DISTRIBUTION SOLUTIONS

MNS® Digital
ABB Ability™ Condition Monitoring
for electrical systems
User Manual
### NOTICE

This document contains information about one or more ABB products and may include a description of or a reference to one or more standards that may be generally relevant to the ABB products. The presence of any such description of a standard or reference to a standard is not a representation that all of the ABB products referenced in this document support all of the features of the described or referenced standard. In order to determine the specific features supported by a particular ABB product, the reader should consult the product specifications for the particular ABB product.

ABB may have one or more patents or pending patent applications protecting the intellectual property in the ABB products described in this document.

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.

Products described or referenced in this document are designed to be connected and to communicate information and data through network interfaces, which should be connected to a secure network. It is the sole responsibility of the system/product owner to provide and continuously ensure a secure connection between the product and the system network and/or any other networks that may be connected.

The system/product owners must establish and maintain appropriate measures, including, but not limited to, the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, and so on, to protect these products, the network, its system, and interfaces against security breaches, unauthorized access, interference, intrusion, leakage, and/or theft of data or information.

ABB performs functionality testing on the products and updates that we release. However, system/product owners are ultimately responsible for ensuring that any product updates or other major system updates (to include but not limited to code changes, configuration file changes, third-party software updates or patches, hardware change out, and so on) are compatible with the security measures implemented. The system/product owners must verify that the system and associated products function as expected in the environment in which they are deployed.

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 written permission from ABB, and the contents thereof must not be imparted to a third party nor used for any unauthorized purpose.

The software or hardware 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. This product meets the requirements specified in EMC Directive 2014/30/EU and in Low Voltage Directive 2014/35/EU.

The MNS Digital Edge GW uses these open source components:

<table>
<thead>
<tr>
<th>Component</th>
<th>Version</th>
<th>License</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>jQuery</td>
<td>3.2.1</td>
<td>Copyright JS Foundation and other contributors, <a href="https://js.foundation/">https://js.foundation/</a></td>
<td></td>
</tr>
<tr>
<td>jQuery UI</td>
<td>1.12.1</td>
<td>Copyright JS Foundation and other contributors, exact contribution history, see <a href="https://github.com/jquery/jquery">https://github.com/jquery/jquery</a></td>
<td></td>
</tr>
<tr>
<td>Perfect Scrollbar</td>
<td>1.1.0</td>
<td>The MIT License (MIT) Copyright (c) 2012-2017 Hyunjuk Jung and other contributors</td>
<td></td>
</tr>
<tr>
<td>Selectric</td>
<td>1.13.0</td>
<td>Copyright (c) 2016 Leonardo Santos</td>
<td></td>
</tr>
</tbody>
</table>

MIT license

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the “Software”), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED “AS IS”, WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.
TRADEMARKS

MNS is a registered or pending trademark of ABB.

Ability is a trademark of ABB.

All rights to copyrights, registered trademarks, and trademarks reside with their respective owners.

Copyright © 2018 ABB.

All rights reserved.

Release: May 2018

Document Number: 1TGC908001M0201

Revision: M0201
# Table of Contents

1. General................................................................................................................................. 1
   1.1. Target Group.................................................................................................................. 1
   1.2. Use of Warning, Caution, Information and Tip icon .................................................. 1
   1.3. Terminology.................................................................................................................... 2
   1.4. Related Documentation................................................................................................. 4
   1.5. Related System Version................................................................................................. 4

2. Introduction............................................................................................................................. 5
   2.1. Switchgear Network and Client/Plant Network ........................................................... 6

3. User Interface ........................................................................................................................ 7
   3.1. Getting started ................................................................................................................ 7
   3.2. Start Screen ................................................................................................................... 8
   3.3. Tree View Navigation .................................................................................................... 9
   3.4. Dashboard Widgets ....................................................................................................... 13
   3.5. Widget – Event List ...................................................................................................... 14
   3.6. Widget – Single Line Diagram ..................................................................................... 17
   3.7. Widget – Physical Position ........................................................................................... 18
   3.8. Widget – Detailed View - Data ..................................................................................... 19
   3.9. Widget – Detailed View - TRENDS ............................................................................. 21
   3.10. Widget – Detailed View - ALARMS .......................................................................... 22
   3.11. Widget – Detailed View - Information ...................................................................... 23
   3.12. Alarms& Events Tab ................................................................................................... 24
   3.13. Home Tab .................................................................................................................... 25
   3.15. About Button .............................................................................................................. 26
   3.16. Logoff .......................................................................................................................... 26

4. Appendix ................................................................................................................................ 27
   4.1. MNS Digital hardware and accessories ...................................................................... 27
   4.2. Software ......................................................................................................................... 33

5. Troubleshooting and Maintenance ...................................................................................... 34
   5.1. Troubleshooting ........................................................................................................... 34
   5.2. Maintenance ................................................................................................................... 34
List of Figures

Figure 1: MNS Digital Network Example ................................................................. 6
Figure 2: Login view .......................................................................................... 7
Figure 3: Start Screen ....................................................................................... 8
Figure 4: Start Screen ....................................................................................... 9
Figure 5: Show Tree Icon .................................................................................. 9
Figure 6: Selectable Views .............................................................................. 9
Figure 7: “Square” – Maximize Widget, “X” – Close Widget ............................... 13
Figure 8: Widgets of Dashboard and its Selection ............................................... 13
Figure 9: Event List .......................................................................................... 14
Figure 10: Trip Acknowledged by User .............................................................. 16
Figure 11: Knowledge Base .............................................................................. 16
Figure 12: Single Line diagram ....................................................................... 17
Figure 13: Physical Position ............................................................................ 18
Figure 14: Select a Module/ Device for Detailed View ........................................ 19
Figure 15: Detailed View – DATA ................................................................. 19
Figure 16: Detailed View - Data – Measurement and Diagnosis Information .......... 20
Figure 17: Detailed View – Trends ................................................................. 21
Figure 18: Detailed View – Trends – Selection of Start Date, Time Resolution ....... 22
Figure 19: Detailed View – ALARMS ............................................................. 22
Figure 20: Detailed View – INFORMATION .................................................. 23
Figure 21: Global Alarm & Event Tab .............................................................. 24
Figure 22: Home Tab ...................................................................................... 25
Figure 23: Help Button ................................................................................... 25
Figure 24: Logoff Button ............................................................................... 26
Figure 25: Interfaces of MNS Digital Edge Gateway ........................................... 28
Figure 26: Power Supply Connector ................................................................ 31
Figure 27: UPS connector ............................................................................... 31
Figure 28: LEDs and Power / Reset Button ...................................................... 32
List of Tables

Table 1: Tree view selections ........................................................................................................... 11
Table 2: Search function .................................................................................................................... 12
Table 3: Color Coding of Alarms and Trips ..................................................................................... 15
Table 4: Edge Gateway Hardware .................................................................................................... 27
Table 5: Connectors of MNS Digital Edge Gateway ....................................................................... 28
Table 6: Power Supply for MNS Digital Edge Gateway ................................................................. 29
Table 7: Technical data ..................................................................................................................... 30
1. General

1.1. Target Group

The MNS Digital Edge Gateway is the hardware platform for ABB Ability™ Condition Monitoring for electrical systems (in the following ‘Condition Monitoring’).

Audiences of this manual are service technicians and switchgear operators on site. This document describes the communication and user interfaces of the MNS Digital Edge Gateway and Condition Monitoring.

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 information icon alerts the reader to pertinent facts and conditions.

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 that the document uses.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm</td>
<td>Alarm</td>
<td>Alarm is defined as status transition from any state to abnormal state. Status transition to abnormal state can be data crossing over a pre-defined Alarm limit.</td>
</tr>
<tr>
<td>Dashboard</td>
<td>Dashboard</td>
<td>A dashboard is a user interface that organizes and presents information in a way that is easy to read.</td>
</tr>
<tr>
<td>Ethernet</td>
<td>Ethernet</td>
<td>Ethernet is a local area network (LAN) technology. The Ethernet standard specifies the physical medium, access control rules and the message frames.</td>
</tr>
<tr>
<td>Event</td>
<td>Event</td>
<td>An event is a status transition from one state to another. It can be defined as Alarm, if the state is defined as abnormal or as warning as a pre-Alarm state.</td>
</tr>
<tr>
<td>LVS</td>
<td>Low Voltage Switchgear</td>
<td>A factory built assembly built to conform with IEC 60439-1</td>
</tr>
<tr>
<td>MCC</td>
<td>Motor Control Center</td>
<td>Common term for switchgear used for motor control and protection.</td>
</tr>
<tr>
<td>MNS</td>
<td>MNavigate</td>
<td>MNS Digital switchgear configuration and parameterization tool</td>
</tr>
<tr>
<td>MNS</td>
<td>Modular Low Voltage Switchgear family from ABB</td>
<td></td>
</tr>
<tr>
<td>Motor Starter</td>
<td>Motor Starter</td>
<td>Consists of motor controller and electrical components to control and protect a motor, part of Motor Control Center</td>
</tr>
<tr>
<td>NAMUR</td>
<td>NAMUR</td>
<td>NAMUR is an international user association of automation technology in process industries.</td>
</tr>
<tr>
<td>OPC UA</td>
<td>OPC UA</td>
<td>The industrial standard for exchange of information between components and process control application.</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Term</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>PLC</td>
<td>Programmable Local Controller</td>
<td>Low level control unit</td>
</tr>
<tr>
<td>Trip</td>
<td></td>
<td>A consequence of an Alarm activated or an external Trip command from another device to stop the motor or Trip the circuit breaker.</td>
</tr>
<tr>
<td>UPS</td>
<td>Uninterruptible Power Supply</td>
<td>Provides emergency power when the input power source or mains power fails.</td>
</tr>
<tr>
<td>Widget</td>
<td></td>
<td>A widget is an application, or a component of an interface, that enables a user to perform a function or access a service.</td>
</tr>
<tr>
<td>Windows OS</td>
<td>Windows Operating System</td>
<td>Windows® is a registered trademark of Microsoft Corporation. All other trademarks are the property of their respective owners.</td>
</tr>
</tbody>
</table>
1.4. Related Documentation


1.5. Related System Version

The content of this document is related to MNS Digital Release 1.1
2. Introduction

This document provides an introduction to the MNS Digital Edge Gateway and its features and describes the user interface of the Condition Monitoring system which provides a web based user interface with following main functions (depending on user rights):

- Convenient navigation options via tree, electrical single line or cubicle front view
- Clear indication of process and diagnosis values
- Trend display for online and historic measurement and diagnostic values
- Alarm and Event history
- Knowledge base providing suggest actions for Alarms and Trips

The MNS Digital Edge Gateway can supervise all devices, which are connected to the NS Digital internal communication structure. This includes:

- Motor starter and feeder, which are equipped with intelligent devices M10x or UMC
- Circuit breakers (Emax2)
- MNS Temperature monitoring system (TMS) – module solution
2.1. Switchgear Network and Client/Plant Network

The MNS Digital Edge Gateway needs an Ethernet connection to the MNS Digital Gateway(s) to read status information from the switchgear (ETH2). The Condition Monitoring data is presented via the web-based user interface on Ethernet interface ETH1 (web browser).

Figure 1: MNS Digital Network Example
3. User Interface

This chapter describes the user interface of the Condition Monitoring system which provides online and historic data from the connected switchgear and devices (e.g. motor starter).

3.1. Getting started

To login into the user interface the first step is to enter “https://” and the IP address of the MNS Digital Edge Gateway into the address bar of the web browser (Firefox or Google Chrome).

Example: https://192.168.220.180

Following login window appears:

![Login view](image)

Figure 2: Login view

Here the user Username and respective password has to be entered.

Note: How to configure user profiles is described in the “ABB Ability™ Condition Monitoring for electrical systems – User Management Quick Guide” document.
3.2. Start Screen

After entering a valid user name and password following Start Screen is shown:

![Start Screen](image)

Figure 3: Start Screen

- It is recommended to limit the simultaneous login to 5 users for best navigation performance results.

This Start Screen shows the first switchgear listed in the tree view. The screen has following components:

- `<Tree View>` to select switchgear sections or motors/consumers
- `<Main Menu>` on top with generic features and indication about logged in user and system wide active Alarms/Trips
- area with 3 fully animated start widgets showing system online data in
  - Event List
  - Electrical Single Line diagram
  - Physical Position (cubicle front view)
3.3. Tree View Navigation

Tree navigation allows the user to select a switch gear or a starter module/consumer. By clicking on the icon “Show Tree” the tree view will be enlarged for easy user navigation.
The Tree View provides following selectable view options to support different user activities:

<table>
<thead>
<tr>
<th>Location view</th>
<th>Modules in the tree view are organized according the physical arrangement in the switchgear</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Location view" /></td>
<td><img src="image2.png" alt="Location view" /></td>
</tr>
<tr>
<td>Bus bar view</td>
<td>Modules in the tree view are organized according the affiliation to bus bar sections</td>
</tr>
<tr>
<td><img src="image3.png" alt="Bus bar view" /></td>
<td><img src="image4.png" alt="Bus bar view" /></td>
</tr>
<tr>
<td>Communication view</td>
<td>Modules in the tree view are organized according to the communication relationship</td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><img src="image" alt="Communication view" /></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project view</th>
<th>Modules in the tree view are organized according to project engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Project view" /></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Tree view selections
The search function provides an easy way to find motors / devices.

Examples:

**Search for devices with “M2” in the name:**

- ![Search for devices with “M2” in the name](image)

**Search function lists all modules with “6E” in the name:**

- ![Search function lists all modules with “6E” in the name](image)

Table 2: Search function
3.4. Dashboard Widgets

Status of the switchgear, measurement values and diagnostic information are presented at a dashboards with following widgets:

- Event list
- Electrical Single Line diagram
- Physical Position

By selecting the square symbol user can maximize widget. Clicking on the “X” symbol closes the widget. In this case the widget is moved to the left menu bar from where it can be activated again.

Figure 7: “Square” – Maximize Widget, “X” – Close Widget

Figure 8: Widgets of Dashboard and its Selection
3.5. Widget – Event List

The Event List provides an overview about pending or/historic Alarms and Trips for the selected switchgear.

The severity of the information is marked by different colors for quick identification. Next to the time stamp also further clear text details about the Events/Alarms are provided in the line. Depending on the user rights it is possible to acknowledge pending Alarms. Various selections are provided for the user to filter the Alarm list.

Figure 9: Event List

The list could be filtered by:

- Severity of Alarm
  - All / Active / New / Active or New
- All / Last Hour / Last Day / Last Week / Last Month / Last Year
- Devices

“Active” means the Alarm or Trip is present and “New” means the Alarm or Trip is not acknowledged.
The Alarms and Trips are colored. The color coding is according to the NAMUR recommendation [2]. Following table describes the color and meaning.

<table>
<thead>
<tr>
<th>Severity</th>
<th>Sub-Condition</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 99</td>
<td>Normal</td>
<td>Green</td>
<td>Motor is available. Status is ‘normal’. Asset functionality is fully available. No maintenance is required.</td>
</tr>
<tr>
<td>100 - 399</td>
<td>Maintenance required</td>
<td>Blue</td>
<td>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.</td>
</tr>
<tr>
<td>400 - 749</td>
<td>Out of Specification</td>
<td>Yellow</td>
<td>Motor is still available. Status is ‘out of specification”. Asset functionality available but decreased due to operating conditions outside the specified limits.</td>
</tr>
<tr>
<td>750 – 899</td>
<td>Function Check</td>
<td>Orange</td>
<td>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).</td>
</tr>
<tr>
<td>900 – 1000</td>
<td>Failure</td>
<td>Red</td>
<td>Motor has been stopped. Status is ‘failure”. Asset Functionality lost due to malfunction of its peripherals or due to operating conditions.</td>
</tr>
</tbody>
</table>

Table 3: Color Coding of Alarms and Trips

ℹ️ The colors are predefined and cannot be changed by the user
The user can acknowledge an Alarm or Trip in the left box by a mouse click:

Figure 10: Trip Acknowledged by User

The background color for each list entry means:

- Yellow: Alarm or Trip is active
- White: Alarm or Trip is not active

Events like “Motor started” could not be acknowledged. An Alarm or Trip stays available in the historical database independent if it was acknowledged or not or if the Alarm or Trip is still active or not. Filtering options allow to show only interesting entries, for example only active and only new Alarms and Trips (new = not acknowledged).

A Knowledge Base provides for each Alarm or Trip a detailed description with possible cause and suggested action:

Figure 11: Knowledge Base
3.6. Widget – Single Line Diagram

The Single Line diagram provides a quick electrical overview about the actual status of the motors, consumers and sensors.

- Main Switch open/closed
- Contactor(s) open/closed
- Motor running CW/CCW
- Alarm/Trip status
- Pre-selected measurement values

Pending Events / Alarm or Trips for each consumer are indicated by colorization of the frame indicating the severity.

Figure 12: Single Line diagram

The colors have following meaning:

<table>
<thead>
<tr>
<th>Color</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Ready/Open - no pending</td>
</tr>
<tr>
<td>Blue</td>
<td>Runs/Closed</td>
</tr>
<tr>
<td>Orange</td>
<td>Alarm</td>
</tr>
<tr>
<td>Red</td>
<td>Trip</td>
</tr>
<tr>
<td>Red and “Not present”:</td>
<td>Device is not present or communication is disturbed</td>
</tr>
<tr>
<td>Black</td>
<td>Status of device is unknown</td>
</tr>
</tbody>
</table>
3.7. Widget – Physical Position

The widget provides an online cubicle front view with all the modules. Health status of the modules are indicated by different colors defined for the different severities. The colors have same meaning as for single line diagram.

Figure 13: Physical Position
3.8. Widget – Detailed View - Data

After clicking on a module/device in Physical Position widget or in the Single Line widget a detailed view of the selected module/device is shown.

Figure 14: Select a Module/ Device for Detailed View

This detailed view shows in the tab “DATA” the online status of the module and motor / load which consist of:

- Detailed information about the status of the power module including status of the connected motor / load in an animated single line diagram
- List views with colors indicating the current operating status of the online values:
  - Measurement values
  - Diagnostic values

Figure 15: Detailed View – DATA
The below example shows the measurement and diagnosis information which is provided for motor starters and reflect the most important data required by user.

Figure 16: Detailed View - Data – Measurement and Diagnosis Information

The colors of measurement bars indicate:

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Measurement value is in normal range</td>
</tr>
<tr>
<td>Orange</td>
<td>Measurement value is out of range 1</td>
</tr>
<tr>
<td>Red</td>
<td>Measurement value is out of range 2</td>
</tr>
<tr>
<td>Grey</td>
<td>Measurement value is not valid</td>
</tr>
</tbody>
</table>
3.9. Widget – Detailed View - TRENDS

The detailed view “TRENDS” shows the online and historic recorded graphical view of the measurement and diagnostic values.

- When opening the trend certain values in the graph are pre-selected
- User can switch on/off existing curves by simple click
- User can add/remove any recorded value to/from the graph
- The trend display provides also features like
  - Zoom In/Out (right mouse click)
  - Changing the time scale

![Detailed View – Trends](image)

Figure 17: Detailed View – Trends
To see details or a certain range of the historical data the Trend Display could be adapted with:

- Start Date
- Time base and time resolution
- End date
- Floating or locked view

Adding or removing items to a trend is only persistent in the current session. After re-login, the defaults are restored.

3.10. Widget – Detailed View - ALARMS

The detailed view “ALARMS” shows the Alarms and Trips for the selected module/device:

- Messages can be filtered by different criteria’s
- User can acknowledge pending Alarms/Trips

For more details see chapter “Widget – Event List”.
3.11. Widget – Detailed View - Information

The detailed view “INFORMATION” provides technical details of the selected module and/or device.

The QR code contains a direct link to ABB Service web page for further support.

Figure 20: Detailed View – INFORMATION
3.12. Alarms & Events Tab

The Alarms and Event tab in the top menu bar shows an unfiltered global Alarm and Event List.

The list provides an overview of all pending or/and historic Alarms and Trips of all connected switchgears. The severity of the information is marked by different colors for quick identification. Next to the time stamp also further clear text details.

Figure 21: Global Alarm & Event Tab

For more details see chapter “Widget – Event List”.

[Image of the Alarms & Events tab interface]
3.13. Home Tab

After pressing the Home tab the start screen is shown again.

![Home Tab](image)

Figure 22: Home Tab


At bottom of left side the Help button is located. When clicking the button this user manual will be displayed in a separate browser tab.

![Help Button](image)

Figure 23: Help Button
3.15. About Button

On the left side the About button is located. Here the information about the actual software version of the Condition Monitoring system can be found.

![About Button Image]

3.16. Logoff

To close the web session, use the Logoff button in the top bar.

![Logoff Button Image]

Figure 24: Logoff Button
4. Appendix

4.1. MNS Digital hardware and accessories

The MNS Digital Edge Gateway is an industrial grade computer system which includes a hard disk for historical data storage.

To prevent loss of data during a power failure a UPS battery must be connected to the MNS Digital Edge Gateway.

---

To prevent data loss or a corrupted operating system, the MNS Digital Edge Gateway needs always a connected UPS battery!

After a voltage drop of the 24VDC power supply the MNS Digital Edge Gateway is running for five (5) minutes on battery supply before a Windows OS shut down is initiated automatically. A Windows OS shutdown can last up to 10 minutes, because of saving of historical data to the hard disk.

A TCP/IP connection to the plant and switchgear network must be available. The settings of the IP addresses have to match the settings of the plant / switchgear network.

The Ethernet connector ETH2 is used to connect the MNS Digital Edge Gateway to the MNS Digital Gateways (see also Figure 1).
4.1.1. Connectors of the Edge Gateway

The MNS Digital Edge Gateway provides following interfaces:

![Interfaces of MNS Digital Edge Gateway](image)

1 IF Option 1 | 2 Eth2 | 3 Eth1 | 4 Power 24VDC | 5 IF Option 2

Figure 25: Interfaces of MNS Digital Edge Gateway

<table>
<thead>
<tr>
<th>Connector</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power 24VDC</td>
<td>24 VDC, max. 86 W</td>
</tr>
<tr>
<td>IF Option 1</td>
<td>Connector for UPS battery</td>
</tr>
<tr>
<td>ETH1</td>
<td>Ethernet 1 connector for Web browser</td>
</tr>
<tr>
<td>ETH2</td>
<td>Ethernet 2 connector for MNS Digital Gateway</td>
</tr>
<tr>
<td>IF Option2</td>
<td>Ethernet 3 connector, disabled, for future use</td>
</tr>
</tbody>
</table>

Table 5: Connectors of MNS Digital Edge Gateway
4.1.2. Electrical Data
The required power supply for MNS Digital Edge Gateway is described in following table.

<table>
<thead>
<tr>
<th>Technical Data</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Voltage</td>
<td>24 VDC ±25%, SELV(^1)</td>
</tr>
<tr>
<td>Power consumption</td>
<td>86W max.</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>EN 61131-2 II</td>
</tr>
<tr>
<td>Inrush current Type</td>
<td>6 A; max. 10 A for &lt;300 μs</td>
</tr>
<tr>
<td>Electrical isolation</td>
<td>Yes</td>
</tr>
<tr>
<td>Protected against reverse polarity</td>
<td>Yes</td>
</tr>
</tbody>
</table>

\(^1\) EN 60950 requirements must be observed. This device is only permitted to be supplied by a SELV / PELV power supply or with safety extra-low voltage (SELV) in accordance with EN 60950.

Table 6: Electrical data of MNS Digital Edge Gateway
### 4.1.3. Technical Data

<table>
<thead>
<tr>
<th>Mechanical Data</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>3.75 kg</td>
</tr>
<tr>
<td>Dimensions H x W x D</td>
<td>270 mm x 91 mm x 255 mm</td>
</tr>
</tbody>
</table>

#### Environmental Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>-20 to 60 °C</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>0 to 50 °C</td>
</tr>
<tr>
<td>Degree of Protection</td>
<td>IP 20</td>
</tr>
</tbody>
</table>

Table 7: Technical data of MNS Digital Edge Gateway
4.1.4. **Power Supply Connector**

The following table describes the power connector for the 24VDC supply voltage:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>24VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+24VDC</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Functional Ground</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>-24VDC</td>
<td></td>
</tr>
</tbody>
</table>

Figure 26: Power Supply Connector

4.1.5. **UPS Connector**

The following table describes the power connector for the UPS battery:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>4-pin male connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Temperature sensor</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td></td>
<td>battery</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0VDC</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>+24VDC</td>
<td></td>
</tr>
</tbody>
</table>

Figure 27: UPS connector
4.1.6. Status LED

The LEDs on the MNS Digital Edge Gateway front plate indicate following device status:

<table>
<thead>
<tr>
<th>LED</th>
<th>Color</th>
<th>Status</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Green</td>
<td>On</td>
<td>Supply voltage Ok</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>blinking</td>
<td>Device booted, internal battery status &quot;BAD&quot;</td>
</tr>
<tr>
<td>Red</td>
<td>On/ Blinking</td>
<td></td>
<td>Device faulty, for more details see APC910 user manual</td>
</tr>
<tr>
<td>Red/Green</td>
<td>Blinking</td>
<td></td>
<td>Device faulty, for more details see APC910 user manual</td>
</tr>
<tr>
<td>Yellow</td>
<td>On</td>
<td></td>
<td>Supply voltage not OK, system operating from UPS</td>
</tr>
<tr>
<td>HDD</td>
<td>Yellow</td>
<td>On</td>
<td>Indicates hard disk access</td>
</tr>
<tr>
<td>Link</td>
<td>Yellow</td>
<td></td>
<td>Not used</td>
</tr>
<tr>
<td>Run</td>
<td>Green/ Red</td>
<td></td>
<td>Not used</td>
</tr>
</tbody>
</table>

Figure 28: LEDs and Power / Reset Button
4.1.7. Power and Reset Button

The power and reset button is located behind the front plate of the MNS Digital Edge Gateway. They have following function:

<table>
<thead>
<tr>
<th>Button</th>
<th>Action</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Press and Release</td>
<td>Switches on the MNS Digital Edge Gateway</td>
</tr>
<tr>
<td></td>
<td>Press and hold</td>
<td>Switches off the ATX power supply without shutting down the MNS Digital Edge Gateway (data could be lost!)</td>
</tr>
<tr>
<td>Reset</td>
<td>Pushing the Button</td>
<td>Triggers a hardware and PCI reset. The MNS Digital Edge Gateway is restarted (cold restart).</td>
</tr>
</tbody>
</table>

Do not use the reset button and do not press and hold the power button.

A reset can result in loss of data or can corrupt the Windows OS.

If required, please lock on to Windows OS and shut down the system by using the Windows OS shut down menu.

Alternatively it is possible to disconnect the “Power 24VDC” connector (see Figure 25) and wait, until the UPS will shut down the PC (approx. 10-15min.).

4.2. Software

All required software for the Condition Monitoring is pre-installed on the MNS Digital Edge Gateway.

To access the web based user interface of the Condition Monitoring following internet browsers are supported and shall be installed on the client PC:

- Google Chrome®
- Firefox®
5. Troubleshooting and Maintenance

5.1. Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>No access to Condition Monitoring web page</td>
<td>Check if the correct IP address has been entered in the address bar of the web browser.</td>
</tr>
<tr>
<td></td>
<td>Check if the MNS Digital Edge Gateway is powered on and no fault is indicated by the front LEDs.</td>
</tr>
<tr>
<td></td>
<td>Ping the IP address of the MNS Digital Edge Gateway</td>
</tr>
</tbody>
</table>

5.2. Maintenance

For details reg. maintenance of the MSN Digital Gateway ref. to respective manual [1].
<table>
<thead>
<tr>
<th>Rev.</th>
<th>Page</th>
<th>Change Description</th>
<th>Date / Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>M0201</td>
<td>all</td>
<td>Initial release</td>
<td>2018-03-23 EPDS/JK</td>
</tr>
</tbody>
</table>