

IRON CORE REACTORS

INSTRUCTIONS FOR INSTALLATION, USE AND
MAINTENANCE

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Page: 1 / 8

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CONTENTS

1. GENERAL	3
2. APPLICATION AND PRODUCT INFORMATION	3
2.1 APPLICATION	3
2.2 PRODUCT INFORMATION	3
3. TRANSPORT AND STORAGE	4
3.1 TRANSPORT AND HANDLING	4
3.2 RECEPTION	4
3.3 SHORT-TERM STORAGE	4
3.4 LONG-TERM STORAGE	4
4. INSTALLATION	5
4.1 LIFTING	5
4.2 MECHANICAL INSTALLATION	5
4.3 GROUNDING	5
4.4 ELECTRICAL CONNECTIONS	5
5. MAINTENANCE	7
6. STANDARDS AND CERTIFICATES	7
7. DECOMMISSIONING	7
8. APPENDICES	7

1. GENERAL

CAUTION

The purpose of this manual is to give guidance on the installation, use and maintenance of (Nokian Capacitors) vacuum impregnated one- and three phase iron core reactors manufactured by (Grid Solution Ltd) in a correct and safe way.

Reactors are to be installed, used and maintained by persons with due experience and training only. The instructions in this manual were written with this kind of reader in mind.

This manual does not supersede national and local safety regulations and instructions nor training.

If the instructions and regulations are not complied with, the warranty on the reactor will lapse, and the manufacturer is absolved from the liability for the proper functioning and safety of the reactor.

2. APPLICATION AND PRODUCT INFORMATION

2.1 Application

Reactors are typically used to compensation purposes, limit fault currents and improve current quality by smoothing current peaks.

In compensation purposes reactive power is compensated with capacitors and reactors to maximize active power.

2.2 Product information

Reactors are delivered completely assembled, fully tested and ready for operation. The only connections to be made are:

1. Grounding

and

2. Electrical connections

Reactor rating and main electrical data is shown on the reactor rating plate. Please check that the rating plate corresponds with the order before installation.

3. TRANSPORT AND STORAGE

3.1 Transport and handling

Reactors are packed in vertical position inside a plywood box and protected against corrosion by using a rust inhibiting VCI packaging film.

One package contains several reactors. Each reactor is attached to the bottom of the box from its lower brackers with four (4) screws.

Each package contains handling marks “Top” and “Sling here” to help to ensure that greater care is taken with cargo handling.

“Top”

The package must always be transported, handled and stored in such a way that the arrows always point upwards. Rolling, swinging, severe tipping or tumbling or other such handling must be avoided.

“Sling here”

symbol indicates where the cargo should be slung.

Reactors must be transported on their original packages and kept in vertical position during transport, handling, and storage!

3.2 Reception

A detailed inspection should be carried out to the received reactors and the protective packing before and after offloading.

Main procedures after transportation:

1. Check the condition of the transportation package as soon as possible.
2. After this open the package to reveal possible latent damage.

3. Inspect that reactors have not been damaged during transportation.

4. In case reactors are covered with rust inhibiting VCI packaging film (yellow/green Zerust film), inspect that there is no humidity inside.

If you notice any damage, or if you need assistance, please contact the manufacturer.

3.3 Short-term storage

Keep reactors in their original packaging until installation if possible.

Keep reactors dry, since humidity may cause corrosion of the electric and electronic components.

Do not store reactors in a place where they are exposed to impurities.

3.4 Long-term storage

Reactors can be stored at a temperature down to -40 °C.

Wide and rapid temperature changes must be avoided.

Reactors must be stored indoors in a well-ventilated storage area and protected against following items:

- Water, water vapour, humidity
- Solar radiation
- Saline environments
- Pollution of all types
- Micro-organisms, vermin.

4. INSTALLATION

Reactors are designed for indoor installation.

The ambient temperature must not fall below -40°C .

Reactors are tested and inspected at the factory before delivery. However, in order to detect possible transportation damage or other obvious defects caused by improper handling, a visual inspection is always necessary prior to installation.

4.2 Lifting

During mounting ensure that lifting is done from reactor's mechanical parts. Heavy reactors have suitable holes or lifting eyes on mechanical parts for lifting.

CAUTION

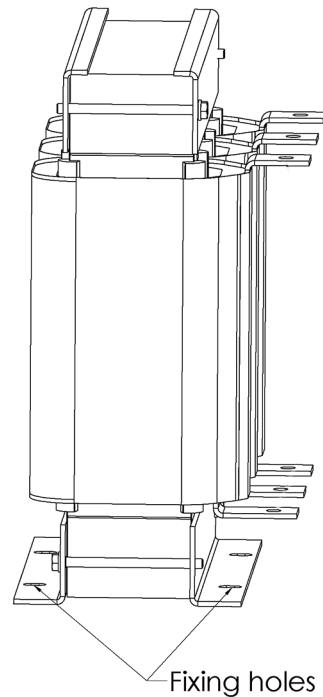
Never use product's electrical connectors (reactor bus bars) for lifting purposes.

4.3 Mechanical installation

Usually reactors have four (4) holes for mounting. Mounting holes are used for earthing also through the cabinet. Reactors must be mounted on vertical position as in drawing.

In mechanical connections use spring washers or equal to ensure connection with mechanical strength. Surfaces to be joined must be smooth and clean.

Strength category of the used hexagon screws must be minimum 8.8 and the accuracy class should be M. Screws, nuts and other materials used in connections must be corrosion protected.



4.4 Grounding

The reactor can be grounded through one of the mechanical assembly screws to its mounting plate or through a separate grounding hole or screw.

In grounding connections a star washer (DIN6797) must be used and varnish (or other insulating layer) must be grinded off.

4.5 Electrical connections

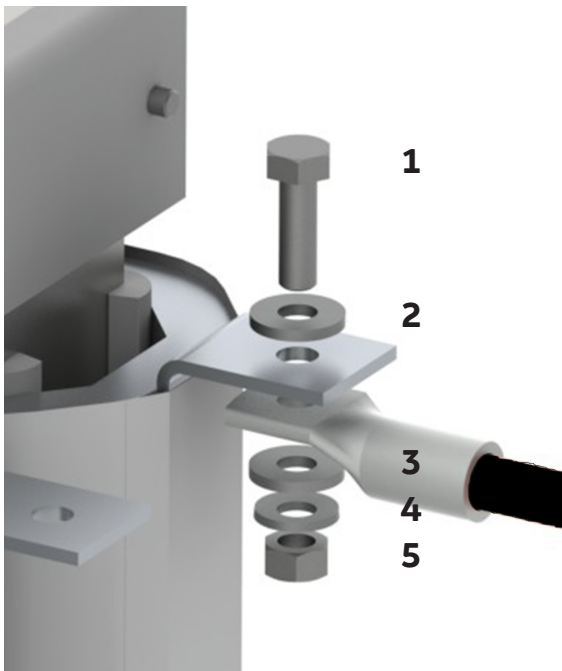
Reactors usually have aluminium or copper bus bars. The bus bars are coated with suitable aluminium grease at the manufacturer to prevent the oxidation. Do not remove grease on the bus bars.

Both copper and aluminium can be used to connect reactor bus bars. The surfaces about to be joined must be smooth and clean.

BOLTS, NUTS AND WASHERS IN ELECTRICAL CONNECTIONS:

The connection should be done with suitable washers. In electrical connections use always plain washers in combination with conical spring washers.

Strength category of the used hexagon screws must be minimum 8.8 and the accuracy class should be M. Screws, nuts and other materials used in connections must be corrosion protected.



1. Screw
2. Plain washer DIN 7349
(or SESKO washer SFS 3738)
3. Plain washer DIN 7349
(or SESKO washer SFS 3738)
4. Conical spring washer DIN 6796
(Belleville washer)
5. Nut

Connections must be tightened to the specific torque by using appropriate tools. Tightening torque used for electrical connection is depending on the bolt size according to following table.

TIGHTENING TORQUES IN ELECTRICAL CONNECTIONS:

Size of a bolt	Tightening torque [Nm]
M6	8...9 Nm
M8	18...22 Nm
M10	35...45 Nm
M12	65...75 Nm

With electrical connections it is recommended to mark all torque controlled connections.

5. MAINTENANCE

Reactors are virtually maintenance free. However, it is advisable to carry out following maintenance operations after one year from commissioning and thereafter every five years:

1. Visual inspection.

At first, make visual inspection to see anything abnormal.

2. Cleaning of dust and dirt.

Dust and dirt can be vacuum-cleaned.

CAUTION

Handle windings with care to avoid damaging sensitive insulations. Do not use liquids when cleaning the windings.

3. Tightening torques.

Inspect that electrical connections have been tightened to a torque as specified. It is important to check the electrical connections for any potential changes.

6. STANDARDS AND CERTIFICATES

Iron core reactors are manufactured and tested in accordance with:

IEC/EN 60076

IEC/EN 60289

Certificates:

ISO9001 by SGS FI

SGS FI-certificate*

*SGS FI-certificate is accorded by SGS FIMKO Ltd. SGS FIMKO Ltd. is an international commercial testing and certification company which is totally independent and impartial. It is also a Competent Body or Notified Body under several European Union directives and is able to verify the conformity of the products within the countries of the European Union.

7. DECOMMISSIONING

Recycling of an old, defective or no longer necessary reactor can be done by GE Grid. All manufactured components are separated in accordance with environmental regulations. Reusable materials are recycled as far as possible.

8. APPENDICES

