Low voltage electrical distribution

Masterpact NT and NW

Circuit breakers and switch-disconnectors

Maintenance guide
11/2008

Schneider Electric

This guide is intended primarily for qualified personnel in charge of equipment maintenance and for Schneider Electric after-sales support personnel for the information on system diagnostics.

Thank you for purchasing a Merlin Gerin protection device.
To maintain the device's operating and safety characteristics as they are indicated in the catalogue from the beginning to the end of the product's service life, Schneider Electric recommends that systematic checks and periodic maintenance be carried out by qualified personnel, as indicated in this "Masterpact maintenance".
Please read this document carefully and keep it at hand, near the device.
It provides detailed information on:

- the various types of maintenance required, depending on the criticality of the protected circuit.
- what must receive maintenance.
- the risks involved if the component ceases to operate correctly.
- what is understood by the terms normal, improved and severe environment and operating conditions.
- the periodic preventive maintenance operations that should be carried out under normal environment and operating conditions as well as the level of competence required for the operations.
- the environment and operating conditions that accelerate device ageing.
- the limits governing use of mechanical and electric accessories and subassemblies.
- finally, all the product guides available in order to maintain the device in proper operating condition.

The level II and III procedures mentioned in this guide may be obtained on request from the Schneider Electric after-sales support department.

Maintenance guide for circuit breakers and switch-disconnector Masterpact NT and NW

Contents

The different types of maintenance

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Corrective maintenance

Corrective maintenance repairs a system in view of fulfilling a required function.

Incidents during system start-up

Many malfunctions result from non-observance of the start-up instructions or lack of knowledge concerning the equipment and/or switchgear procedures.
Schneider Electric operating guides, supplied with products and equipment, contain clear instructions for operators or maintenance personnel on how to correct malfunctions. These instructions are included at the end or this guige.
The list of the available operating guides may be found at the end of this document.
The PDF files may de downloaded from the www.schneider-electric.com site.

Breakdowns during operation

Contact the certified maintenance department.
The Schneider Electric Service Centres may be contacted via the www.schneider-electric.com site.

Preventive maintenance

Preventive maintenance consists in carrying out, at predetermined intervals or according to prescribed criteria, checks intended to reduce the probability of a failure or deterioration in the operation of a system.
There are two types of preventive maintenance:

■ **Periodic maintenance**

For each type of product, maintenance recommendations are laid out by the technical department. These verification procedures, intended to maintain systems or their subassemblies in correct operating condition over the targeted service life, must be carried out according to the time intervals stipulated in this document.
Under no circumstances can Schneider Electric be held responsible for any damage caused by the failure of device if the periodic checks were not carried out in accordance with the recommendations in this document.

■ **Conditional maintenance**

To a certain extent, conditional-maintenance operations are a means to reduce (but not eliminate) the recommended periodic-maintenance operations (thus limited to the strict minimum) that require an annual shutdown of the installation.
These operations are launched when programmed alarms indicate that a predefined threshold has been reached. To that end, sensors must be installed on the switchgear and in the switchboard. Conditional maintenance is the means to optimise installation maintenance.
For more information on the possibilities offered by conditional maintenance, contact your Schneider Electric after-sales support department.

The different types of maintenance

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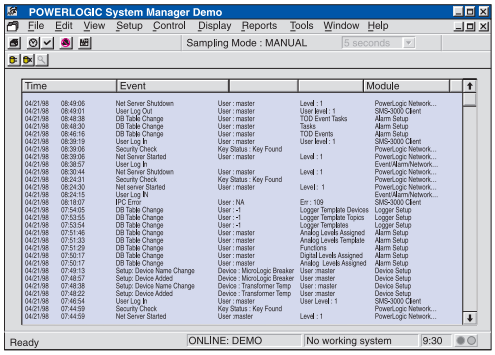

Predictive maintenance

Predictive maintenance, based on the recording and analysis of system parameters, is the means to detect drift from the initial state and significant trends. Using predictive maintenance, the customer can anticipate on the corrective action required to ensure equipment safety and continuity of service, and plan the action for the most convenient time.

To ensure the highest possible level of installation reliability and optimise the service life of equipment, it is advised to establish a maintenance plan.

The plan indicates for each piece of equipment:

- the most suitable type of maintenance
- the recommended frequency of maintenance.

The plan is based on two criteria:

- the criticality of each device in the installation
- device operating conditions.

Criticality depends on the consequences of device failure in terms of the safety of life and property, production losses, the cost of repair and start-up, etc. An empirical estimate may be sufficient for simple cases, but it is recommended to undertake a reliability analysis of the installation for more complex architectures involving backup sources, transfer mechanisms, etc. Check with your Schneider Electric Service Centre for more information.

The operating conditions reflect the environment in which the device is installed (relative humidity, heat, dust, etc.) and how the device is used (load, frequency of operation, quality of the supply current, etc.). These conditions are discussed in detail in this document, as well as the ensuing maintenance recommendations. Consequently, for a given device, the recommended maintenance may vary substantially both in terms of the necessary operations and their frequency.

Example of Masterpact predictive maintenance

Monitoring and recording	Goal	Tool	Service offered
Number of operating cycles	Monitor manufacturer limits and determine the probable replacement date	Electronic counter with the communication module + MPS100 server	Remote monitoring by: ■ customer supervisor or ■ Serenity service (1)
Trip and alarm histories	Analyse the distribution-system phenomena that resulted in tripping or alarms caused by transient overloads, setting changes or a modification in the installation	Micrologic P/ H event log + MPS100 server	Remote monitoring by: ■ customer supervisor or ■ Serenity service (1)
Contact wear	Monitor (without dismantling) the arc chutes on the circuit breakers and plan their replacement	Micrologic P/ H event log + MPS100 server	Remote monitoring by: ■ customer supervisor or ■ Serenity service (1)
Percent load	Estimate as precisely as possible the probable service life of the device		Remote monitoring by: ■ customer supervisor or ■ Serenity service (1)
Pole opening and closing speed	Monitor any mechanical drift in devices and evaluate their condition	Prodiag tester	Remote monitoring by: ■ customer supervisor or ■ Serenity service (1)

(1) Serenity is a Schneider Electric service providing installation diagnostics and analysis of distribution systems.

For more information on the possibilities offered by predictive maintenance, contact your Schneider after-sales support department.

Masterpact NT and NW What must be maintained and why?

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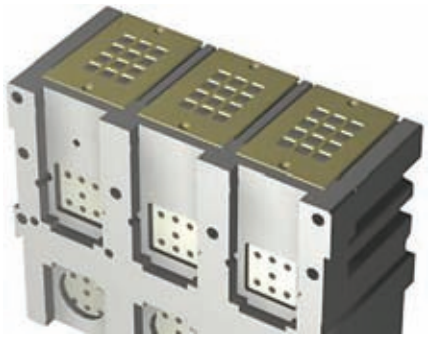

The case

The case is an essential element in the circuit breaker. First of all, it ensures a number of safety functions:

- functional insulation between the phases themselves and between the phases and the exposed conductive parts in order to resist transient overvoltages caused by the distribution system
- a barrier avoiding direct user contact with live parts
- protection against the effects of electrical arcs and overpressures caused by short-circuits.

Secondly, it serves to support the entire pole operating mechanism as well as the mechanical and electrical accessories of the circuit breaker.

On the case, there should be:

- no traces of grime (grease), excessive dust or condensation which all reduce insulation
- no signs of burns or cracks which would reduce the mechanical solidity of the case and thus its capacity to withstand short-circuits.

Preventive maintenance for cases consists of a visual inspection of its condition and cleaning with a dry cloth or a vacuum cleaner. All cleaning products with solvents are strictly forbidden. It is advised to measure the insulation every five years and following trips due to a short-circuit. The case must be replaced if there are signs of burns or cracks.

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Arc chutes

During a short-circuit, the arc chute serves to extinguish the arc and to absorb the high level of energy along the entire path of the short-circuit. It also contributes to arc extinction under rated current conditions. An arc chute that is not in good condition may not be capable of fully clearing the short-circuit and ultimately result in the destruction of the circuit breaker. The arc chutes must be regularly checked. The fins of the arc chutes may be blackened (due to the gases produced at In) but must not be significantly damaged. What is more, the filters must not be blocked to avoid internal overpressures. It is advised to use a vacuum cleaner rather than a cloth to remove dust from the outside of the arc chutes.

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Main contacts

The contacts make and break the current under normal conditions (rated current for the installation) and under exceptional conditions (overloads and short-circuits). The contacts are eroded by the many opening and closing cycles and can be particularly deteriorated by short-circuit currents.

Worn contacts may result in abnormal temperature rise and accelerate device ageing. It is imperative to remove the arc chutes and visually check contact wear at least once a year and following each short-circuit.

The contact-wear indicators constitute an absolute minimum value that must not be overrun.

To plan and reduce the number of shutdowns, an electronic wear counter is available with the Micrologic P and H. A visual check is required when the counter reaches 100. When the counter reaches 300, the contacts must be replaced.

Masterpact NT and NW What must be maintained and why?

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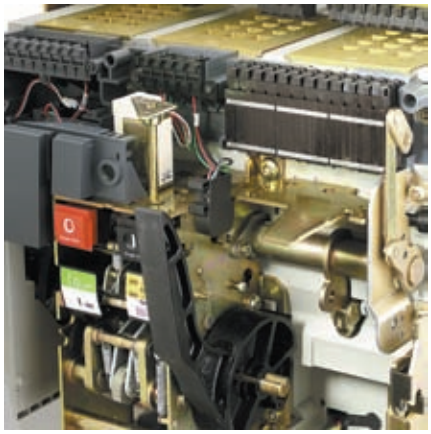

Device and chassis mechanisms

Mechanical operation of the circuit breaker may be hindered by dust, knocks, aggressive atmospheres, no greasing or excessive greasing. Operating safety is ensured by dusting and general cleaning, proper greasing and regular opening and closing of the circuit breaker.

■ Dusting

Dusting is best carried out using a vacuum cleaner.

■ Cleaning

Cleaning should be carried out using a cloth or brush that is perfectly clean and dry, without using any solvents, avoiding greased parts except for grease on electrical contacts.
Application of products under pressure or containing solvents (trichloroethane, trichloroethylene) is strictly forbidden (e.g. WD40).
The main problems of products under pressure are the following:
□ it may be impossible to regrease inaccessible lubrication points (greased for the life of the product)
□ corrosion of points that are not regreased
□ damage caused by the pressure of the product
□ risk of temperature rise due to the presence of an insulating solvent in the contact zones
□ elimination of special protection
□ deterioration of plastic materials.

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■ Greasing

This operation is carried out after cleaning on certain mechanical parts as described in the maintenance procedures, using the various greases recommended by Schneider Electric. Grease must not be over applied because the excess, if mixed with dust, may result in mechanism malfunctions.
Generally speaking, under normal operating conditions, the pole-operating mechanism does not require any regreasing (greased for the life of the product).
□ The clusters and disconnecting-contacts must be greased according to the defined intervals using the greases indicated by Schneider Electric.
□ The main contacts must not be greased.

■ Operating cycles

The imperative need to ensure continuity of service in an installation generally means that power circuit breakers are rarely operated. If, on the one hand, an excessive number of operating cycles accelerates device ageing, it is also true that a lack of operation over a long period can result in mechanical malfunctions. Regular operation is required to maintain the normal performance level of each part involved in the opening and closing cycles.
In installations where power circuit breakers are used in source changeover systems, it is advised to periodically operate the circuit breaker for the alternate source.

Masterpact NT and NW What must be maintained and why?

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Auxiliary circuits

■ **Control auxiliaries**

MX and XF shunt releases are respectively used to remotely open and close the circuit breaker using an electrical order or by a supervisor via a communication network.
The MN undervoltage release is used to break the power circuit if the distribution-system voltage drops or fails in order to protect life (emergency off) or property.
Communicating MX and XF releases and MN releases are continuously supplied and the internal electronic components may suffer accelerated ageing if there is temperature rise in the circuit breaker.
Preventive maintenance consists in periodically checking operation at minimum values. Depending on the operating and environment conditions, it is advised to estimate their service life using the "service life" software (1) and to replace them if necessary to avoid any risk of non-operation when they are needed.

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■ **Auxiliary wiring**

Auxiliary wiring is used to transmit orders to the various control devices and to transmit status-condition information. Incorrect connections or damaged insulation may result in either non-operation of the circuit breaker or nuisance tripping.
Auxiliary wiring must be regularly checked and replaced as needed, particularly if there are vibrations, high ambient temperatures or corrosive atmospheres.

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■ **Indication contacts**

The contacts indicating the status of the circuit-breaker (ON / OFF), of the chassis (CE, CD, CT), a trip due to an electrical fault (SDE) or that the circuit breaker is ready to close (PF) provide the operator with the status information required to react correspondingly. Any incorrect indications may result in erroneous device operation that could endanger life and property. Contact failure (wear, loose connections) may result from vibrations, corrosion or abnormal temperature rise and preventive maintenance must ensure that contacts correctly conduct or isolate according to their positions.

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■ **Gear motor**

The gear motor (MCH) automatically recharges the operating-mechanism springs as soon as the circuit breaker is closed. The gear motor makes it possible to instantaneously reclose the device following an opening. This function may be indispensable for safety reasons. The charging lever serves simply as a backup means if the auxiliary voltage fails.
Given the mechanical forces exerted to charge the mechanism, the gear motor wears quickly. Periodic checks on gear-motor operation and the charging time are required to ensure the device closing function.

(1) For more information, contact your Schneider Electric after-sales support department.

Masterpact NT and NW What must be maintained and why?

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Electronic trip unit

If an electric fault occurs in the installation, the electronic trip unit detects the fault and orders the circuit breaker to open and thus protect life and property. Electronic components and circuit boards are sensitive to the environment (ambient temperature, humid and corrosive atmospheres) and to severe operating conditions (magnetic fields, vibrations, etc.). To ensure correct operation, it is necessary to periodically check:
the chain of action resulting in a trip
the response time as a function of the level of the fault current.
Depending on the operating and environment conditions, it is advised to estimate their service life using the "service life" software (1) and to replace them if necessary to avoid any risk of non-operation when they are needed.

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Communication module and accessories

Via the communication bus, the communication option transmits data to a remote site for use by various departments (maintenance, management, production, etc.). A break in the transmission of data can result in:
- production losses due to unawareness concerning the status of a circuit breaker
- financial losses due to incorrect system management
- diagnostic errors
- etc.

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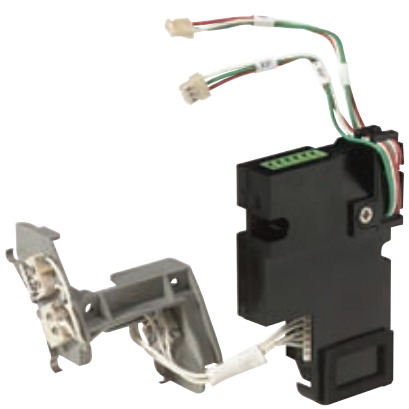

Periodic checks on the orders (read, write, commands) transmitted by the communication bus are required to maintain a high degree of reliability and confidence in the communication system.

(1) For more information, contact your Schneider Electric after-sales support department.

Masterpact NT and NW What must be maintained and why?

Connections

The connections between the various distribution systems in a switchboard (busbars, cables) and the switchgear are a major source of heat loss.
Incorrect tightening may lead to thermal runaway which in turn can provoke damage to the device, the cable insulation and even result in a short-circuit and/or a fire.
This type of malfunction is often due to disregard for installation requirements during switchboard assembly.
***Note**: connections must never use different materials (copper / aluminium).*

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■ **Sliding connections (chassis)**

They are made up of two parts, the clusters and disconnecting contacts. This type of connection is critical and requires periodic cleaning in compliance with the described procedures. The grease facilitates the connection between the clusters and the disconnecting contacts and avoids damaging the silver-coated surface by reducing the racking-in friction.
In sulphurous (corrosive) atmospheres (H_2S / SO_2), it is necessary to implement the cleaning procedure using the Thiourea solution, with mandatory regreasing using the specified fluorinated grease. This type of grease protects the silver and copper-coated contacts against sulphuration. Because silver or copper sulphide being insulating it provokes an increase in the contact resistance and thus greater temperature rise.
The grease breaks down over time and it is therefore necessary to replace it regularly.

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■ **Fixed connections**

Connections using lugs or bars.
When made in compliance with Schneider Electric recommendations (tightening torque, 8.8 hardware and contact washer), this type of connection does not require any particular maintenance. Otherwise, regularly check the temperature-rise points (change in colour of copper or tinning), dismantle the connections, clean and scrape the contact surfaces, then reassemble the connections using new hardware.
Check the terminals.

Recommended preventive maintenance and time intervals

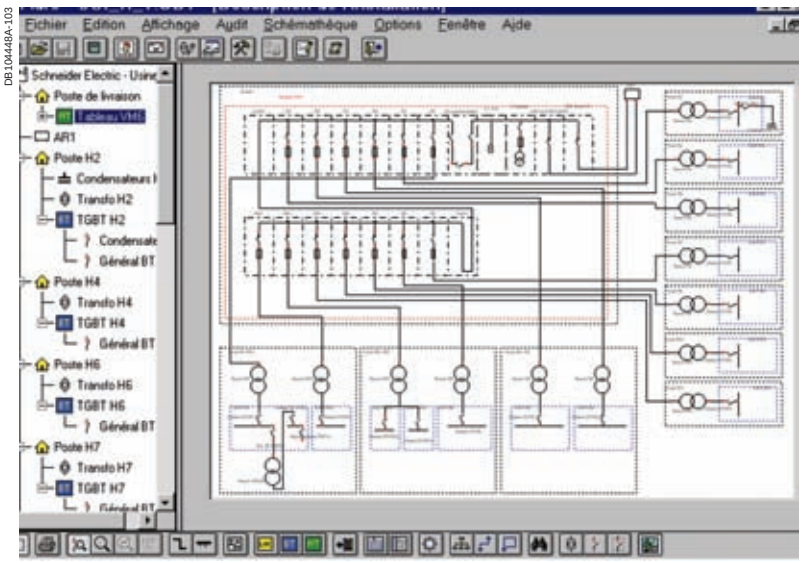
Normal conditions

The maintenance guide (1) that must be carried out every one, two or five years on Masterpact NT/NW subassemblies and the level of competence required on the part of service agents are described in the tables on pages 12, 13 and 14.
At the end of each five year period, the maintenance guide must be systematically repeated.
These maintenance operations apply for normal operating and environment conditions as defined below.

Normal operating and environment conditions	
Temperature	Average annual temperature < 25 °C outside the switchboard (Ta (1))
Percent load	< 80 % of In 24/24 hours
Harmonics	Harmonic current per phase < 30 % of In
Relative humidity	< 70 %
Corrosive atmosphere	Device installed in environment category 3C1 or 3C2 (IEC 60721-3-3)
Salt environment	No salt mist
Dust	Low level Device protected in switchboard equipped with filters or ventilated IP54 enclosure
Vibration	Permanent vibration < 0.2 g

Beyond the above limits, the circuit breakers suffer accelerated ageing that may rapidly result in malfunctions. For this reason, periodic checks must be carried out at shorter time intervals. On the other hand, when special efforts are made to improve the operating and environment conditions, the preventive-maintenance operations can be carried out less often.

(1) The Masterpact maintenance guide is taken into account by the Schneider Electric CamSoft software.
Example of a maintenance plan managed by CamSoft.



Recommended preventive maintenance and time intervals

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Favourable conditions or device protected

The time interval between two preventive-maintenance visits can be doubled **if all the conditions** presented below are met.
The only exception is the check-up program recommended for the 5th year.

Favourable operating and environment conditions or device	
Temperature	Average annual temperature < 25 °C outside the switchboard (Ta (1)). The device is installed in an air-conditioned room or in a ventilated enclosure
Percent load	< 50 % of In 8/24 hours or 24/24 hours
Relative humidity	< 50 %
Corrosive atmosphere	Device installed in environment category 3C1 or in a protected room (air is conditioned and purified)
Salt environment	None
Dust	Negligible Device protected in switchboard equipped with filters or ventilated IP54 enclosure
Vibration	None

(1) (Ti)–(Ta), see the definition in the Masterpact catalogue.

Example depending on the conditions:
- normal: check on charging time = 2 years
- favourable: check on charging time = 2 x 2 = 4 years

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Severe conditions and device not protected

The time interval between two preventive-maintenance visits must be reduced by half **if any of the conditions** presented below are present.

Severe operating and environment conditions	
Temperature (annual average)	Average annual temperature between [35 ° and 45 °C] around the switchboard (see definition in EN 60439-1)
Percent load	> 80 % of In 8/24 hours or 24/24 hours
Relative humidity	> 80 %
Corrosive atmosphere	Device installed in environment category 3C3 or 3C4 without any particular protection
Salt environment	Installation < 10 kilometers from seaside and device without any particular protection
Dust	High level Device not protected
Vibration	Continuous vibrations between 0.2 and 0.5 g

Example depending on the conditions:
- normal: check on charging time = 2 years
- severe: check on charging time = 0.5 x 2 = 1 year

Recommended preventive maintenance and time intervals

Device check-up

During the 5th year of operation, it is advised to run a complete check-up on the device to determine its status condition.

This diagnostic must be carried out by Schneider Electric Service or by certified personnel having received Level IV training.

The complete diagnostic must be systematically carried out following:
- tripping due to a short-time or instantaneous short-circuit
- five trips due to overloads.

See the Level IV program, voir page 14.

Check after prolonged storage

Storage conditions

Devices must be stored in a dry, ventilated room, protected from rain, water and chemical agents.
They must be well protected against dust, rubble, paint, etc.

If storage is for an extended period, the relative humidity in the room must be maintained below 70 %.
- storage conditions:
  - devices without their control unit: -40 °C +85 °C.
  - devices with their control unit: -25 °C +85 °C.

Devices must be stored in the open (OFF) position with the charging springs discharged.

Check and maintenance

After extended storage and if the conditions above were respected, the checks below must be carried out to ensure correction device operation.

Storage ≤ 2 years
Run the Level II and III 2nd year program on the subassemblies below:
- mechanism
- control unit
- device and chassis locking
- chassis.

Storage > 2 years
Run the Level III and IV 5th year diagnostic program on the subassemblies below:
- mechanism
- control auxiliaries
- control unit
- device and chassis locking
- chassis.

If the devices were stored under severe conditions (high temperature, corrosive atmosphere), it is necessary to:
- check the surface condition of the metal parts (zinc) and the copper parts (silver coatings (Ag) or tinning (Sn))
- check the greasing for the device and chassis
- clean and regrease the clusters and disconnecting-contacts.

Level II preventive maintenance recommended every year

Level II

Minor preventive-maintenance operations such as greasing and operating checks, as well as repairs by standard exchange of certain assemblies, carried out by a certified customer employee according to the manufacturer maintenance instructions.

Check	Year					Tool	Procedure number
	1	2	3	4	5(1)		
Device							
Check the general condition of the device (escutcheon, control unit, case, chassis, connections)	■	■	■	■	■	None	device NII_1_1.pdf
Mechanism							
Open/close device manually and electrically	■	■	■	■	■	None	mechanism NII_1_1.pdf
Charge device electrically	■	■	■	■	■	None	mechanism NII_1_2.pdf
Check complete closing of device's poles	■	■	■	■	■	None	mechanism NII_1_3.pdf
Check number of device operating cycles	■	■	■	■	■	Operation counter	mechanism NII_1_4.pdf
Breaking unit (arc chutes + contacts)							
Check the filters cleanlines and the fixing of the arc-chute	■	■	■	■	■	Dynamometric crank	breaking unit NII_1_1.pdf
Control auxiliaries							
Check auxiliary wiring and insulation	■	■	■	■	■	None	auxiliaries NII_1_1.pdf
Control unit							
Trip control unit using test tool and check operation of contacts SDE1 and SDE2	■	■	■	■	■	HHTK ou FFTK	control unit NII_1_1.pdf
Check earth-fault protection function (Micrologic 6.0) or earth-leakage protection function (Micrologic 7.0)	■	■	■	■	■	None	control unit NII_1_2.pdf
Device locking							
Open and close keylocks installed on device	■	■	■	■	■	None	device locking NII_1_1.pdf
Open and close padlocking system installed on device	■	■	■	■	■	None	device locking NII_1_2.pdf
Chassis (optional)							
Remove device from chassis and put it back	■	■	■	■	■	None	chassis NII_1_1.pdf
Check operation of position contacts (CE, CT, CD, EF)	■	■	■	■	■	None	chassis NII_1_2.pdf
Check operation of safety shutters	■	■	■	■	■	None	chassis NII_1_3.pdf
Chassis locking							
Open and close keylocks installed on chassis	■	■	■	■	■	None	chassis locking NII_1_1.pdf
Operate padlocking system	■	■	■	■	■	None	chassis locking NII_1_2.pdf

(1) These checks will be carried out by Schneider Electric Services in case of diagnostic the fifth year (see page 14).

Level III preventive maintenance recommended every 2 years

Level III

General preventive-maintenance operations such as general adjustments, trouble-shooting and diagnosis of breakdowns, repairs by exchange of components or functional parts, minor mechanical repairs, carried out by a qualified customer technician using the tools and measurement/setting devices specified in the manufacturer maintenance instructions.

Check	Year					Tool	Procedure number
	1	2	3	4	5(1)		
Mechanism							
Check gear-motor charging time at 0,85 Un		■		■	■	Stop-watch + external power supply	mechanism NIII_2_1.pdf
Check general condition of mechanism		■		■	■	Screwdriver	mechanism NIII_2_2.pdf
Breaking unit (arc chutes + contacts)							
Check condition of breaking unit		■		■	■	Screwdriver	breaking unit NIII_2_1.pdf
Control auxiliaries							
Check operation of indication contacts (OF / PF / MCH)		■		■	■	Ωmetre	auxiliaries NIII_2_1.pdf
Check closing operation of control auxiliary XF at 0.85 Un		■		■	■	External power supply	auxiliaires NIII_2_2.pdf
Check opening operation of control auxiliary MX at 0.70 Un		■		■	■	External power supply	auxiliaires NIII_2_3.pdf
Check operation of control auxiliary MN/MNR between 0.35 and 0.7 Un		■		■	■	External power supply	auxiliaries NIII_2_4.pdf
Check delay of MNR devices at 0.35 and 0.7 Un		■		■	■	External power supply	auxiliaires NIII_2_5.pdf
Check MX tripping time		■		■	■	Tester	auxiliaires NIII_2_6.pdf
Control unit							
Check tripping curves using test tool, signallling LED (tripped, overload) Save results on PC		■		■	■	FFTK FFTK report generator software	control unit NIII_2_1.pdf
Chassis (optional)							
Dust and regrease chassis		■		■	■	Mobilith SHC100	chassis NIII_2_1.pdf
Regrease disconnecting-contact clusters(specific case of corrosive athmospheres)		■		■	■	Mobilith SHC100	chassis NIII_2_2.pdf
Power connections							
Check and tighten loose connections	Only after a visual inspection showing overheating marks					Dynamometric crank	power connections NIII_2_1.pdf

(1) These checks and tests will be carried out by Schneider Electric Services in case of diagnostic the fifth year (see page 14).

Level IV manufacturer diagnostic and replacement of components recommended every 5 years

Level IV

All the major preventive and corrective-maintenance work ensured by the Schneider Electric after-sales support department.

Check	Year					Tool	Procedure number (=S= internal use)
	5	10	15	20	25		
Case							
Measure insulation resistance	■	■	■	■	■	Ohmmeter	device NIV_3_1.pdf
Mechanism							
Check tripping forces (crescent shaped part)	■	■	■	■	■	Tester	mechanism NIV_3_1.pdf
Breaking unit (arc chutes + contacts)							
Measure resistance of input/output contact	■	■	■	■	■	Ohmmeter + injection unit	breaking unit NIV_3_1.pdf
Control auxiliaries							
Check the service life of the auxiliaries XF, MX, MN	■	■	■	■	■	"service life" software	auxiliaries NIV_3_1.pdf
Preventitive replacement of control auxiliaries			■			None	
Micrologic control unit							
Save protection settings, log events (Micrologic P and H), and edit reports.	■	■	■	■	■	Magicbox + SSU software	control unit NIV_3_1.pdf
Check continuity of the tripping chain by primary injection for each phase	■	■	■	■	■	Injection unit	control unit NIV_3_2.pdf
Check DIN/DINF tripping using performer test tool	■	■	■	■	■	Performer test kit	control unit NIV_3_3.pdf
Check operation of thumbwheels	■	■	■	■	■	RSU	control unit NIV_3_4.pdf
Check the service life of control unit	■	■	■	■	■	"service life" software	auxiliaries NIV_3_1.pdf
Preventitive replacement of Micrologic			■			RSU	control unit NIV_3_5.pdf
Chassis (optional)							
Check connection/disconnection torque	■	■	■	■	■	Dynamometric crank	chassis NIV_3_1.pdf
Clean and regrease racking screw (NW only)	■	■	■	■	■	Grease	chassis NIV_3_2.pdf
Communication module and accessories							
Test the device control, the uploading of contact status (OF, SDE, PF, CH) operation of optical link , by using the communication Bus	■	■	■	■	■	Magicbox + RCU software	communication-en NIV_3_1.pdf
Test the uploading of chassis position contacts, the synchronisation of the address between BCM and CCM, the forced replication of the BCM address, by using the communication Bus	■	■	■	■	■	Magicbox + RSU software	communication-en NIV_3_2.pdf
Test the writing of data into Micrologic by using the communication Bus	■	■	■	■	■	Magicbox + RSU software	communication-en NIV_3_3.pdf

Causes of accelerated ageing

A switchboard and the switchgear age, whether they are in operation or not. Ageing is due primarily to the influence of the environment and the operating conditions.

Influence of the environment

A device placed in a given environment is subjected to its effects.
The main environmental factors that accelerate device ageing are:

- temperature
- percent load
- relative humidity
- salt environment
- current harmonics
- dust
- corrosive atmospheres.

The following tables sum up for each factor:

- why it is harmful : influence
- how to identify it : appearance
- impact on operation : consequences.

Ambient temperature (outside the switchboard)

Influence	Appearance	Consequences
Note: The ambient temperature affects the device temperature, which is itself affected by the percent load. Major variations in temperature (greater than 30°C) cause both mechanical stresses (thermal expansion) and condensation that can accelerate ageing.		
The mechanical characteristics of plastic parts (insulation, case) are increasingly deteriorated by temperature the higher it rises.	Change in colour.	Breaking of parts leading to failure of functions.
Hardening of grease. Elimination of grease on disconnecting-contact clusters.	Change in colour and viscosity. Caramel colour of clusters.	Device cannot be operated. Increase of racking forces exerted on clusters.
Deterioration of insulating varnishes on coils.	Burning smell.	Failure of coils (CT, MN, MX, XF, MCH, electrical reset).
Hardening of glues.	Visual.	Loss of labels.
Deterioration of electronic components.	Modified display of LCDs.	Loss of display. Nuisance tripping or no tripping.
Deterioration of opto-electronic devices and SCRs.	Not identifiable.	Possible transmission of erroneous orders.
Loss of battery backup power.	Not identifiable.	Fault indications not displayed.
Temperature thresholds in °C.		
≤ 25 °C	**[25 - 35 °C]**	**[35 - 45 °C]**
Optimum operating conditions (1)	A 10°C increase in the ambient temperature is equivalent to a 5 % increase in the percent load.	A 20°C increase in the ambient temperature is equivalent to a 10 % increase in the percent load.
Recommendation		
Preventive maintenance		
Implement the standard program.	Carry out more frequent periodic checks (see page 10).	Carry out more frequent periodic checks (see page 10).
Installation		
No particular precautions required.	No particular precautions required.	Install forced-air ventilation in the switchboard or air-conditioning for the electrical room.

(1) Example. A 100 A device, with an 80 % load, with an annual average ambient temperature of:

- *25 °C will have a service life of approximately 30 years,*
- *35 °C will have a service life of approximately 27 years,*
- *45 °C will have a service life of approximately 25 years.*

Causes of accelerated ageing

Percent load (I/In)

Influence	Appearance	Consequences
Note: The percent load affects the device temperature, which is itself affected by the ambient temperature.		
Ageing of plastic insulation.	Change in colour of insulation.	Breaking of parts leading to failure of functions.
Ageing of grease.	Change in colour and viscosity.	Increase in mechanical friction.
Ageing of electronic components.	Modified display of LCDs.	A 10 °C increase (i.e. an 85 percent load) cuts the service life of components by approximately half.
Deterioration of characteristics: ■ steel springs (above 100°C), ■ stainless steel springs (above 200°C).	Rupture.	Non operation of mechanisms.

Thresholds				
⩽ 80 %, 24/24 hours	**⩽ 90 %, 8/24 hours**	**⩽ 90 %, 24/24 hours**	**In, 8/24 hours**	**In, 24/24 hours**
Maximum percent load generally taken into account in sizing the installation. At this percent load, temperature rise is reduced approximately 40 % with respect to a 100 percent load.	At this percent load, temperature rise is reduced only 20 %. Heating and cooling cycles impact on the mechanical junctions of the power circuit.	The thermal stress for continuous operation is three times higher than in the previous case, but the absence of thermal cycles slows ageing of the electromechanical components.	Between 90 and 100 %, temperature rise is close to its maximum value. Heating and cooling cycles impact on the mechanical junctions of the power circuit, with major impact on ageing.	Between 90 and 100 %, temperature rise is close to its maximum value. This situation has a major impact on ageing. It is not recommended.
Recommendation				
Preventive maintenance				
Implement the standard program.	Carry out more frequent periodic checks (see page 10).	Preventive maintenance is difficult due to the continuous process.	Carry out more frequent periodic checks (see page 10). Inspect for condensation.	Preventive maintenance is difficult due to the continuous process. Plan more frequent periodic checks.
Installation				
Normal conditions.			Provide ventilation for the switchboard.	Spread the load over other outgoers. Install a device with a higher rating.

DB109068

Causes of accelerated ageing

Relative humidity

Influence	Appearance	Consequences
Corrosion of metal surfaces that is accelerated when a pollutant is present (corrosive gas, salt, chlorine, etc.).	Appearance of: ■ red rust on iron, ■ white rust on zinc, ■ blue deposit on copper, ■ black deposit on silver.	Increase in friction. Risk of mechanical rupture resulting in non operation of mechanisms. Increase in contact resistance (clusters and main contacts).
Deterioration of dielectric qualities of plastics.	White traces on case.	Risk of a reduction in insulation.
Deterioration of electronic components, in particular SMCs and silver-coated components. This phenomenon is worsened by the presence of H_2S corrosive gas (hydrogen sulphide).	Not visible. Appearance of dentrites on electronic boards.	Short-circuiting of circuits resulting in non operation of control-unit protection, measurement, indication and communication functions.
Deterioration of electronic components, in particular non-varnished copper circuits.	Not visible. Erosion of copper tracks. Oxidation of metal connectors of components and metal cases. Oxidation of connectors of integrated-circuits mounted on supports.	Failure due to short-circuit or open circuit. Rupture of component connectors along case. Poor contact with integrated-circuit supports.
Degradation of opto-electronic components.		Failure of data transmission.
Thresholds in %		
≤ 70 %	**70 to 85 %**	**> 85 %**
Level of relative humidity generally found in continental and temperate zones. The level is generally lower in switchboards due to the internal temperature rise. No significant deterioration is noted at this level.	Level of relative humidity generally found in zones close to water. Possible appearance of condensation on cold parts and accelerated rusting.	Level of relative humidity generally found in tropical zones and certain factories (e.g. paper mills). Increased risk of condensation and rust resulting in difficulties to disconnect devices, risk of non opening or non closing.
Recommendation		
Preventive maintenance		
Preventive maintenance	Carry out more frequent periodic checks (see page 10). Measurement of insulation is advised every 5 years.	Carry out more frequent periodic checks (see page 10). Inspect for rust on metal parts. Measurement of insulation is imperative every 2 years.
Installation		
No particular precautions required.		Install heating resistors in the switchboard.

046356A-66

Causes of accelerated ageing

Salt environment

Influence	Appearance	Consequences
Corrosion of metal parts.	Appearance of: ■ white rust on zinc coatings, ■ red rust on steel.	Increase in friction. Freezing of mechanism. Broken springs. Blocking of cores of MX/XF/MN control auxiliaries.
Risk of salt deposits on electronic circuits when thick salt mists occur.	Appearance of salt bridges on electronic boards.	Failure of electronic systems due to short-circuiting of circuits, particularly non-varnished circuits.
Risk of conducting salt deposits on the device when thick salt mists occur.	White deposit.	Deterioration of device dielectric withstand resulting in risk of phase-to-frame short-circuit and a phase-to-phase short-circuit if an overload occurs.
Thresholds		
No salt mist	**Moderate salt mist < 10 km from seaside**	**Significant salt mist < 1 km from seaside**
No influence.	Moderate ageing of switchgear.	Rapid ageing of exposed switchgear. On average, service life is divided by a factor of three for non-protected devices.
Recommendation		
Preventive maintenance		
Implement the standard program.	Carry out more frequent periodic checks (see page 10).	Carry out more frequent periodic checks (see page 10). Test the dielectric withstand every two years.
Installation		
No particular precautions required.	No particular precautions required.	Switchgear must be protected from salt mist. Increase the switchboard IP value (IP54 is advised). Create a protected room.

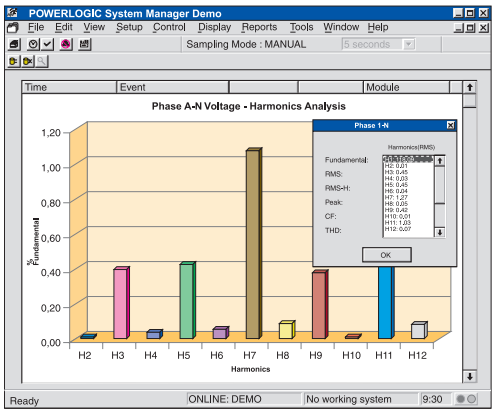
62605A-66

Causes of accelerated ageing

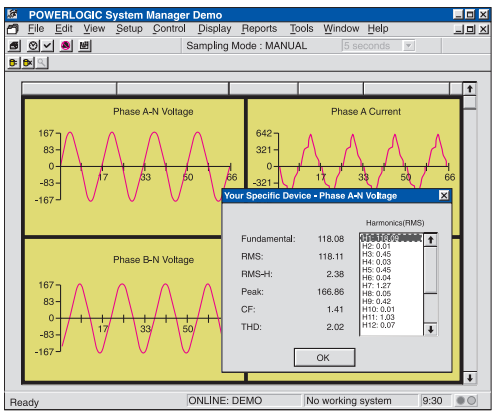
Harmonics

Influence	Appearance	Consequences
Increase in skin effect, proximity effect, iron losses, Foucault currents.	Change in colour of terminals, insulators and grease. Modified display of LCDs.	Harmonics cause temperature rise greater than that of the fundamental current.
Possible overload of neutral if third-order harmonics and their multiples are present.	Distorted waveform.	Erroneous current value. Nuisance tripping if non-rms trip units.
Thresholds in % of In		
THDi ⩽ 30 %	**THDi 30 to 50 %**	**THDi > 50 %**
No notable influence on ageing.	At 40 % THDI, heat loss is approximately 10 % higher, corresponding to 5 % more current.	
Recommendation		
Preventive maintenance		
Implement the standard program.	Carry out more frequent periodic checks (see page 10).	Carry out more frequent periodic checks (see page 10).
Installation		
No particular precautions required.	Standard filtering with an inductor to reduce harmonics.	If necessary, oversize the neutral. Oversize switchgear. Filtering is mandatory.

DB101521



DB101522



Causes of accelerated ageing

Dust

Influence	Appearance	Consequences
Deposit on grease of mechanisms (device and chassis).	Change in colour and texture of greases.	Premature wear of mechanisms because dust mixed with grease can be abrasive. Increase in mechanical friction and freezing of moving parts. Risk of device not moving on chassis. Risk of device non opening or non closing.
Deposit on grease of clusters.	Change in colour and texture of greases.	Increase in racking forces exerted. Increased contact resistance and temperature rise.
Deposit on displays.		Screen data not legible.
Deposit on insulation.		Reduced insulation resistance (depends on type of dust). This phenomenon is worsened by the presence of humidity.
Deposit on device contacts.		Increased contact resistance and temperature rise.
Deposit on opto-electronic communication system between devices.		Failure of communication-data transmission.
Dust deposit		
Low level	**Moderate**	**High**
Quantity of dust generally deposited on and around devices in commercial buildings and on standard industrial premises.	Quantity of dust found in **protected switchboards** installed in dusty environments such as cement works, grain mills, incineration installations, plastic and steel mills, mines, etc.	Quantity of dust deposited on and around devices inside **non-protected switchboards** installed in dusty environments such as cement works, grain mills, incineration installations, plastic and steel mills, mines, etc.
Recommendation		
Preventive maintenance		
Implement the standard program. It is advised to vacuum cleaner dust deposits.	Carry out more frequent periodic cleaning (see table 10).	Carry out more frequent periodic cleaning (see table 10).
Installation		
Switchboard with standard IP.	Make sure the switchboard remains closed.	Special equipment required to protect the switchgear is mandatory.

027488A-66

Causes of accelerated ageing

Corrosive atmosphere

Corrosive atmosphere	Influence	Appearance	Consequences	Thresholds (ppm (1) in volume) Average value
SO_2 Sulphur dioxide	Corrosion of silver, aluminium and bare copper. Phenomenon accelerated by high temperature and relative humidity.	Blackening of exposed silver surfaces. Appearance of dendrites on electronic and power circuits.	Increased resistance of disconnecting contacts exposed to air. Excessive device temperature rise. Short-circuiting of circuits resulting in non operation of the control unit.	3C1: 0.037 3C2: 0.11 3C3: 1.85 3C4: 4.8
H_2S Hydrogen sulphide	Sulphuration of silver, this phenomenon is accelerated by high temperatures.	Major blackening of exposed silver surfaces. Appearance of dendrites on electronic and power circuits.	Increased resistance of disconnecting contacts exposed to air. Excessive device temperature rise. Short-circuiting of circuits resulting in non operation of the control unit.	3C1: 0.0071 3C2: 0.071 3C3: 2.1 3C4: 9.9
Cl_2 Chlorine	Corrosion of metal parts.	Oxidation. Inter-granular corrosion of stainless steel.	Increase in friction. Risk of mechanical rupture. Breaking of stainless-steel springs.	3C1: 0.034 3C2: 0.034 3C3: 0.1 3C4: 0.2
NH_3 Ammoniac	Attacks polycarbonates, corrodes copper.	Cracking of polycarbonates. Blackening of copper.	Risk of rupture. Increased temperature rise.	3C1: 0.42 3C2: 1.4 3C3: 14 3C4: 49
NO_2 Nitrogen oxide	Corrosion of metal parts.	Oxidation.	Increased temperature rise.	3C1: 0.052 3C2: 0.26 3C3: 1.56 3C4: 5.2
Oily atmospheres	Attacks polycarbonates.	Cracking of polycarbonates.	Risk of rupture. Increased temperature rise.	

Environment categories as per standard 721-3-3

Class			
3C1	**3C2**	**3C3**	**3C4**
Rural zones or urban zones with low industrial activity.	Urban zones with scattered industrial activity and heavy traffic.	Immediate vicinity of industrial pollution. Example, paper mills, water treatment, chemicals, synthetic fibres, smelting plants.	Inside polluting industrial premises. Example: paper mills, water treatment, chemicals, synthetic fibres, smelting plants.
Presence of corrosive gases			
Negligible	**Low level**	**Significant level**	**High level**
Impact on switchgear			
No impact on service life because concentrations are very low.	Moderate impact on service life.	Major impact, particularly concerning temperature rise. For electronic systems, no impact on varnished boards and gold-plated contacts.	Significantly reduced service life if no particular precautions are taken. For electronic systems, no impact on varnished boards and gold-plated contacts.
Recommendation			
Preventive maintenance			
Implement the standard program.	Implement the standard program. "PYRATEX" grease can be used for the disconnecting contacts, but must be changed annually (see the manufacturer procedure).	Carry out more frequent periodic checks (see page 10). Change the grease on the disconnecting contacts.	Carry out more frequent periodic checks (see page 10). Change the grease on the disconnecting contacts.
Installation			
No particular precautions required.	No particular precautions required.	Use fixed rather than drawout devices.	It is advised to install the switchgear in a room protected from the pollution. Use fixed rather than drawout devices, or implement special solutions (gold-plated disconnecting contacts).

(1) ppm = Parts Per Million.

Causes of accelerated ageing

Operating conditions

Operating conditions directly affect the service life of switchgear due to the limited electrical and mechanical endurance levels of the various subassemblies. Operating conditions include:

- vibrations,
- the number of operating cycles,
- the interrupted currents.

Vibrations

Influence	Appearance	Consequences	
Premature deterioration of contact surfaces (clusters and main contacts).	Not identifiable.	Increased device temperature rise.	
Untightening of bolted assemblies.	Not identifiable.	Increase in mechanical play.	
Wear of mechanical parts.	Not identifiable.	Broken springs. Increase in mechanical play between parts.	
Appearance of fretting corrosion on auxiliary connections.	Not identifiable.	Erroneous information or loss of continuity in data or supply, excessive temperature rise.	
Breaking of connectors on large electronic components (e.g. large capacitors).	Not identifiable.	Failure of protection function.	
Wear of thumbwheel contacts on the control unit.	Not identifiable.	Nuisance tripping or no tripping.	
Thresholds (g)			
≤ 0.2 g	**0.2 g to 0.5 g**	**0.5 g to 0.7 g**	**> 0.7 g**
Normal condition, no impact on service life.	Reduced service life.	Significant increase in incidents.	Forbidden for standard devices.
Recommendation			
Preventive maintenance			
Implement the standard program.	Carry out more frequent periodic checks (see table).	Carry out more frequent periodic checks (see page 10). Check in particular the tightness of connections.	
Installation			
No particular precautions required.	No particular precautions required.	Install switchgear on a rubber mounting bush.	Use special devices.

Number of operating cycles

Influence	Appearance	Consequences
The number of operating cycles depends directly on the electrical and mechanical endurance of the device.		Device service life depends on the daily number of operating cycles.
Device service life depends on the daily number of operating cycles.		
≤ 30 cycles per month	**≤ 60 cycles per month**	**≤ 120 cycles per month**
Corresponds to one cycle per day. For an endurance of 10000 cycles and an interrupted current of less than 0.4 In, the service life is 27 years.	Corresponds to two cycles per day. For an endurance of 10000 cycles and an interrupted current of less than 0.4 In, the service life is 13 years.	Corresponds to four cycles per day. For an endurance of 10000 cycles and an interrupted current of less than 0.4 In, the service life is 7 years.

63398A-64

Causes of accelerated ageing

Interrupted current

Influence	Appearance	Consequences
Wear of fixed and moving contacts.	Deterioration of contacts.	Beyond the electrical-endurance limit, device temperature rise increases due to the greater contact resistance and a reduction in the pressure of contacts.
Wear of the arc chutes (insulating materials, separators).	Deterioration of insulation.	Beyond the electrical-endurance limit, the insulation (input/output and between phases) is reduced, which results in a reduction of device suitability for isolation. In this case, the safety of persons is no longer guaranteed.
Thresholds		
≤ 0.4 In	**≤ 0.8 In**	**≤ In**
This level of interrupted current corresponds to the mechanical durability (see Mechanical endurance).	This level of interrupted current corresponds to approximately 125 % of the electrical durability.	This level of interrupted current corresponds to the electrical durability at the specified voltage (see Electrical endurance).

PIC00027A-56

PIC00005A-56

Operating limits

Maximum number of opening/closing cycles (no load)

Masterpact NT AC	(1)	Masterpact NW AC	(1)	(2)	Masterpact NW DC	(1)	(2)
All ratings and performance levels	12500	NW08 to NW16 N1, H1, H2, L1	12500	25000	500 V DC / 900 V DC		
		NW20 to NW25 H1,H2 H3	10000	20000	NW10 N, H	10000	20000
		NW20 L1	10000	20000	NW20 N, H	10000	20000
		NW32 to NW 40 H1,H2, H3	10000	20000	NW40 N, H	10000	20000
		NW40b to NW63 H1, H2	5000	10000			

(1) Number of device operating cycles without maintenance.
(2) Number of device operating cycles with maintenance. The elements below must be replaced during the device service life to reach the maximum possible number of operating cycles (arc chutes, main contacts, connecting-rod springs, MCH gear motor, interlocks, MX/XF/MH control auxiliaries). In case of contact'swear, all contacts must be changed, the complete breaking block is then replaced.

Masterpact NT AC		Masterpact NW AC		Masterpact NW DC	
Arc chutes (at In)					
NT08 to 10 440 V H1	6000	NW08 to NW16 N1, H1, H2	10000	500 V DC	
NT08 to 10 690 V H1	3000	NW08 to NW16 L1	3000	NW10 N, H	8500
NT12 440 V H1	6000	NW20 to NW25 440 V H1,H2	8000	NW20 N, H	5000
NT12 690 V H1	3000	NW20 to NW25 690 V H1,H2	6000	NW40 N, H	2000
NT16 440 V H1	3000	NW20 to NW25 H3	2000	900 V DC	
NT16 690 V H1	1000	NW20 to NW25 690 V H1,H2,H3	6000	NW10 N, H	2000
NT08 to 10 440 V L1	3000	NW20 L1	3000	NW20 N, H	2000
NT08 to 10 690 V L1	2000	NW32 to NW40 440 V H1,H2	5000	NW40 N, H	1000
		NW32 to NW40 690 V H1,H2	2500		
		NW32 to NW40 690 V H3	1250		
		NW40b to NW63 H1,H2	1500		
Main contacts (at In)					
NT08 to 10 440 V H1	6000	NW08 to NW16 N1, H1, H2	10000	500 V DC	
NT08 to 10 690 V H1	3000	NW08 to NW16 L1	10000	NW10 N, H	8500
NT12 440 V H1	6000	NW20 to NW25 440 V H1,H2,H3	8000	NW20 N, H	8500
NT12 690 V H1	3000	NW20 to NW25 690 V H1,H2,H3	6000	NW40 N, H	4000
NT16 440 V H1	3000	NW20 L1	10000	900 V DC	
NT16 690 V H1	1000	NW32 to NW40 440 V H1,H2,H3	5000	NW10 N, H	2000
NT08 to 10 440 V L1	3000	NW32 to NW40 690 V H1,H2,H3	2500	NW20 N, H	2000
NT08 to 10 690 V L1	2000	NW40b to NW63 H1,H2	3000	NW40 N, H	2000
Connecting-rod springs, gear motor, interlocking mechanisms					
All ratings and performance levels	12500	NW08 to NW16 N1, H1, H2	12500	500 V DC / 900 V DC	
		NW08 to NW16 L1	12500	NW10 N, H	10000
		NW20 to NW40 H1,H2,H3	10000	NW20 N, H	10000
		NW20 L1	10000	NW40 N, H	10000
		NW40b to NW63 H1,H2	5000		
MX/XF/MN control auxiliaries					
All ratings and performance levels	12500	All ratings and performance levels	12500	500 V DC / 900 V DC	
				NW10 N, H	12500
				NW20 N, H	12500
				NW40 N, H	12500

List of available guides

Switchgear guides

	Masterpact NT	Masterpact NW	Micrologic A - P - H
Adaptation and exchange policy (PAR)			
	NT PAR Schneider Electric after-sales support only	NW PAR Schneider Electric after-sales support only	NT PAR & NW PAR Schneider Electric after-sales support only
Catalogues			
	LVPED205008EN	LVPED205008EN	LVPED205008EN
Maintenance procedure			
	Maintenance 15-03 Schneider Electric after-sales support only	Maintenance 15-03 Schneider Electric after-sales support only	Maintenance 15-03 Schneider Electric after-sales support only
Installation manual			
	■ circuit breaker: 51201003AA-A1 ■ circuit breaker accessories: 51201111AA-A0 ■ chassis accessories: 51201112AA-A0	■ circuit breaker: 51156118AA-A0 ■ circuit breaker accessories: 04443717AA-A0 ■ chassis accessories: 04443718AA-A0	
User manual			
	51201115AA-A	AC : 04443719AA-A DC : En : 04444163AA_B1	Micrologic A : 04443723AA-B Micrologic P : 04443725AA-A Micrologic H :
Modbus communication for Micrologic - Installation and user manual			
	En/Fr : 510051284AAA	En/Fr : 510051284AAA	En/Fr : 510051284AAA
List of adaptation sheets			
	FIM NT Schneider Electric after-sales support only	FIM NW Schneider Electric after-sales support only	FIM NT & FIM NW Schneider Electric after-sales support only
List of typical problems			
	See User manual 51201115AA-A	See User manual 04443719AA-A	
Price list for spare parts			
	COMBT15EN	COMBT15EN	COMBT15EN
Portable test-kit user manual			
			48049-183-01

Troubleshooting and solutions

Problem	Probable causes	Solutions
Circuit breaker cannot be closed locally or remotely	■ Circuit breaker padlocked or keylocked in the "open" position	□ disable the locking fonction
	■ Circuit breaker interlocked mechanically in a source changeover system	□ check the position of the other circuit breaker in the changeover system □ modify the situation to release the interlock
	■ Circuit breaker not completely connected	□ terminate racking in (connection) of the circuit breaker
	■ The reset button signalling a fault trip has not been reset	□ clear the fault □ push the reset button on the front of the circuit breaker
	■ Stored energy mechanism not charged	□ charge the mechanism manually □ if it is equipped with a an MCH gear motor, check the supply of power to the motor. If the problem persists, replace the gear motor (MCH)
	■ MX opening shunt release permanently supplied with power	□ there is an opening order. Determine the origin of the order. The order must be cancelled before the circuit breaker can be closed
	■ MN undervoltage release not supplied with power	□ there is an opening order. Determine the origin of the order. □ check the voltage and the supply circuit (U > 0.85 Un). If the problem persists, replace the release
	■ XF closing release continuously supplied with power, but circuit breaker not "ready to close" (XF not wired in series with PF contact)	□ cut the supply of power to the XF closing release, then send the closing order again via the XF, but only if the circuit breaker is "ready to close"
	■ Permanent trip order in the presence of a Micrologic P or H control unit with minimum voltage and minimum frequency protection in Trip mode and the control unit powered	□ Disable these protection functions on the Micrologic P or H control unit
Circuit breaker cannot be closed remotely but can be opened locally using the closing pushbutton	■ Closing order not executed by the XF closing release	□ check the voltage and the supply circuit (0.85 - 1.1 Un). If the problem persists, replace the XF release
Unexpected tripping without activation of the reset button signalling a fault trip	■ MN undervoltage release supply voltage too low ■ Load-shedding order sent to the MX opening release by another device	□ check the voltage and the supply circuit (U > 0.85 Un) □ check the overall load on the distribution system □ if necessary, modify the settings of devices in the installation
	■ Unnecessary opening order from the MX opening release	□ determine the origin of the order
Unexpected tripping with activation of the reset button signalling a fault trip	A fault is present : ■ overload ■ earth fault ■ short-circuit detected by the control unit	□ determine and clear the causes of the fault □ check the condition of the circuit breaker before putting it back into service
Instantaneous opening after each attempt to close the circuit breaker with activation of the reset button signalling a fault trip	■ Thermal memory	□ see the user manual of the control unit □ press the reset button
	■ Transient overcurrent when closing	□ modify the distribution system or the control-unit settings □ check the condition of the circuit breaker before putting it back into service □ press the reset button
	■ Closing on a short-circuit	□ clear the fault □ check the condition of the circuit breaker before putting it back into service □ press the reset button

Troubleshooting and solutions

Problem	Probable causes	Solutions
Circuit breaker cannot be opened remotely, but can be opened locally	■ Opening order not executed by the MX opening release	□ check the voltage and the supply circuit (0.7 - 1.1 Un). If the problem persists, replace the MX release
	■ Opening order not executed by the MN undervoltage release	□ drop in voltage insufficient or residual voltage (> 0.35 Un) across the terminals of the undervoltage release. If the problem persists, replace the MN release
Circuit breaker cannot be opened locally	■ Operating mechanism malfunction or welded contacts	□ contact a Schneider Electric service centre
Circuit breaker cannot be reset locally but not remotely	■ Insufficient supply voltage for the MCH gear motor	□ check the voltage and the supply circuit (0.7 - 1.1 Un). If the problem persists, replace the MCH release
Nuisance tripping of the circuit breaker with activation of the reset button signalling a fault trip	■ Reset button not pushed-in completely	□ push the reset button in completely
Impossible to insert the crank in connected, test or disconnected position	■ A padlock or keylock is present on the chassis or a door interlock is present	□ disable the locking function
Impossible to turn the crank	■ The reset button has not been pressed	□ press the reset button
Circuit breaker cannot be removed from chassis	■ Circuit breaker not in disconnected position	□ turn the crank until the circuit breaker is in disconnected position and the reset button out
	■ The rails are not completely out	□ pull the rails all the way out
Circuit breaker cannot be connected (racked in)	■ Cradle/circuit breaker mismatch protection	□ check that the cradle corresponds with the circuit breaker
	■ The safety shutters are locked	□ remove the lock(s)
	■ The disconnecting-contact clusters are incorrectly positioned	□ reposition the clusters
	■ Cradle locked in disconnected position	□ disable the cradle locking function
	■ The reset button has not been pressed, preventing rotation of the crank	□ press the reset button
	■ The circuit breaker has not been sufficiently inserted in the cradle	□ insert the circuit breaker completely so that it is engaged in the racking mechanism
Circuit breaker cannot be locked in disconnected position	■ The circuit breaker is not in the right position	□ check the circuit breaker position by making sure the reset button is out
	■ The cranck is still in the cradle	□ remove the crank and store it
Circuit breaker cannot be locked in connected, test or disconnected position	■ Check that locking in any position is enabled	□ contact a Schneider service centre
	■ The circuit breaker is not in the right position	□ check the circuit breaker position by making sure the reset button is out
	■ The cranck is still in the cradle	□ remove the crank and store it
The crank cannot be inserted to connect or disconnected the circuit breaker	■ The rails are not completely in	□ push the rails all the way in
The right-hand rail (chassis alone) or the circuit breaker cannot be drawn out	■ The crank is still in the chassis	□ remove the crank and store it

Notes

Schneider Electric Industries SAS
35 rue Joseph Monier
92500 Rueil-Malmaison
France

http://www.schneider-electric.com

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