
5. Login with your user name and password. The default credentials are
 - User name: admin
 - Password: dogma
6. The ORM Admin main screen is opened.

4.1.2. Configuring ORM CM with ORM Admin

When you have logged in and the ORM Admin main screen is open, you can start making changes to the ORM CM configuration. You can use ORM Admin to make all ORM CM configurations.

You can choose whether to:

- Use the pre-installed dOGMA software with or without connection to dOGMA Condition Monitoring System server, or
- Disable dOGMA and use your own condition monitoring software, see Section 4.3, “ORM CM Programmer's Guide” for more details.

In the ORM Admin sensor configuration section, you can configure all parameters (for example resolution, gain, scaling factors) of the sensors connected to ORM CM. The supported sensors include analogue, Pt-100, acceleration, pulse sensors and more.

You can assign the desirable number of measurable values for every sensor and, for each measurable value, its own unit, read interval, record interval and other parameters.

In the ORM Admin network settings section, you can choose how ORM CM will be connected to the dOGMA Condition Monitoring System server, if it is registered with the server. Local network settings and GPRS/3G are specified here.

When you make changes to the ORM CM configuration in ORM Admin, the changes are also updated to the dOGMA Condition Monitoring System server, if the server is online. In this way, you can configure ORM CM both through the server and when the server is offline.

4.1.3. ORM Admin Installation Wizard

To make the commissioning of new ORM CM devices easier, faster and more convenient, ORM Admin has an installation wizard. This wizard guides you through the steps needed to install and configure a new ORM CM to the condition monitoring environment. After you have completed the wizard, you have an ORM CM that is ready for use.

4.1.4. Updating ORM CM Software

ORM Admin can be used to update all ORM CM software, such as dOGMA Condition Monitoring System, the operating system, different drivers and so on.

You can update the software by using one of the following methods:

- You can use your computer to download and install an update package. The installation steps are:
 1. Download an update package from Oliotalo Oy web site: <http://www.oliotalo.fi/orbcm>.
 2. Save the downloaded update package to the computer connected to ORM CM.
 3. Open the ORM Admin user interface and go to the *Updates* page.
 4. Upload the update package.
 5. Start the installation by pressing the Install updates button.
- You can use a physical media, such as a USB memory stick or an SD memory card. The installation steps are:
 1. Download an update package from Oliotalo Oy web site: <http://www.oliotalo.fi/orbcm>.
 2. Save the downloaded update package on a USB stick or on an SD memory card.
 3. Plug the installation media to the USB connector or SD memory card slot on the ORM CM device.
 4. Open the ORM Admin user interface and go to the *Updates* page.
 5. Start the installation by pressing the Install updates button. ORM Admin will automatically recognize the installation media.
- If ORM CM is registered to dOGMA Condition Monitoring System server, you can request for a dOGMA software update directly from the server. The installation steps are:
 1. Open the ORM Admin user interface and go to the *Updates* page.
 2. Press the Request software button. ORM Admin will fetch the dOGMA installation package from the server and install it.



Note

dOGMA software can be also updated remotely through the dOGMA Condition Monitoring System server web interface, see Section 4.2, “dOGMA Condition Monitoring System Server”.

4.1.5. System Status

You can view an ORM CM system status screen in ORM Admin. Information shown includes, for example:

- ORM CM serial number
- Version numbers for different software and drivers
- The server connection type and status
- SIM card number and its signal strength (Optional)

4.1.6. Testing Tools

ORM CM testing tools contain the following utilities:

- Monitoring of the AD channels
- Testing the relays and digital outputs
- Testing the Internet connection

4.2. dOGMA Condition Monitoring System Server

ORM CM devices and the dOGMA Condition Monitoring System server form a complete dOGMA Remote Condition Monitoring System. This system is a wireless conditioning monitoring system for different industrial machinery, where the

data is gathered from the machinery by using ORM CM devices transmitted to the dOGMA Condition Monitoring System server. The data is then summarised in the dOGMA Condition Monitoring System server and displayed to the user as graphs and tables on an Internet browser.

4.3. ORM CM Programmer's Guide

If, for some reason, the dOGMA Condition Monitoring System server is not used, ORM CM devices can transmit the collected data to another, customer specific server. This system structure, its interfaces and protocols are described in detail in the ORM CM Programmer's Guide.

4.4. Serial Number

ORM CM serial number contains information on the terminal itself. The serial number can be, for example, as follows:

ORMH10480001A

This serial number indicates that the ORM CM was produced in 2010 on week 48, it is the first device produced on that week and it is of revision A.

The serial number syntax is detailed in the table below:

Table 4.1. Serial Number Fields

Field	Length	Description
1	3 characters	ORM = ORM CM.
2	1 character	The ORM CM model. This field is for OIotalo Oy internal purposes. The options are: <ul style="list-style-type: none"> • H - High end • L - Lite
3	2 characters	Production year in clear text, for example 10.
4	2 characters	Production week in clear text. The possible values are between 01 and 53.
5	4 characters	A number indicating the device's ordinal number in production on the assembling day. If the number is, for example, 0002, the device is the second ORM CM assembled on that week.
6	1 character	Revision, for example B.

4.5. Troubleshooting

If you are experiencing trouble installing ORM CM, read these troubleshooting instructions.

Table 4.2. Troubleshooting Symptoms and Solutions

Symptom	Solution
No data is collected.	1. Check that the cables between ORM CM and the signal sources are firmly fastened. Check also the power cable.
No data is sent to the dOGMA server.	1. Check that the SIM card does not request the PIN code. 2. Check that data is collected to ORM CM logs. 3. Check that the antenna cable is firmly fastened.
The fuse disconnects the current.	1. Remove the problem that caused the fuse to disconnect the current, if possible.

Symptom	Solution
	2. The fuse is a temperature triggered fuse. If it disconnects the current, wait for a while that the ORM CM cools down.

4.6. Hardware Maintenance

ORM CM requires no hardware maintenance. It contains no batteries or any other parts that require to be replaced.

Appendix A. Cable Pinouts and Connections

The ORM CM connections are depicted and numbered in the figure below.

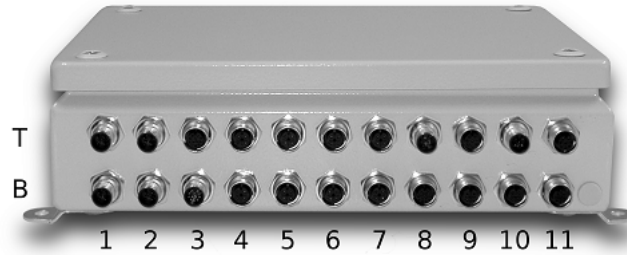


Figure A.1. ORM CM as Seen from Front

The connector names refer to the figure as follows:

- *T* - Refers to the top row. In other words, connector *T4* is the fourth connector from left on the top row.
- *B* - Refers to the bottom row. In other words, connector *B1* is the first connector from left on the bottom row.

You can use the following tables to build cables for each numbered connection.

A.1. Connector B11: Power

In this connection you can use, for example, the Phoenix connector number SACC-DSI-FSB-5CON-L180 SCO. The connector on ORM CM is a male connector. Connect the wires as follows:

Table A.1. Pinout for the Power Connector

Connector	Pin #	Purpose
	1	Voltage in
	2	Ground
	3	Empty
	4	Empty
	5	Empty

A.2. Connector T10: MODBUS

In this connection you can use, for example, the Phoenix connector number SACC-DSI-MS-5CON-L180 SCO. The connector on ORM CM is a female connector. Connect the wires as follows:

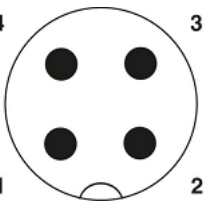
Table A.2. Pinout for the MODBUS Connector

Connector	Pin #	Purpose
	1	Empty
	2	Ground
	3	RS485_B
	4	RS485_A
	5	Empty

A.3. Connectors T1-T2 and B1-B2: IEPE 1-4

In these connections you can use, for example, the Phoenix connector number SACC-DSI-MS-4CON-L180 SCO. The connector on ORM CM is a female connector. Connect the wires as follows:

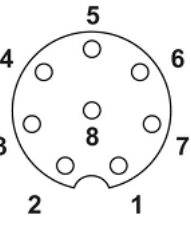
Table A.3. Pinout for the IEPE Connectors

Connector	Pin #	Purpose	Pin #	Purpose
	<i>Connector T1 (IEPE 1)</i>		<i>Connector B1 (IEPE 3)</i>	
	1	IEPE 1	1	IEPE 3
	2	Empty	2	Empty
	3	Empty	3	Empty
	4	Ground	4	Ground
	<i>Connector T2 (IEPE 2)</i>		<i>Connector B2 (IEPE 4)</i>	
	1	IEPE 2	1	IEPE 4
	2	Empty	2	Empty
	3	Empty	3	Empty
	4	Ground	4	Ground

A.4. Connector T9: Relay and Open Drain

In this connection you can use, for example, the Phoenix connector number SACC-DSI-FS-8CON-L180 SCO. The connector on ORM CM is a male connector. Connect the wires as follows:

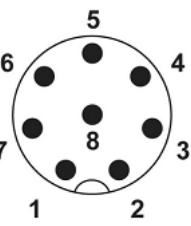
Table A.4. Pinout for the Relay and Open Drain Connector

Connector	Pin #	Purpose
	1	Relay 1/1
	2	Relay 1/2
	3	Relay 2/1
	4	Relay 2/2
	5	Open drain 1
	6	Ground
	7	Open drain 2
	8	Ground

A.5. Connector T8: Opto-Coupled Inputs and Outputs

In this connection you can use, for example, the Phoenix connector number SACC-DSI-MS-8CON-L180 SCO. The connector on ORM CM is a female connector. Connect the wires as follows:

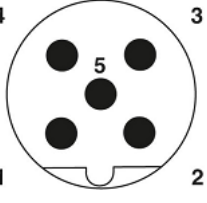
Table A.5. Pinout for Opto-Coupled Inputs and Outputs

Connector	Pin #	Purpose
	1	Opto in 1 -
	2	Opto in 1 +
	3	Opto in 2 -
	4	Opto in 2 +
	5	Opto out 1 -
	6	Opto out 1 +
	7	Opto out 2 -
	8	Opto out 2 +

A.6. Connectors B9-B10: CAN

In these connections you can use, for example, the Phoenix connector number SACC-DSI-FS-5CON-L180 SCO. The connector on ORM CM is a male connector. Connect the wires as follows:

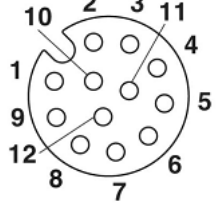
Table A.6. Pinout for CAN Connectors

Connector	Pin #	Purpose	Pin #	Purpose
	<i>Connector B9 (CAN 1)</i>		<i>Connector B10 (CAN 2, optional)</i>	
	1	Shield	1	Shield
	2	Empty	2	Empty
	3	Ground	3	Ground
	4	CAN1H	4	CAN2H
	5	CAN1L	5	CAN2L

A.7. Connector B3: General Purpose Sensors - Voltage Input

In this connection you can use, for example, the Phoenix connector number SACC-DSI-MS-12CON-L180 SCO. The connector on ORM CM is a female connector. Connect the wires as follows:

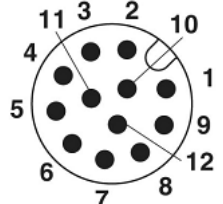
Table A.7. Pinout for General Purpose Sensors - Voltage Input

Connector	Pin #	Purpose	Pin #	Purpose
	1	Voltage input 1 +	7	Voltage input 3 +
	2	Voltage input 1 -	8	Voltage input 3 -
	3	Ground	9	Ground
	4	Voltage input 2 +	10	Voltage input 4 +
	5	Voltage input 2 -	11	Voltage input 4 -
	6	Ground	12	Ground

A.8. Connector T3: General Purpose Sensors - Current Input

In this connection you can use, for example, the Phoenix connector number SACC-DSI-FS-12CON-L180 SCO. The connector on ORM CM is a male connector. Connect the wires as follows:

Table A.8. Pinout for General Purpose Sensors - Current Input

Connector	Pin #	Purpose	Pin #	Purpose
	1	Current input 1 +	7	Current input 3 +
	2	Current input 1 -	8	Current input 3 -
	3	Ground	9	Ground
	4	Current input 2 +	10	Current input 4 +
	5	Current input 2 -	11	Current input 4 -
	6	Ground	12	Ground

A.9. Connector T11: Ethernet

The figure below depicts the wire colouring for a crossover and a patch Ethernet cable.

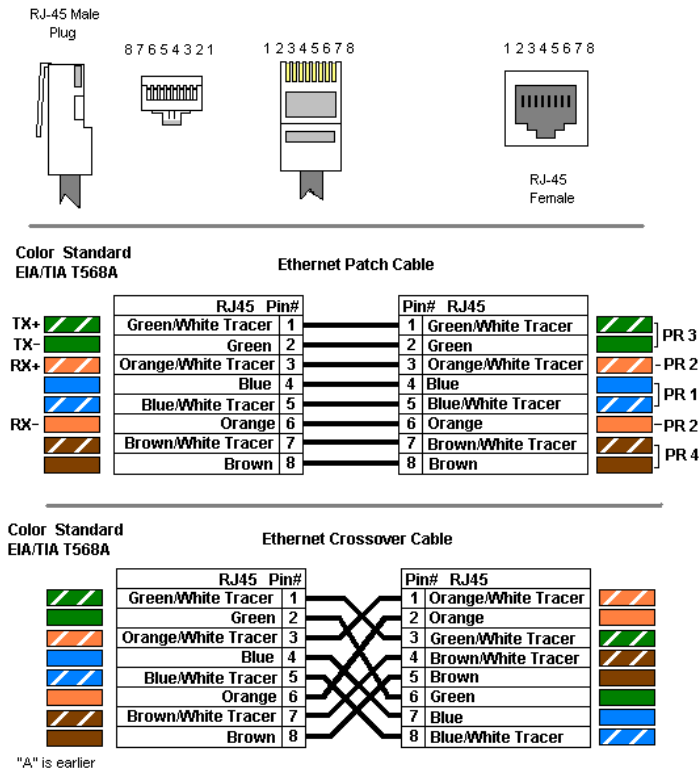


Figure A.2. Wire Colouring for Crossover and Patch Ethernet Cables

In this connection you can use, for example, the Phoenix connector number SACC-DSI-FS-8CON-L180 SCO. The connector on ORM CM is a male connector. Connect the wires as follows:

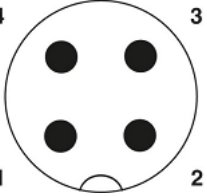
Table A.9. Pinout for the Ethernet Connector

Connector	Pin #	Purpose
	1	TX+
	2	TX-
	3	RX+
	4	Empty
	5	Empty
	6	RX-
	7	Empty
	8	Empty

A.10. Connectors T4-T7 and B4-B7: Pt-100

In these connections you can use, for example, the Phoenix connector number SACC-DSI-MS-4CON-L180 SCO. The connector on ORM CM is a female connector. Connect the wires as follows:

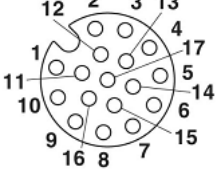
Table A.10. Pinout for the Pt-100 Connectors

Connector	Pin #	Purpose	Pin #	Purpose
	<i>Connector T4 (Pt-100 1)</i>		<i>Connector T6 (Pt-100 3, optional)</i>	
	1	Pt-100 1, voltage -	1	Pt-100 3, voltage -
	2	Pt-100 1, current -	2	Pt-100 3, current -
	3	Pt-100 1, current +	3	Pt-100 3, current +
	4	Pt-100 1, voltage +	4	Pt-100 3, voltage +
	<i>Connector B4 (Pt-100 5)</i>		<i>Connector B6 (Pt-100 5, optional)</i>	
	1	Pt-100 5, voltage -	1	Pt-100 7, voltage -
	2	Pt-100 5, current -	2	Pt-100 7, current -
	3	Pt-100 5, current +	3	Pt-100 7, current +
	4	Pt-100 5, voltage +	4	Pt-100 7, voltage +
	<i>Connector T5 (Pt-100 2)</i>		<i>Connector T7 (Pt-100 4, optional)</i>	
	1	Pt-100 2, voltage -	1	Pt-100 4, voltage -
	2	Pt-100 2, current -	2	Pt-100 4, current -
	3	Pt-100 2, current +	3	Pt-100 4, current +
	4	Pt-100 2, voltage +	4	Pt-100 4, voltage +
	<i>Connector B5 (Pt-100 6)</i>		<i>Connector B7 (Pt-100 6, optional)</i>	
	1	Pt-100 6, voltage -	1	Pt-100 8, voltage -
	2	Pt-100 6, current -	2	Pt-100 8, current -
	3	Pt-100 6, current +	3	Pt-100 8, current +
	4	Pt-100 6, voltage +	4	Pt-100 8, voltage +

A.11. Connector B8: Maintenance Connector

In this connection you can use, for example, the Phoenix connector number SACC-DSI-FS-17CON-L180 SCO. The connector on ORM CM is a male connector. Connect the wires as follows:

Table A.11. Pinout for the Maintenance Connector

Connector	Pin #	Purpose	Pin #	Purpose
	1	VGA LCLK	10	VGA RED
	2	RS232 TX	11	VGA FCLK
	3	USB1 D-	12	RS232 RX
	4	USB1 D+	13	USB1 Ground
	5	USB1 +5V	14	USB2 Ground
	6	USB2 D-	15	USB2 +5V
	7	USB2 D+	16	VGA Ground
	8	VGA Blue	17	RS232 Ground
	9	VGA Green		

A.12. Temperature Input Connections

The figures below depict the temperature input connections for two-wire, three-wire and four-wire Pt-100 sensors.

Two-Wire Pt-100 Sensor

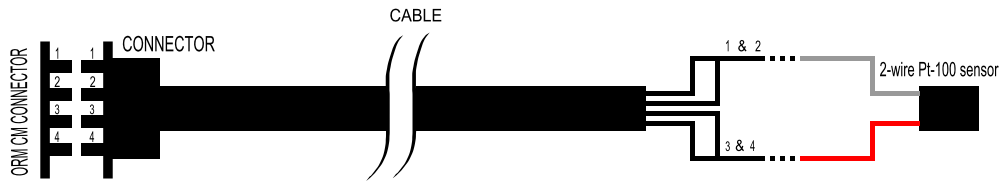


Figure A.3. Temperature Input Connections for a Two-Wire Pt-100 Sensor

Three-Wire Pt-100 Sensor

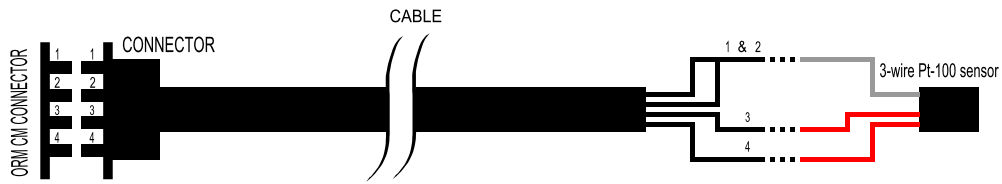


Figure A.4. Temperature Input Connections for a Three-Wire Pt-100 Sensor

Four-Wire Pt-100 Sensor

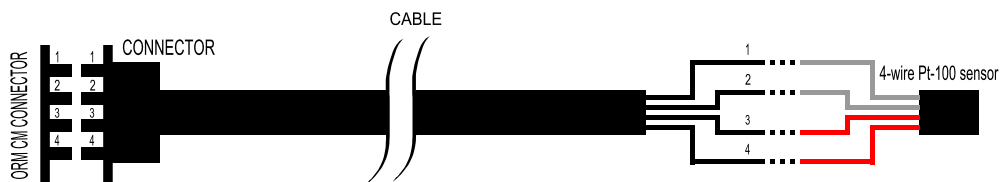


Figure A.5. Temperature Input Connections for a Four-Wire Pt-100 Sensor

Glossary

C

Controller Area Network (CAN)

Controller Area Network (CAN or CAN bus) is a vehicle bus standard designed to allow microcontrollers and devices to communicate with each other within a vehicle without a host computer.

Condition monitoring

Condition monitoring is the process of monitoring a parameter of condition in machinery, such that a significant change is indicative of a developing failure. It is a major component of predictive maintenance.

G

General Packet Radio Services (GPRS)

GPRS is a mobile data service available to users of GSM and TDMA mobile phones. GPRS can be used for services such as WAP access, SMS and MMS, but also for Internet communication services such as email and web access.

I

Integrated Circuit Piezoelectric (ICP)

See Integrated Electronics Piezo Electric.

ICP is a registered trademark of PCB Group, Inc. ICP (IEPE-type) piezoelectric transducers measure dynamic pressure, force, strain, and acceleration.

Integrated Electronics Piezo Electric (IEPE)

See Integrated Circuit Piezoelectric.

IEPE is the standard for piezoelectric transducers.

M

MODBUS

Modbus is a serial communications protocol published in 1979. It has become a de facto standard communications protocol in industry, and is now the most commonly available means of connecting industrial electronic devices.

P

Pt-100

The most common resistance thermometers used in industry have a nominal resistance of 100 ohms at 0°C, and are called Pt-100 sensors. *Pt* is the symbol for platinum.

S

Subscriber Identity Module (SIM)

SIM is a smart card that securely stores the key identifying a mobile phone service subscriber, as well as subscription information, saved telephone numbers, preferences, text messages and other information. Each ORM CM must be equipped with a SIM card if GPRS or SMS is the means of communication with the application server.

W

Wireless Local Area Network (WLAN)

WLAN is a wireless local area network, which links two or more computers without using wires. WLAN uses spread-spectrum technology based on radio waves to enable communication between terminals in a limited area.