

THYCON

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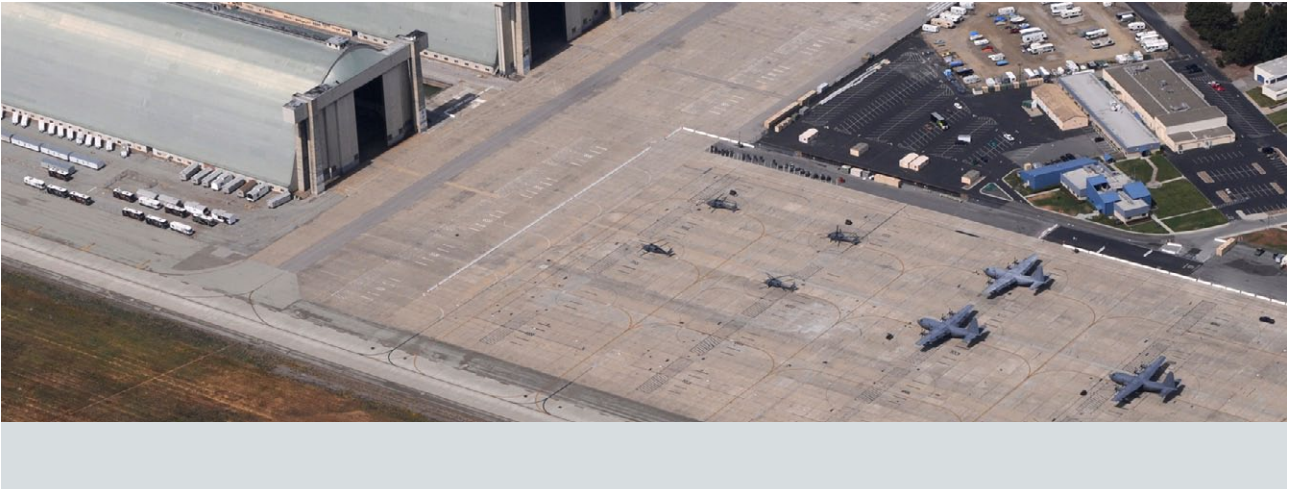


Thycon Defence Capabilities



Prepared by Thycon Industrial Pty Ltd.



**Thycon Strengths**

Thycon is a specialised power quality technology & service provider.

We provide a diverse range of products and services designed to maximize efficiency and uptime for our clients.

Power Quality is a science that requires specialised knowledge and ongoing review as site conditions change and improved solutions develop.

The benefit Thycon provides to its clients is not that it can resolve one power requirement, but that it can improve power efficiency across the installation throughout its entire lifetime.

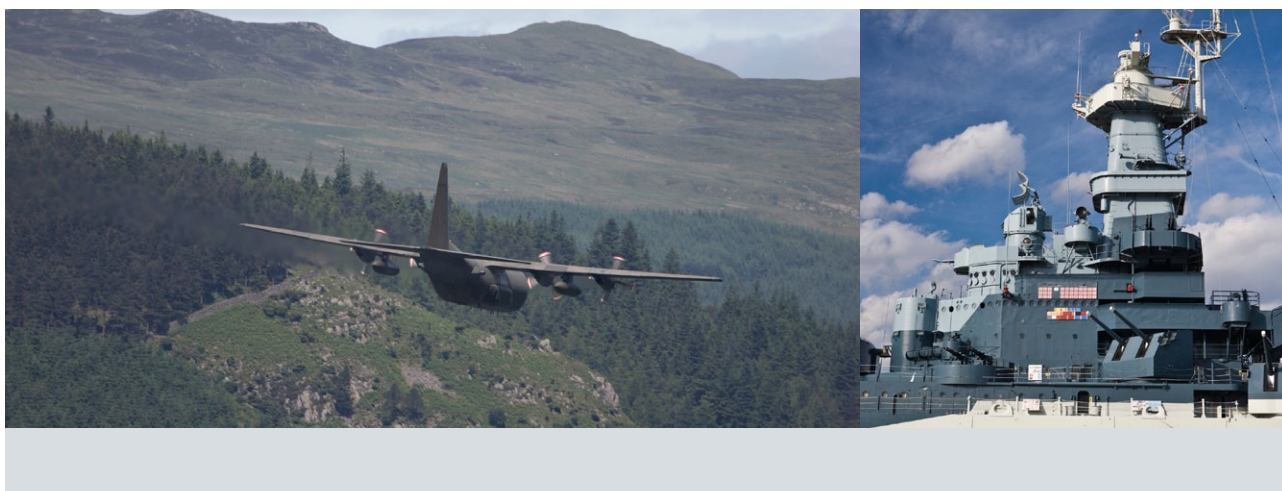
Thycon Capabilities

Thycon, established in 1968, is a second generation, Australian owned Electrical Engineering and Manufacturing Company. The business is composed of a Research & Development Division, Manufacturing Division and Projects & Services Division and is located in Melbourne, Australia.

Thycon's success is due to design simplicity, product ruggedness and consequently long service life, frequently 20 – 30 years.

Today, Thycon converters exhibit power losses which are half the value of those generated by our competitor's conventional cutting edge conversion technology. This in turn makes Thycon products highly efficient for today's energy saving needs.

These advanced products are our Australian development with high levels of detailed conversion know-how – our 40 years' experience.



Thycon Product Lines

Thycon is Australia's leading manufacturer of power quality and conversion solutions for the defence, industrial, resource and commercial sectors. Since the company's foundation in 1968 our product line has grown steadily in response to technical advances and market needs.

Today, Thycon power quality products include:

- Uninterruptible Power Supplies
- Active Power Regulators
- Triplen Isolation/3rd Harmonic Cancellation Transformers
- Static Transfer Switches
- Solid State Breakers

Thycon power control products include:

- Static Frequency Converters for 50/60Hz
- Static Frequency Converters for 50/400Hz
- Constant Current Regulators
- Cyclo-converters
- High Current Rectifiers
- Solar Inverters

Thycon Vertical Markets

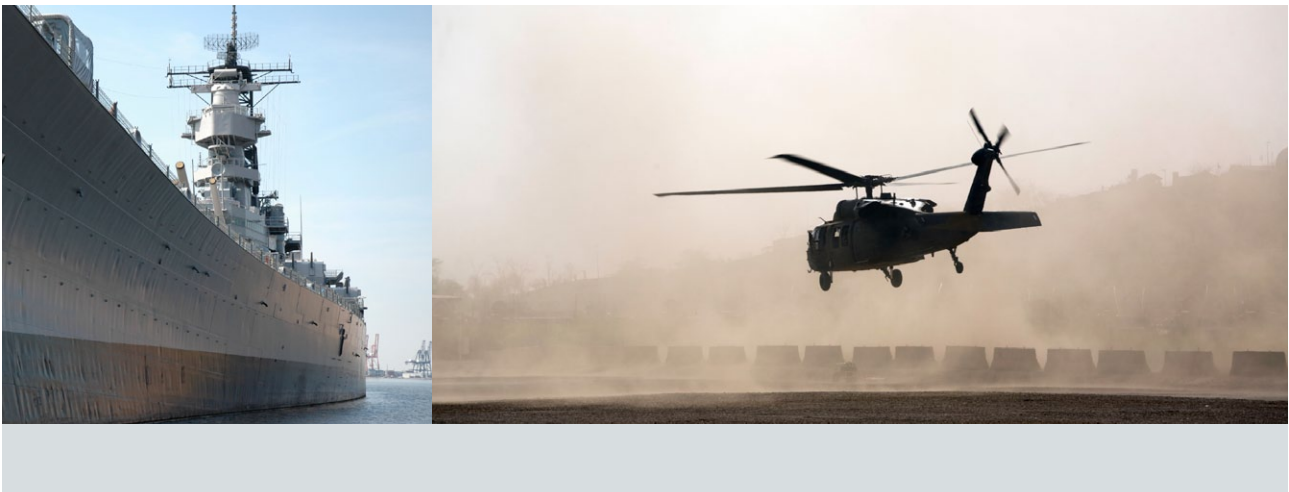
Thycon products have been supplied to most government departments and blue chip commercial and industrial companies throughout Australia. They have been used to supply and protect applications as diverse as computer networks in the banking and finance sector, newspaper presses, manufacturing machines, stadium lighting, airfield lighting, commercial and defence aircraft & ships, motors, anodising plants and rotary and static frequency loads.

Thycon Engineering, Design and Construct

Thycon will design, engineer and recommend solutions for the required support of infrastructure for mission critical environments.

Thycon believes in building client relationships by assisting with pre-design, planning and providing budgetary costing to ensure we provide the client with the best possible solution within the client's budget constraints.

Thycon has a proven record in delivering major projects to a range of customers including Government, Defence, Corporate, Mining & Industry. Turnkey services include – concept design, detailed design, project and construction management of electrical, communication, fire, security, mechanical, hydraulics, and associated building works.



Thycon has the project experience, technical and engineering capabilities and project management skills to deliver each project on time and on budget from concept design stage through to delivery.

Thycon Service / Maintenance

Thycon products are designed with ease of service & maintenance in mind. To support this, Thycon delivers preventive maintenance service via a variety of programmes to suit each client's specific needs.

Our experienced team of engineers, backed by our design and install knowledge, will ensure that your systems are maintained in a manner that offers your business the stability that it requires.

Thycon Quality & Safety

Thycon Quality Assurance and quality manufacturing commitment:

- Excellence in design, manufacture, installation, and maintenance of power quality and control products can only be based on a commitment to continuous improvement.
- Our aim is to achieve the highest level of product quality, reliability and safety but we also know that this must be achieved at the lowest practicable cost.

- An experienced and expert Project Management team manages the installation of both standard products and special systems.
- Subcontractor arrangements, specification conformance and programmed deadlines are carefully controlled.
- Thycon manufacturing has been continuously ISO 9001 certified since 1995.
- Customer satisfaction is our primary objective. Delivering the right products at the right price, on time is the way we achieve it.
- Thycon has a comprehensive safety system to promote a safety first culture.

Thycon is an Australian owned & operated company which has been successfully designing and manufacturing power solutions in Australia for over 40 years. We are proud that we continue to design and manufacture power quality and power control solutions in Australia.

Our ability to deliver flawless projects, and offer genuine support to ensure its success is the cornerstone of Thycon's business philosophy, reducing the risk for anyone choosing to partner with us.



Thycon Commitment Statement

Thycon is committed to working closely with clients to ensure electrical design; manufacturing and management resources are allocated and will commit to the successful delivery of any project awarded for both parties. Having the right people working closely with our clients in building relationships and having the flexibility to meet their needs will guarantee this commitment.

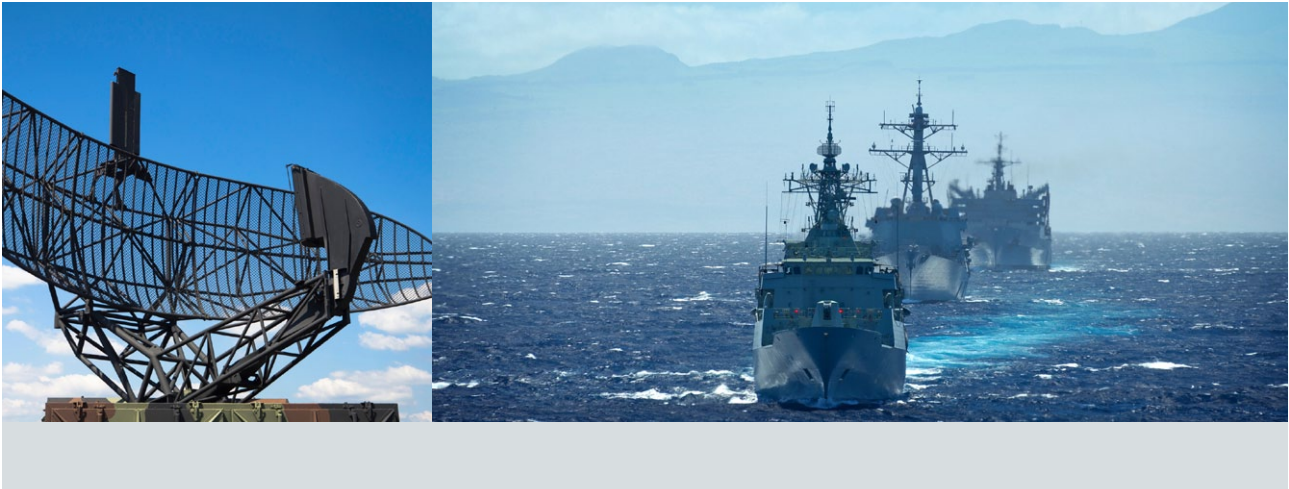
Defence Experience & History

With over 40 years design & manufacture experience in power conversion systems including 25 years experience in the design & supply of defence frequency conversion equipment for a wide range of applications, Thycon is well placed to work with any defence department to provide a reliable solution that will meet the wide range in needs seen across defence.

The fact that most of the equipment supplied by Thycon has been in continuous operation in the harsh Australian Environment with minimal maintenance bears testament to the robust 25 year design life that Thycon prides itself in delivering. In fact the current record for Thycon equipment operating in a critical application at an Airport exceeds 40 years; with this testament to reliability who else would you trust to ensure your defence capabilities are supported with reliable equipment.

Thycon Design Advantages Include:

- High fault clearing capability with advanced Thyristor technology
- Robust industrial design with proven 25 year plus operational life
- Thycon proprietary static flywheel technology enables mechanical load support
- Re-settable protection design utilising circuit breakers (no fuses)
- Modular design with field service & repair in mind
- Low component count increasing MTBF
- Backwards & forwards compatibility
- Naturally commutated low harmonic output waveform (non PWM)
- Low EMI & RFI ensuring interference is minimised
- Transformer isolated output
- Thycon proprietary optional 960V conversion reducing losses
- High Quality Australian Design & Manufacture
- Designed for harsh Australian operating conditions 0-45°C



Naval Capabilities

With many Navy vessels designed for 60Hz on-board power, dockside power in many ports and naval facilities requires conversion from the local 50Hz network to a reliable 60Hz supply negating the need to run ship board generation when in dock and hence reducing burn of expensive and high emission ship fuel.

Thycon's years of experience providing dockside power for a range of vessel sizes including patrol boats, mine hunters, submarines and destroyers means that operators can be confident that they will have the power available when required.

Thycon's proprietary static flywheel technology ensures that even under varying and high inertia mechanical loads such as gun turrets & loading winches efficient & reliable power is available on demand.

Thycon 50/60Hz Converters can range from between 50kVA – 6MVA for a single converter with paralleling options available to increase the size of this capacity or alternatively provide flexibility & redundancy of supply.

Dockside Power reticulation can be configured to maximise flexibility or minimise installation costs and parasitic losses using Thycon proprietary 960V conversion technology and combining centralised and/or de-centralised reticulation schemes.

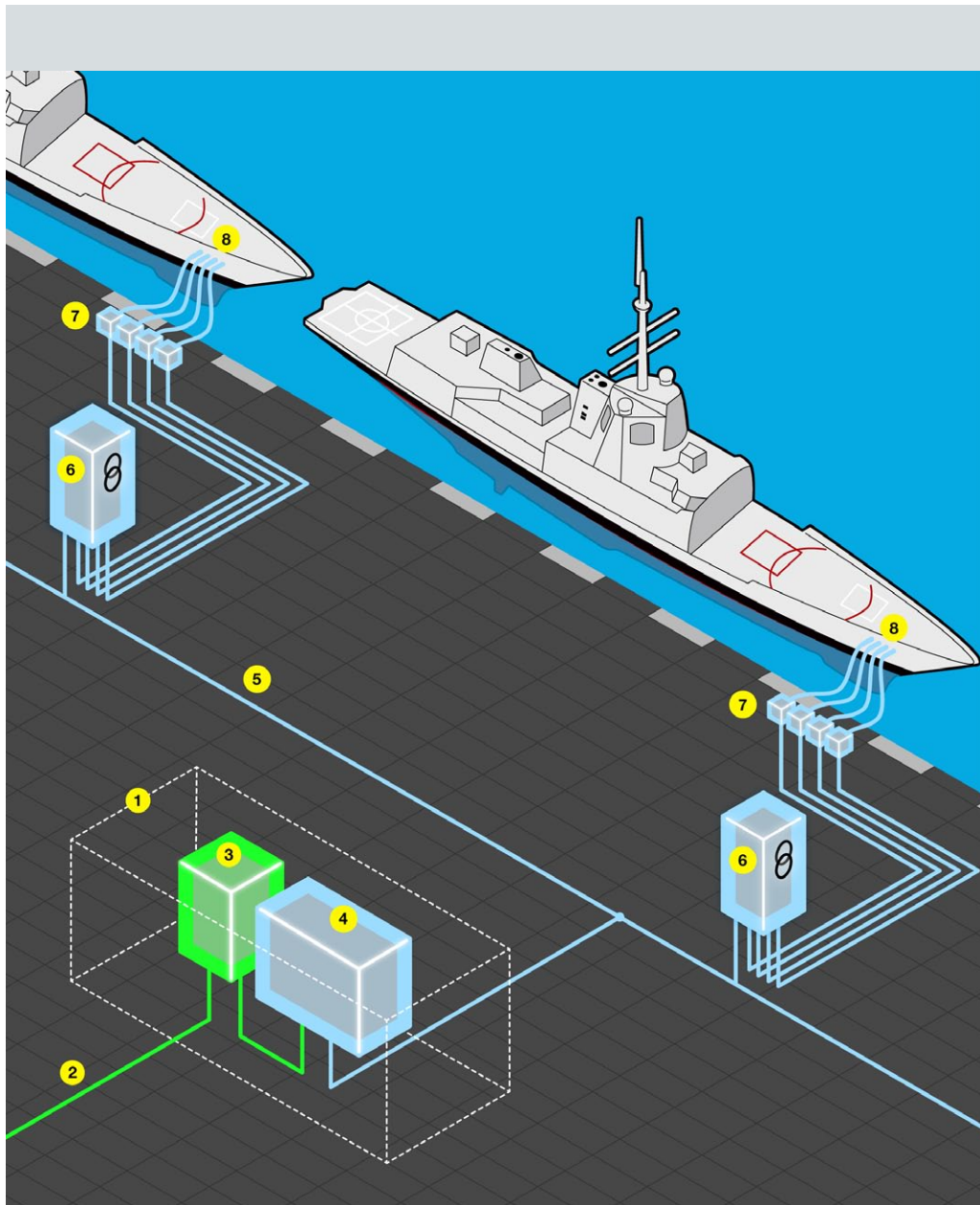
Frequency Converter Design Options include:

- Centralised Power House Systems
- De-centralised Dockside Systems
- Portable Containerised Dockside Systems

Applications include:

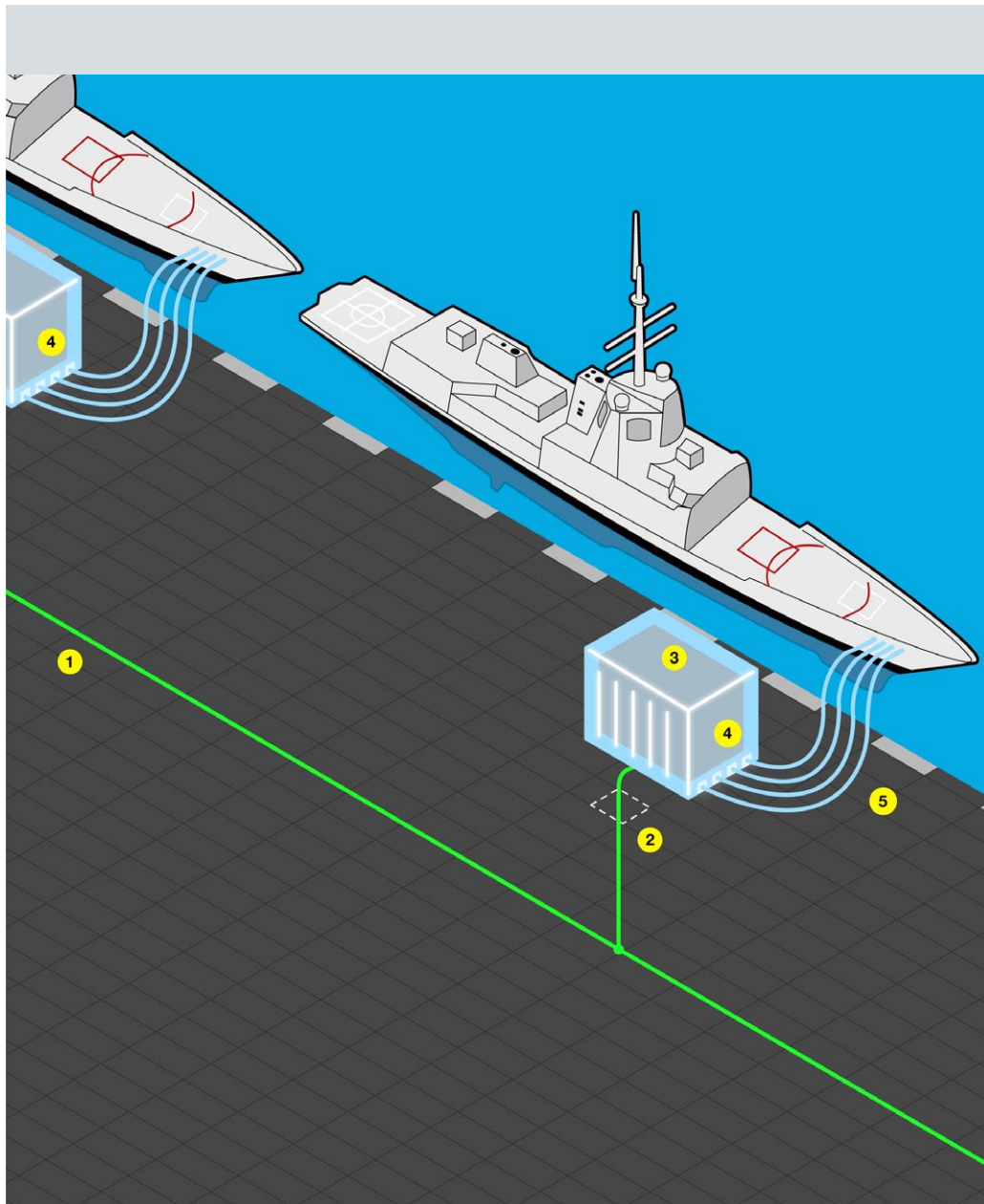
- Navy Base Power House
- Dockside Power
- Weapons Testing Facilities
- Command and Training Centre Facilities

Whether you are operating patrol boats, submarines or destroyers, if you have a shore power requirement, talk to Thycon.



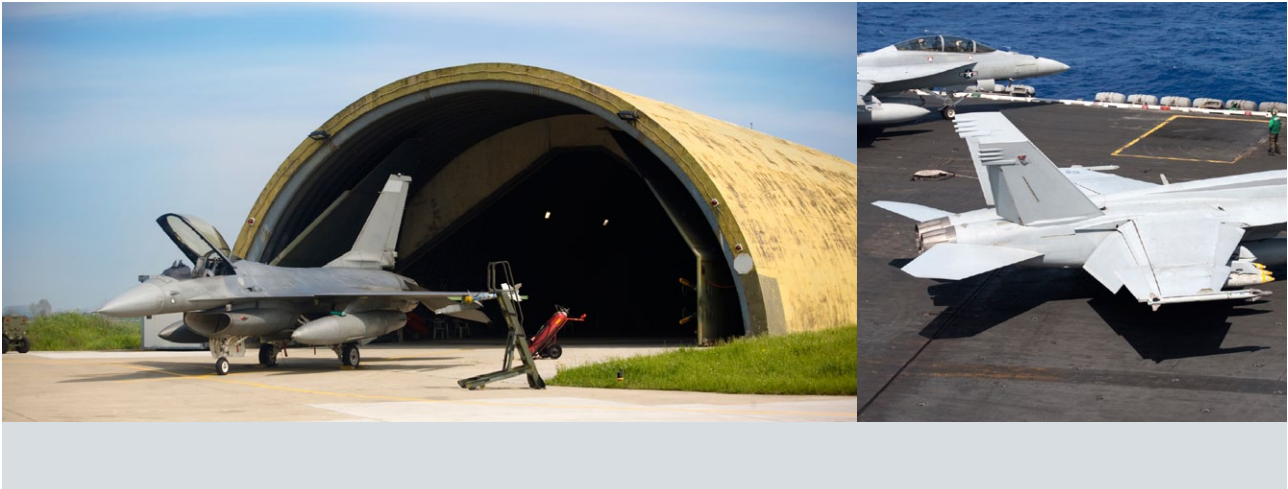
CENTRALISED POWER SYSTEM

- | | |
|---|---|
| 1. Centralised Power House | 5. MV Ring Main |
| 2. High quality supply, MV, 50Hz,
THDI < 5% and PF > 0.95 | 6. Step down Transformers
MV/440V RMS 60Hz |
| 3. Main switchboard MV supply 50Hz | 7. Cope boxes |
| 4. Static Frequency Converter 50/60Hz
Modular/Redundant optional | 8. Pluggable Cope leads |



DECENTRALISED POWER SYSTEM

- | | |
|--|-------------------------|
| 1. High quality supply, MV Ring Main, 50Hz,
THDI < 5% and PF > 0.95 | 4. Built-in Cope boxes |
| 2. Flexible MV 50Hz supply cable & pit | 5. Pluggable Cope leads |
| 3. Static Frequency Converter
MV/440V RMS 50/60Hz
Containerised and portable | |



Airforce Capabilities

Military Aircraft require clean & reliable 400Hz power supply whilst stationary to conserve expensive aviation fuel & ensure that systems can still be operated and tested with aircraft engines turned off.

Thycon's years of experience providing power for a range of aircraft sizes including fighters, carriers, and commercial jets means that operators can be confident that they will have the power available when required.

Thycon's proprietary static flywheel technology ensures that even under varying and high inertia mechanical loads such as gun turrets & loading winches efficient & reliable power is available on demand.

Thycon 50/400Hz Converters can range from between 25kVA – 500kVA for a single converter with paralleling options available to increase the size of this capacity or alternatively provide flexibility & redundancy of supply.

Aircraft Power reticulation can be configured to maximise flexibility or minimise installation costs and parasitic losses using Thycon proprietary 960V conversion technology and combining centralised and/or de-centralised reticulation schemes.

Frequency Converter Design Options include:

- Centralised Power Systems
- De-centralised Power Systems
- Portable Power Systems

Applications include:

- Aircraft Hangar Facilities
- Weapons Testing Facilities
- Command and Training Centre Facilities

Whether you are operating jets, transport or rotary wing aircraft, if you have an aircraft ground power requirement, talk to Thycon.



Runway Lighting Constant Current Regulation

Thycon Constant Current Regulators are designed to provide high-quality, regulated, single phase power to achieve maximum performance and lifetime of airfield lighting systems while achieving high power quality and energy efficiency for the Aircraft Base.

Features that provide extended lifetime and reliability of runway lighting systems include:

- Sinusoidal output current and voltage throughout the load range and intensity settings
- Low THDV & THDi ensuring lowest possible flicker & cable/bulb degradation
- Low EMI & EMF ensuring lowest possible flight systems interference
- Soft start and intensity transition facility
- Comprehensive protection for open circuit, over-voltage and over-current

Features that enhance energy efficiency and power quality of supply to the Aircraft Base are:

- Input power factor > 0.95 at all loads
- Supply harmonic injection <3%

If you have an aircraft runway lighting requirement, talk to Thycon.

Special Projects - MESA Radar Program

Thycon's reputation for robust, long life, quality equipment has in recent years seen international recognition with authorisation by the US Department Of Defence to collaborate with Northrop Grumman in the design, manufacture and testing of radar power supply requirements for the Wedgetail (Australia) And Peace Eagle (Turkey) Multirole Electronically Scanned Array (MESA) Radar Program.

If you have a special power project, talk to Thycon.

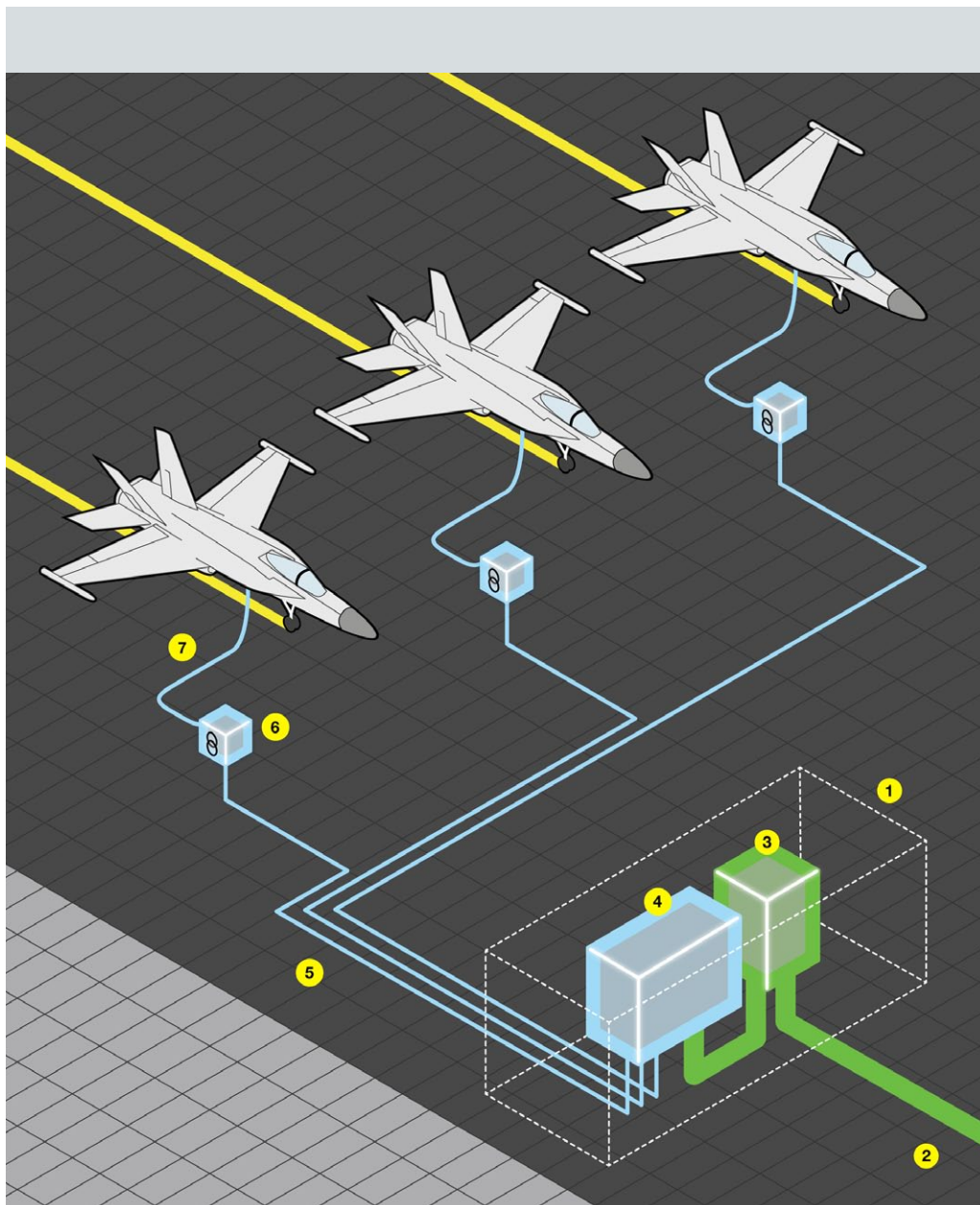
Operations/Command/Training Capabilities

Defence facilities require clean, uninterruptible 50Hz, 60Hz or 400Hz power to ensure mission critical systems can operate 24hours a day, 365 days a year.

Thycon's years of experience providing Industrial UPS power for a range of Operations, Control Towers and Training Facilities means that operators can be confident that they will have the power available when required.

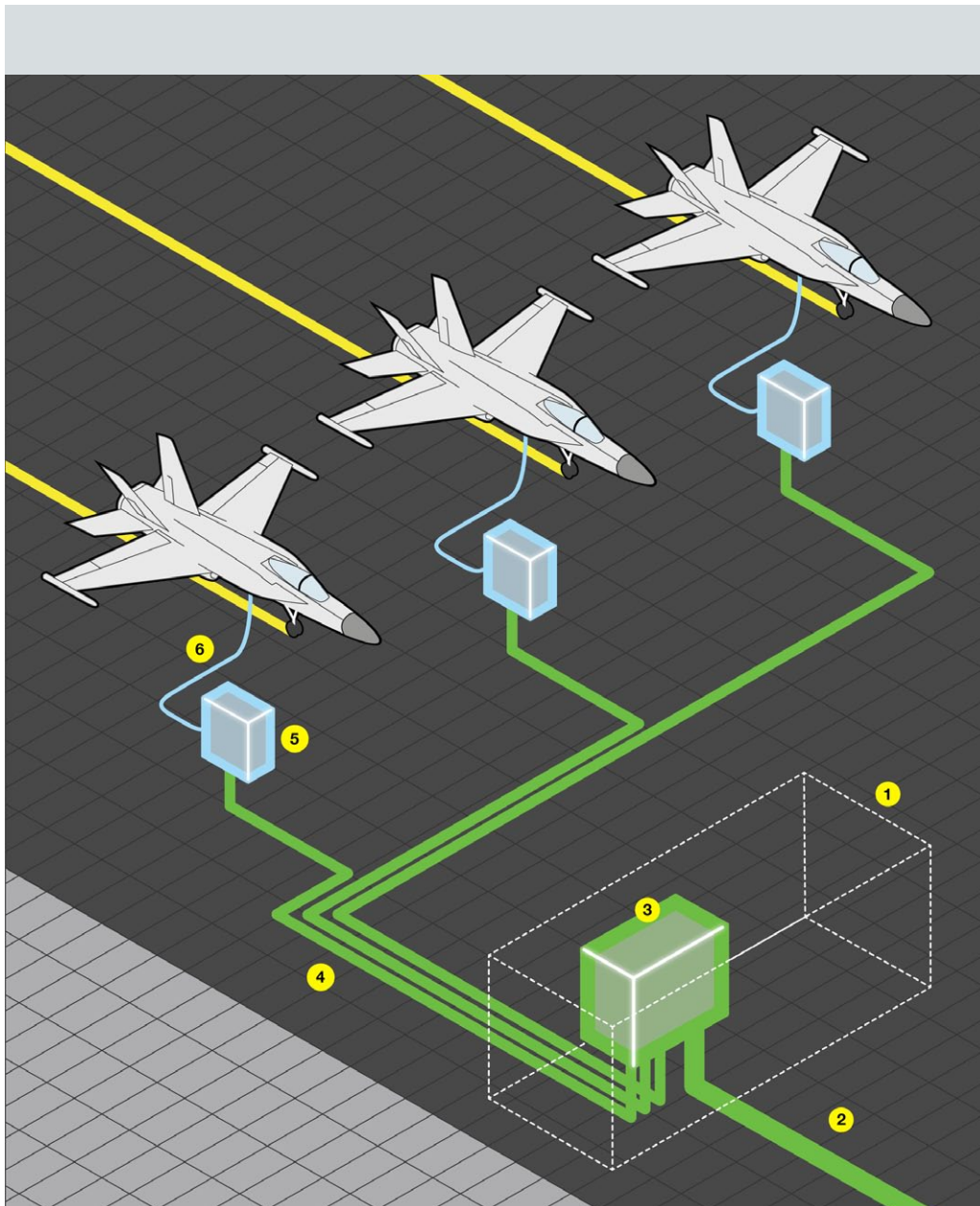
Ruggedised Thycon Industrial UPS equipment has been installed on Flight Simulators, Air Craft Control Towers, Radar Systems and Training/Repair Facilities.

If you have an Operation, Command or Facility power requirement, talk to Thycon.



CENTRALISED POWER SYSTEM

- | | |
|--|---|
| 1. Centralised Plant Room | 5. 960V RMS 400Hz distribution |
| 2. High quality mains supply, 50Hz
THDI < 5% and PF > 0.95 | 6. Step down Transformers
960/200V RMS 400Hz |
| 3. Main switchboard supply 50Hz | 7. Umbilical aircraft cable |
| 4. Static Frequency Converter 50/400Hz
Modular/Redundant optional | |



DECENTRALISED POWER SYSTEM

- | | |
|---|---|
| 1. Centralised Plant Room | 4. Mains supply 50Hz distribution |
| 2. High quality mains supply, 50Hz
THDI < 5% and PF > 0.95 | 5. Static Frequency Converter 200V 50/400Hz
Standalone |
| 3. Main switchboard supply 50Hz | 6. Umbilical aircraft cable |

Static Frequency Converter References 1989-2012

Year		Customer Details	State	Qty	Equipment
1993		ADI Garden Island	NSW	1	100kVA 60Hz Frequency Converter
1994		ADI Garden Island	NSW	1	20kVA 400Hz Frequency Converter
2005		ADI Garden Island	NSW	1	40kVA 400Hz Frequency Converter
1995		ADI Limited	NSW	2	300kVA 60Hz Frequency Converter
2005	2006	AMC Wharf	WA	3	800kVA 60Hz Frequency Converter
1992		Australian Submarine Corp.	SA	1	10kVA 400Hz Frequency Converter
1992		Australian Submarine Corp.	SA	1	70kVA 60Hz Frequency Converter
1998		BAE Lead-In-Fighter Facility	NSW	7	30kVA 400Hz Frequency Converter
2012		BAE Systems - Williamstown	VIC	2	1500kVA 60Hz Frequency Converter
2012		Defence South Australia	SA	3	1500kVA 60Hz Frequency Converter
1992		DOD	ACT	1	40kVA 60Hz Frequency Converter
1994	2012	DOD - Orchard Hills	NSW	3	20kVA 60Hz Frequency Converter
1996		DSTO Edinburgh	SA	1	20kVA 400Hz Frequency Converter
2002	2005	DSTO Edinburgh	SA	4	30kVA 60Hz Frequency Converter
1992		HMAS Albatross	ACT	1	40kVA 60Hz Frequency Converter
1993		HMAS Garden Island	NSW	1	100kVA 60Hz Frequency Converter
2004		HMAS Garden Island	NSW	1	100kVA 400Hz Frequency Converter
1991	1995	HMAS Stirling	WA	2	12.5kVA 400Hz Frequency Converter
1995		HMAS Stirling	WA	1	150kVA 60Hz Frequency Converter
1995		HMAS Stirling	WA	2	75kVA 60Hz Frequency Converter
1995		HMAS Stirling	WA	3	25kVA 60Hz Frequency Converter
1995		HMAS Stirling	WA	1	5000kVA 60Hz Frequency Converter
1995		HMAS Waterhen	NSW	2	300kVA 60Hz Frequency Converter
1995	2005	HMAS Waterhen	NSW	4	20kVA 400Hz Frequency Converter
2000		HMAS Waterhen	NSW	1	70kVA 60Hz Frequency Converter
1995	2004	HMAS Watson	NSW	3	20kVA 400Hz Frequency Converter
1995		HMAS Watson	NSW	2	50kVA 60Hz Frequency Converter
1995	2004	HMAS Watson	NSW	2	10kVA 400Hz Frequency Converter
1995		HMAS Watson	NSW	4	15kVA 60Hz Frequency Converter
1995		HMAS Watson	NSW	1	35kVA 60Hz Frequency Converter
1995		HMAS Watson	NSW	1	45kVA 60Hz Frequency Converter
1995	2001	RAAF Base - Amberley	QLD	5	35kVA 400Hz Frequency Converter
1993	1995	RAAF Base - Edinburgh	SA	2	45kVA 400Hz Frequency Converter
1993		RAAF Base - Edinburgh	SA	1	10kVA 60Hz Frequency Converter
1995		RAAF Base - Edinburgh	SA	1	20kVA 400Hz Frequency Converter
1996		RAAF Base - Edinburgh	SA	1	60kVA 400Hz Frequency Converter
2001	2002	RAAF Base - Edinburgh	SA	2	30kVA 400Hz Frequency Converter

Year		Customer Details	State	Qty	Equipment
2001	2009	RAAF Base - Edinburgh	SA	7	90kVA 400Hz Frequency Converter
2002		RAAF Base - Edinburgh	SA	1	20kVA 60Hz Frequency Converter
2003		RAAF Base - Edinburgh	SA	1	180kVA 400Hz Frequency Converter
2005		RAAF Base - Edinburgh	SA	4	30kVA 60Hz Frequency Converter
1993		RAAF Base - Kingswood	NSW	1	60kVA 60Hz Frequency Converter
1993	1996	RAAF Base - Kingswood	NSW	2	25kVA 400Hz Frequency Converter
1996		RAAF Base - Kingswood	NSW	1	25kVA 60Hz Frequency Converter
1994		RAAF Base - Pearce	WA	4	60kVA 400Hz Frequency Converter
1994		RAAF Base - Pearce	WA	1	12.5kVA 400Hz Frequency Converter
2004		RAAF Base - Richmond	NSW	1	60kVA 60Hz Frequency Converter
1992		RAAF Base - Salisbury	SA	1	20kVA 400Hz Frequency Converter
1993		RAAF Base - Salisbury	SA	2	40kVA 400Hz Frequency Converter
1989	1992	RAAF Base - Tindal	NT	3	50kVA 60Hz Frequency Converter
1991	1993	RAAF Base - Tindal	NT	14	37.5kVA 400Hz Frequency Converter
1991	1992	RAAF Base - Tindal	NT	4	15kVA 400Hz Frequency Converter
1992	2005	RAAF Base - Tindal	NT	2	100kVA 60Hz Frequency Converter
1992		RAAF Base - Tindal	NT	2	20kVA 60Hz Frequency Converter
1992	1993	RAAF Base - Tindal	NT	5	50kVA 400Hz Frequency Converter
1997		RAAF Base - Tindal	NT	1	150kVA 60Hz Frequency Converter
1997		RAAF Base - Tindal	NT	5	120kVA 60Hz Frequency Converter
2011		RAAF Base - Tindal	NT	3	90kVA 400Hz Frequency Converter
1998		RAAF Base - Williamtown	NSW	1	125kVA 60Hz Frequency Converter
1998		RAAF Base - Williamtown	NSW	1	50kVA 400Hz Frequency Converter
1998	1999	RAAF Base - Williamtown	NSW	7	60kVA 400Hz Frequency Converter
1999		RAAF Base - Williamtown	NSW	2	200kVA 400Hz Frequency Converter
1999		RAAF Base - Williamtown	NSW	8	30kVA 400Hz Frequency Converter
1999		RAAF Base - Williamtown	NSW	1	100kVA 400Hz Frequency Converter
2001		RAAF Base - Williamtown	NSW	2	100kVA 400Hz Frequency Converter
2001		RAAF CRU 2 - Darwin	NT	2	125kVA 400Hz Frequency Converter
2000		Raytheon	NSW	1	20kVA 60Hz Frequency Converter
2011		Raytheon	SA	2	50kVA 60Hz Frequency Converter
2005		Robertson Barracks - Darwin	NT	6	120kVA 400Hz Frequency Converter
2005		Robertson Barracks - Darwin	NT	2	40kVA 400Hz Frequency Converter
2005		Robertson Barracks - Darwin	NT	3	20kVA 400Hz Frequency Converter
1992		Transfield Defence Systems	VIC	1	420kVA 60Hz Frequency Converter
1994		Transfield Defence Systems	VIC	1	200kVA 60Hz Frequency Converter

THYCON

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