TRANSFORMER RECTIFERS OIL COOLED THYRISTOR CONTROL

DATASHEET 1.16

TRS

BAC Corrosion Control Ltd design, manufacture and test a complete range of Transformer Rectifiers and Power Control systems under their Infinity Power brand name.

We cater for a wide range of specifications and functionality requirements and work with our clients to provide reliability, value and quality at every step of the process.

The transformer rectifier is built into an oil tank and control cabinet/s with the monitoring and control instruments mounted on an internally hinged control panel. The inner control panel includes a door interlocked isolator switch, providing electrical protection to the operator.
The control cabinet is fitted with a viewing window to enable easy monitoring of the transformer rectifier operating condition.

The transformer, choke, rectifier and shunt are mounted inside the oil tank on a removeable frame. The AC MCB, DC fuses, thyristor firing PCB and AC/DC lightning arrestors are mounted on the control cabinet backplate.

The DC voltmeter, DC ammeter, AC On lamp, door interlocked isolator, 4mm test points and controls are all mounted on the internal door.

BAC CORROSION CONTROL

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Electrical Circuit

The transformer rectifier converts a single phase or three phase AC power supply into controlled DC current which is be used for providing impressed current for cathodic protection.

The AC input is supplied to the main transformer via the AC isolator and MCB. The main transformer Steps down the voltage to that required for the maximum DC output.

The reduced voltage is applied to a full wave half control thyristor rectifier via semi-conductor fuse/s, which rectifies the voltage from AC to DC. The DC voltage is then smoothed using a choke and capacitor network.
The type of control utilised is 'Phase angle control' achieved by determining the point on the sine wave at which the thyristors will fire thus giving the level of DC output required.

Monitoring of the DC output current is achieved using a shunt typically rated 100mV at full output and a fused dc voltage signal from the DC terminals.
The DC monitoring signals are converted to digital signals by our thyristor control PCB using 16- bit converters for high accuracy and control.
We can offer analogue meter and or controls in place of digital HMI if required.

Enclosure

Typically, we offer our TR units in mild steel using CR4 Cold Reduced mild steel sheet. We can build in stainless steel both 304L and 316L grades. Additionally, we can offer hybrid design utilizing both mild steel and aluminium to offer best thermal performance.
The oil tank is typically 3 or 4mm thick.
The control cabinets/s, sunshade and internal panel are typically 2 or 3mm thick.
All sheet material is CNC or laser cut and folded into shape.
All non folder seems, and part intersections are fully welded.

The tank lid is a folded pan it is bolted to the tank lifting channel sections using the lifting eyebolt holes. The tank is sealed with an oil rated Silicon gasket fixed to the underside of the tank lid.
Cabinet doors are fitted with silicon gasket for ingress protection.
All sealing gaskets have been tested by a UKAS accredited test house to EN 60529:1992+A2:2013 achieving IP66 rating.

The oil tank assembly includes 2 pre-formed channels fully welded to the bottom of the tank. These channel have 17.5mm holes for securing to a concrete base.

All components inside the tank are mounted to a removable frame.
All cable connections are made at the top of the frame above the oil.
The frames includes lifting point suitable for M20 eyebolts.

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Supply Voltage
Please state AC input rating as available at site.

Rated Output
To suit application, please request DC Voltage and Amperage as required.

Type
Outdoor, plinth mounting. safe area locations. Hazardous area TR units also available please see our Oil cooled Hazardous Area Transformer Rectifier Datasheet.

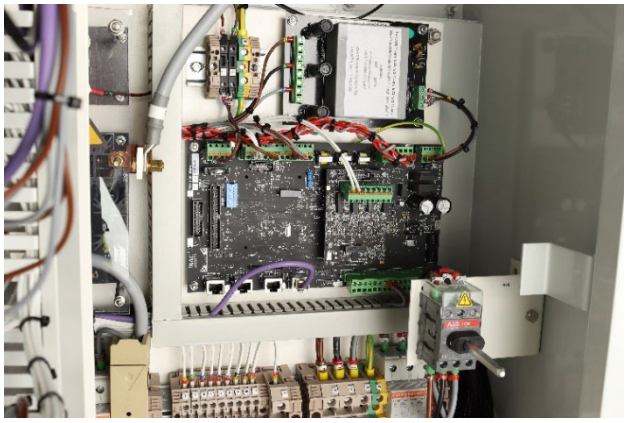
Control
Manual Thyristor Control as standard with option for auto-potential control.

Temperature Range
Minimum: -10°C to Maximum: 55°C as standard.
Lower and higher (max -40 to +70) ambient temp on request.

Cooling
ONAN (oil immersed, natural convection air cooled)
Tank size calculated using site ambient, max oil temperature and material heat dissipation value W/m²/°C for very unit we build to ensure optimal size and reliable operation.

Protection
The equipment is provided with the following devices as standard for protection against over voltage and over current conditions:

- AC MCB
- Snubber network on thyristors
- Rectifier Semi-conductor fuse/s
- Voltmeter fuse
- DC output fuse
- Control circuit fuse/s
- Electronic voltage & current limits
- AC/DC surge protection rated 20kA at 8/20us waveform



Optional features
- Remote Monitoring and Control System (RMCS)
- RS485 MODBUS RTU or MODBUS TC/IP telemetry
- Auto potential control from up to 8 reference electrodes
- GPS time synchronised or standard non-synchronised DC timer interrupter
- Removable sunshade
- Local datalogging with SD card for data storage
- 4-20mA transducers
- Volt free contact alarms

More features available on request.

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Cable Entry

The control cabinet/s are fitted with glandplate/s suitably sized to accommodate all AC supply, DC output, reference electrode and control cables. As standard we offer brass compression glands to suit client cable size.
We can offer other cable glands on special request.
Glandplate can be supplied predrill with glands fitted or undrilled.

Paint Finish

A range of surface preparation and paint finishes are available.
The following specifications are offered as standard:

Standard Paint finish (C4):
Surface preparation: Shot Blast SA2.5
Interpon Redox PZ zinc rich primer (70-120µm)
Interpon D1036 high performance polyester powder (80-90µm)
Finish Colour: Light Grey (RAL 7035)

High Specification Paint finish (C5):
Surface preparation: Shot Blast SA2.5
Hot Zinc Spray Zn100 (80µm)
Interpon Redox APA anti-gassing primer (60-80µm)
Interpon D1036 high performance polyester powder (80-90µm)
Finish Colour: Light Grey (RAL 7035)

Stainless steel can be offered in bare metal with random orbit or bead blast finish. Stainless steel can also be supplied with polyester powder coating.

Meters

The equipment is fitted with a digital HMI controller as standard.
Our HMI offer significant local monitoring and Control including (*Optional) :

Monitoring	Control
- DC output	- Control Mode
- AC ripple	- Control set point and limits
- Alarms	- Alarm thresholds
- Date and Time	- *DC Timer interrupter
- *Up to 8 ref electrodes	- *Datalogging
- *Temperature	
- *Oil Level	

The HMI screen shuts down after 15 minutes of inactivity, for TR units with viewing window we include a wake button on the outside of the control cabinet to activate screen with opening the external door.

Optional digital or Analogue metering and controls available including but not limited to :
- DC output voltage and current
- AC supply voltage and current
- DC reference to structure potential meter
- Hours run meter
- Analogue controls via switches and potentiometers.

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AC Ripple on the DC output

Less than 5% from 5% to 100% of the DC output.
AC ripple can be monitored and alarm on the Digital HMI controller.
<100mV ripple available on special request.

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Accessories

The equipment is supplied with the following as standard:

- Rating plate
- Oil sight level gauge
- Desiccant gel breather
- Door catches (1x padlockable catch)
- Oil filler port
- Oil drain tap

Tests

Every unit built is fully tested to the following program:

- Visual and mechanical checks
- 1000V insulation test pre-heatrun
- Transformer 2.5kV flash test
- PCB setup and check
- Operation / Functional test pre heatrun
- Recorded results
- Heat run – TR unit run at full load for minimum 12 hours with all critical temperatures logged.
- 1000V insulation test post-heatrun
- Final checks

Additional testing can be offered to suit client special requirements.

Test certificate is produced along with as built drawings and operational manual. All documents are shared with client and hard copies included inside each TR unit.

We welcome client and 3rd party inspections.

All our TR units are CE and UKCA marked.
All certification backed by appropriate qualification testing and product technical file.

Other certifications available on special request.

Infinity™ POWER

BAC Corrosion Control would be pleased to receive your valued enquiries and we look forward to being of assistance with your project. Please email your enquiries to

sales@bacgroup.com

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