MNS & MNS *iS* Motor Control Centres
M*Service* based Condition Monitoring V7.7
User Manual

Power and productivity
for a better world™

ABB

MNS and MNS *i*S a registered trademark.

Microsoft, Windows 2008, Windows 7, and Windows 8 are registered trademarks of Microsoft Corporation.

Product names of other products are registered trademarks of their manufacturers.

This document relates to the MService Release 7.7.

The information in this document is subject to change without notice and should not be construed as a commitment by ABB.

ABB assumes no responsibility for any errors that may appear in this document.

In no event shall ABB be liable for direct, indirect, special, incidental, or consequential damages of any nature or kind arising from the use of this document, nor shall ABB be liable for incidental or consequential damages arising from use of any software or hardware described in this document.

This document and parts thereof must not be reproduced or copied without ABB's written permission, and the contents thereof must not be imparted to a third party nor be used for any unauthorized purpose. The software described in this document is furnished under a license and may be used, copied, or disclosed only in accordance with the terms of such license.

1   General

1.1   Target Group

M*Service* is the embedded Condition Monitoring device for ABB Low Voltage Switchgears. Audiences of this manual are service technicians and switchgear operators on site.

The document describes how to get the device installed in a switchgear network, and how to operate it using the web based user interface.

The reader shall be familiar with the terms and concept of ABB MNS Low Voltage Switchgear.

1.2   Use of Warning, Caution, Information and Tip icon

This publication includes **Warning**, **Caution**, and **Information** icons where appropriate to point out safety related or other important information. It also includes **Tip** icons to point out useful hints to the reader. The corresponding symbols should be interpreted as follows:

The electrical warning icon indicates the presence of a hazard that could result in *electrical shock*.

The warning icon indicates the presence of a hazard that could result in *personal injury*.

The caution icon indicates important information or warnings related to the concept discussed in the text. It might indicate the presence of a hazard that could result in *corruption of software or damage to equipment/property*.

The information icon alerts the reader to pertinent facts and conditions.

The tip icon indicates advice on, for example, how to design your project or how to use a certain function

Although **Warning** notices are related to personal injury, and **Caution** notices are associated with equipment or property damage, it should be understood that the operation of damaged equipment could, under certain operational conditions, result in impaired process performance leading to personal injury or death. It is, therefore, imperative that you comply fully with all **Warning** and **Caution** notices.

1.3   Terminology

List of the terms, acronyms, abbreviations and definitions, the document uses.

Abbreviation	Term	Description
Eth.	Ethernet	Ethernet is a local area network (LAN) technology. The Ethernet standard specifies the physical medium, access control rules and the message frames.
HMI / WebHMI	Human Machine Interface	Hard- and Software which implements the user interface. A WebHMI is a SW providing the HMI in an Internet web browser
LVS	Low voltage switchgear	Low voltage switchgear assembly built in accordance with IEC 61439-1
MCC	Motor Control Centre	Common term for switchgear used for motor control and protection.
MNS		Modular Low Voltage Switchgear family from ABB
UMC / M10x	Universal Motor Controller	An intelligent motor controller for 3-phase AC induction motors combining the two classical functions of motor protection and motor management in a single device plus offering diagnostic and fieldbus communication
MTQ22-EFB		The MTQ22-FBP Ethernet adapter module allows the connection of FBP devices to Ethernet
MNS iS		The integrated intelligent switchgear solution from ABB
	M*Start* M*Feed* M*Control* M*Connect* M*Speed* M*Link* M*View* M*Navigate*	MNS *i*S components integrated in the switchgear, see the MNS *i*S System Guide for technical details
OPC		The industrial de-facto standard for exchange of information between components and process supervision and monitoring applications using TCP/IP based networks.
OPC ID	OPC Network identifier	The OPC ID configured for M*Link* devices and for the OPC Server defines, which M*Link* devices are

		communicating to which OPC server. This defines a kind of logical sub-net within a certain IP network.
TCP/IP	Transmission Control Protocol / Internet Protocol	TCP/IP is a high-level connection oriented, reliable, full duplex communication protocol developed for networked integration of the heterogeneous computer systems.
NAMUR		NAMUR is an international user association of automation technology in process industries.

1.4   References

[1] 1TGC910001B0204 MNS iS System Guide

[2] 1TGC910232M0201 OPC Server Interface Manual V7.7

[3] 1TGC910221M0201 MNS iS Interface Manual Web Interface_Rel_7.0

[4] NE107 (2006-02-10) NAMUR Recommendation Self-Monitoring and Diagnosis of Field Devices

2 System Overview

2.1   Product Concept

The M*Service* device implements an innovative approach to condition monitoring: The supervision of the performance and health status of a MNS and MNS *i*S switchgear are made possible with a small-scale and easy-to-use embedded industrial PC.

The M*Service* implements the whole condition monitoring concept from collecting field level real-time data to performing assessment algorithms. Based on that, it is possible to work out a prognosis of developing situations and prompting the operator for action. However, if the situation continues and results in a tripping or failure, the M*Service* offers clear diagnosis for fast problem resolution.

Fig. 1: M*Service* device

M*Service* targets two main application scenarios:

- Customer's staff can use the device for performance analysis and continuous support of maintenance planning for MNS and MNS *i*S system, with M*Service* installed as permanent part of the switchgear.

- ABB's service personnel uses the device to place it in a customer's switchgear to support customer decisions in keeping the switchgear in good condition by collecting data for a certain time and derive an assessment on the switchgear performance and operational status.

To fit to these scenarios, the M*Service* employs a small-scale, compact approach to enable fast commissioning and ease of use.

2.2 Supported Functions

M*Service* Condition Monitoring covers the following main functions:

- Collection of operational data of the supervised modules
- Collection of all alarms and trips generated in the supervised modules
- Collection of maintenance warnings derived from additional assessment logic related to the supervised modules.
- Display of the MNS or MNS *i*S system structure highlighting modules signaling problems
- Display of historical data in trend displays
- Detailed information on the identification, location, and type of supervised modules
- Online supervision of temperature or power loss related problems within individual cubicles.

M*Service* can supervise all modules in MNS and MNS *i*S, which are connected to the internal switchgear communication bus. This includes:

- Motor starter and feeder modules (all sizes), which are equipped with measuring and communication electronic device M*Control*
- Motor starter and feeder modules (all sizes), which are equipped with intelligent device, UMC and M10x, communicates to M*Link*.
- Circuit breakers connected to the switchgear communication with the interface M*Connect*
- Circuit breakers connected to the switchgear communication with the interface M*Link*

Excluded from supervision in M*Service* are all modules not connected to the internal switchgear communication such as M*Speed* (Variable Speed drives in MNS *i*S) and conventional modules.

In general, M*Service* supports all types of modules which are also accessible in M*View*.

M*Service* firmware version 7.7 is extended to MNS - Intelligent Switchgear, UMC100/UMC100.3/M10x-M/Emax/Emax2 connects to M*Link*. In order to configure M*Service* to MNS – Intelligent Switchgear, MNS Engineer, M*Navigate* and M*Navigate* Plus version release 7.7 onwards shall be used. See more details in 1TGA710500 INSUM Upgrade Guideline UMC100 and 1TGA710501 INSUM Upgrade Guideline M10x.

2.3   Hardware characteristics

Fig. 2: MService interfaces

All interfaces of the M*Service* devices are located in the front plate. The following interfaces are relevant for the operation of the device:

Power connector	24 DC connection
Reset button	If pressed < 5s, an operating system reboot is initiated. If pressed > 5s, an immediate hardware restart is executed.
CF-Card slot	The compact flash card is used to transfer configuration data to the device. For proper operation of the device a compact flash card must be inserted. To enforce this, the CF-Card slot is covered by a latch, which is locked by the power connector.
Network interfaces	
LAN1	1GB/s autosensing interface free to use for any network
LAN2	1GB/s autosensing interface free to use for any network. Primary interface to connect switchgear network and M*Navigate*.

LAN3	1GB/s autosensing interface with fixed IP-configuration used for point-to-point connection to a PC running M*Navigate* for initial configuration download or maintenance access.
	The autosensing capability does not require using a cross-over cable to connect
	To avoid IP-Address conflicts, this interface must not be connected to a network switch.
USB connectors	Used to attach an external hard drive for Backup/Restore of database.

The following interfaces are not used by regular operation:

Serial port 1 and 2	Not used

The LEDs on the front plate have the following indicator function.

Please see sec. 13.2 for more information how to address certain problem indications.

LED 1 - Green	This LED is signaling the general status of M*Service*.
	• Off – Software components are not yet started: System is initializing
	• Blinking 2Hz – Firmware update running
	• Blinking 1Hz - SCADA system starting
	• On – System components are up & running
LED 2 - Red	This LED is signaling a problem
	• Off – No error
	• On – Software component failure: SCADA or OPC components are not yet fully initialized or not running as expected
	• Blinking 2Hz– Problem with LAN2 (switchgear connection)
LED 3 - Green	This LED is signaling status of OPC components
	• On – OPC is running correctly
	• Blinking – Not all of OPC processes are running.
LED 4 - Orange	This LED is signaling a recommended regular backup.
	• Blinking 4Hz: An M*Service* backup is recommended.
	Note: The LED is activated every 90days for a duration of 7 days.

LED 5 - Green	This LED is signaling status of LAN communication • On – LAN1 or LAN2 communication is up • Blinking 2Hz – LAN3 communication is up • Off – no LAN communication
LED 6 - Orange	• Blinking 2Hz – Problem with CF-Card. • Blinking 1Hz – Low RAM situation
LED 7 - Green	24V Power is connected and available – always on
LED 8 - Green	This LED represents life signal – it blinks twice each 20 seconds

2.4   Technical Data

Electrical Data	
Power Supply	24V DC (19 – 31V DC)
Power Consumption	Typical 800mA, Maximum 1000mA
Mechanical Data	
Weight	2.5 kg
Dimensions H x W x D	140 x 160 x 165 mm
Environmental Data	
Storage Temperature	-20°C to +70°C
Operating Temperature	0°C to +55°C
Degree of Protection	IP 51
MTBF (Mean Time Between Failures)	46 years @ 40°C
System behavior	
Boot time of operating system	1 min
Start-up of SCADA and OPC packages	2min + SCADA Startup Delay (s) + (45s per connected M*Link*) + 5 min, if no M*Link* is available in network
Configuration time	30s per supervised MNS *i*S module/device

3 Installation and Commissioning

3.1 Commissioning Workflow Overview

The following workflow outlines the necessary steps to setup an M*Service* device. Details for the individual items are found in the subsequent sections.

Step	Description
1	Mechanical installation and electrical connection. See section 3.2
2	Planning of network parameters within the switchgear network. See Sec. 3.3
3	Update the M*Service* firmware with latest fixes available from the BU LPLS Support Database. See Sec. 3.5
4	Configuring network settings and other parameters in M*Navigate*. See section 3.4.1
5	Copy / Download initial configuration to M*Service* See section 3.4.7
6	Connect M*Service* to switchgear network
7	Power on ⚠ In order to have a correct start of the communication between the M*Service* and the M*Link* devices it is essential to configure and connect first the switchgear LAN, and boot the device afterwards.
8	Complete the configuration using the 'Autoconfigurator Wizard' See section 4.3

3.2   MService mounting in MNS and MNS iS Cubicle

The MService device is placed in the control compartment of a MNS iS switchboard. The device is mechanically held by means of a device support (single support 300mm for MService only, double support 400mm for MLink/MService combinations).

The electrical power (24V DC) is typically taken from the control voltage distribution bar in the same compartment.

Fig. 3a: Example of MService placement in MNS iS switchboard

The MService is installed on a MLink mounting kit which is housed in an 8E withdrawable module compartment of the MNS cubicle. The MLink mounting kit is capable to support mounting for two MLink and one MService within an 8E compartment. The installation instruction and the required part of the mounting kit can be found in the "1TNA810039 -- Manufacture Instruction – Installation of MService and MLink"

Fig. 3b: MLink mounting kit

 If the MService device is placed alongside of a MLink device, it is recommended to use the left position for the MService.

3.3   M*Service* in MNS and MNS *i*S network

M*Service* collects the operational data from the switchgear using the built-in OPC Server. Therefore the device has to be connected to the switchgear network. All M*Service* and M*Link* devices have to be configured appropriately.

Different possibilities exist, how to set up the network, the most common are depicted in the following sections.

Do not connect several M*Service* devices to the same network before the correct networks settings are downloaded and activated. A failure of the network communication may be result if ignoring this.

Since the design of computer networks is in most cases governed by company rules on site, ABB provides the required network equipment only on special request.

The network sketches in the following sections always assume, that all devices are connected to a network switch forming a local area network (LAN) depicted by the grey line.

3.3.1   Client PC requirements and configuration recommendations

The M*Service* WebHMI uses standard web technologies limiting the software requirements on the client PC to a minimum. To use the web interface of the M*Service* device a standard PC is needed with the following minimum characteristics:

Hardware	
CPU	Min. Intel Atom 1.6GHz
RAM	1 GB
Network interface	100 MBit / 1 GBit
Display	Recommended resolution: 1280x1024 pixel
Software	
Operating system	Windows XP / Windows 7 / Window 8 and corresponding server variants
Internet Browser	Microsoft Internet Explorer, Version 8, 9, 10, 11 (see below remarks)
Java	Runtime environment, Version 6u24 or higher (see below remarks)

Microsoft Internet Explorer 9 & 10

Using Internet Explorer Version 9 or 10 requires the following settings to be made:

- Show 'Command bar'

- From the 'Tools' menu, enable 'Compatibility View'

Microsoft Internet Explorer 11

Using version 11 of Internet Explorer requires Java Runtime Environment to be upgraded to at least Version 7 update 55.

Java Runtime Environment

The main display of the M*Service* WebHMI is implemented as Java applet. Starting with Java 7, Oracle introduced a security check, asking the user to run the applet. The Java runtime shows a dialog, asking for permission to run the applet. The Java applet is digitally signed and the user can select to accept the signature. If the certificate is accepted, the security dialog is not shown again for this MService and on this PC.

Furthermore it is recommended to configure the Java Runtime environment in the following manner:

  •   Disable "Keep temporary files on my computer"

Fig. 4: Configuration of recommended Java settings

3.3.2   Switchgear network and client/plant network

The M*Service* may be connected to both the Client (Plant) network and the Switchgear Network.

Connection to Client Network is via LAN1 and the Switchgear Network via LAN2.

Fig. 5: M*Service* network example LAN1 & LAN2

3.3.3   Switchgear network and client/plant network with commissioning laptop

The special purpose LAN connection LAN3 can be used to create a point-to-point connection. This is used in the commissioning phase to upload the initial base configuration to the device.

Fig. 6: M*Service* LAN3 connection

> LAN3 has a fixed network configuration, which is the same on all M*Service* devices. It is set by factory and not configurable by any user. Therefore this port must not be connected to a network switch. Otherwise the function of the device is not possible and the whole network may fail to work.

3.3.4   Time synchronization via NTP

M*Service* collects alarms and events from several sources such as M*Link* and M*Control*/UMC /M10x devices. The built-in logic uses real-time operational data to assess certain conditions and creates maintenance alarms on its own.

In order to have a coordinated message archive, where all messages are placed with their real time of occurrence it is crucial to synchronize all M*Link* and M*Service* devices in the switchgear network.

All M*Link* and M*Service* devices use the Network Time Protocol (NTP) to get the date & time from a single source, the time master.

There are several scenarios how to distribute the time in the switchgear network. Two of them use dedicated hardware or one of the M*Link* as described below. Other architectures are possible, such as using network bridges to synchronize several IT-networks in a plant.

Redundant time master are currently not supported in MNS *i*S and M*Service*

3.3.4.1   PC as time master

In a common scenario a standard PC or server located in the switchgear network is configured as NTP server for all MNS & MNS *i*S devices.

Fig. 7: Time synchronization with standard PC as NTP server

All M*Link* and M*Service* devices have to be configured to use this clock master as NTP server. This is done using the M*Navigate* tool. For details how to achieve this see the M*Navigate* Help.

NTP Server configuration with standard PC, instruction is provided in 1TGE098081 – NTP Basic for MNS *i*S work instructions.

3.3.4.2 Clock-master hardware

There are dedicated products available just to provide the time to IT-Networks. They use the GPS and/or DCF77 or similar technologies to get a highly reliable reference time from public providers and distribute it to network clients.

All M*Link* and M*Service* devices have to be configured to use this clock master as NTP server. This is done using the M*Navigate* tool. For details how to achieve this see the M*Navigate* Help.

This mechanism is the recommended one, since it provides highest reliability.

Fig. 8: Time synchronization with dedicated clock master as NTP server

3.3.4.3   M*Link* as time master

If there is no common time master available, the simplest case is to use one of the M*Link* as time master:

This M*Link* is configured to run from its own hardware clock, all other devices are configured to use this M*Link* as NTP server. This is done using the M*Navigate* tool. For details how to achieve this see the M*Navigate* Help.

This mechanism relies on the time of the time master M*Link*, which may need to be set each time after a reboot of this M*Link* device.

Fig. 9: Time synchronization with M*Link* as NTP server

3.4   M*Service* commissioning

3.4.1   M*Service* configuration via M*Navigate*

In M*Navigate*, one or multiple M*Service* nodes appear if M*Service* devices are found in the switchgear configuration.

Fig. 10: Appearance of M*Service* devices in M*Navigate*

The access to M*Service* configuration dialogs is organized in the same manner as for all other devices.

The following M*Service* configuration settings need to be parameterized in M*Navigate*.

3.4.2   M*Service* Basic configuration

The basic settings define configuration of the network interfaces of the M*Service* devices. While LAN1 and LAN2 can be freely used to connect the device to networks, LAN3 has a fixed configuration to allow for a point-to-point connection to the device for commissioning purposes.

The configuration of the time server and the time zone to be used is also part of this dialog.

Fig. 11: M*Service* configuration – Network settings

See next page for details on the available parameters

M*Service* basic configuration: available parameters	
IP Address (LAN1,2)	IP-Address relevant for the corresponding LAN interface
Subnet Mask (LAN1,2)	Subnet mask relevant for the corresponding LAN interface
Default Gateway	Defines the gateway used enable network communication in other IP-networks. There shall be only one gateway set, either for LAN1 or for LAN2
OPC Startup Delay	Delays the start of the SCADA and OPC Components after the M*Service* system start. This allows for fine tuning the system start sequence to give the M*Link* devices time to power up and initialize their communication components.
TCP/IP Port Data Communication	For future use in complex network environments.
Time Sync Method	Fixed parameter: M*Service* always uses NTP based synchronization
Time Server IP-Address	IP Address of the clock master or clock relay server.
Time Zone	Time zone used on M*Service*. This influences the display of the timestamps of the messages.

3.4.3   OPC server parameters

The OPC server running in the M*Service* needs to be configured to match the OPC Server network set up.

Namely the OPC ID has to be set correctly to allow for correct communication to the M*Link* devices. See [2] for a detailed discussion of the OPC ID.

The OPC Refresh time can be used to fine tune the CPU load on the M*Service*.

Detailed information on parameters, value ranges, default values etc. are available via the M*Navigate* Online Help.

Fig. 12a: M*Service* configuration – OPC parameters

Fig. 13b: M*Link* configuration – OPC parameters

3.4.4 CAM (Condition Assessment Module) parameters

An OPC server running on the M*Service* includes a special module to run certain condition assessment logic. Various algorithms use the operational data from the M*Control*/UMC100/UMC100.3/M10x-M devices to derive maintenance alarms. These algorithms are parameterized as part of the OPC parameterization dialog.

Starting with M*Navigate* 7.4.11, the parameters are split into few, which are globally defined per M*Service* device, and a majority, which is defined on each power module individually.

Fig. 14: M*Service* configuration – Condition Assessment Module: Global parameters (left) and individual parameters (right)

Detailed information on parameters, value ranges, default values etc. are available via the M*Navigate* Online Help.

3.4.5   User management and language settings

The access right to the M*Service* device is governed by M*Navigate* user management. The language of the M*Service* User Interface is also associated with the individual user definition.

Every user is associated with a role, which defines the access level to the different device classes in the switchgear. M*Service* defines four access levels

No Access	User associated with this role do not have access to this M*Service*
Read only	This access level allows simple observation
Read & Write	In addition to 'Read' level, this access level allows acknowledgement of alarms, trips and condition messages. Additionally adding of comments is possible.
Administration	In addition to 'Read & Write' level, this access level allows changing system configuration.

With M*Service* R7.4 acknowledging trips does no longer include the automatic reset command being sent to the corresponding devices!

Fig. 15: M*Service* configuration –Role definitions and creation of users

All user/role definition made for one device can be transferred to other devices in the same M*Navigate* project using the 'Assign to M*Link*/M*Service* command.

Fig. 16: MService configuration – Transfer user settings to other devices

3.4.6   Installation of a language pack for MService

Contact the local ABB service organization if a language other than English is required.

A new language pack can be installed using the context menu 'Import Language Package' from the 'MService Devices' object in MNavigate.

The language pack has to be copied or extracted from archive file to the following location:

C:\ABB MNS iS\

If this folder does not exist on the PC, it has to be created.

Do not use any special characters in the folder name!

As an example, the following picture shows the correct placement of the language pack 'MService NLS EN_DE_FR".

Fig. 17 Correct placement of the language pack 'M*Service* NLS EN_DE_FR"

Fig. 18: Importing MService Language Pack

After successful load of a language pack, the 'edit user' dialog allows to select the language for the M*Service* user interface.

Fig. 19: Selection of user language

3.4.7   Activation of M*Service* configuration

The actual configuration can be transferred to the M*Service* device either by using direct copy the files on the CF-Card or with a download via LAN2 or LAN3 interface.

> A download of configuration files via LAN1 is not possible.

3.4.7.1   Copy configuration files to CF-Card

The configuration can be copied directly to the CF-Card of the M*Service* device. The M*Service* has to be powered off and the CF-Card has to be placed in a card reader device on the M*Navigate* PC.

The command opens a file dialog box to select the drive letter associated to the CF-Card and copies all configuration files on that place.

Fig. 20: Copy configuration on CF-Card

Place the CF-Card again in M*Service* and power on.

> Do not remove the CF-Card from the M*Service* while the device is powered on.

> Do not remove the CF-Card slot lock to gain better access to the CF-Card. The purpose of the lock is to prohibit the removal of the card during operation.

3.4.7.2   Configuration download via LAN3 'Service port'

The LAN3 port is used for point-to-point connections to the MService device. This is useful for situations, where no CF-Card reader is available and the device is not yet configured to communicate via the switchgear network.

Fig. 21: Connect MNavigate PC to MService via LAN3 'Service Port'

After the initial download of a configuration and the subsequent connection to the switchgear network, a reboot is required to complete the activation of the new configuration.

The MNavigate PC has to be prepared by the following two steps:

- Connect a network interface of the PC directly to the LAN3 port of the MService. There is no need to use a cross-over cable as the Ethernet port will detect the cable type.

- Configure this network interface on the PC as shown in the picture.

Fig. 22: Settings for network interface of M*Navigate* PC for access to M*Service* via LAN3

Fig. 23: Download configuration via LAN3 'Service Port'

3.4.7.3   Download via LAN2 'Switchgear LAN'

Once the initial M*Service* configuration is done either with CF-Card or Service Port LAN3, the M*Service* is accessible for further changes via the switchgear network connected to LAN2.

Fig. 24: Download configuration via LAN2 'Switchgear Network'

3.5   Update of System Firmware

To update the firmware of the M*Service* device, the local ABB service organization may provide update packages.

An update package is an archive file in zip format, which is to be loaded to the M*Service*. To ensure integrity of the package and prohibit installation of not released software, the zip file is encrypted. The user does not need to unzip the archive.

Updates are always installed via the CF-Card.

Installation of an update must not be interrupted by power cuts. This can put the device in an unusable state and might require to exchange the device.

It is necessary to put the device on a reliable 24V power source.

The following procedure applies:

Step 1	The CF-Card has to be placed in a CF-Card reader on a PC.
Step 2	The zip file has to be copied on the CF-Card in the folder 'Firmware' as shown in the figure below. More than one update may be placed on the CF-Card

Fig. 25: Placement of firmware updates on the M*Service* CF-Card. Please note: The screenshot shows illustrative examples.

Step 3	After the next power-on the updates gets installed.
Step 4	A reboot happens after each update package.
Step 5	After successful installation the zip-File is removed automatically from the CF-Card. If the installation fails, the zip-File is moved to a new folder 'Firmware-unsuccessful' on the CF-Card

4 Getting started

4.1   Login

M*Service* is controlled via a Web-Interface.

> **i** The site is optimized for a display with 1280x1024 pixels.
>
> The underlying software technology does not allow zooming in and out.

To be able to view and control the M*Service*, a login dialog has to be passed.

The login screen provides form fields to enter your username and password and a login-button.

Fig. 26: M*Service* login screen

Based on the given credentials, the system will perform a login operation. If this is successful, the User Interface will show up.

> **i** From version 7.4 on it is prohibited to have parallel logins with the same credentials. Only one login is allowed at a time for each user. However, several different user are allowed to login at the same time.

4.2   User Interface

The M*Service* User Interface is shown in the language as previously assigned to the user.
See section 3.4.6.

If no switchgear and device data are loaded yet, the main areas of the User
Interface are still empty. Data are loaded using the Autoconfigurator, see instruction
in section 4.3

Fig. 27: M*Service* User Interface – MNS *i*S

The User Interface is divided into four sections as described in following sections.

4.2.1   Menu bar

The Menu bar is the main navigation tool.

| Overview | Message Archive | Trend Display | Value Export | Configuration | Reports | MService Links | Logout |

It delivers quick access to the most frequently needed information and operations.

Overview	The Overview page is always shown directly after the login. This page contains the menu bar, the cubicle view and the message list.
Message Archive	The Message Archive is opened in a new window and gives detailed access to all messages recorded in the system. See chapter 5.
Trend Display	The Trend Display allows graphical display of recorded data. See chapter 6.
Value Export	Measurement data can be exported to the client PC. See chapter 7
Configuration	The configuration page allows reviewing the settings of the device and modifying the condition monitoring setup. See chapter 8
Reports	The Reports page allows creation of different reports created for the whole switchgear or a selected range of modules. Those reports can be viewed online or created as pdf file for download and print-out See chapter 9
M*Service* Links	The link page shows other M*Service* devices found in the same network and allows quick navigation to them. See chapter 10
Logout	Click on logout closes the connection to the M*Service* and redirects the user back to the M*Service* login screen.

The Logout button may get replaced with a button 'reboot required'

ts   MService Links   Reboot required

This indicates that there are configuration changes, which cannot be activated dynamically, such as changing the time zone of the M*Service*.

Please see sec. 11.5 for details how to re-boot the device from the WebHMI.

The 'reboot required' button disappears after next login to the WebHMI and the 'Logout' button becomes available again.

4.2.2   Message list

The Message list shows events colored according to their severity (latest events on top). The view changes dynamically always showing only the messages related to the actually chosen device view. For every entry, a timestamp, device name, description, a severity bar is shown.

Further on, links to the Knowledge Base (i) as well as the Detailed View of the device (⇒) are accessible. Messages can be acknowledged individually or group-wise. For details, see chapter 12.

Acknowledgement	Timestamp	Plant	Text	Priority		
Not acknowledged	Feb 20, 2012 10:48:18.203 AM	ML-0000004214.3PMotor2	Thermal Overload Protection Tripped		i	⇒
Not acknowledged	Feb 17, 2012 07:55:02.467 PM	ML-0000004214.3PMotor2	Thermal Overload Protection Alarm		i	⇒
Not acknowledged	Feb 17, 2012 07:51:00.687 PM	ML-0000004214.3PMotor2	Stall Protection Alarm		i	⇒
Not acknowledged	Feb 17, 2012 07:51:00.687 PM	ML-0000004214.3PMotor2	Stall Protection Alarm		i	⇒
Not acknowledged	Feb 17, 2012 07:46:28.640 PM	ML-0000004214.3PMotor2	Undervoltage Protection Tripped		i	⇒
Not acknowledged	Feb 17, 2012 07:32:32.177 PM	ML-0000004214.3PMotor2	Undervoltage Protection Alarm		i	⇒
Not acknowledged	Feb 17, 2012 07:32:32.177 PM	ML-0000004214.3PMotor2	Undervoltage Protection Alarm		i	⇒
Not acknowledged	Feb 17, 2012 07:46:28.640 PM	ML-0000004214.3PMotor2	Undervoltage Protection Tripped		i	⇒
Not acknowledged	Feb 17, 2012 07:32:32.177 PM	ML-0000004214.3PMotor2	Undervoltage Protection Alarm		i	⇒
Not acknowledged	Feb 17, 2012 07:46:28.640 PM	ML-0000004214.3PMotor2	Undervoltage Protection Tripped		i	⇒
Not acknowledged	Feb 17, 2012 07:32:32.177 PM	ML-0000004214.3PMotor2	Undervoltage Protection Alarm		i	⇒
Not acknowledged	Feb 17, 2012 07:32:32.177 PM	ML-0000004214.3PMotor2	Undervoltage Protection Alarm		i	⇒
Not acknowledged	Feb 17, 2012 07:51:00.687 PM	ML-0000004214.3PMotor2	Stall Protection Alarm		i	⇒

Group acknowledgement

Fig. 28: Message list

4.2.3   Cubicle view / Device view

This area either shows the cubicle view or device views on M*Start*/M*Feed*, M*Link* or M*Service*.
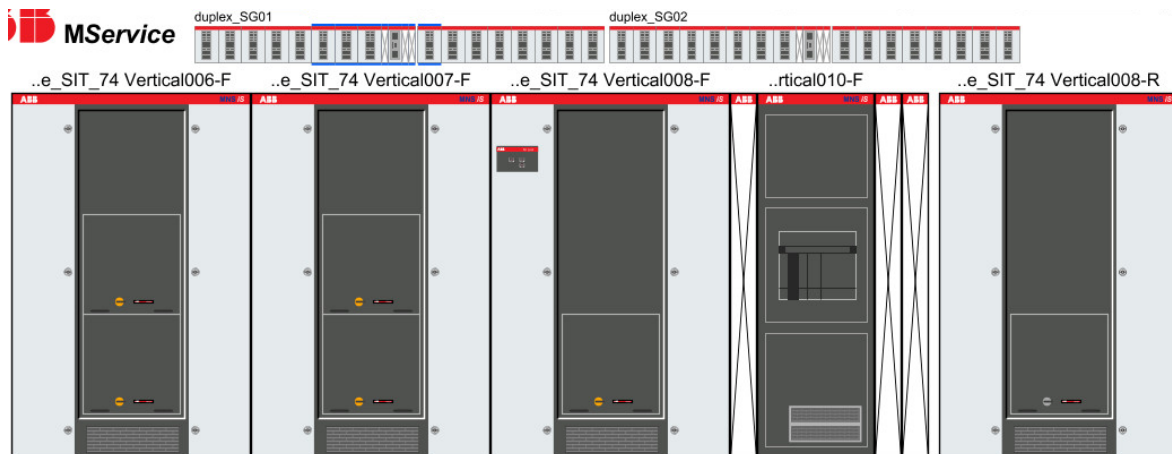For details see section 0.

Fig. 29a: Cubicle view – MNS *i*S

Fig. 30b: Cubicle view – MNS 3.0

4.2.4   Tree view

As an additional navigation, the system tree view is always accessible from any part of the main
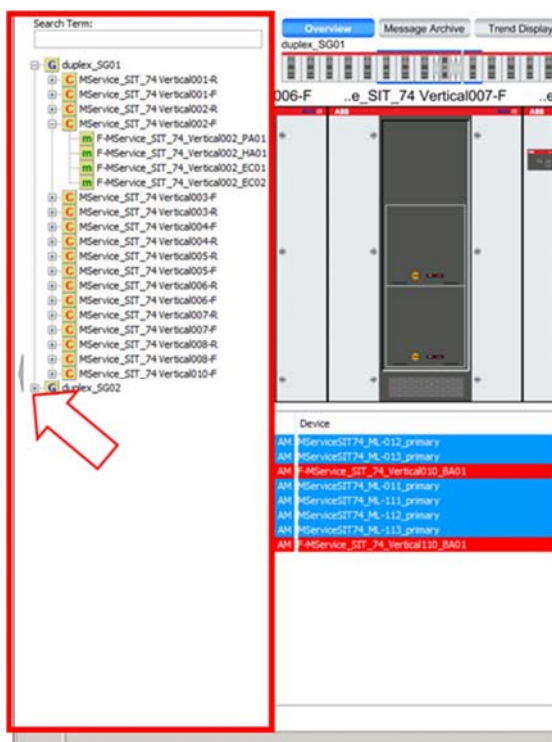window of the user interface by clicking the small triangle icon on the left side of the screen.

Fig. 31: Tree view (fade-in)

By clicking this triangle, the shortcut menu slides in from the left. Here the user can search all devices, presented in a hierarchical structure acc. to physical arrangement of the switchgear. From here, user can jump directly to the detail page of the selected device.

On top of the menu a search term can be entered in order to filter the list. Thus the menu is reduced and shows the matching devices only.

To hide the tree view, click again on the small triangle on the left

4.3   Autoconfigurator

If the M*Service* is used for the first time and no device data are configured, the user configures the M*Service* using the Autoconfigurator. Alternatively, the Autoconfigurator is also used to update the device data after a configuration changes in MNS & MNS *i*S switchgear at site (e.g. adding of new devices etc.)

The Autoconfigurator reads the switchgear structure and device data based on the OPC network configuration. With this, devices can be added or excluded from the condition monitoring.

4.3.1   Preparation of Autoconfiguration: Switchgear commissioning status

The shown system topology and device data depends on the commissioning status of the switchgear.

- The M*Service* detects only those parts of the switchgear, where the communication from the M*Link* to the OPC server within M*Service* device is established.

- For such M*Link* devices, the Autoconfigurator only shows those power modules, for which the configuration files are available.

  o This is automatically the case for all power modules, which are fully commissioned, i.e. download of application, parameters, and configuration is successfully done and the module is visible as online in M*View*.

  o However, if the power module and/or the M*Control*/M*Connect*/UMC100/UMC100.3/M10x-M/Emax/Emax2 are not yet available during switchgear commissioning, the required files can be downloaded to M*Link* using the download ''M*Control*/M*Connect* Data Definition' or 'Device Data Definition' command available on the corresponding M*Link* in M*Navigate*.

Fig. 32: Download Data definition files for not yet commissioned M*Control*/M*Connect* devices.

In all cases, the OPC Server software within M*Service*, needs some time to detect updates of the configuration and upload the files from the connected M*Link* devices.

4.3.2   Adding and removing modules to be monitored by M*Service*

To start, select 'Configuration' in the menu bar.
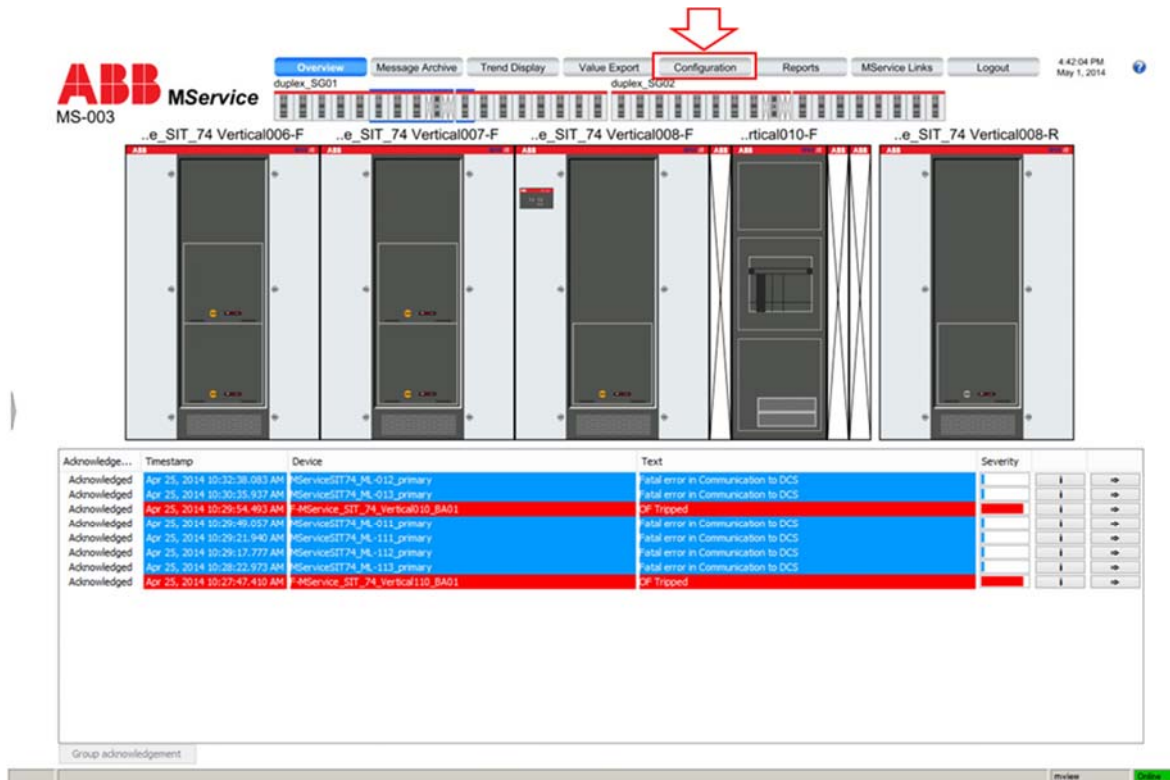

Fig. 33: Starting the Configuration

A new browser window is opened. Select 'Autoconfigurator to start the configuration wizard.

A 4-step wizard creates needed objects, database entries, visualization pages based on the information stored in configuration files:
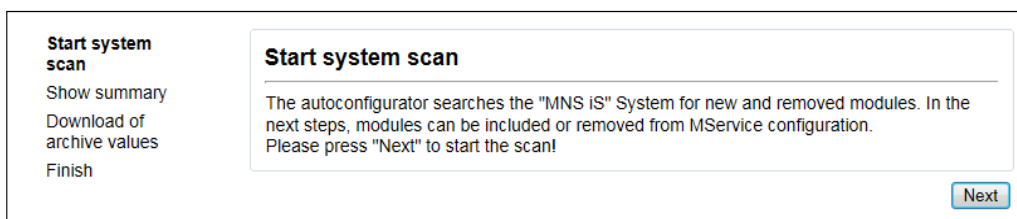
Step 1: Scan of the system for new and removed modules

Fig. 34: Autoconfigurator – System scan

Click Next to start the process.

Step 2: Summary of this scan.

The summary shows a tree view of the switchgear organized in cubicles. Two columns indicate if the device is currently available in the switchgear configuration and if it is already configured for supervision by this M*Service*.

> After M*Service* system startup or after an update of switchgear configuration including the download to M*Link* respective M*Control*/M*Connect*/UMC100/UMC100.3/M10x-M/Emax/Emax2 devices, some time is requried to distribute the new data through the system.
>
> If devices are missing in the shown system tree, see below, go back to the 'Configuration' start page and retry the system scan after a minute.

With the check-boxes 'Add' and 'Remove' the user can select to include or exclude a device from supervision by this M*Service*.

Fig. 35: Autoconfigurator – Show summary

Click Next to continue modifying and refreshing the M*Service* configuration.

Step 3 (only for deletion): Download of archive values.

This page shows up only in case modules are selected for deletion.

Here user can download the history values as CSV-file analog to the value export in the main menu bar in order to archive measurement data from these devices.

Fig. 36: Autoconfigurator – Download of archive values

Click 'Next' when ready.

Step 4: Confirmation

Before the Autoconfigurator starts loading/modifying the configuration, step 4 asks to confirm this action. If modules/devices have been selected for deletion, all the history values for this device are deleted.

Fig. 37: Autoconfigurator – Finish

Click 'Finish' to start the Autoconfiguration.

After clicking finish, the wizard starts the automatic configuration and gives feedback on the progress.

Fig. 38: Autoconfigurator – Configuration progress

New or modified switchgear data are now being made available and user can start using M*Service* functionality.

Fig. 39: Autoconfigurator – Configuration done

Click Next to return to the configuration overview page.

Step 5: Reload WebHMI

After Autoconfiguration it is required to reload the WebHMI in order to see the changed configuration. Depending on the settings of the client PC, it might be necessary to close down all windows of the internet browser.

Modules not selected during the configuration are excluded from MService supervision. Such modules are greyed out in the visualisation and in the tree view. If a complete MLink and its MControl/UMC100/UMC100.3/M10x-M/Emax/Emax2 devices are excluded, the related cubicles are not shown at all.

Fig. 40: Excluded modules are displayed in light grey. No detail display is available for them

.

5 Message Archive

The Message archive is opened in a new window.

All digital messages (alarms, operating messages, warnings and so on) are shown in the message archive with time stamp and exact message text. Extensive filter and search criteria allow getting a fast and precise overview. On every message individual notes can be entered and saved (e.g. for the next employee on duty).

Filtered occurrences can be exported as csv-files so they can be opened and revised in Microsoft Excel™. Alternatively the message lists can be printed directly.

5.1   Configuration area

In the configuration area (upper part of the window) it is specified, which messages shall be displayed in the listing area. Several filtering options are available.

Fig. 41: Configuration area

Generic functions		
❓	Help	Opens the online help.
▲ / ▼	Collapse / expand filter	The filter area will be collapsed respectively expanded.
	Refresh	The display is updated with the settings made in the configuration area.
	Print	The current list (with optional filter applied) is printed.
	Download CSV	The list is downloaded as csv file, which should be saved first and then opened e.g. in Microsoft Excel™.
Filter Settings		
	All pending messages	All currently active messages are displayed.
	All not acknowledged messages	All not yet acknowledged messages are displayed. The amount between brackets displays how many not acknowledged messages exist in the system currently.
	Period	All messages which appeared in a specified selected period are displayed. Selection of period for frequency analysis of messages.
	Direction	For messages related to a certain state, the user can select to show the activating ('coming') or deactivating ('going') event.
	Priority	Selection of the severity class of a message. Multiple selections are possible. The classes are shown in that color, which is also used for the messages in the listing area below.
	Text filter	Here a text filter can be entered. See sec. 5.1.1 for details and an example on how to use text filter

Display Options for Listing area		
	Message list	All messages are displayed as a list sorted by date and time in descending order.
	Statistics	User can choose this option only if *Period* is marked. Thereby the actual list of messages is analyzed on • the frequency of occurrence (counter) • the period • the average period • the percentage period The entries of the list can be sorted by clicking on the headings: • Message text • Counter • Period Clicking once more the sorting is reversed.
Group Acknowledgement		
	Select all messages, which need acknowledgement	All messages which need acknowledgement are selected in the data sheet.
	Acknowledge all selected messages	All marked messages are acknowledged.

5.1.1   On using text filter

A single message contains three textual attributes:

- The device name,
- the condition,
- and a description

The text filter offers to set three criteria, which are used to select the messages to be shown.

Based on the selection in the drop-down box, each text filter acts individually on either

- 'Device': the device name
- 'Condition': the condition
- ' -- Overall –': all three attributes device name, condition and description in parallel

Each entered filter text may contain placeholders to broaden the filter:

- '*' stands for multiple characters
- '?' stand for a single character.

Example:

Assuming the following power modules are configured in MService

- 1KHZ3LBA
- 1KHYY3LSA10
- A0-1KH1LSA20

The following filter on 'Device' would have the corresponding effect

Filter	Show messages for device(s)
1KH*	1KHZ3LBA 1KHY3LSA10
1KH?3*	1KHZ3LBA
1KH	1KHZ3LBA 1KHY3LSA10 A0-1KH1LSA20
*LSA?0	1KHYY3LSA10 A0-1KH1LSA20

5.2   Listing area

In the Listing Area (lower part of the window) the messages are listed according to the filter criteria defined in the configuration area. The color is equivalent to the color of the message type.

The message list is automatically updated every 60 s and/or with every change of the filter settings. Manual update is possible utilizing the "Refresh" button.

If more than 500 messages according to the selected filter criteria have come up, the display is separated into several pages. At the bottom of the message list, user finds links to switch between the several pages.

Fig. 42: Listing area

Explanation of list headings	
Timestamp	This is the point of time, the message appears.
Device/Condition/ Description	The message text gives information on the device the message refers to. Background color Color corresponds to the message severity acc. to NAMUR recommendation. For the definition see section 11.1 Color shade The active message has a dark color shade and the inactive a bright shade. Blinking Not acknowledged messages are blinking.
Acknowledgement	In this column, messages are marked as acknowledged/ not acknowledged. User can set check boxes and thereby acknowledge groups of messages by clicking on *Acknowledge all selected messages*.
Severity	The length of the bar equates to the severity of the message.
Comment	By clicking the squared brackets at *Comment* a window is opened, allowing the user to add a free notation on each particular incident. This comment applies to this particular event only. This is different from the notations (e.g. instructions) in the *Knowledge base* which refer generally to messages
No.	Consecutive number of the message. All messages receive a unique counter number in the sequence of arriving in the system. This number can also be used to sort the message list in an exported csv file in case no time stamp is available in MNS & MNS *i*S

Quick Filter

A "quick filter" mechanism allows for immediate selecting events limited to certain criteria: Device, Condition, Description, or Direction (coming/going).

The "quick filter" is applied using the mouse hovering over a message line and clicking on the appearing 'lock' symbol.

Fig. 43: Application of a "Quick Filter"

The result is shown as follows:

Fig. 44: "Quick filter" applied on Device Name

Multiple 'quick filters' can be applied at one time.

Fig. 45: Multiple "Quick filters" applied on Device Name and Condition

Statistics

With the aid of the statistics option in the Configuration Area, the frequency of occurrence of messages during a certain time period can be evaluated. Total duration and average duration of single messages are calculated, the percentage duration is displayed graphically as a bar graph. The list can be sorted according to different criteria.

Messagetext		Severity	Counter	Duration	Average duration	Percentaged duration	
MS-006	Database size limit (9.5GB)		1	200.84 h	200.84 h		26.43 %
ML-DeBoRed.Breaker	HW Status		1	0.00 h	0.00 h		0.00 %
ML-DeBoRed.MLinkAlarm	HW Status		3	0.00 h	0.00 h		0.00 %
ML-DeBoRed.Mod010102	HW Status		2	760.02 h	380.01 h		100.00 %
ML-DeBoRed.MLinkAlarm	App_Fatal_Param		2	760.02 h	380.01 h		100.00 %
SIT_73_ML_AllStarter.SIT_73_Actuator	Contact Temp Unbalance Trip		2	0.00 h	0.00 h		0.00 %
SIT_73_ML_AllStarter.SIT_73_CFeed	Contact Temp Unbalance Trip		2	0.00 h	0.00 h		0.00 %
SIT_73_ML_AllStarter.SIT_73_DOL	Contact Temp Unbalance Trip		2	0.00 h	0.00 h		0.00 %
SIT_73_ML_AllStarter.SIT_73_REV-DOL01	Contact Temp Unbalance Trip		2	0.00 h	0.00 h		0.00 %
SIT_73_ML_AllStarter.SIT_73_REV-DOL02	Contact Temp Unbalance Trip		2	0.00 h	0.00 h		0.00 %
SIT_73_ML_AllStarter.SIT_73_SoftStarter	Contact Temp Unbalance Trip		1	0.00 h	0.00 h		0.00 %
ML-DeBoRed.Mod010102	Earth Leakage Alarm		1	0.00 h	0.00 h		0.00 %

Fig. 46: Frequency analysis

6 Trend Display

The trend display opens in a new window after clicking the button in the menu bar.

  Depending on the settings of the browser, the new window may be opened and pushed behind all other windows. Use the Windows task bar to bring it to the front.

6.1   Display options

There are extensive curve representation possibilities. The user can select any process items and represent them in graphs. This applies for analogue as well as for digital values at the same time.

Further on, graphs combinations can be saved with an individual name. At any time, these combinations can be re-called via a selection box listing the saved graphs combinations.

Fig. 47: Trend display with legend

Trend display options available:

Selection of process values

- Selection of single process values from system structure or selection of user-defined value (graphs) combinations

Display mode

- Selection between display modes e.g. time series, frequency analysis or live data recorder

Legend

- Fade in of process item names related to defined graphs. Legend can be extended by user-defined titles.

Time intervals

- Time axis is configured, either via explicit setting of the time range or via pre-defined range settings. Options for navigation and zooming are given.

Data aggregation level

- Access to the various pre-defined levels of data aggregation, e.g. fifteen minutes average

Diagram options

- Options like crosshair, line graph, bar graph.
  Optional fade in of extreme values, limits, single data points.
  Print the current view.

6.2   Selection of Process Items and Layout Configuration

Clicking on the ☑ button, the process item selection window opens. Individual process items of devices chosen from the system tree can be added to a specific combination.

Each graph has a default characteristic (color, scale) which can be modified.

The chosen graphs combination can be directly shown in the trend diagram or saved under a particular name.

Further on, the layout of the diagram (background, grid, Y-axis definitions) is defined for the particular graphs combination.

Fig. 48: Selection of process items

Process Items selection

Selection of process item to be displayed in a graph.

Add	Adds the selected process item to the combination in the lower window.
Remove	Deletes the marked process item from the combination in the lower window.

Selected items

The properties of the selected process items can be changed here.

Color	Specifies the color to be used for the graph of the selected process item. A standard color selection dialog is used.
Minimum	Defines the lowest value of process item to be shown in the graph.
Maximum	For items of type "AI" (i.e. analog measurements), this value defines the highest value of process item to be shown in the graph. For items of type "PC" (e.g. switching cycles counter), this value defines the maximum in the 1h aggregate display. In other aggregation levels the y-axis is adjusted automatically based on this value.
Primary Axis	The item marked as 'primary axis' determines the horizontal grid lines of the trend.
Graph Type	Type of Graph (Line, Bar, Area) for this individual item.

Layout

Layout options for the actual graphs combination.

Background color	Background color of the graphs combination.
Text color	Text color of the legend of the graphs combination.
Grid color	Color of the grid lines

Y-axes	Single	For each displayed graph a separate Y-axis is shown.
	Combine equals	Y-axes with the same scale are displayed only once (default).
	0-100%	On the right and left side one Y-axis with a scale from 0 to 100% is shown (for all graphs of the combination).
	Logarithmic	Y-axis is represented with a logarithmic scaling (for all graphs of the combination).
	None	No Y-axis is shown.

Startup

Startup options for the actual graphs combination.

Time selection	Initial range of time-axis (current hour, day, month, year) 'Default' is 'current day'
Resolution	Initial data aggregation (raw values, aggregated values 15min, 1h, 1d, 1m) 'Default' is 'Raw values'
Chart Type	Initial type of graph (Line, bar, or area diagram) 'Default' is 'Line diagram'

Combinations

A combination of different process items and presentation options is saved under one graphs combination name and can be recalled at any time.

Load	Opens a dialog listing all available graphs combinations. Desired graph combination can be selected and opened with *OK*.
Save	Saves a graphs combination under a specified name. Option "Public": The graphs combination can be opened and seen by all users accessing this M*Service*.
Delete	Deletes an available graphs combination. Graphs combination to be deleted is selected in the list and deleted with *OK*.

6.3   Graphs characteristics

After the definition of the process values for the graphs combination, the trend is shown with default characteristic: archive values of current day, shown in a line diagram.

If analog values in the chosen time period are out of the parameterized scale, an arrow will be drawn in up or down direction in the color of the variable.
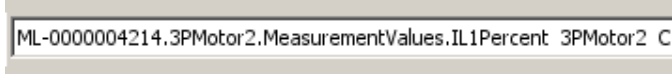

Fig. 49: Trend display example

6.3.1   Graph controls

Graphs characteristics can be modified using the following options:

Display mode Depending on the selection of the display mode, the remaining toolbar varies.		
	Archive Values	In order to calculate the graphs, archived values from the M*Service* database are used. The graph is updated with the latest values depending on the selected data aggregation level.
	Archive Values with Time Comparison	See archive values. 2 graphs to be compared are shown with a time offset which can be defined. See time selection.
	Frequency Analysis	The frequency of occurrence of analog measured values is displayed with a bar graph. With selection of this option, the classes buttons become visible:

		Classes: 50
		With the number of classes the measuring range of the selected process item is partitioned along the x-axis. The higher the number of classes, the finer the resolution of the frequency analysis.
	XY-Presentation	With the XY-Presentation a measured value is shown in dependence of another value, e.g. the power input of a pump as a function of the differential pressure of this pump.
		With selection of this option, the list box for the selection of the X-axis becomes visible:
		ML-0000004214.3PMotor2.MeasurementValues.IL1Percent 3PMotor2 C
	Pen recorder	The live values of the selected process items are written directly in a line graph.
	Legend on/off	Legend is shown or hidden, see sec. 6.3.2
	Selection of Process Items	See Selection of process items, sec. 6.2
	Graphs Combinations	Via this dropdown field, a graphs combination can be selected and shown.
Time Intervals		
	Time Selection	Definition of the time period, the graphs are shown for.

		Selection of Time Period ☒
		
		Period Today
		fr... Feb 21, 2012 12:00 AM Current Week
		till Feb 22, 2012 12:00 AM Current Month
		
		          OK Cancel
		
		Date and hour can be entered freely or selected directly by clicking the buttons. (Today, current week, current month).
		
		If the mode *archive values with time comparison* is active, the following dialog box comes up. Time offset for the comparison of 2 graphs is defined. The offset curve is dotted.
		
		Selection of Time Period ☒
		
		Period Today
		fr... Feb 1, 2012 12:00 AM Current Week
		till Mar 1, 2012 12:00 AM Current Month
		
		          OK Cancel

[1]	Today	Current day is indicated as time period.
[7]	Current Week	Current week is indicated as time period.
[31]	Current Month	Current month is indicated as time period.
←	Scroll Back	With *Scroll back* the current time period is moved back half of the current selected time period.
→	Scroll Forward	With *Scroll forward* the current time period is moved forward half of the current selected time period.
🔍	Zoom out	The current time period is zoomed out into the next larger one.

	Zoom in	A certain time period is marked with the left mouse button hold. Thus the marked time period will be displayed in a larger scale.

Aggregation

	Raw values	Archived raw values are displayed.
	15 min aggregation	Archived 15-minutes-values are displayed.
	1 hour aggregation	Archived hours-values are displayed.
	1 day aggregation	Archived days-values are displayed.
	1 month aggregation	Archived months-values are displayed.

Diagram options

	Crosshair	Activation of crosshair enables the user to read out coordinates of a specific point in the diagram.
		Depending on the position of the crosshair, the corresponding data are displayed in the legend.
		Statistics
		A certain time period can be marked with the crosshair (left click into the diagram, drag mouse along the x-axis). Thus the legend is extended by statistical data for this time period, see sec. 6.3.3
		Crosshair "freezing"
		This function is only available in the archive- and time comparison modes. With right mouse click into the diagram, it is possible to "freeze" the mouse pointer (e.g. for a print-out). After "freezing", the crosshair can be moved with pressed mouse button.

	Line chart	Values are shown in a line chart.
	Bar chart	Values are shown in a bar chart.
	Area chart	Values are shown in an area diagram.
	Measured Value marker on/off	There are 2 different marker types for measured values: ● A dot signals: Measured value is within range. ✕ A cross signals: Measured value is out of range. In the legend the value is indicated in red. In case of an OPC failure, no value is displayed.
	Min/Max-Display on/off	The extreme values (minimum and maximum) of each indicated graph in the diagram are marked with a horizontal line. The extreme values are identified with date and time.
	Limits on/off	Option not used
	Grid Lines on/off	Background grid lines are shown or hidden.
	Print	Opens a print dialog to print out the current view. ⚠ Microsoft XPS printer may not be supported on Windows 7 client PCs.

6.3.2   Legend

The legend lists the process items shown in the trend display graphs. Using the crosshair option, the legend is extended by statistical data.

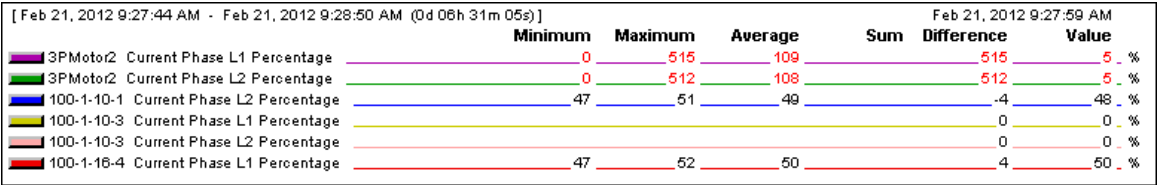Legend is switched on or off by clicking on the button .

Fig. 50: Trend display legend

It is possible to show or hide graphs temporarily by clicking on their corresponding colored bars in the legend.
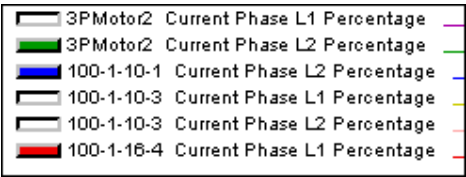

Fig. 51: Trend display – show/hide graphs

6.3.3 Statistics

With activated crosshair a *statistics* options can be used.

A certain time period is marked with the crosshair (left click into the diagram, drag mouse along the x-axis). The selected range is colored in yellow. The legend is extended by statistical data for this time period.
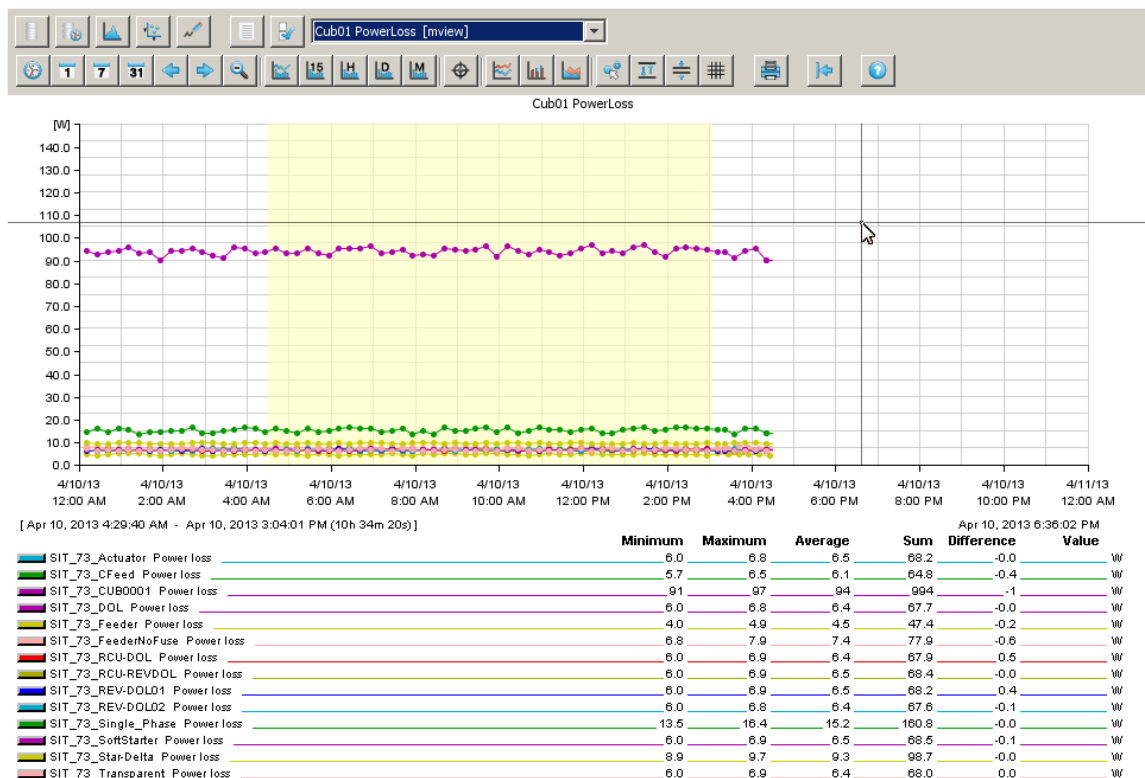

Fig. 52: Selection of range for statistics

With a further left mouse-click the selected range is fixed. A left mouse-click at the left or right border next to the y-axis removes the selection.

If the mouse points directly to the border of the selection, the mouse-pointer changes into a double arrow. Thus the selected range can be modified.

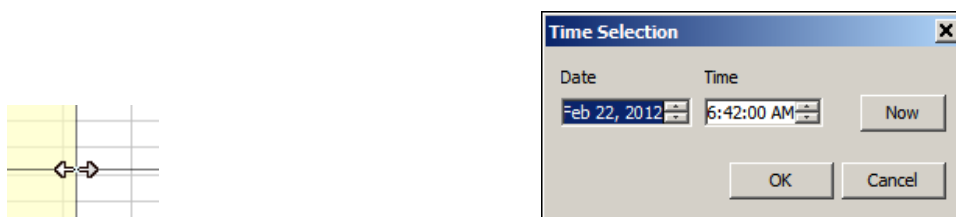With double-click on the double arrow, a dialog box opens to specify the exact time.

Fig. 53: Selection of range for statistics graphically (left) and directly (right)

The legend shows the following information on statistics:

Value	Indication of the value for the position of the crosshair.
Difference	If the mouse pointer is placed between 2 measurement points, the value difference is shown.
Sum	All values within the selected area are summed up. Sum is only calculated for counters like switch cycles, insertion cycles etc.
Average	Average of values within the selected area is displayed.
Maximum	Highest value within the selected area is displayed.
Minimum	Smallest value within the selected area is displayed.
The following values are only displayed in case a digital signal is available in the graphs:	
Duration	Display of time how long a digital signal has been in signal state 1 (high) within the selected area.
Count	Display of amount of starting attempts (rising edge) of the digital signal within the selected area.

7   Value Export

Measurement values can be exported in the widespread CSV format.

7.1   Export of data from M*Service*

User selects the desired modules/devices and the time span and then clicks on 'Create Archive File'.

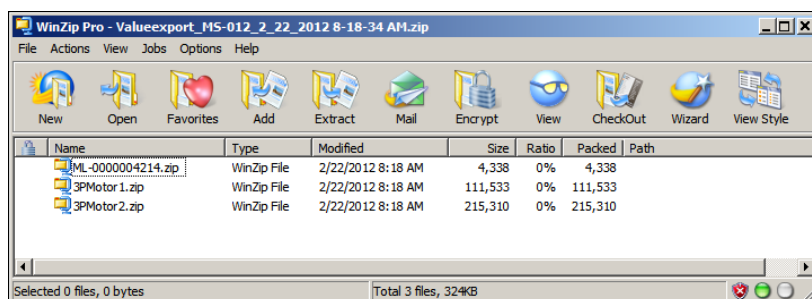Fig. 54: Archive value export – Module and time span setting

A progress bar indicates the ongoing process to create the csv.

Fig. 55: Archive value export –
feedback during creation of zip file (left side) and download link for zip file (right side)

The created compressed archive (zip) contains one embedded zip with multiple csv files per selected device:

- Archive values: List of analog values

- Message archive: List of status messages and alarms
  (Message archive is only available, if there are messages in the selected time span)

The file structure presents every data record in a separate line with timestamp, message text, acknowledgement status, priority, comment and number separated by semicolons.

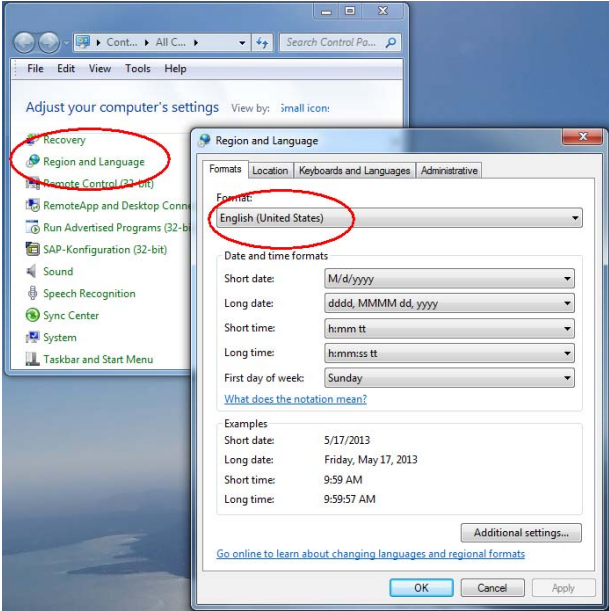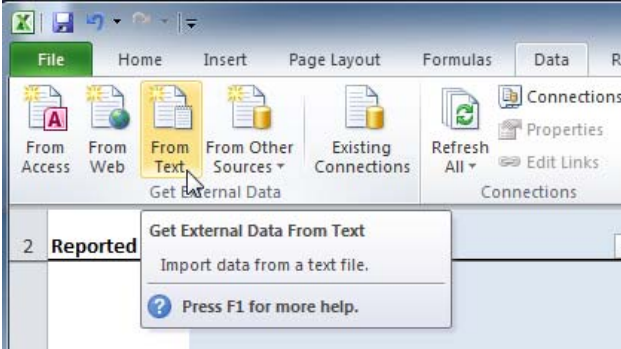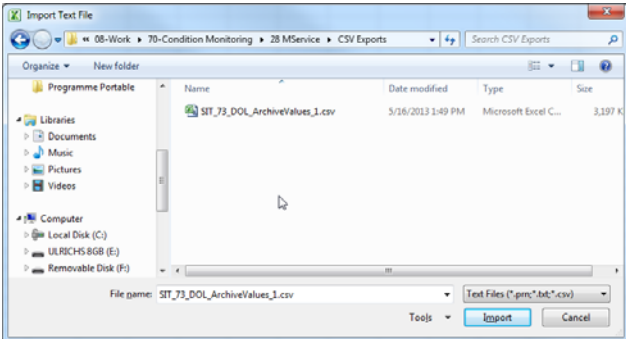Export files containing more than 65.000 lines are separated to different files.

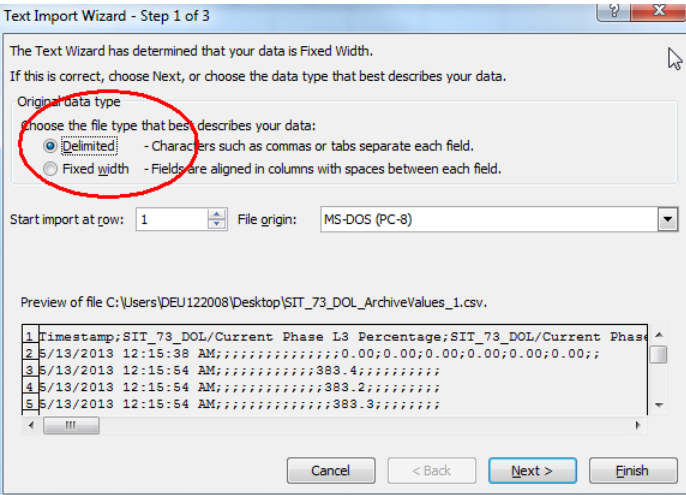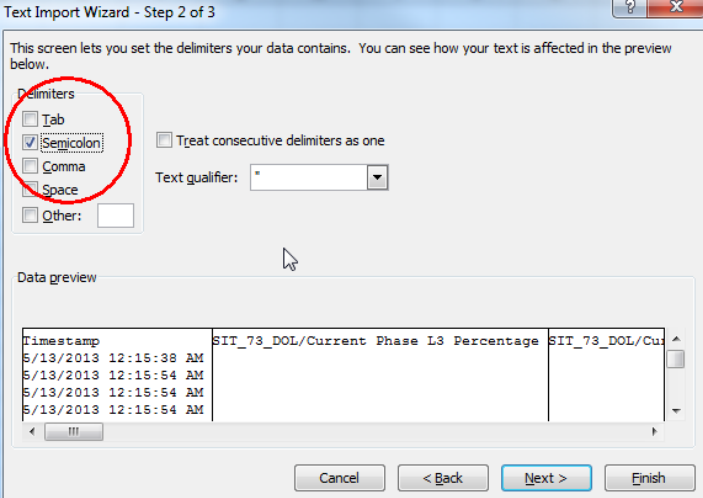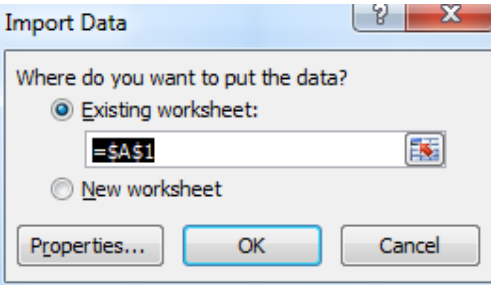Fig. 56: Archive value export – file export

7.2   Import of the data into Microsoft Excel™

The formatting of the csv data depends on the regional settings of the current user exporting the data. E.g. if the user's language is 'English', the date format is Month/Day/Year and the decimal separator is '.'

If the data is to be imported into Microsoft Excel™, the user's regional settings of Windows temporarily have to be adjusted to match the regional settings of the exporting MService user.

1	Open "Control Panel → Region and Language", to prepare the csv import matching the export settings. (Example shown for US-English)	
2	In Excel, open a workbook and use the 'Data' menu to import the csv file. (Example shown for Excel 2010)	
3	Locate and Select the csv file.	

4	Text import wizard: Set Data type to 'Delimited'.	
5	Text import wizard : Set delimiter to 'semicolon' only.	
6	Text import wizard : Select where the data should be placed within the Excel document.	
7	Reset the regional settings to the previous state	

The result shall look similar to the following:

Fig. 57: Example of exported csv data in Microsoft Excel

8 Configuration

The configuration function provides the ability to check the device's settings and modify the condition monitoring setup via four sub-pages: Summary page with network settings, the Autoconfigurator, Alarming and Reporting tool and the M*Service* Backup/Restore tool.

8.1 Summary

In the Summary page, the user finds the applied IP network settings of the system. It allows for checking version numbers, network configuration, OPC server settings and local time settings.

To change these settings use M*Navigate* as described in sec. 4.4.

User has also the possibility to set the M*Service* system time according to the time of the web client. This is useful should the configured NTP server temporarily not be available.

Changing the M*Service* time into the past may result in loss of data and need of recalculation of the aggregated values.

No further validation check is done. If the time is changed here, it is assumed that the client PC has the correct time set.

Fig. 58: MService system overview

8.2   Autoconfigurator

The Autoconfiguratior wizard is described in section 4.3

8.3   Alarming and Reporting

M*Service* is able to send alarm and report notifications via E-Mail. The settings are done in the Alarming and Reporting configuration form:

Fig. 59: Alarming and reporting

Messages

For each of the five message classes user can define up to three destination E-mail addresses to be notified in case of an event. The button 'Copy all entries downwards' will copy information entered in the 'Failure' row downwards to the other severity rows.

Fault reports

A 'fault report' is an email containing all messages in the configured send-interval with severity 'Maintenance required soon' (100) and higher.

For fault reports, up to three destination E-mail addresses and sending intervals can be defined.

E-Mail settings

To enable this functionality, E-Mail server settings have to be made so that the server is able to send the notification E-Mail. SMTP-server IP address, a sender name and a sender mail address are to be provided. See figure above for examples.

In case the e-mail settings are not correct and MService is not able to deliver the mail to the mail server, a system message is issued, indicating a problem with the 'FCEmail' component.

| 5/16/2013 9:39:27 AM.467 | FCEMail.EMailApplication.1 | FCEMail.EMailApplication.1 | Error | (-) | |
| 5/16/2013 9:34:27 AM.850 | FCEMail.EMailApplication.1 | FCEMail.EMailApplication.1 | Error | (+) | |

The message has a severity of 750 ("Function Check").
It is automatically cleared by the system within few seconds

> In order to use the E-Mail option, MService device must be connected to a plant or enterprise network. Additional security requirements apply according to the customer network regulations and it may not be possible to use this option in some networks.
>
> Check with the customer network and IT administrator for options.

8.4   Backup / Restore

Safety backups of the M*Service* database and configuration can be done on an external USB hard-disk. This is an option to prevent complete data loss. In case the database gets corrupted or M*Service* hardware was replaced, the data can be restored from backup.

8.4.1   Backup

The USB hard-disk has to be connected to one of the USB connectors on the M*Service* device front. The 'Backup/Recovery' page allows defining a location where the backup shall be placed on the hard-disk.

The progress of the backup creation is shown after pressing 'Backup now'.
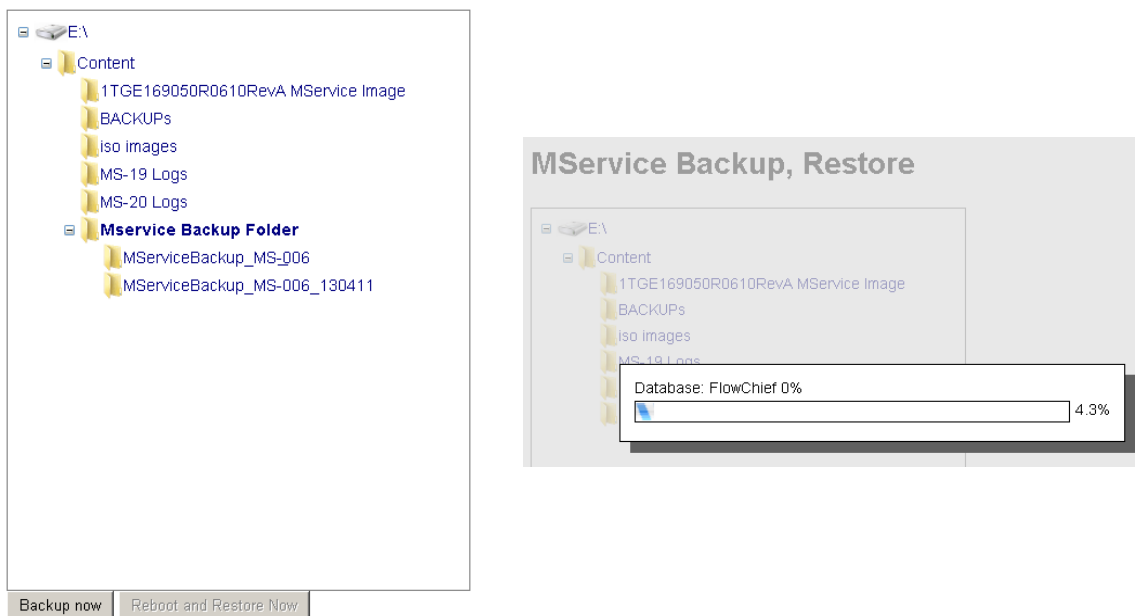

Fig. 60: Backup: defining the target location (left side) and feedback on progress (right side)

8.4.2   Restore

In the window select a folder with a valid backup file. The 'Reboot and Restore Now' button is enabled once a valid file is found by M*Service.*

To restore a database and the configuration recovery click on 'Reboot and Restore Now'.

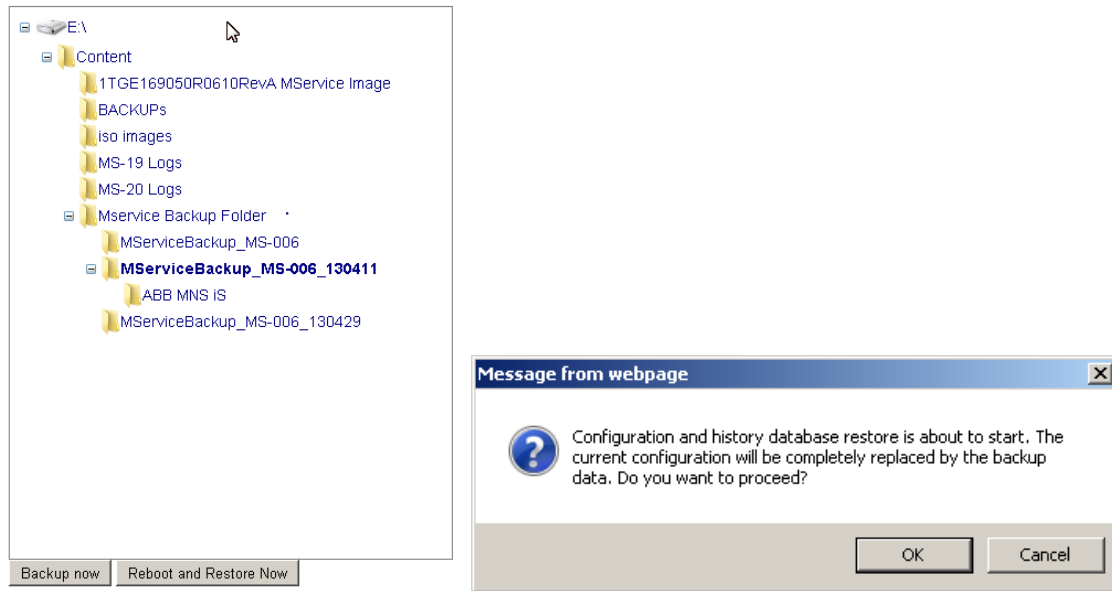**MService Backup, Restore**

Fig. 61: Restore: Selecting the location of the backup

Pressing 'Reboot and restore now' triggers a confirmation dialog, before an immediate reboot of the M*Service* followed by an automated replacement of the current database with the backup database is executed.

Ensure that the power supply to the M*Service* device is not cut off during the process. Do not power off or remove USB hard-disk until it is possible to log-in to the M*Service.*
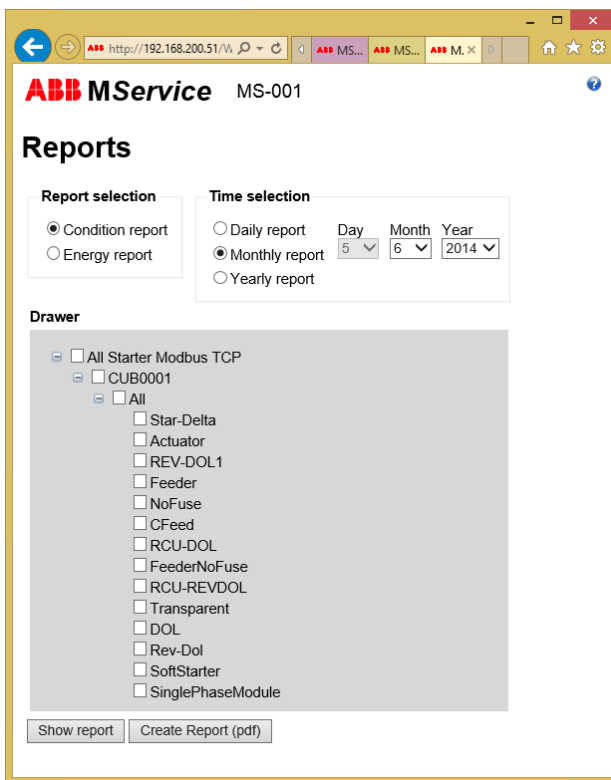
9 M*Service* Report module

The creation of reports allows to collect operational and maintenance status information into a document to be exported from M*Service* device for further use such as documentation purposes.

The Reporting Module starts with a selection dialog similar to the Value Export. It allows for a selection of the report type and the time period to be reported.

9.1 Condition Report

This type of report collects and displays all the operational and condition data available for the power modules in the switchgear

Fig. 62: The entry page of the Report module

- The time selection allows for daily, monthly and yearly reports.

- Condition summaries are created on three levels:

  o *Switchgear level:* Shows a summary over all monitored devices and cubicles

  o *Cubicle level:* Shows the collected data on the power loss and temperature supervision status within the cubicle

  o *Device level:* Shows the summary of collected data and events for individual devices.

- The system tree offers the possibility to select which items are to be included in the report.

  o The check box in front of a named item (switchgear, cubicle, or device) select the corresponding summary page to be created.

  o The check box 'All' selects all devices below.

Reports can be generated for online display or as pdf-File to be downloaded.

The generated report starts with a summary page showing the main plant and contact information along with the list of selected switchgears, cubicles and devices.

Fig. 63: First page of Condition Report showing site and contact information

The switchgear overview level shows per alarm severity class, for which device and how many alarms were triggered within the reporting period.

Fig. 64: Switchgear overview page of Condition Report

The cubicle overview level collects all information on the online power loss supervision.

Fig. 65: Cubicle overview page of Condition Report

The device condition level finally shows statistical information on the devices usage in the reporting period, as well as a summary list of all alarms occurred on the device.

Fig. 66: Power module page of Condition Report

The value tables are organized in three areas: the current reporting period, the corresponding previous period and a difference area.

For the measurement values, in each area the minimum and maximum values are shown and in the middle the average value for the measurement. To limit CPU load and creation time the minimum and maximum values are taken from the next lower aggregation level.

Daily Report	Min (hourly avg)	Minimum is the lowest hourly average on that day
	Max (hourly avg)	Maximum is the highest hourly average on that day
Monthly Report	Min (daily avg)	Minimum is the lowest daily average in that month
	Max (daily avg)	Maximum is the highest daily average in that month
Yearly Report	Min (monthly avg)	Minimum is the lowest monthly average on that year
	Max (monthly avg)	Maximum is the highest monthly average on that year

For counter values, each area shows the start and end value and the change of the value during the reported period. The last column shows the difference of the change values of current and previous period.

Daily Report	Change	Difference between 'end' and 'begin' value. This is for example the energy consumption on that day
	Daily Change	Difference between 'current day change' and 'previous day change'. This is for example the change of the energy consumption reported day and previous day.
Monthly Report	Change	Difference between 'end' and 'begin' value.
	Monthly Change	Difference between 'current month change' and 'previous month change'.
Yearly Report	Change	Difference between 'end' and 'begin' value.
	Yearly Change	Difference between 'current year change' and 'previous year change'.

9.2   Energy Report

The energy report is available per switchgear and collects for each contained cubicle the recorded values for power loss and active energy counter.

- The time selection allows for daily, monthly and yearly reports.

- Energy report is always created for all configured modules of a switchgear

- Reports can be generated for online display or as pdf-File to be downloaded.

Fig. 67: The entry page of the Report module for the energy report

The shown total sum includes only the measurements from the power modules configured for supervision.

The real totals include of course all power modules, including also the conventional modules which do not provide any operational data to the MService.

The generated report starts with a summary page showing the main plant and contact information along with the list of selected switchgears, cubicles and devices.

Fig. 68: First page of Energy Report showing site and contact information

The switchgear overview page summarizes the recorded power loss and energy consumption numbers.

Service Report
MService Report
Energy Report   Daily Report from 03.06.2014   Page 2 of 5

Executive Summary of Report Content

Number of cubicles	3

Summary

Switchgear name	All Starter Modbus TCP

Power Loss [W]

Cubicle name	Current period Min (hourly avg)	Current period Value	Current period Max (hourly avg)	Previous period Min (hourly avg)	Previous period Value	Previous period Max (hourly avg)	Change
CUB0001	43	73	87	65	76	88	-3
CUB0002	100	100	100	100	100	100	0
CUB0003	0	0	0	0	0	0	0
Total		173			176		-3

Active Energy Counter [kWh]

Cubicle name	Currrent period	Previous period	Change
CUB0001	71336	108258	-36922
CUB0002	5150	7733	-2583
CUB0003			
Total	76486	115991	-39505

Fig. 69: Switchgear overview page of energy report

The cubicle detail page shows the power loss and energy consumption values per supervised module within the cubicle.

Service Report
MService Report
Energy Report   Daily Report from 03.06.2014   Page 3 of 5

Cubicle Report

Cubicle name	CUB0001
Switchgeartype	MNS iS

Power Loss [W]

Device name	Current period Min (hourly avg)	Current period Value	Current period Max (hourly avg)	Previous period Min (hourly avg)	Previous period Value	Previous period Max (hourly avg)	Change
Actuator	2.0	4.0	5.1	3.4	4.2	5.0	-0.1
CFeed	2.0	3.9	4.8	3.3	4.1	5.2	-0.1
DOL	2.0	4.0	5.1	3.0	4.2	5.4	-0.2
Feeder	0.0	2.0	3.0	1.4	2.2	3.3	-0.2
Star-Delta	5.0	6.9	8.0	6.4	7.2	7.9	-0.2
Transparent	2.0	3.9	5.0	3.4	4.2	5.2	-0.3
Total		73.2			76.5		-3.2

Active Energy Counter [kWh]

Device name	Current period Value	Current period Consumption	Previous period Value	Previous period Consumption	Change
Actuator	46844	5090	41667	7731	-2641
Star-Delta	46844	5140	41685	7731	-2591
Transparent	46844	5040	41671	7733	-2693
Total		71336		108258	-36922

Fig. 70: Cubicle detail page of Energy Report

10 M*Service* Link Page

The 'M*Service* Link page' gives an overview on M*Service* devices available in the same network.

The page shows a tabular view, with one row per found device.

Fig. 71: The M*Service* Link Page allows for fast navigation to other devices in the same network.

- The icons allow for starting a new user session on the corresponding device, either using a connection via LAN1 or via LAN2.
    - The device from which the page was started is shown without link buttons.
- The further columns show the current numbers of active alarms in the devices per severity class.
- A device, which is currently booting, shows negative numbers as values for the active alarms.

> This page shows only M*Service* devices, which are upgraded with the M*Service* Service Pack 7.4.

11 Data view area

The data view occupies the middle part of the M*Service* display. It contains either an overview on the system or detailed pages for the various devices or the cubicles.

11.1   Cubicle overview

In the cubicle view a detailed display of up to 5 cubicle is presented.

A thumbnail list of all cubicles configured in the M*Service* is shown above. Clicking with the left button on the thumbnails allows for switching to the desired cubicle in the main view. Using the right button, the option to open the view in a new window is shown.

Fig. 72: Cubicle view

Cubicles of the same switchgear are shown in the same sequence as in the physical switchgear installation. In case of a duplex configuration, front and rear are separated by small gap.

Switchgears are separated by grey line between the cubicles and a space between the thumbnails.

Every module is displayed in its configured location within the equipment compartment of the cubicle.

The M*Link* is shown according to its location specified in the configuration. If the location of M*Link* is not specified then it is displayed in the first of its associated cubicles having a control compartment.

M*Service* devices are not shown in this overview.

Devices which are included in the M*Service* configuration are shown in dark grey and are colored according to the operational status.

Devices which are shown as part of a cubicle but are not configured for supervision are indicated in light grey color without a background picture of the device.

Devices can be clicked to jump to the detailed view.

Devices in status 'running' or 'closed' are shown with a small orange circle. Devices with an active alarm or trip are shown in yellow (alarm) or red (trip).

11.1.1   Color coding

The cubicle thumbnails are colored if one of their modules has an active alarm/trip state. The color coding is according to the NAMUR recommendation [4].

Following table describes the color and meaning.

Severity	Sub-Condition	Description
1 - 99	Normal	Motor is available. Status is **'normal"**. Asset functionality is fully available. No maintenance is required.
100 -399	Maintenance required	Motor is available. Status is **'maintenance required (soon)"**. Asset functionality fully available but maintenance required soon to avoid functional restrictions, e.g. caused by a nearly exhausted wear reserve or operating conditions.
400 -749	Out of Specification	Motor is still available. Status is **'out of specification"**. Asset functionality available but decreased due to operating conditions outside the specified limits.
750 – 899	Function Check	Motor has been stopped. Operation is not possible. Status is **'function check"**. Asset functionality might be temporarily restricted, due to on-going work on the asset, e.g. as local operation, maintenance (main-switch off), simulation or a function check (test-position).
900 – 1000	Failure	Motor has been stopped. Status is **'failure"**. Asset Functionality lost due to malfunction of its peripherals or due to operating conditions.

Fig. 73: Colors in cubicle view

The colors are predefined and cannot be changed by the user.

11.2   Cubicle Online Power-loss Supervision

As an advanced option in M*Service*, the Online Power-loss Supervision function assesses the total power-loss together with the number of temperature related problems of individual modules within each cubicle. Three different alarms with increasing severity are generated alongside an indication which of the modules is rated as highest contributor to the total power loss.

Cubicle Online Power-loss supervision		
Severity	Alarm	Description
300	Power-loss is in warning state	The total 1h-average of the cubicle power-loss is above the configured limit
400	Power-loss is in alarm state	The total 1h-average of the cubicle power-loss is above the configured limit and some modules report temperature related problems (less than 5)
500	Power-loss is in critical state	The total 1h-average of the cubicle power-loss is above the configured limit and modules report temperature related problems (more than 5)
Module Online Power-loss supervision		
Severity	Alarm	Description
100	Module producing high power-loss	In case of a cubicle power-loss alarm, the three modules contributing most to the total power-loss are evaluated and marked with this warning

Cubicle Online Power loss supervision is only available,

- if the MNS *i*S system data files were recreated and exported by MNS Engineer 7.3.or newer

- Parameterization of the assessment requires at least M*Navigate* 7.3

- At minimum a 'Download Device List' to the M*Link* devices is required

- A 'Download configuration' to M*Service* is required

A dedicated cubicle detail page provides an overview on the current status of the power-loss supervision. The cubicle detail page is accessible through the overview page by clicking in the cubicle area not hitting a device. Alternatively, open the left side tree menu (see 4.2.4) and select the cubicle there.
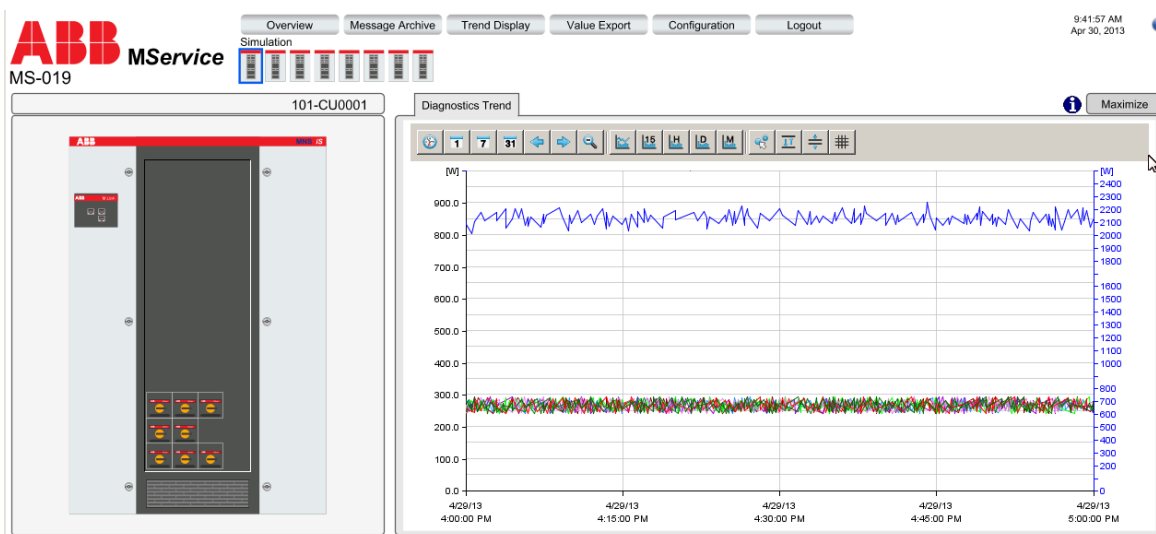

Fig. 74: Cubicle detail page with online power-loss information

The page shows the selected cubicle on the left side and a trend display on the right side. The trend shows the total cubicle power-loss.

If the total number of modules in the cubicle (supervised and not supervised) is less than 10, their individual power-loss values are shown. In case of more than or equal 10, only the power-loss summary is shown.

The configuration of this page cannot be changed by the user.

11.3   Power Module view

The detailed view of an M*Start*/M*Feed*/UMC100/UMC100.3M10x-M modules or Circuit Breaker is opened by clicking the device in the Cubicle view. Another option to open the detailed view is via the "detail view"-button (⇒) in the Message list (see 5.2) or via the left side tree menu (see 4.2.4).

On the left side a simplified M*Start*/M*Feed* or Circuit Breaker schematic is shown whereas on the right side detailed information and control options are available in a tab-separated area. The lower part of the window shows the alarm and event list, filtered for the selected module.

Fig. 75: Power Module view example: M*Start*

11.3.1   Power Module schematic

The Power Module view on the left side shows a simplified schematic of the device's electrical structure with the device and cubicle name on top.

Individual parts of a module, which are with a fault or require maintenance action, are colored according to the color of the associated message's priority (see also 11.1.1).

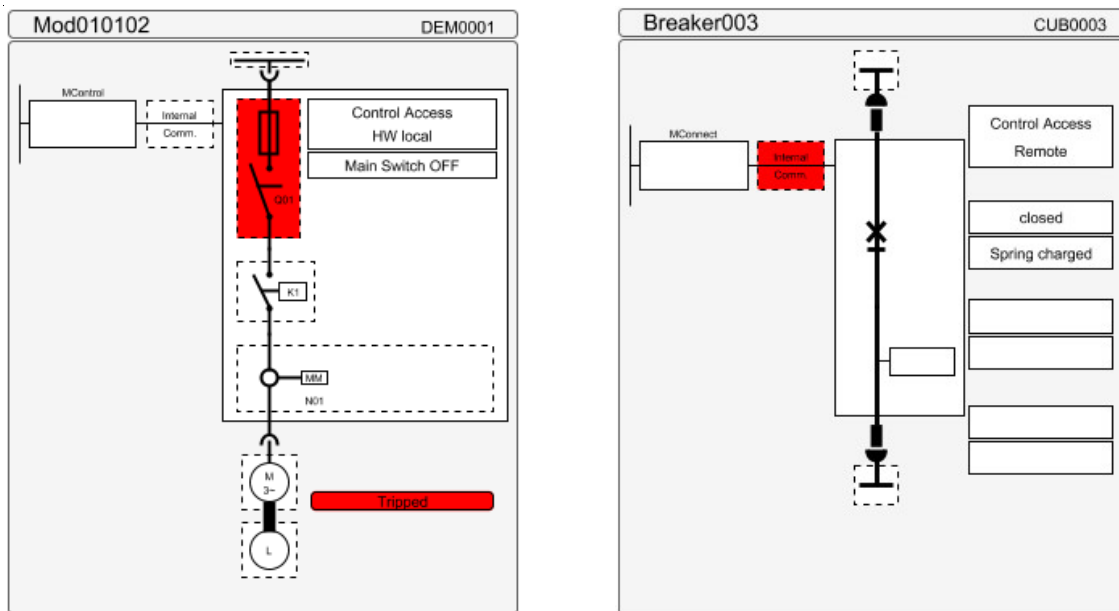Additional status information is provided and indicated when active.

Fig. 76: Power Module schematic example: M*Start* and Circuit Breaker

11.3.2   Tab "Online"

This area shows the live values available for the device. This is useful for directly monitoring actual electrical and maintenance values.

M*Start* / M*Feed* connected through M*Control*

Fig. 77a: Power Module view - Online values for M*Start*

The following values are available (depending on motor, load or module type)

M*Start* / M*Feed*	
Current	Current for up to 3 phases in [A]
Voltage	Phase to phase Voltage for up to 3 phases in [V]
Residual Current	Residual Current in [A]
Active power	Active power in [W]
Reactive Power	Reactive Power in [W]
Cos φ	Power factor
Contact Temperature	Temperature of the outgoing contacts for up to 3 phases in [°C]
Active energy counter	Current value of energy counter calculated by MControl in [kWh]
Power loss	Module's current power loss in [W]
Switch Cycles	Count of switching operations for up to 3 contactors
Insertion cycles	Count of Power Module insertions
Operating Hours	Count of operational time of load in hours
Measured Motor Start Time	Start-up time of the motor in [s]
Thermal Image	Motor temperature profile showing the thermal load level in [%]
Time to Trip	Expected time to trip due to thermal overload in [s]
Time to Reset	Expected time to wait until TOL trip reset is possible [s]

Failsafe Activated	Device is in Failsafe status (serial communication failure)

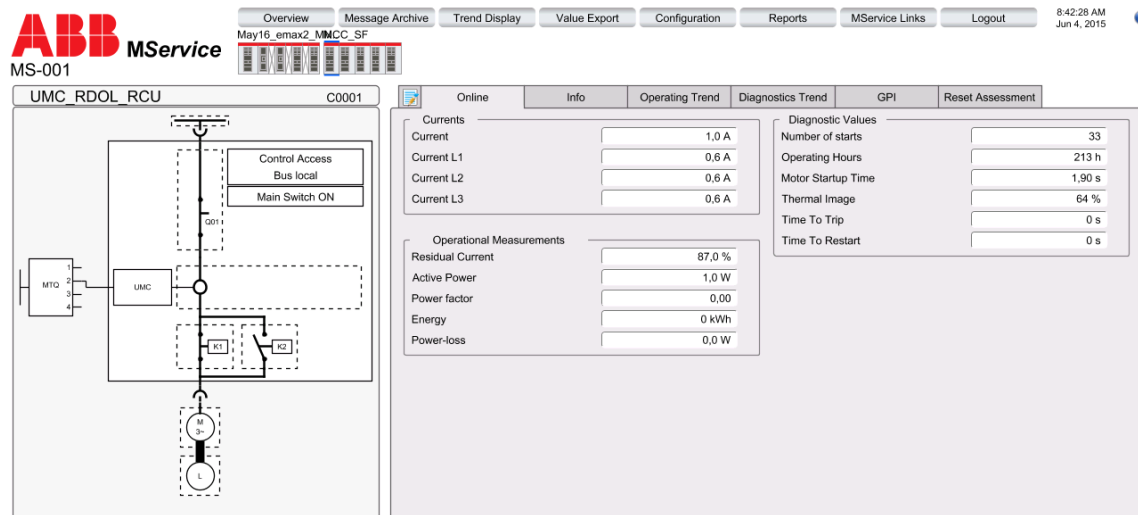UMC module connected through M*Link.*
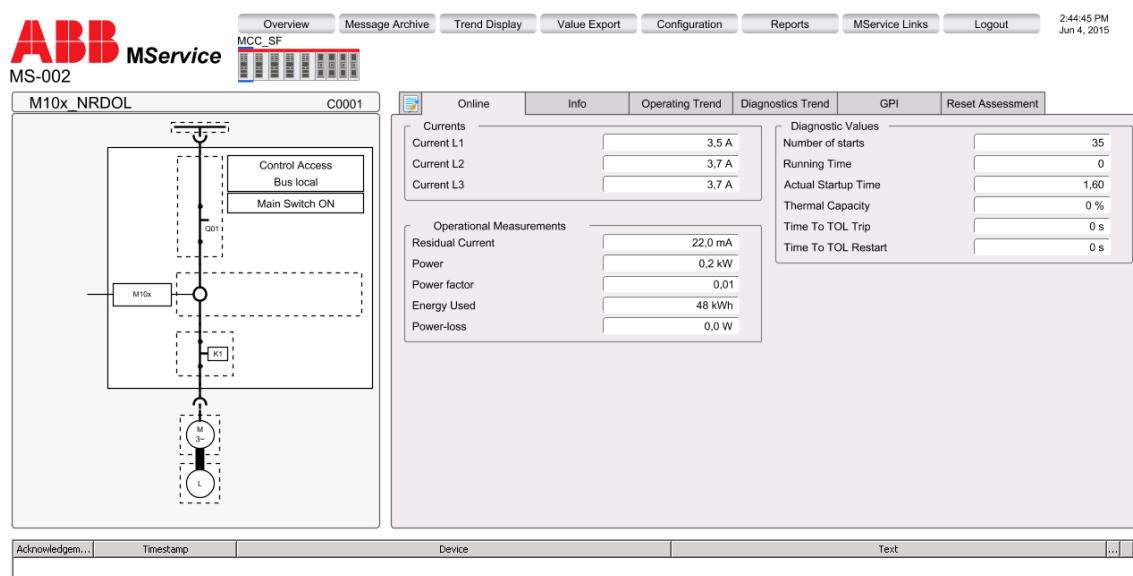

Fig. 78b: Power Module view - Online values for UMC.

The following values are available (depending on motor, load or module type)

UMC100 / UMC100.3	
Current	An average current for 3 phases in [A] (This value is available for UMC100 only.)
Current L1, L2, L3	Phase current for up to 3 phases in [A] (This value is available for UMC100.3 only.)
Residual Current	Residual Current in [A]
Active power	Active power in [W]
Reactive Power	Reactive Power in [W]

Active energy counter	Current value of energy counter calculated by UMC100 or UMC100.3 in [kWh]
Power loss	Module's current power loss in [W]
Number of Starts	Process value shown the maintenance counters for Number of Starts
Operating Hours	Count of operational time of load in hours
Measured Motor Start Time	Start-up time of the motor in [s]
Thermal Image	Motor temperature profile showing the thermal load level in [%]
Time to Trip	Expected time to trip due to thermal overload in [s]
Time to Reset	Expected time to wait until TOL trip reset is possible [s]

M10x module connected through M*Link.*

Fig. 79c: Power Module view - Online values for M10x.

The following values are available (depending on motor, load or module type)

M10x - M	
Current L1, L2, L3	Phase current for up to 3 phases in [A]
Residual Current	Residual Current in [A]
Active power	Active power in [W]
Reactive Power	Reactive Power in [W]
Active energy counter	Current value of energy counter calculated by M10x in [kWh]
Power loss	Module's current power loss in [W]
Number of Starts	Process value shown the maintenance counters for Number of Starts
Operating Hours	Count of operational time of load in hours
Measured Motor Start Time	Start-up time of the motor in [s]
Thermal Image	Motor temperature profile showing the thermal load level in [%]
Time to Trip	Expected time to trip due to thermal overload in [s]
Time to Reset	Expected time to wait until TOL trip reset is possible [s]

Circuit Breaker

Fig. 80: Power Module view - Online values for Circuit Breaker

Circuit Breaker	
Current	Absolute current for 3 phases and neutral current in [A]
Voltage	Line to line voltages in [V]
Power	Total active, reactive, and apparent power in [W]
Energy	Total active, reactive and apparent energy in [kWh], [kvarh], resp. [kVAh]
Frequency	Measured Frequency in [Hz]
Total Power factor	Power factor (Cos Phi)

11.3.3   Tab "Info"

Here, detailed hardware information of the device can be found. This is useful to identify a device, the connected plant component (e.g. motor or load) and the device main parameters (e.g. serial number)

.

MStart / MFeed connected through MControl

Fig. 81a: Power Module view – Device Information for MStart / MControl

The following information is available:

Labels	
Device Name 1, 2, 3	Device Identifier for Motor Starter or Feeder module as in MNavigate
Location	
Switchgear	Switchgear name where the device is located
Cubicle	Cubicle name where the device is located
Level	The row where the device is installed in the cubicle
Position	The column where the device is installed in the cubicle
MLink	

Device Name	Name of the M*Link* to which the device is connected to through the internal serial communication. Clicking on the link opens the detail page for that M*Link*
M*View*	
Open M*View* web page	Clicking on this link opens a new web browser with the M*View* web page of the related device. The attempt is based on the current M*Service* user. This function is limited to networks, where the M*Service* client is connected to the same subnet as the M*Link*.
Power Module Info (M*Start* / M*Feed*)	
Identnumber	ABB Identification number of the Power Module
Size	Mechanical size of MStart / MFeed (6E4, 6E2, .. 72E)
Nominal Current	Maximum current of the Power Module
Serial Number	Serial number identifying the Power Module
Power Module Functions	
Power Module Type	Starter/Feeder type
Application type	Configured software application
M*Control* / M*Connect*	
Identnumber	ABB Identification number of the M*Control* device as originally engineered.

UMC module connected through M*Link*

Fig. 82b: Power Module view – Device Information for UMC100 or UMC100.3

The following information is available:

Labels	
Device Name 1, 2, 3	Device Identifier for Motor Starter or Feeder module as in M*Navigate*
Location	
Switchgear	Switchgear name where the device is located
Cubicle	Cubicle name where the device is located
Level	The row where the device is installed in the cubicle
Position	The column where the device is installed in the cubicle
M*Link*	
Device Name	Name of the M*Link* to which the device is connected to through the internal serial communication. Clicking on the link opens the detail page for that M*Link*
M*View*	
Open M*View* web page	Clicking on this link opens a new web browser with the M*View* web page of the related device. The attempt is based on the current M*Service* user.

	This function is limited to networks, where the M*Service* client is connected to the same subnet as the M*Link*.
Power Module Info (UMC100/UMC100.3)	
Identnumber	ABB Identification number of the Power Module (User configures in MNavigate Plus)
Size	Mechanical size of module (8E4, 8E2, .. 72E)
Nominal Current	Maximum current of the Power Module (User configures in MNavigate Plus)
Serial Number	Serial number identifying the Power Module (User configures in MNavigate Plus)
Control Module Info	
Power Module Type	UMC Power Module type
Application type	Configured software application
MTQ address	IP address of MTQ
MTQ Port	MTQ Port number connects to UMC

M10x module connected through MLink

Fig. 83c: Power Module view – Device Information for M101 / M102

The following information is available:

Labels	
Device Name 1, 2, 3	Device Identifier for Motor Starter or Feeder module as in MNavigate
Location	
Switchgear	Switchgear name where the device is located
Cubicle	Cubicle name where the device is located
Level	The row where the device is installed in the cubicle
Position	The column where the device is installed in the cubicle
MLink	
Device Name	Name of the MLink to which the device is connected to through the internal serial communication. Clicking on the link opens the detail page for that MLink
MView	

Open M*View* web page	Clicking on this link opens a new web browser with the M*View* web page of the related device. The attempt is based on the current M*Service* user. This function is limited to networks, where the M*Service* client is connected to the same subnet as the M*Link*.
Power Module Info (M10x)	
Identnumber	ABB Identification number of the Power Module (User configures in MNavigate Plus)
Size	Mechanical size of module (8E4, 8E2, .. 72E)
Nominal Current	Maximum current of the Power Module (User configures in MNavigate Plus)
Serial Number	Serial number identifying the Power Module (User configures in MNavigate Plus)
Control Module Info	
Power Module Type	M10x Power Module type
Application type	Configured software application
Device Number	Slave number

Circuit Breaker

Fig. 84: Power Module view – Device Information for a Circuit Breaker / MConnect

The following information is available:

Labels	
Device Name 1, 2, 3	Device Identifier of the Circuit Breaker as in M*Navigate*
Location	
Switchgear	Switchgear name where the device is located
Cubicle	Cubicle name where the device is located
Level	The row where the device is installed in the cubicle (1 to 36)
Position	The column where the device is installed in the cubicle (1 to 4)

M*Link*	
Device Name	Name of the M*Link* to which the device is connected to through the internal serial communication. Clicking on the link opens the detail page for that M*Link.*
M*View*	
Open M*View* web page	Clicking on this link opens a new web browser with the M*View* web page of the related device. The attempt is based on the current M*Service* user. This function is limited to networks, where the M*Service* client is connected to the same subnet as the M*Link*
Breaker Info	
Identnumber	ABB Identification number of the circuit breaker.
Breaker Type	Incoming / Outgoing / Bus-Tie circuit breaker
Serial Number	Serial number of the circuit breaker
Nominal Current	Nominal current of the breaker as engineered
Number of Poles	3 / 4 pole application as engineered
Reference standard	Relevant standard the device conforms to (IEC)
M*Control* / M*Connect*	
Identnumber	ABB Identification number of the M*Connect* device as originally engineered.

11.3.4   Tab "Operating Trend"

The Operating Trend is available for MStart / MFeed / UMC / M10x and Circuit Breaker.

This is a graph view plotting operational data (e.g. current and voltage) for the selected device into a diagram. Function and usage is similar to the Trend Display (see 6), but the graphs combination is predefined for Operating Trend.
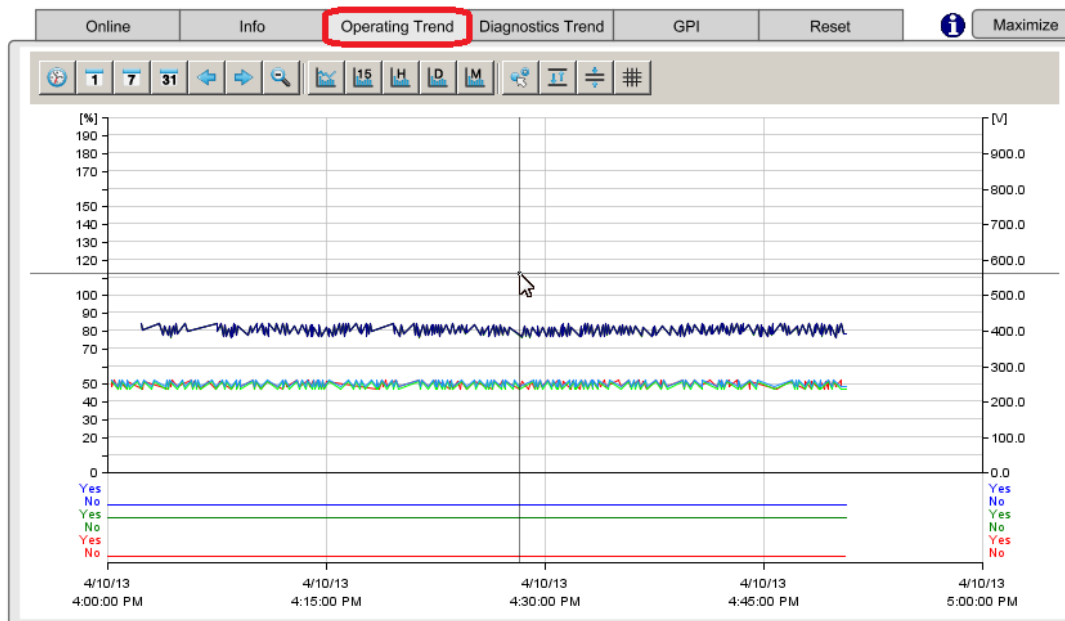

Fig. 85: Power Module view – Operating Trend

With a click on the "info" icon , a detailed legend pops up in a new window. Here user finds the color and description for every curve in the graph.
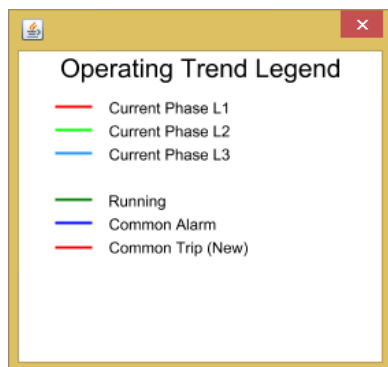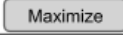

Fig. 86: Power Module view – Operating Trend Legend

Clicking on the "Maximize" button [Maximize], the trend display opens in a new window with all capabilities of the trend display (see also description of trend display in chapter 6.).
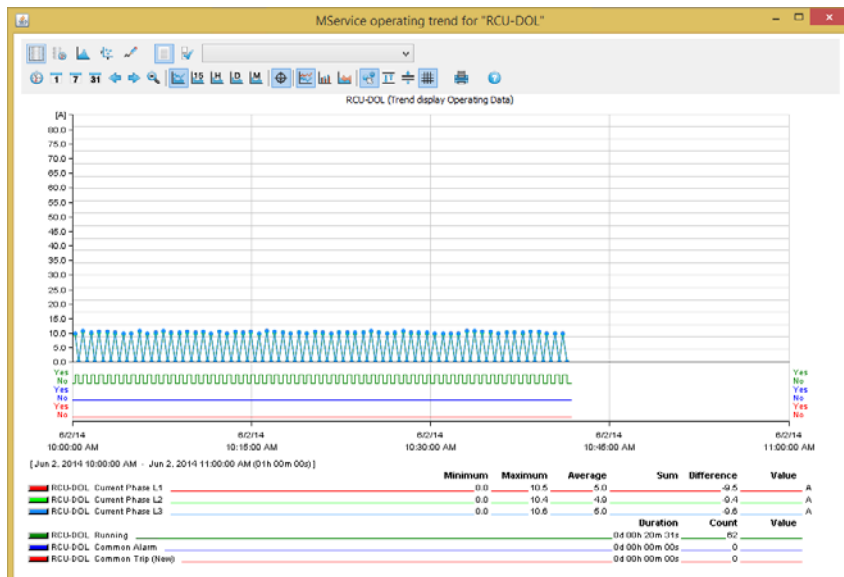

Fig. 87: Maximized trend display

11.3.5   Tab "Diagnostics Trend"

The Diagnostic Trend is only available for M*Start* / M*F*eed / UMC / M10x.

This is a graph view plotting diagnostic data (e.g. contact temperature, thermal image, time to trip, time to reset) for the device. The content is predefined for Diagnostic Trend.
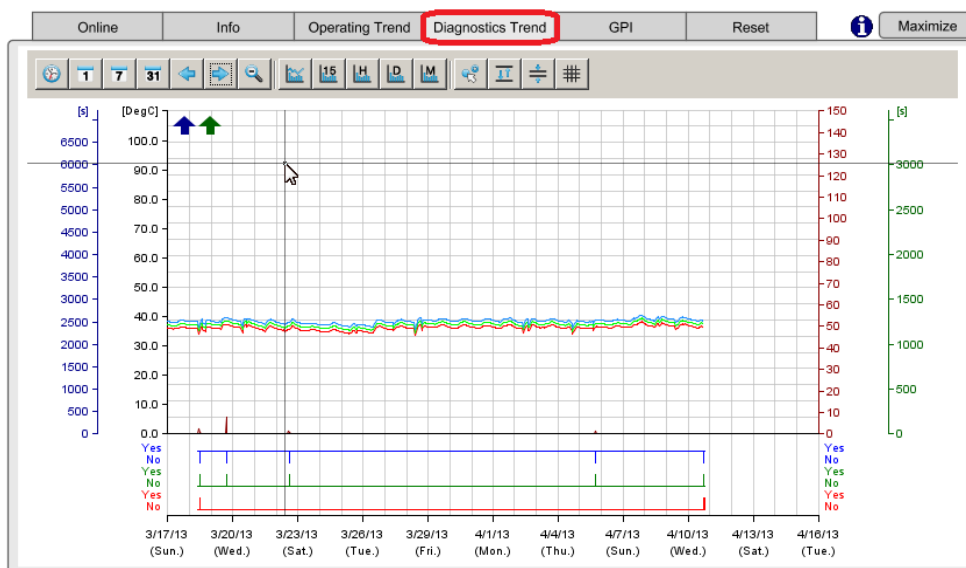

Fig. 88: Power Module view – Diagnose Trend

The legend, opening when clicking on the "info" icon, has the same functionality as in Operating Trend. (See 11.3.4)

11.3.6   Tab "GPI" - General Purpose Input

The tab is only available for M*Start* / M*F*eed / UMC / M10x modules.

Each module has up to 16 digital input channels (General Purpose Input – GPI) which are individual customizable according to the application need.

The text shown is configured in MNavigate using the 'Settings➔ Mass edit display text' commands.

If a GPI is active (high), the associated diagnostic lamp in this view is blue.
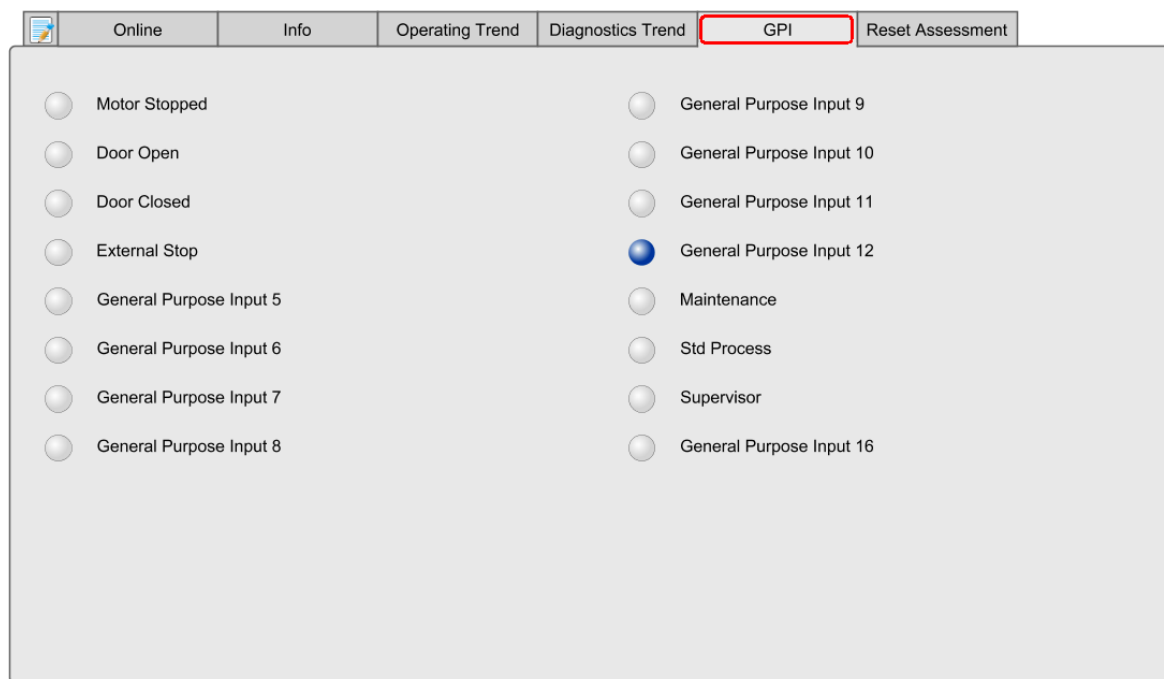

Fig. 89: Power Module view – General Purpose Inputs (GPI)

11.3.7   Tab "Reset"

The tab is only available for M*Start* / M*Feed*.

Several condition assessment algorithms are running within the OPC server and parameterized via M*Navigate*. See sec. 0

A few of them are related to some maintenance action, which cannot be monitored automatically from data coming from the devices. Therefore these assessment algorithms have to be reset manually using this tab.
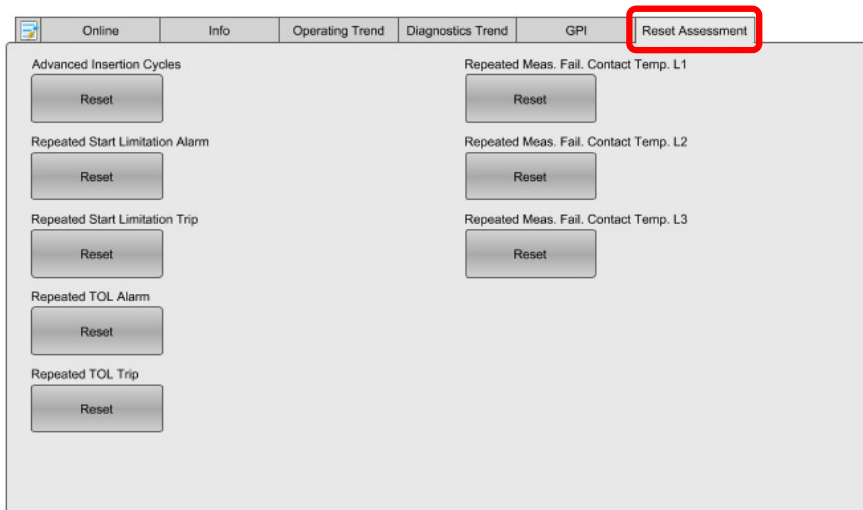
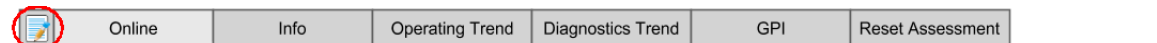

Fig. 90: Power Module view – Reset function

For UMC and M10x module, only Operation and TOL Supervision condition assessment algorithms are available.

Reset options:

Assessment: Advanced Insertion Cycles	The M*Start* / M*Feed* supervises the numbers of its insertion cycles and an alarm is shown on M*View*. M*Service* has implemented an additional supervision, which raises an alarm each 100 cycles. The severity is increased in two steps from 'Maintenance required' until 'Failure'. It is recommended to disable the M*Start*/M*Feed* alarm in M*Navigate* if the function is used in M*Service*
Assessment: Repeated Alarms / Trips	A frequency of occurrence of alarm / trips is supervised for 'Start Limitation' and 'TOL protection' by M*Control* / UMC / M10x-M respective. 'DCS communication error' in M*Link*. A special condition is raised, if such an event happens more as specified.

	The limit and period of assessment is to be specified in M*Navigate*.

11.3.8   Tab 'User Note'

Online	Info	Operating Trend	Diagnostics Trend	GPI	Reset Assessment

Clicking on the 'User Note' icon, a new window is opened to enter general notes specific for this power module.

ABB MService   MS-002

User Notes

Cubicle: CUB0001
Drawer: DOL

☑ Show hidden notes

Date and time	User	User note	Hidden	
	mview	New user notes	☐	Apply
6/2/2014 4:49:42 PM	mview	First service done on 2014-08-10 acc. to service manual	☐	Edit Delete
6/2/2014 4:48:36 PM	mview	Commissioning on 2012-04-23 with ABB experts	☐	Edit Delete
6/2/2014 4:48:03 PM	mview	This device is essential for proper running the main cracker	☑	Edit Delete

User Notes are stored with creation date and user name.

User Notes are shown in reversed time order (newest on top).

User Notes can be hidden to allow for periodization of the shown notes.

11.4 M*Link* view

By selecting one particular M*Link* in the cubicle view or alternatively in the left side tree menu, all its details are presented.

11.4.1 M*Link* configuration data

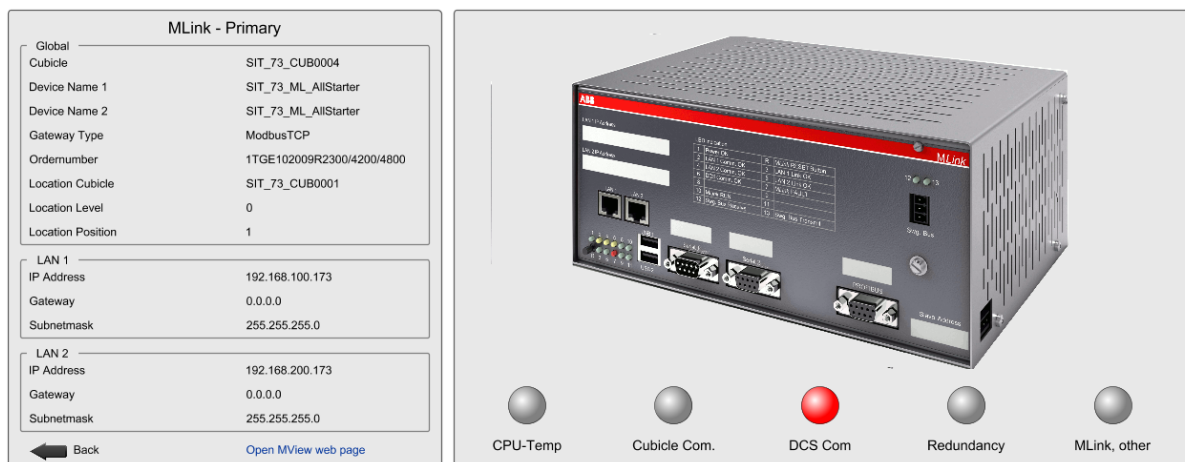On the left side the user can see the M*Link* configuration data.

Fig. 91: MLink configuration data

Global	Global configuration parameters
Cubicle	Name of the cubicle
Device Name 1, 2	Names of the M*Link*
Gateway Type	Fieldbus protocol
Identnumber	ABB identification number of the M*Link* device
Location Cubicle	Cubicle location identifier
Location Level	Row in this cubicle (1 to 36)
Location Position	Column in this cubicle (1, 3)

LAN 1, 2 interface	Configuration of primary and secondary LAN
IP address	Network IP address
Gateway	Gateway IP address
Subnetmask	Network subnet mask
Open M*View* web page	Clicking on this link opens a new web browser with the M*View* web page of the related device. The attempt is based on the current M*Service* user. This function is limited to networks, where the M*Service* client is connected to the same subnet as the M*Link*

11.4.2   M*Link* critical state signals

On the right side a schematic view of the device is shown with warning lamps signaling the critical states listed hereunder. If the OPC connection is lost (Com state alarm), a red frame around the M*Link* appears.

Fig. 92: M*Link* critical state signals

Critical state signals are with colors as defined in 10.1.1:

CPU-Temp		No valid temperature value
		Temperature is increased.
		Temperature is critical.
Cubicle Com.		Combines all failures leading to communication loss between M*Link* and all devices module is lost (e.g. internal switchgear bus failure).
DCS Com		Combines all failures leading to communication loss between M*Link* and DCS (e.g. fieldbus failure).
Redundancy		All states leading to availability of redundant device. Communication via the active device still running.
		Parameter "Startup as Primary" sent to both devices by mistake. Internal switchgear bus communication is disturbed.
M*Link*, other		M*Link* supervision not running or internal error occurred or the connection to M*Navigate* is interrupted.
		Connection to M*Navigate* is interrupted.
		Critical failure in the M*Link* configuration or the supply voltage is below alarm level.

11.4.3   Redundant M*Link* configuration

In a redundant M*Link* configuration both the primary and backup M*Link* are shown in the same view.

The active M*Link* device (currently communicating top a DCS master) has a green border.

Fig. 93: Redundant M*Link* configuration

11.5   M*Service* view

By clicking on the ABB logo in the top-left corner, the M*Service* detailed view opens.

Fig. 94 Opening M*Service* view

Fig. 95: M*Service* view

The page shows the configuration parameters of the M*Service* device. Furthermore some operational data such as last boot time, current CPU load and the usage of the internal hard drive and the active database are shown.

At the bottom of the M*Service* picture user finds a button which allows to reboot the device.

 The reboot of the M*Service* device using this button is possible only after the device has been configured once.

12 Message list details

The Message list shows alarms and events colored according to their severity (for color coding see 11.1.1). The latest event is on top of the list. The view changes dynamically showing only the messages related to the actually chosen device. For every entry, a timestamp, device name, description, a severity bar is shown. Further on, links to the knowledge base as well as the detailed view of the device are accessible.

Messages can be acknowledged individually or group-wise.

Acknowledgement	Timestamp	Plant	Text	Priority		
Not acknowledged	Feb 24, 2012 06:27:33.547 PM	ML-0000004214.3PMotor2	Motor is stopped. Repeated thermal overload trip of motor.		i	⇒
Not acknowledged	Feb 24, 2012 06:09:43.557 PM	ML-0000004214.3PMotor2	Motor will be stopped soon due to a trip.		i	⇒
Not acknowledged	Feb 23, 2012 11:04:16.457 AM	ML-0000004214.3PMotor2	Thermal Overload Protection Tripped		i	⇒
Not acknowledged	Feb 23, 2012 11:04:16.457 AM	ML-0000004214.3PMotor2	Stall Protection Alarm		i	⇒
Not acknowledged	Feb 23, 2012 10:56:02.537 AM	ML-0000004214.3PMotor2	Thermal Overload Protection Tripped		i	⇒
Not acknowledged	Feb 23, 2012 11:04:16.457 AM	ML-0000004214.3PMotor2	Stall Protection Alarm		i	⇒
Not acknowledged	Feb 23, 2012 10:28:25.390 AM	ML-0000004214.3PMotor2	Thermal Overload Protection Tripped		i	⇒
Not acknowledged	Feb 23, 2012 11:04:16.457 AM	ML-0000004214.3PMotor2	Stall Protection Alarm		i	⇒
Not acknowledged	Feb 23, 2012 10:25:39.357 AM	ML-0000004214.3PMotor2	Thermal Overload Protection Tripped		i	⇒
Not acknowledged	Feb 23, 2012 11:04:16.457 AM	ML-0000004214.3PMotor2	Stall Protection Alarm		i	⇒
Not acknowledged	Feb 23, 2012 10:22:54.500 AM	ML-0000004214.3PMotor2	Thermal Overload Protection Tripped		i	⇒
Group acknowledgement						

Fig. 96: Message list

Link to Knowledge Base

The "information"-button (i) opens the Knowledge Base database in M*Service*. The Knowledge Base provides detailed information on each message. It includes detailed on the type of incident, the description, possible cause and suggested actions.

Every Knowledge Base entry can be extended by the user by adding plant specific information and/or advice for co-workers.

User needs read/write access to add or edit comments in the Knowledge Base.

Comments can only be entered as plain text.

Do not try to add formatting marks such as <bold> or similar.
Use the following rules to enter certain special characters

      '<'   <

      '>'   >

Fig. 97: Knowledge Base

Link to Module Detail View

With the "arrow"-button ⟨ ⇒ ⟩, user can jump to the related Power Module view of M*Start* / M*Feed* / UMC / M10x or Circuit Breaker. Additional diagnostics is possible there.

For details, see section 11.3.

Acknowledgement

By clicking on the button ⟨ Not acknowledged ⟩ next to a message it can be acknowledged.

Acknowledging a message means a user has recognized its occurrence. If the message condition is cleared, the message will disappear from the list. To be able to acknowledge, the current user needs to have at minimum 'Write' access to the M*Service*.

13 Trouble Shooting

Following chapter contains some hints and recommendation when facing trouble during commissioning or operation of M*Service*.

Warranty seal

⚠️ The M*Service* device housing must never be opened. A warranty seal is applied on the housing.

Warranty is void if seal is broken!

13.1   MService Boot sequence and front LED feedback

After power up the M*Service* runs its system initialization. The user can follow the process based on the feedback given on the front LEDs.

Boot process with connected and configured switchgear

Power On		LED 7 is power (24V) indicator
LED control starting		All LED are lightened once in a cycle
Check for / installation of Firmware update		LED 1 blinking with 2Hz

SCADA initializing		LED 1 blinking with 1Hz
SCADA is started and OPC initializing		LED 3 blinking
All components up&running		Login is possible, but availability of current OPC data may still need some time

Boot process with no switchgear connected

Power On		LED 7 is power (24V) indicator
LED control starting		All LED are lightened once in a cycle

Check for / installation of Firmware update		No LAN connection: LED 1 blinking with 2Hz LED 5 is off
SCADA initializing		LED 1 is blinking with 1HZ LED 2 is blinking with 0.5Hz
SCADA initialized, but no LAN connection available		LED 1 is on, LED 2 is blinking with 0.5Hz LED 3 indicates missing OPC Server processes.

13.2   Issues indicated via front LED

The front LEDs indicate the status of some components of the M*Service* device. Some of the problem indications can be addressed by the user. If not, please contact ABB Support.

LED 5 is off: 'No LAN communication'	- Check if cables to LAN 1 or LAN 2 are properly connected. - Check also connection to the switch - Make sure, that no IP-Address conflict
LED 2 is blinking: 'Problem with LAN 2'	- Check if cables to LAN 2 are properly connected. - Check also connection to the switch - Make sure, that no IP-Address conflict
LED 4 blinking	- Creating a data backup is recommended. Use the 'backup facility', see sec. 8.4.1 - The status indication will be active every 90 days for 7 days.

LED 6 blinking 2Hz 'Problem with CF-Card	• Check, if the CF-Card is properly inserted before power on of M*Service* • Try to open the CF-Card in a card reader on a PC/Laptop and correct any issues reported by Windows, e.g. choose 'Scan and fix' if this dialog is shown:
LED 6 blinking 1Hz 'Low RAM situation'	• This can happen temporarily during report generation. If the status persist, try to remove devices from the configuration

13.3   Issues using the web-interface

Internet Explorer does not show changed system configuration

When the Autoconfigurator wizard completed successfully, the user session has to be restarted. Depending on the settings of the web browser it might be necessary to close the browser and all its windows in order to clean up current session and restart the Java engine cleanly.

Boot of M*Service* device without connected network

If the M*Service* is booted but not connected to any switchgear network, the communication components close down after a while. All configured devices are shown as 'not connected'.

If the switchgear network is connected later on, the MS*ervice* device is still not able to re-establish the communication to the M*Link* devices.
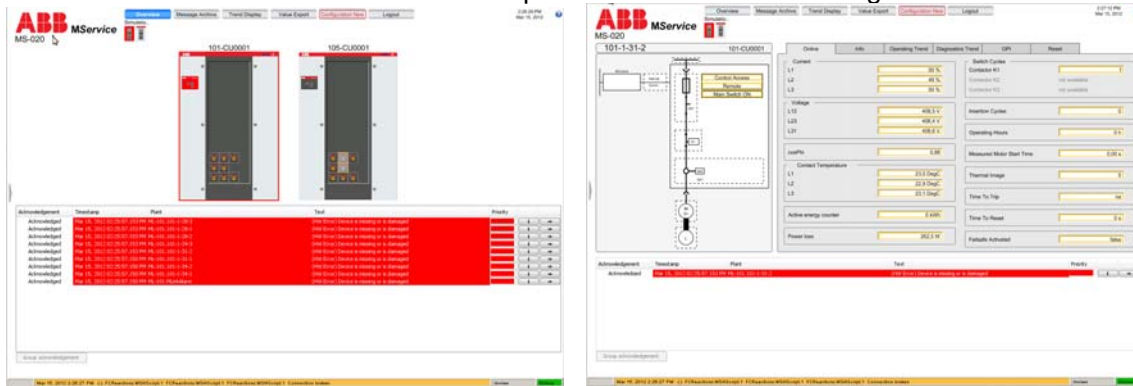
In this case a reboot of the M*Service* is required with connected switchgear network.

Configured M*Link* does not show live values after reboot of M*Service*

If the M*Service* was booted, but a single M*Link* was not available at that time, the communication could not be established.

When the MLink is later on connected to the switchgear network, the MService is still not able to re-establish the communication.

In this case a reboot of the MService is required with connected switchgear network

Communication loss to MLink

If the communication between MService and MLink gets lost, the related cubicles are shown with a red border. In the module detail view, all data items are shown with an orange border.

NTP server temporarily not available

The internal clock of the MService is not battery buffered. Therefore, after ca. 3h power off, the time is reset to the device's default value.

If the configured network time service is not available after system boot, the system time is set to a recovery time stamp value, which is stored regularly on the hard disk. This mechanism ensures, that the MService system time and all database entries always use a continuous proceeding time. No overlap of 'time fragments' will happen.

Once the NTP server is available again, the system time is synchronized automatically. If the MService time is ahead of the ntp server time, MService time will be set backwards as long as the step is less than 1 week.

Timeout during csv export

Exporting large data packs may require long time for the MService to read all data out of history database and prepare it for download to the client PC.

The time-out of this operation is set to 1hour.

If the download does not happen within this period, an error of the web server is shown. Use the web browser's 'back' button to return to the previous page and select the range to be exported new.

To avoid this it is recommended to divide the data to be downloaded manually in smaller packs via selection of smaller date range or fewer devices.

Failure in sending E-mail

In case the e-mail settings are not correct or there is no network connection to a mail server and M*Service* is not able to deliver the mail to the mail server, a system message is issued, indicating a problem with the 'FCEmail' component.

5/16/2013 9:39:27 AM.467	FCEMail.EMailApplication.1	FCEMail.EMailApplication.1 Error	(-)		
5/16/2013 9:34:27 AM.850	FCEMail.EMailApplication.1	FCEMail.EMailApplication.1 Error	(+)		

The message has a severity of 750 ("Function Check") and is automatically cleared by the system within a few seconds.

Review and correct the settings as described in sec. 8.3

If the problem persists, ask the IT administrator of the mail server to check its configuration as well.

Computer client

M*Service* firmware version 7.4 backwards does not support for JAVA8 and Windows 8. Windows 2008 and Windows 7 running with JAVA 7 shall be used when M*Service* is running firmware version 7.4.

 M*Service* firmware version 7.7 is implemented for JAVA8 and Windows 8.

M*Service* TCP/IP Port Data Communication

There is an error message shown when ABB computer connects to M*Service*. The default of M*Service* TCP/IP Port Data Communication from MNavigate is 8080. This port is occupied by other ABB Application so that the error message is issued.

Solution is to change the M*Service* TCP/IP Port Data Communication from 8080 to 20202 in MNavigate and complete download into MService. See below picture.

MS-Support1 Configuration

Here is the list of configuration items available for this MService.

IP Address LAN1	192 . 168 . 100 . 199
Subnet Mask LAN1	255 . 255 . 255 . 0
Default Gateway LAN1	0 . 0 . 0 . 0
IP Address LAN2	192 . 168 . 200 . 199
Subnet Mask LAN2	255 . 255 . 255 . 0
Default Gateway LAN2	0 . 0 . 0 . 0
IP Address LAN3	123 . 123 . 123 . 123
Subnet Mask LAN3	255 . 255 . 255 . 0
Default Gateway LAN3	0 . 0 . 0 . 0
OPC Startup Delay	120
TCP/IP Port Data Communication	20202
Time Sync. Method	NTP
Time Server IP-Address	192 . 168 . 200 . 100
Time Zone	(UTC+08:00) Kuala Lumpur, Singɛ

Help   OK   Apply   Cancel

If the error message is remained, please contacts local IS-IT to re-install JAVA application.

Contact us