NHP CUBIC Switchboard solutions

Simplify the future
NHP Electrical Engineering Products (NHP) specialises in motor control, power distribution and automation systems.

NHP offers the Australasian market the complete industrial electrical and automation solutions package. As authorised distributors for Rockwell Automation and their Allen-Bradley® products in our designated areas of Australia and throughout all of New Zealand, NHP is partnered with the leading global provider of industrial automation solutions and switchgear components.

An Australian owned company, NHP is committed to serving the Australasian industry with quality products and customer support. This is achieved through an 900+ strong team which is distributed across 25 branches and 24 regional locations throughout Australia and New Zealand.

While NHP stock an impressive 70,000+ line items, we are much more than a component supplier. NHP source the highest quality products from leading global suppliers, and customise these into solutions for the local Australian and New Zealand markets, providing a complete fit to purpose systems and solutions service.

At NHP we have a strong customer focus and we look to provide the right product and product solutions for our customers’ requirements and applications, all at a competitive price. We value and care for our customers and support them by offering personalised service and assistance to meet their every need and demand. Our customers can have 100% confidence in our ability to support them when, where and how it is needed.

Put simply, NHP is ‘easy to do business with’.
NHP CUBIC switchboard systems

NHP can now offer its leading range of switchgear, motor control and automation products together with the CUBIC modular switchboard system to provide industry with a solution to the wide and varying requirements within Australasia.

CUBIC represents the very best in main switchboard and motor control centre design.

CUBIC’s unique assembly method allows for speedy and fully modular construction.

CUBIC offers a fully type tested modular system for the New Zealand, Australian and international markets.

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CUBIC features

Applications

• MSB, DB MCC, PF and control panels
• MCCs: up to 27 starters per tier

Switchboard design

• Fully modular design
• Enclosure and type tested busbar system
• Fast and easy to assemble - smart design

Segregation

Form 1 up to Form 4 b according to AS/NZS 3439-1, 2002

Construction

• Fixed, plug-in and withdrawable functional units
• Fully withdrawable cells have a three position racking system
• Wide range of latching and locking devices
• Coating: Epoxy-polyester powder, CUBIC RAL 7035 light grey or RAL 2000 orange
• Full range of CUBIC assembly tools available

Ingress of liquids and solids

• IP 43 standard, IP 54 optional
• Plastic or metal gland plates up to IP 54

Busbar system

• Main bars up to 7000 A at 120 kA
• Clamped busbar connections minimising drilling requirements

Type tested design

• Arc fault containment of ingoing and outgoing units to AS/NZS 3439.1-2002, Annex ZD
• Type tested busbar systems
• Type tested cells for motor starter co-ordinated applications

Type tested flexible busbar

• Cuflex flexible busbar

Design tools

• Comprehensive applications software available for switchboard design
• Full engineering documentation available

Who builds CUBIC

• CUBIC is built by accredited and trained switchboard builders
Getting started with CUBIC

NHP can offer a comprehensive switchboard and motor control centre solution

- Circuit breaker products - Terasaki, Sprecher + Schuh
- Transfer switches - Terasaki, Socomec
- Motor control - Sprecher + Schuh, Ghisa, Microelettrica, Santerno, Aucom
- Isolators and load break switches - Socomec, Sprecher + Schuh, Katko
- Fusegear and bases - NHP
- Time clocks and metering - IME, Grasslin
- Timers - Sprecher + Schuh, Carlo Gavazzi
- Pushbuttons - Sprecher + Schuh, Austrol
- Cam switches - Sprecher + Schuh, Elektra
- Terminals - Sprecher + Schuh, Wago
- Monitoring relays - Carlo Gavazzi
- Relays - Finder, Sprecher + Schuh, Carlo Gavazzi
- Motor protection - Sprecher + Schuh, NHP AmpCom
- Arc detection relays - Selco
- Proximity sensors - Carlo Gavazzi
- Integrated control and visualisation
- PLCs
- Graphic display panels
- SCADA
- Cable duct - Iboco
- Flexible busbar - CUBIC, Erica
- Climate control - Stego, Cosmotec
- Power factor correction - Beluk, Electronicon
- Surge protection devices - NHP
- Stack lights - Sirena
- Sirens - Klaxon
- Beacons - MoFlash
# Specifications

## GENERAL

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUBIC applications</td>
<td>Main switchboard, distribution boards, motor control centres, power factor correction and control panels</td>
</tr>
<tr>
<td>Standards built to</td>
<td><strong>AS/NZS 3439.1: 2002</strong>&lt;br&gt;<strong>IEC 60439-1: 2004</strong></td>
</tr>
</tbody>
</table>

## ELECTRICAL

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main horizontal and vertical busbar ratings</td>
<td>Up to 7000 A</td>
</tr>
<tr>
<td>Poles</td>
<td>3 or 4 pole</td>
</tr>
<tr>
<td>Rated short time withstand current (Icw)</td>
<td>Up to 120 kA for 1 second</td>
</tr>
<tr>
<td>Rated peak withstand current (Ipk)</td>
<td>Up to 264 kA</td>
</tr>
<tr>
<td>Voltages</td>
<td><strong>Rated insulation voltage:</strong> 1000 V AC as standard&lt;br&gt;<strong>Rated operating voltage:</strong> 1000 V AC as standard</td>
</tr>
<tr>
<td>Rated impulse withstand voltage</td>
<td>8 kV</td>
</tr>
<tr>
<td>Rated Frequency</td>
<td>50 - 60 Hz</td>
</tr>
<tr>
<td>Arc fault containment of outgoing cells</td>
<td><strong>AS/NZS 3439.1: 2002, Annex ZD</strong></td>
</tr>
</tbody>
</table>

## DESIGN TOOLS

CUBIC Galaxy software includes:<br>
- **Spica** - Switchboard design<br>
- **Alcor** - Commercial and pricing aspects<br>
- **Proxima** - Power loss and temperature calculations

## MECHANICAL

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction of switchboard</td>
<td>Panel type 100 % modular designs</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 43, IP 54 optional</td>
</tr>
<tr>
<td>Segregation</td>
<td>Form 1 up to Form 4 b</td>
</tr>
<tr>
<td>Mounting types</td>
<td>Fixed, plug-in or fully withdrawable</td>
</tr>
<tr>
<td>Sheet steel construction</td>
<td>Outside cover 1.25 mm, doors 1.5 mm and the base 3 mm steel&lt;br&gt;MOUNTING PLATES ARE OF 2.5 MM GALVANISED STEEL</td>
</tr>
<tr>
<td>Colours/finish</td>
<td>Exterior: Grey RAL 7035&lt;br&gt;Orange RAL 2000&lt;br&gt;Interior: gear trays - galvanised, dividing panels - powder coated grey</td>
</tr>
<tr>
<td>Other colours available on request.</td>
<td></td>
</tr>
</tbody>
</table>

## DIMENSIONS

All CUBIC width, height and depth dimensions are measured in multiples of 192 mm which are called “modules”. Multiples of modules are indicated by the designations: 1M, 2M, 3M…12M etc. For example, individual tiers for motor control applications can be up to three modules wide.

| Panel construction type (with frame + covers) | Maximum modules per plinth: W: 10M, H: 12M, D: 4M<br>There are no limits on multiples of the above being used for Width, Height, Depth when using panel types. |
OPERATIONAL SAFETY
The CUBIC switchboard system is characterised by a high degree of operational dependability and safety.

NHP CUBIC safety features

TYPE TESTING CERTIFICATION
System is tested to the various standards by the manufacturer.

ACCREDITED SWITCHBOARD BUILDERS
Operational safety

The CUBIC switchboard system is characterised by a high degree of operational dependability and safety. The switchboard builder has the option of combining fixed, plug-in and withdrawable units according to their customers requirements.

MD (Multi Drawer), One system - all possibilities

The MD is used worldwide where electrical energy is distributed with the highest possible personal and operation safety; typical within the process industry, mining, navigation, hospitals infrastructure, where even a short interruption of the electricity supply may be crucial to human lives and cause huge operation disadvantages and economic losses.

The MD system provides the possibility to offer versatile and compact solutions, which simultaneously meet the end users demand for competitive products.

MD is designed and constructed in concert with the users, and so the product appears with the optimum combination of user-friendliness, high level of operational safety and economy.

- Possibility of rebuilding while live, subject to site and operational requirements
- Minimum maintenance
- Operationally dependable
- Compact design
- Fewer operational stops

MD is designed with optimum utilisation of the space in the panel and with the possibility of choosing drawers in sizes from 16 A to 630 A.

The MD drawers are prepared for installation of all communication bus systems on the market, including Profibus and future use of Ethernet.

MD drawers are delivered with:

- Main plug, 3 P or 4 P
- Holes for component installation
- Alignment connections
- Interlock
- Fixed or hinged front

Withdrawable

- Full functionality and total safety
- Switchboard down time is eliminated
- Mechanically separated, test and run positions

In the case of withdrawable starters, each individual starter can be supplied with a unique coding system to prevent the risk of it being inadvertently placed into the wrong location. Each withdrawable starter is also provided with a front plate where the pushbuttons, indicating lights and instruments can be fitted. CUBIC Motor Control Centres can be assembled with a type tested busbar system up to 7000 A at 120 kA.

“For a complete Integrated MCC solution, combine CUBIC Multi-Drawer with NHP AmpCom – Networkable Motor Protection and Energy Management System. Available in Ethernet Modbus/TCP and Profibus-DP. Scan the QR code for more details”. 

Two stage draw-out to ‘Test Position’ and ‘Disconnect Position’
NHP CUBIC accredited switchboard builders

Designed and built by accredited, experienced switchboard builders only.

System Accreditation

End users, consultants and specifiers can be certain that switchboard builders are trained and accredited to assemble CUBIC. This ensures switchboard builders follow best assembly practices and CUBIC guidelines when using the modular system. Builders receive accreditation only after attending extensive training using the CUBIC software and documentation. Accredited switchboard builders are listed on the NHP website nhp.com.au/cubic

Quality

CUBIC provides products of very high quality. All CUBIC products have been tested and/or type approved by several of the most recognised test laboratories in the world including KEMA, ASTA, UL, Germanischer Lloyds, Russian Maritime Register of Shipping and DNV.

Quality is CUBIC’s main aim. Their quality system has been certified according to DS/ISO 9001. This certification is your guarantee of high quality products from development, to finished goods, administration and service.
**CUBIC Galaxy**

**Design software**

The electronic software tool: “Galaxy” software is designed for use by switchboard builders. CUBIC Galaxy Software contains a number of important sub programs that greatly increases the usefulness of this software.

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**PROXIMA**

With **PROXIMA** it is possible to calculate and document power loss and temperatures in a switchboard section. With the Proxima program, the user can also ascertain that the components can function satisfactorily in the switchboard environment.

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**SPICA**

**SPICA** is an application which makes designing switchboards easy. All components in the switchboard are exported into the calculation program Alcor with a complete list of parts. The price is then automatically generated from the drawings list of parts.

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**ALCOR**

**ALCOR** is a calculation program that makes it possible to make an overview of the commercial aspects of the switchboard.
Section 3: SEISMIC AND TYPE TESTING CERTIFICATION
Type test certificates

The MNS low-voltage switchgear system is subjected to extensive type tests in compliance with the standards in order to ensure the highest possible degree of safety.

Accredited SBB

A list of NHP CUBIC Accredited Switchboard Builders for Australia and New Zealand is available online at nhp.com.au/cubic/asb_nsw.asp. You will be able to view the contact details and also the level of accreditation associated with each company.
NHP CUBIC education

Applications

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• MCCs: up to 27 starters per tier

Switchboard design

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Ingress of liquids and solids

• IP 43 standard, IP 54 optional
• Plastic or metal gland plates up to IP 54

Busbar system

• Main bars up to 7000 A at 120 kA
• Clamped busbar connections minimising drilling requirements

Fault levels

<table>
<thead>
<tr>
<th>TRANSFORMER KVA</th>
<th>FULL CURRENT (A)</th>
<th>4% IMPEDANCE</th>
<th>4.5% IMPEDANCE</th>
<th>5% IMPEDANCE</th>
<th>6% IMPEDANCE</th>
<th>6.5% IMPEDANCE</th>
<th>7% IMPEDANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>278</td>
<td>7</td>
<td>6.2</td>
<td>5.6</td>
<td>4.6</td>
<td>4.3</td>
<td>4</td>
</tr>
<tr>
<td>300</td>
<td>417</td>
<td>10</td>
<td>9.3</td>
<td>8.3</td>
<td>7</td>
<td>6.4</td>
<td>6</td>
</tr>
<tr>
<td>400</td>
<td>556</td>
<td>14</td>
<td>12</td>
<td>11</td>
<td>9.3</td>
<td>8.6</td>
<td>7.9</td>
</tr>
<tr>
<td>500</td>
<td>696</td>
<td>17</td>
<td>15</td>
<td>14</td>
<td>12</td>
<td>11</td>
<td>9.9</td>
</tr>
<tr>
<td>750</td>
<td>1043</td>
<td>26</td>
<td>23</td>
<td>21</td>
<td>17</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>1000</td>
<td>1391</td>
<td>35</td>
<td>31</td>
<td>28</td>
<td>23</td>
<td>21</td>
<td>20</td>
</tr>
<tr>
<td>1500</td>
<td>2087</td>
<td>52</td>
<td>46</td>
<td>42</td>
<td>35</td>
<td>32</td>
<td>30</td>
</tr>
<tr>
<td>2000</td>
<td>2782</td>
<td>70</td>
<td>62</td>
<td>56</td>
<td>46</td>
<td>43</td>
<td>40</td>
</tr>
</tbody>
</table>
## Forms of segregation

### Definition of symbols

- **Enclosure**
- **Busbar and tee-offs**
- **Internal separation**
- **Functional units**
- **Terminals**

### Table of Segregation Forms

<table>
<thead>
<tr>
<th>Main Criteria</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Form 1</strong></td>
<td>No Internal Separation</td>
</tr>
<tr>
<td><strong>Form 2a</strong></td>
<td>Separation of busbars from functional units, Terminals not separated from Busbars</td>
</tr>
<tr>
<td><strong>Form 2b</strong></td>
<td>Terminals not separated from Busbars, Terminals separated from Busbars</td>
</tr>
<tr>
<td><strong>Form 3a</strong></td>
<td>Separation of busbars from functional units, Separation of functional units from one another, Separation of terminals from functional units, Terminals not separated from Busbars</td>
</tr>
<tr>
<td><strong>Form 3b</strong></td>
<td>Separation of busbars from functional units, Separation of functional units from one another, Separation of terminals from functional units, Terminals separated from Busbars</td>
</tr>
<tr>
<td><strong>Form 4a</strong></td>
<td>Separation of busbars from functional units and terminals, Separation of functional units from one another, Separation of terminals from functional unit and those of other functional units, Terminals not in same compartment as associated functional unit</td>
</tr>
<tr>
<td><strong>Form 4b</strong></td>
<td>Separation of busbars from functional units and terminals, Separation of functional units from one another, Sep of term’s from funct. unit and those of other funct. units, Terminals not in same compartment as associated functional unit</td>
</tr>
</tbody>
</table>
Calculation of a downstream short circuit current is a function of the upstream short-circuit current (Isc), cross-section and length of the conductor. The following table provides information to calculate approximately, the short circuit current at a relevant point of the installation.

### Line protection - copper conductor

<table>
<thead>
<tr>
<th>mm²</th>
<th>Length of the line in metres</th>
<th>Isc (kA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td></td>
<td>0.9</td>
</tr>
<tr>
<td>2.5</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>1.2</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>1.4</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>1.8</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>2.2</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>2.6</td>
</tr>
<tr>
<td>35</td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>50</td>
<td></td>
<td>3.4</td>
</tr>
<tr>
<td>70</td>
<td></td>
<td>3.8</td>
</tr>
<tr>
<td>95</td>
<td></td>
<td>4.1</td>
</tr>
</tbody>
</table>

### Selection Chart

Downstream short circuit current calculator

- Estimated short-circuit current of 12 kA at the end of the cable.
- Current at the transformer terminals of 30 kA.
- Cable with cross section 95 mm² Cu, 45 m length, and short-circuit current at the transformer terminals of 30 kA.

### Notes:
- Values shorter than 0.8 m or longer than 1 km are not considered.
- All values are for voltage 400 V.
Degrees of Protection provided by enclosures (IP Rating)

The degree of protection provided by any assembly against contact with live parts, ingress of solid foreign bodies and liquid is indicated by the designation IP... according to IEC 60529 (IEC 60439-1 Paragraph 7.2.1.1).

The degree of protection is also a criteria for type tests (IEC 60439-1 paragraph 8.2.7.). It is subject to agreement between the manufacturer and user (IEC 60439-1 Annex E).

Definitions

Degrees of protection provided by enclosures of electrical equipment in accordance with IEC 60529:

1. Protection of persons against access to hazardous parts inside the enclosure;
2. Protection of the equipment inside the enclosure against ingress of solid foreign objects;
3. Protection of the equipment inside the enclosure against harmful effects due to the ingress of water.

Designations for the degrees of protection

Code letters
"International Protection"

1st characteristic numeral:
Protection against penetration by foreign bodies and dust

2nd characteristic numeral:
Protection against ingress of water with harmful effects

Additional letter
(optional)

Remark

Where a characteristic numeral is not required to be specified, it shall be replaced by the letter “X” (“XX” if both numerals are omitted).

MNS – Available standard degrees of protection

As MNS is designed for indoor applications, no IP degrees covering water jetting and total water immersion are foreseen.

<table>
<thead>
<tr>
<th>VENTILATED</th>
<th>NON-VENTILATED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventilation grids in: doors, covers and roof plate</td>
<td>Sealed; no ventilation openings</td>
</tr>
<tr>
<td>IP 30</td>
<td>IP 40</td>
</tr>
<tr>
<td>IP 31</td>
<td>IP 41</td>
</tr>
<tr>
<td>IP 32</td>
<td>IP 42</td>
</tr>
<tr>
<td>IP 54</td>
<td></td>
</tr>
<tr>
<td>Maximum heat dissipation (by air convection)</td>
<td>Low heat dissipation (heat emission via enclosure only)</td>
</tr>
</tbody>
</table>
### 1st number protection against solid objects

<table>
<thead>
<tr>
<th>IP RATING</th>
<th>TESTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No protection</td>
</tr>
<tr>
<td>1</td>
<td>Protected against solid objects up to 50 mm. (eg. accidental touch by hands).</td>
</tr>
<tr>
<td>2</td>
<td>Protected against solid objects up to 12 mm (eg. fingers).</td>
</tr>
<tr>
<td>3</td>
<td>Protected against solid objects over 2.5 mm (tools + small wires).</td>
</tr>
<tr>
<td>4</td>
<td>Protected against solid objects over 1 mm (tools + small wires).</td>
</tr>
<tr>
<td>5</td>
<td>Protected against dust - limited ingress permitted (no harmful deposit).</td>
</tr>
<tr>
<td>6</td>
<td>Totally protected against dust.</td>
</tr>
</tbody>
</table>

### 2nd number protection against liquids

<table>
<thead>
<tr>
<th>IP RATING</th>
<th>TESTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No protection</td>
</tr>
<tr>
<td>1</td>
<td>Protected against vertical falling drops of water.</td>
</tr>
<tr>
<td>2</td>
<td>Protected against direct sprays of water up to 15° from the vertical.</td>
</tr>
<tr>
<td>3</td>
<td>Protected against spray of water up to 60° from the vertical.</td>
</tr>
<tr>
<td>4</td>
<td>Protected against water sprayed from all directions - limited ingress permisssable.</td>
</tr>
<tr>
<td>5</td>
<td>Protected against low pressure jets of water from all directions - limited ingress permisssable.</td>
</tr>
<tr>
<td>6</td>
<td>Protected against strong jets of water eg. for use on shipdecks - limited ingress permisssable</td>
</tr>
<tr>
<td>7</td>
<td>Protected against the affects of immersion between 15 cm and 1 m.</td>
</tr>
<tr>
<td>8</td>
<td>Protected against long periods of immersion under pressure.</td>
</tr>
</tbody>
</table>
NHP has released a new and updated version of its TemCurve 6 MCCB selectivity applications software. This new version includes many enhanced features that will make TemCurve 6 a more versatile applications tool compared to previous versions. Device types available in TemCurve 6 include Terasaki MCBs, MCCBs, ACBs, NHP fuses, as well as generic IEC protection relay curves.

TemCurve 6 includes:

- Circuit line-diagrams
- Cable fault calculations
- TemCurve file sharing
- Distribution schematic
- Supply fault calculations
- Supply voltage options
- Catalogue data prints
- Time current curves
- Motor start applications
- Device photos
- User defined curves
- Internet update capability
- I2T curves
- Supply device type options
- Exports to AutoCad
- Circuit breaker setting detail
- A calculator

TemCurve 6 software can also be downloaded from the NHP TemBreak 2 website: nhp.com.au/tembreak2