SATO VICINITY

User Manual

Open Shelf Module



Document Number : 097-00-0048-1.2

Last Changed : 22 February 2021

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Please read this document before proceeding

Please read and understand this document before using Sato Vicinity's Open Shelf Module. If you have any questions, comment or suggestions about the User Manual please contact Sato Vicinity Pty Ltd.

Important Information

Installation Environment

For indoor use only unless otherwise specified. Install Sato Vicinity's PJM RFID Open Shelf Module within the temperature and humidity range according to the product specification. The environment must not contain corrosive, flammable, or explosive agents or be subject to rapid changes in temperature, to direct vibration or shock.

Installation

Sato Vicinity's Open Shelf Modules communicate with data carriers (RFID inlets, labels and tags) using the 13.56 MHz High Frequency (HF) band. Some industrial devices can generate unwanted noise which may degrade communication. Make sure that other equipment is properly installed, grounded and at a reasonable distance.

Wireless communication can be degraded by high-voltage and high-current lines and other sources of strong electric and magnetic fields. Installation in such locations should be avoided

③ Maintenance

Sato Vicinity's Open Shelf Modules are low maintenance equipment. There are no userserviceable parts in the Open Shelf Module or the PJM RFID Reader.

Servicing by unauthorised personnel will void the product warranty

Do not attempt to clean internally. Periodic cleaning of external case parts with a damp cloth is advisable. Do not use solvents of any kind!



In order to avoid electric shock do not any covers or attempt to repair. The equipment must be maintained by authorised, qualified, and service-trained personnel only



For disposal purposes the Open Shelf Modules should be treated as industrial waste.

The Open Shelf Modules shall not be treated as household waste. Instead it shall be handed over to an appropriate collection point for the recycling of electrical and electronic equipment. By ensuring correct disposal you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please contact your local city office, your household waste disposal service, or the Sato Vicinity Technology regional sales office.

1. Introduction

Thank you for your recent purchase of a SATO's Open Shelf Module system.

This User Manual will provide you with information regarding the Open Shelf Module system. The Open Shelf Modules can be used for blood or plasma storage enabling PJM RFID tagged blood bags or plasma bags/boxes to be read when they are placed on an Open Shelf Module in a cool room or freezer room.

NOTE: This User Manual will NOT detail the operation of the cool room/freezer room or any software applications, it focusses solely on the Open Shelf Modules and the MARS-12ATR Reader.

1.1 Regulation and Standards

RFID equipment is subject to national and international regulations.

The FCC, EU, AU and most national regulation regards RFID equipment as low-power transmitting devices and, therefore, does not require users of RFID devices to obtain a license to operate them.

CE Declaration of Conformity (European Union)

This equipment has been declared as compliant in accordance with 2014/53/EU (RED Directive) and 2014 / 35 / EU (Low Voltage Directive).

This apparatus complies with ETSI EN 301 489-1 RF common mode immunity requirements on Ethernet Port with shielded CAT5 Ethernet Cable.



This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures

ACMA Declaration of Conformity (Australia)

This product complies with the Australian Communications and Media Authority (ACMA) radio communications regulations and carries the C-Tick mark accordingly.





This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures

Any changes or modifications to the equipment that are not expressly approved by the party responsible for compliance could void the user's authority granted to operate this equipment.

IMDA Declaration of Conformity (Singapore)

This product complies with the Singapore IMDA TS SRD (Low Power Radio Equipment) telecommunications regulations and carries the following compliance label:

Complies with IMDA Standards N0443-20

ISO/IEC 18000 – 3 Mode 2 (Air Interface at 13.56 MHz) Compliance

Sato's Open Shelf Module system fully complies with the ISO/IEC 18000 Part 3 Mode 2 (Information technology – Radio frequency identification for item management. Part 3: Parameters for air interface communications at 13.56 MHz) published in August 2004.

1.2 Warranty

Sato Vicinity's products are warranted against defects in design, materials and workmanship for a period of 1 year from the date of purchase by the original owner.

Any liability with respect to components including purchased or free issued items and other materials used in the manufacture of products are covered by, and limited to, any warranty provided by the original manufacturer

1.3 Limitation of Liability

Sato Vicinity's warranty excludes products that have been improperly installed or maintained, modified or misused. Notification of claims must occur within the warranty period.

End-users should contact the company from whom they purchase the products for replacement, repair or refund.

If purchasing the Open Shelf Module system directly from Sato Vicinity, contact Sato Vicinity for a Return Merchandise Authorization (RMA) before shipment.

1.4 Changes in Product Family, Specifications and User Manuals

This document is subject to change without notice in future editions. Sato Vicinity reserves the rights to change its product design, specifications, and product range

1.5 Meaning of Alert Symbols and Signal Words

	Notes and Tips. Application Notes		
!	This part of the Manual requires your attention		
	In order to avoid electric shock, follow the instructions provided		
! CAUTION	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury. Can cause property damage.		



Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Can cause significant property damage.

1.6 Glossary of Terms and Abbreviations

D/C	Date Code
HF	High Frequency
LED	Light Emitting Diode
MLC	Machine Level Control
OEM Label	Original Equipment Manufacture label is located on the back of the equipment. It includes the Model Number, P/N, D/C, S/N and MLC where applicable
PJM™	Phase Jitter Modulation or PJM™ is a registered Trademark of Sato Corporation
PJM StackTag®	Registered Trademark for Sato Corporation's StackTag tags
P/N	Part Number
RMA	Return Merchandise Authorisation
Reader	Sato Vicinity's RFID reader/writer
Reader Manager	Graphical user application for Windows/Linux which provides a platform for testing, demonstrations and application development
ReaderServer	Embedded Reader application that provides the standard Application Programmer Interface to serve end-user applications.
RFID	Radio Frequency Identification
RFID inlet	A RFID device comprising a microchip and a printed antenna (copper/aluminium/conductive inks) on a flexible substrate (PET plastic film)
RFID Label	RFID inlet with finished top layer and adhesive backing (sticky label)
RFID Tag	Generic name for RFID inlet and label
MARS-12ATR RFID reader	Device for reading and writing to RFID tags
S/N	Serial Number
LAN	Local Area Network

2. Product Overview

The Open Shelf Module system provides unparalleled performance with a 3D reading field that eliminates the need for any special handling or placement of plasma bags/boxes. The antennas are completely orientation insensitive and capable of reading deeply stacked PJM RFID tagged blood bags or plasma bags/boxes with 100% accuracy. The antennas do not require manual calibration and are capable of automatic antenna tuning while the cool/freezer room is being used. The Open Shelf Module system enables users to perform immediate 100% accurate stock takes of their critical blood or plasma supplies, either locally or from a remote location. Specific units can be reserved for patients with an alarm triggered if the incorrect unit is removed (Software Dependent). Moreover, multiple Open Shelf Modules can be placed in proximity with one another without any interference.

The Open Shelf Modules are 100% safe to use with biological agents and materials. PJM RFID technology operates in the 13.56MHz frequency range which is the International Society of Blood Transfusion (ISBT) recommended frequency for use in blood banking and transfusion medicine.

2.1 Open Shelf Module

- Variable configurations available (typically 6 tiers)
- External dimensions in mm (H x W x D): Variable x 1350 x 620
- Per shelf capacity RBC using SATO's optional trays: 130 units
- Per shelf capacity using SATO's optional plasma trays and boxed plasma units: 171 units
- Cool/Freezer room can have up to 12 Open Shelf Modules running from 1 PJM RFID Reader
- Multi-axis shelf antennas provide 3-dimensional operation
- 8 communication reply channels provide industry leading reliability
- Up to 9,360 RBC (12 x 6 tier units) or 12,312 plasma units (12 x 6 tier units) per room can be tracked using just one PJM RFID reader
- Optional non-RFID enabled shelves available.
- MARS-12ATR Reader and Power Supply (housed in Remote Enclosure)

3. Getting Started

3.1 Inspection



When you receive your Open Shelf Modules, inspect for any obvious damage that may have occurred during shipment or assembly. If there is damage, notify the shipping carrier and the supplier of the equipment or Sato Vicinity if purchased directly from Sato Vicinity

Included with the Open Shelf Module should be the following components:

- I Quick Start Guide & Test Results sheet
- **③** Reader Manager CD-ROM

The CD-ROM will contain the following 4 files:

Autorun.inf	Will automatically launch the Reader Manager-Install.exe			
Documentation Folder	Contains various PDF documents including User Manuals & Programmer information			
CD-ReadMe,txt	Text file describing all the files on the CD			
Reader Manager-Install.exe	The GUI application for configuration and demonstration of all readers			



Ethernet cables are not included with the MARS12ATR Reader. Sato Vicinity recommends a CAT5 or CAT 6 Ethernet cable.



Only power cables and adaptors that are compliant with the regulations in the country of use may be connected to Sato Vicinity's equipment.



USB cable should be USB 2.0, screened & no longer than 3m

As shielded cables (USB and Ethernet) are generally required to comply with EMC emissions limits, only shielded communication cables should be used.

3.2 Installation Environment

The Open Shelf Module MARS-12ATR Reader (remotely located outside the Cold/Freezer room) is designed for indoor environment operation only.

The environment must not contain conductive dust, corrosive, flammable or explosive agents and or be subject to rapid changes in temperature, excess or direct vibration or shock.

The Open Shelf Module itself has an operating temperature range of -40°C to +40°C and an IP65 rating.

SATO's Open Shelf Module system communicates with data carriers (RFID inlets, labels, and tags) using the 13.56 MHz High Frequency (HF) band. Some industrial devices can generate unwanted noise which may degrade communication. Make sure that other equipment is properly installed, grounded and are at a reasonable distance.

Wireless communication can be degraded by high-voltage and high-current lines and other sources of strong electric and magnetic fields. Installation in such locations should be avoided.

In Multiple-axis antennas are tag orientation insensitive.
^③ Reading and writing speeds depend on reader-tag communication speeds and channel numbers (communication protocol), amount of information to be read and/or written and number of tags presented at a time. Additional numbers of tags and information to be read/written slow down read-write communication. If you require further information specific to your application, please consult Sato Vicinity or your support organisation.
⁽³⁾ Please note that tags and Readers can be incompatible with each other. Bigger tags can typically work with all types of Readers. Smaller tags require higher field strengths to communicate with a Reader and as a result they may not communicate with some Readers or must be closer to a Reader antenna to function. If you require further information specific to your application, please consult Sato Vicinity or your support organisation.

3.2.1 Working with Tags

3.2.2 Installation Requirements

SATO's Open Shelf Module system is pre tuned from factory and does not require any manual tuning of the internal antennas or MARS-12ATR Reader post installation.

Power supply and data requirements for the MARS-12 ATR Reader:

Mains input:	100 - 240 VAC @ 47 - 63 Hz
Low voltage input (PJM reader):	15 VDC @ 4A (60W)
Ethernet port connection to LAN	RJ45 connection

3.2.3 Tag to Shelf Orientation

As the Open Shelf Module antennas produce a three dimensional field, they are orientation insensitive, meaning that and the RFID tags can be presented in any orientation, vertical, horizontal, parallel or at any angle to the shelves with no loss in performance – A feature unique to PJM RFID.



Figure 1: OSM RFID shelf antenna.

3.3 Tag to Shelf Orientation

Due to the bespoke nature of each Open Shelf Module System. The Open Shelf Modules and the remote MARS-12ATR Reader and Power Supply will be installed by SATO or by a SATO trained technician on a per Freezer/Cool room basis.

Power LED Custom USB configuration pot 8 Reply channel LED's LUBB Connection to PC Image: Channel LED's Image: Channel

3.3.1 MARS-12ATR Reader Ports & LED's

Interface Ports & LED's



Open Shelf Module/Antenna Ports

3.3.2 Connection & Functionality Test

NOTE: Due to the bespoke nature of the Open Shelf Module System, all installation and testing will be conducted by SATO or by SATO trained technicians with signed off functionality test reports provided.

The MARS-12ATR Reader can be connected to a computer via Ethernet, using the Ethernet Port (RJ45 Jack) or via USB using the USB Device port. *Ethernet connection is preferred as the reader will be available across the LAN.* Any number of PJM RFID Readers can be connected to the LAN via Ethernet with all readers on the LAN accessible by all PC's on the LAN. *Crossover cables must not be used!*

Connect the required number of Open Shelf Modules or PJM RFID antennas (Noting the port number) to the MARS-12ATR Reader as required.

Connect the USB Flash Drive Cable Assembly with the correct room configuration, to the MARS-12ATR Reader.

When power is connected to the MARS-12ATR Reader the RFID system will power on, taking approximately 2 minutes to fully boot up. The Power LED on the MARS-12ATR Reader will be continually Illuminated once the MARS-12ATR Reader OS is ready for use.

Presenting RFID tag(s) to any of the PJM RFID antennas/shelves should result in the MARS-12ATR Reader 8 Reply Channel LED's (Labelled A - H) blinking in a random manner when the when the shelf/antenna with RFID tag(s) on it is scanned.

3.3.3 Hardware Maintenance & Cleaning

SATO's PJM RFID hardware has been designed to be maintenance free.

MARS-12ATR Reader enclosure - Any exposed components can be dusted off as required using a lint free cloth.

Open Shelf Module - The Open Shelf Modules have been designed to be accessible from all sides to facilitating cleaning. In the event of a spillage or as part of a routing cleaning schedule, all shelves (RFID enabled, or non-RFID enabled) can be cleaned using a lint free cloth dampened with a mild detergent or alcohol-based cleaners & disinfectants. Caustic cleaners must not be used!

Should the Open Shelf Modules need to be moved for cleaning see Section 3.3.4 Moving an Open Shelf Module

3.3.4 Moving an Open Shelf Module

If a single or multiple Open Shelf Modules need to be moved for any reason, please follow the process below for each Open Shelf Module.

- 1. Notify the system application administrator of the intention to take the Open Shelf Module offline.
- 2. <u>You must completely remove all stock from the Open Shelf Module as it is not permissible to</u> <u>move a loaded (even partially loaded) Open Shelf Module!</u>
- 3. Unscrew the antenna cable connector by turning it anti-clockwise. The antenna cable connector is found to the right of the uppermost shelf. See Figure 2



Figure 2: Cable Connection.

4. Once the cable has been disconnected, free the cable by lifting the cable upward to release it from the two cable clamps that are securing it in place. See Figure 3



Figure 3: Cable disconnected ready for release from clamps

5. Disengage the brakes on the front two castor. See Figure 4.



Figure 4: Wheel brake detail (engaged position shown)

6. Untether the Open Shelf Module from the wall. Depending on how the Open Shelf Module is tethered this can be achieved in one of two ways. Either by disconnecting the chain snap hook from the tethering chain, or by releasing the tethering chain from the wall fixing. See Figure 5



Figure 5: OSM tethered by a wall hook.

- 7. The Open Shelf Module can now be moved as required.
- 8. Once the Open shelf Module is ready to be reinstalled, proceed as follows.
- 9. Return the Open shelf Module to its location and Retether the Open Shelf Module. See Figure 6



Figure 6: OSM re-tethered to a wall hook.

10. Engage the brake on the front two castors. See Figure 7



Figure 7: Brake in the engaged position

11. Refit the antenna cable to the two cable clamps and reconnect the antenna cable turning the connector clockwise to secure the connectors together. See Figure 8



Figure 8: Cable re-connected and secured to the cable clamps

12. Notify the system application administrator that the Open Shelf Module has been reinstalled, ready to be brought back online.

4. Troubleshooting

Issue	Cause	Solution	
No Power	Power cable not connected to the Reader	Ensure the power cable is connected correctly to the Remote Reader	
	Power Cable faulty	Replace the cable	
	Power Adaptor faulty	Replace the power adaptor	
	Reader Fault	Contact your local supplier for support	
Cannot find and connect to the reader	The reader is not connected	Ensure the Ethernet cable is connected properly	
	Invalid Network configuration	Check the computer IP address & Reader IP address are configured/routed correctly for the LAN	
	Data Cable	Test USB/Ethernet cable	
	Reader Fault	Contact your local supplier for support	
PJM RFID tagged blood/plasma bags are not detected	Faulty tag/tags	Replace tag/tags. Do not use tags with a black dot or black square marking (faulty tags).	
	Faulty Antenna	Contact your local supplier for support	
	The <i>Powering Field</i> is off	Ensure the powering field is on. Using Reader Manager go to <i>Tools></i> <i>System>Reader Setting.</i> Tick the <i>Powering</i> <i>Field</i> box.	
	USB or Ethernet connection is not functioning	Ensure the Ethernet/USB cable is working correctly, try using an alternative cable. Power cycle the Reader & restart the host computer.	
	The tag type is incompatible with the reader	Use the appropriate tag type for the reader contact your local supplier to help with tag compatibility information	
	Reader fault	Contact your local supplier for support	

5. Document Revision History

Version	Date	Person	Change
Ver 1.0	19 January 2021	Steve Antonio	Initial Release of 097-00-0048-1
Ver 1.1	28 January 2021	Steve Antonio	Temperature range correction
Ver 1.2	22 February 2021	Steve Antonio	Additional MARS-12ATR Reader information

6. Appendix

6.1 Open Shelf Module Product Specification

Electrical		Host		
Operating Frequency	13.56 MHz	Host Interface	USB or Ethernet (Ethernet	
ISO/IEC Compliance	18000-3 Mode 2		must be shielded (CAT 5/6)	
Command Data Rate	424 kbit/s	Host OS	Windows 10 or later	
Reply Data Rate per Channel	106 kbit/s	Environmental		
Number of Axis	3	Operation environment	Indoor use	
Power Supply	15VDC	Temperature Range	-40°C to +40°C	
DC Power Supply Connector	2.5 mm DC centre pin positive	Mechanical		
Mains Input	110 - 240 VAC @ 50/60 Hz	Load capacity	150kg per tier (Evenly distributed)	
Maine Connector	IEC 220/C14 connector	Post material	Stainless Steel (Customisable height)	
Mains Connector	IEC 320/C14 connector	RFID shelves	Food grade polycarbonate	
Power Consumption	60W	Shelf clips	Food grade polypropylene	
Performance		Feet	Adjustable nylon	
RFID field	3D	Wheels	Optional wheels available	
Operating Range	Shelf surface	Sizes (W x D x H)	1350mm x 600mm x 1970mm	
Identification rate with 100% accuracy	Up to 150 tags/s	a an a n		
Identify & read 96 bits of data with 100% accuracy	Up to 100 tags/s			
Identify, write & read 96 bits of data with 100% accuracy	Up to 50 tags/s			
General		and the second se	A REAL PROPERTY AND A REAL	
Performs read and write operat	Performs read and write operations ✓			
No manual antenna calibration	needed 🗸	Almark		
Automatic antenna tuning 🗸				
Can be placed in close proximi	ty to one another 🗸			
RFID field unaffected by liquids ✓				
100% safe to use with biological material 🗸				
RFID tags can be presented in any orientation ✓				
100% safe to use in medical applications 🗸				
ISBT recommended frequency for blood banking and transfusion medicine		100	4	
Mobile option 🖌		Contraction of the second seco		