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CATHODIC PROTECTION SYSTEMS

PRODUCT CATALOGUE

Rev. 170926

WATER INDUSTRIES

POWER PLANTS

CONCRETE STRUCTURES

HARBOURS & JETTIES

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THOR SYSTEM



Overview

The Thor system has been specially developed to control and monitor cathodic protection systems in plant areas where multiple systems are installed.

The basic idea is to allow one system to control a large number of rectifiers instead of having individual systems, which is an advantage from an installation and operating point of view. The separate rectifier modules can be located up to 500 m away from the control panel and will be connected via a CAN (Controller Area Network) buss.

The Thor system can control up to 20 rectifiers in constant current-, voltage- and potential mode. A total of 96 reference electrodes can be connected to the system and any of them can be used as controlling reference.

From the panel simultaneous IR-drop measurement can be carried out for all installed reference electrodes.

The system also has a built in data logger function that can sample all operational data at intervals between 1 per minute and 1 per 24 hours.

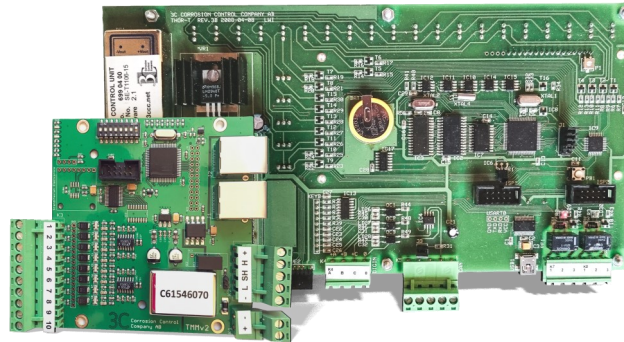
The data can then be down loaded to a USB memory, laptop or through the internet (optional) for further analysis.

The Thor system has, for each sub system, Hi/Lo alarms for current, voltage and potentials.

The system in the standard version is operated from the local control panel where all configuration and operation is carried out.

As an alternative to operation from the local control panel a remote control can be used. The remote system can be connected to the common cabinet either via TCP/IP local or via internet, modem.

All functions that can be done on the local control panel can also be done remotely.



Technical Data

Thor TCU (HMI)	Art. No. 603-0400	TMM Potential I/O	Art. No. 603-0410
Supply voltage	24VDC	No. Input ch.	8
Field bus type	CAN	Resolution	12-bit
Data log capacity	400 positions	Range:	± 2.5 VDC
Max distance	750 m (First to last Node)		
		TRM Regulator I/O	Art. No. 603-0420
No. of rectifiers to control	20	Resolution	12-bit
Operation Mode	Constant Potential Constant Current Constant Voltage	Range	Output: 0-10V Current input: 0-60mV 0-1V Voltage input: 0-60V
Radio interference	Suppressed according to VDE 0871 A, wirebound interference.	Protections I/O cards	Transient voltage
Ambient temp.	Max 40°C		
Optional Add-on	Art no. 603-0405		
	Remote Monitoring		
	<ul style="list-style-type: none"> • Ethernet interface • Micro SD card • USB 		



Thor Remote Monitoring and Control



Overview

The Thor Remote Monitoring & Control system software is designed to handle a large amount of rectifiers and potentials inputs, at a central server.

The Thor Remote Monitoring & Control system software can be installed on owner's servers or hosted at 3C Corrosion Control Company and accessed over the internet with a web browser over a secure SSL connection.

The rectifier cabinets can be linked directly to the server on a local network or via internet.

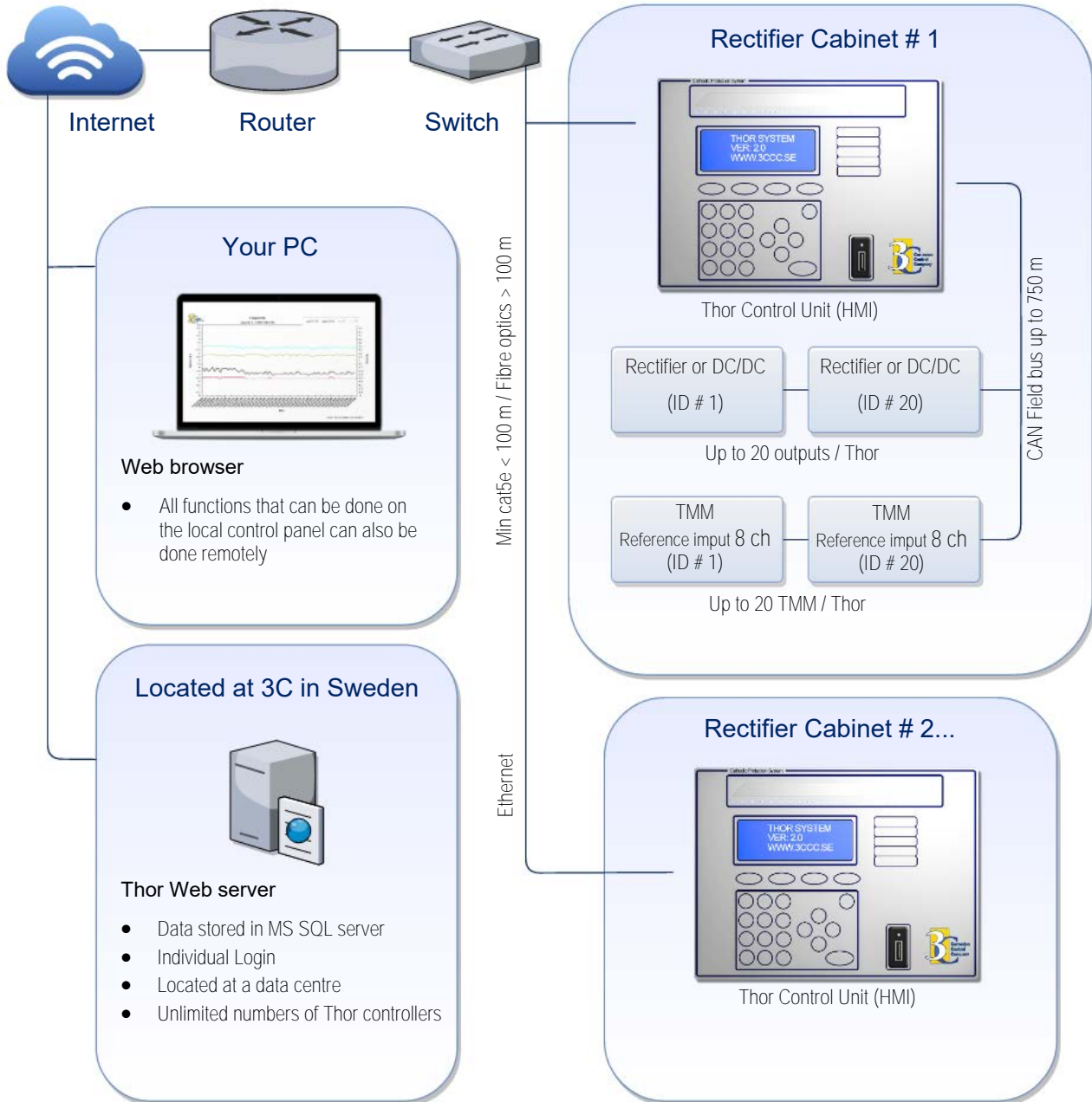
All data is stored on the server in a reliable SQL database.

The user interface is via a web-based system where the user can perform different tasks depending on the access level given.

Main functions

- Overview of alarms for all systems connected
- Individual control of each rectifier module (PCM).
 - View Online data like Voltage, Current and potentials
 - Change of operation mode (OFF, Potential, Constant Current or Voltage)
 - Change of operation set parameters
 - Change of Alarm levels and limits
 - All adjustments will be stored in a separate database for easier fault finding
- View on/off potential values
- View 24h de-polarization measurement data
- View historical data stored in the database as graphs or numeric values
- Export data to Excel or as Pdf's

Service Layout



LC Probe

Local Corrosion Detection



- Detects AC & DC induced corrosion
- Patented invention
- Works without power supply
- Early warning solution
- Indicates predefined corrosion depth
- Works remotely controlled

Background

The LC Probe was originally developed to detect AC corrosion in buried pipelines.

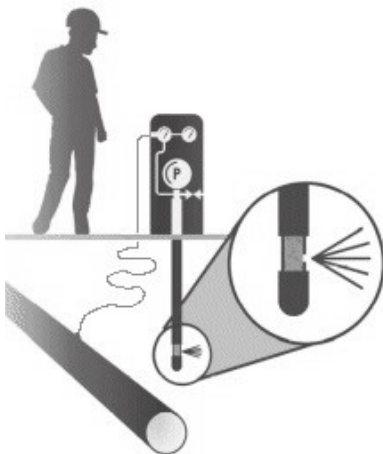
It is well known that pipelines located in the vicinity high voltage power lines can be exposed to AC corrosion. Well coated pipelines are especially sensitive. Established corrosion monitoring is expensive and laborious. Results are often known when the corrosion has proceeded too far. Other kinds of equipment cannot monitor the most common type of AC corrosion, can cause rapid penetration of the pipe. The LC Probe can indicate this.

All other types of corrosion on the pipeline can be detected as well and the solution has also been found excellent for detecting corrosion in other areas, such as reinforcement bars in concrete structures, pipelines in refineries and tanks for petrol stations.



How it works

The LC Probe is located in the pipe trench of the pipeline it is monitoring and shall be in electrically contact to it. In this way, the LC Probe is exposed to the same environment and degree of electrical interference as the pipeline. When the deepest pit penetrates the wall of the pressurized steel tube of the LC probe the pressure inside is lost. This is indicated immediately on a pressure meter in the test post or remotely in a control centre by an alarm.



Features and benefits

- Mechanical function provides clear and reliable results. Limited maintenance and absence of laboratory analysis reduces cost.
- Simple functionality makes the LC probe reliable in rough environments.
- The LC Probe itself requires no power supply. If controlled remotely from a control centre the equipment sending the signal requires external power, which can be from a small solar panel.
- Install the LC Probe on existing and new pipe lines exposed to AC corrosion hazards, to enable early warning before the pipeline is penetrated and avoid major cost due down time in distribution.



DataCell

Advanced Data Logger



CORROSION PROTECTION | NETWORK MONITORING | EVENT ALARMING

INPUTS

- » 1 voltage/current
- » 1 digital counter
- » 1 state/alarm

MEASURE

- » voltage
- » current

LOG

- » voltage
- » current

ALARM

- » high
- » low

NEXT G

- » Data returned as scheduled
- » Instant alarm notification
- » Send to system
- » Send to phone

RUGGED WATERPROOF INDEPENDANT

- » IP68
- » Battery powered

INTEGRATE TO

- » SCADA
- » BMS
- » SQL
- » Monitoring Systems
- » Web Hosted Systems

Product Overview

The DataCell advanced data logger has been designed to provide automated remote monitoring and analysis of systems and environments critical to your needs.

The DataCell has been designed to be maintenance free, specifically for the harsh, remote environments where it is usually deployed.

Being battery powered and completely self contained the DataCell can monitor powered or unpowered networks independent of the mains supply, enabling critical system measurement, monitoring, and alarming.

The data from the DataCell is returned to you via the Next G/3G/GSM/GPRS network and can be automatically integrated into your business systems for analysis. KPI reports, trend analysis and alarming become a breeze and allow you to concentrate on business improvement rather than analysis. Data can be returned directly to your system or displayed on the DataScape web platform.

Being absolutely independent of any other support systems, the DataCell is truly self sufficient.

Installation simply involves mounting the unit and sensor - no field calibration or configuration is required. The exceptional battery life will result in a low 'whole of life' cost of ownership.

3C Corrosion Company is a distributor of:



Specifications—CZ21073

Inputs

Analogue Range	± 10 V
Analogue Resolution	± 10mV
Digital	100 Hz max.
State	Alarm

Logging

Memory	16,000 records
Alarms	Low/High reading in a period

Communications

Serial	USB Interface
Wireless	Next G/3G/GSM/GPRS
Protocols	TCP, FTP, Email, SMS
Delivery	Data programmable from 1 hour Alarms - immediate

Clock

Real time with SNTP time update

Battery

Type	3.6V Primary LiSOCl ₂
Life	Typically 5 years, configuration dependant

Physical

Dimensions	68mmØ x 170mm
Weight	415 grams
Environmental	IP68
Operating Temperature	0°C to +50°C
Storage Temperature	-20°C to +70°C

Applicable Standards

AS 60529 - 2004: IP68	IEC 60529 Ed 2.1: IP68
AS/NZS 60950.1:2011	EN 60950-1:2006/A11:2009
AS/NZS CISPR 22:2009	RMC
CE	



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Rectifier PSW 60



Overview

The PSW 60 is a multi-channel DC/DC converter designed for cathodic protection applications.

Each individual converter can be configured for different number of output channels: 4 x 1A, 2 x 2A, 1 x 4A, 4 x 100 mA, 2 x 200 mA, or 1 x 400 mA is available.

The modules are controlled by the Thor Control System via CAN field bus or via a 0-10 VDC signal.

On the individual modules a display are fitted that shows ID number, Current, Voltage and alarms for the individual channels.

The modules can also be operated as standalone units, then controlled by a potentiometer (0-10 V).

Each module is equipped with a block input signal for interrupt measurements.

Technical Data

Automatic Control

Fully controlled by the Thor Control System via CAN Field bus.

Manual Control

Input 0-10 VDC
Signal output Current 0-1 A, Voltage 0-1 V

Module Data

Input 24VDC \pm 10 %,
Output 15 V / 4 x 1 A, 2 x 2 A, 1 x 4 A
15 V / 4 x 100 mA, 2 x 200 mA
1 x 400 mA

Mode of operation

Constant Current Constant Voltage
Constant Potential (up to 96 reference electrodes)

Alarms

Hi/Low Current/Voltage/Block signal input for interrupt Potential measurement.

Dimensions

215 x 60 x 130 (l x b x h mm)

Rectifiers SwitchMode

1 - 15 A



Profitable investment

- Compact and powerful
- Easy to install

Low cost of operation

- Minimum of maintenance
- Air cooling, no cost for oil, water etc.
- Designed for automatic operation

Process optimized

- Designed to work with Thor System
- High accuracy and very low ripple
- Ease of interface with computers
- Easy to link units for higher current output
- Wide range of options to suit your process

Secure and safe

- Designed according to international standards
- Extensive warranties
- Service and spare parts available world wide

Built in features

- CAN Field bus interface
- Serial communication

Options

- Programmable controller
- Signal converters
- Digital instrumentation
- 10-turns potentiometers
- Custom-designed rectifiers

Function

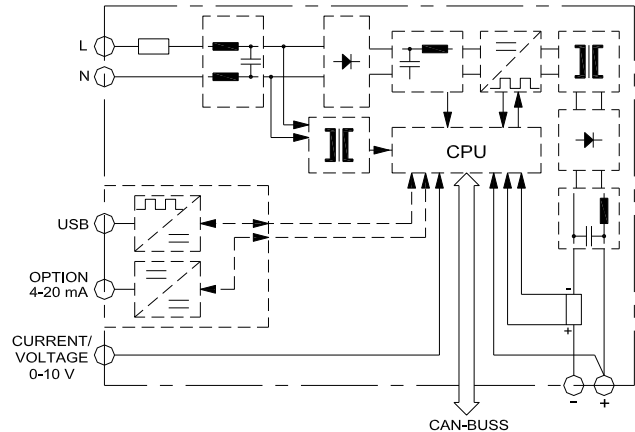
The main voltage is connected to the diode bridge via a RFI-filter. The main voltage is rectified and smoothed by a filter and is then connected to the transistor switch.

The transistor switch converts the DC-voltage into high frequency pulses which are applied to the main transformer.

The transformer provides isolation from the mains and transforms the voltage to the rated output level. The control unit, monitors actual DC-current & voltage and regulates the output.

For external annunciation the unit have 2 relays for Alarm & Current output .

Block schematic diagram



Technical Data & Standard Sizes

Supply voltage:	230 V, $\pm 10\%$, 50-60 Hz, other voltages on request	Protections:	Over-current, over-temperature, transient voltage and short circuit protected.
Control accuracy:	Voltage/current $< \pm 1\%$.	Cooling:	Air cooling by natural.
Ambient temp.:	Max 40°C	Humidity:	Max 85% relative
Radio interference:	Suppressed according to VDE 0871 A, wirebound interference.	DC ripple:	$< 1\%$ between 10 - 100% of output current at CC mode (typically $< 0,5\%$).
Power factor:	About 0,95 at rated load.	Duty ratio:	Designed for continuous operation at rated load up to 1000 m altitude.
Regulation range:	Constant Voltage/Current 0-100%.	Efficiency:	$\sim 95\%$ depending on rating.
Dimension (LxHxD):	230x230x125 mm	Weight:	2kg

Nominal DC-voltage V	25	25	15
Nominal DC-current A	1	10	15
Primary current (240V)	0,4	2,4	2,4



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Rectifiers SwitchMode

15 - 100 A

Profitable Investment

- Units are extremely compact and powerful
- Very easy to install

Low Cost of Operation

- Minimum of maintenance
- Air cooling, no cost for oil, water etc
- Designed for automatic operation

Process Optimized

- High accuracy and very low ripple
- Ease of interface with computers
- Easy to link units for higher current output
- Wide range of options to suit your process



Secure and Safe

- Designed according to international standards
- Extensive warranties
- Service and spare parts available world wide

Built in Features

- CAN Field bus interface
- USB/Serial communication

Options

- Programmable controller
- Signal converters
- Digital instrumentation
- 10-turns potentiometers
- Custom-designed rectifiers



Rectifiers SwitchMode

15 - 100 A

Function

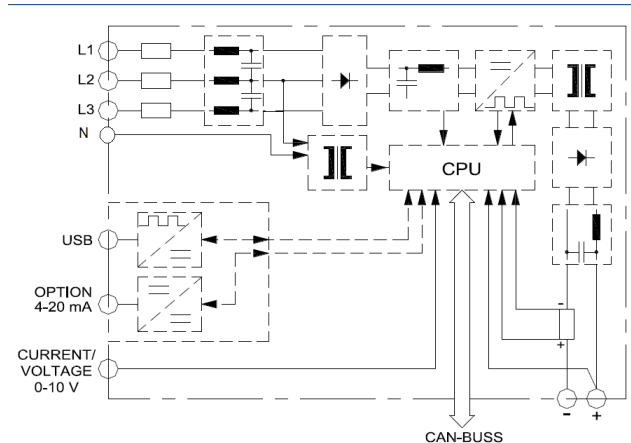
The main voltage is connected to the diode bridge via a RFI-filter. The main voltage is rectified and smoothed by a filter and is then connected to the transistor switch.

The transistor switch converts the DC-voltage into high frequency pulses which are applied to the main transformer.

The transformer provides isolation from the mains and transforms the voltage to the rated output level. The control unit, monitors actual DC-current & voltage and regulates the output.

For external annunciation the unit have 2 relays for Alarm & Current output.

Block schematic diagram



Technical Data & Standard Sizes

Supply Voltage: 400 V, +5 –10 %, 50-60 Hz, 3ph+N
other voltages on request

Control Accuracy: Voltage/current $\leq \pm 1\%$

Ambient Temp.: Max 40°C

Radio Interference: Suppressed according to VDE 0871 A, wirebound interference

Power Factor: About 0,95 at rated load

Regulation Range: Constant Voltage/ Current 0-100 %

Protections: Over-current, over-temperature, transient voltage and short circuit protected

Cooling: Air cooling by natural/forced convection

Humidity: Max 85% relative

DC Ripple: $< 1\%$ between 0 - 100 % of output current (typically $< 0,5\%$)

Duty Ratio: Designed for continuous operation at rated load up to 1000 m altitude

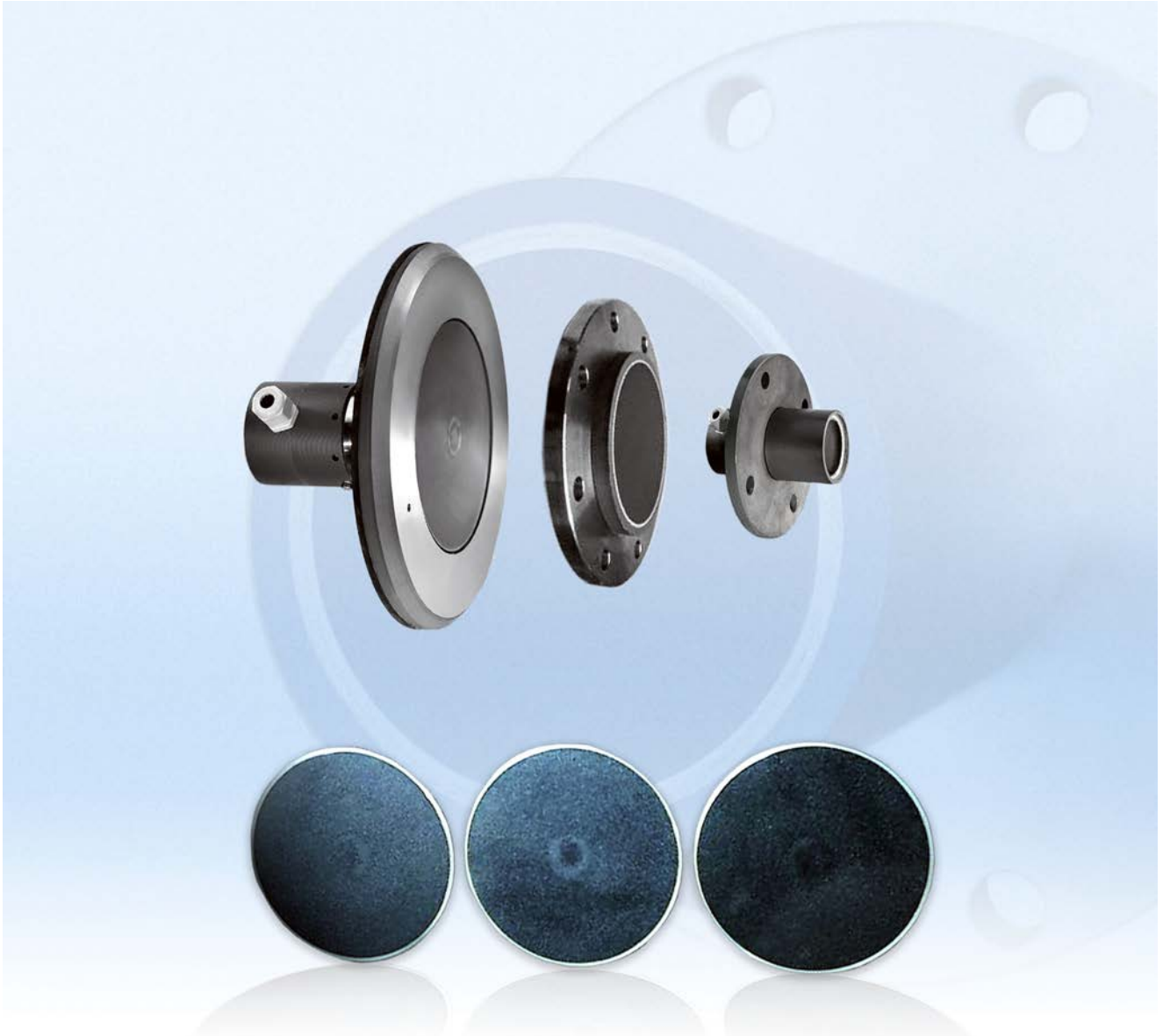
Efficiency: ~93 % depending on size

Weight: 7 kg

Nominal DC-Voltage V	20			30	15	100
Nominal DC-Current A	25	50	75	50	100	15
Connection Power kVA	0,8	1,2	1,7	1,7	1,7	1,7
Primary Current (400V)	1,0	1,2	2,4	2,4	2,4	2,4



Disc Anodes



Disc Anodes

3C Corrosion Control Company AB manufactures Mixed Metal Oxide (MMO) disc anodes for cathodic protection.

The standard disc anode consists of a solid titanium disc that has been coated with MMO coating.

The titanium substrate meets ASTM Standard B348, Grade 1 or Grade 2.

Disc anodes are available in standard diameters of 25, 60, 100 and 150 mm. Other sizes and current ratings are available upon request.

The MMO coating applied to the titanium disc has been designed for use in all cathodic protection applications. The coating consists of $\text{IrO}_2/\text{Ta}_2\text{O}_5$. MMO coating is generally accepted by the cathodic protection industry to be satisfactory for both chlorine and oxygen evolving electrolytes.

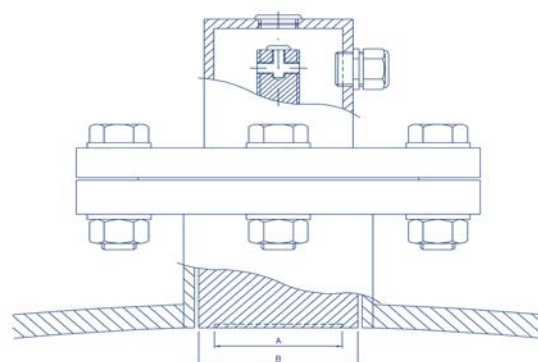
Based on accelerated life testing conducted by an independent laboratory, the coating has proven to be superior or equivalent to other MMO coatings currently being used. A copy of this test report is available upon request.

Strict quality control procedures are followed throughout the coating process to insure proper coating adhesion and loading. Production of a quality product makes every step of the manufacturing process fundamental.

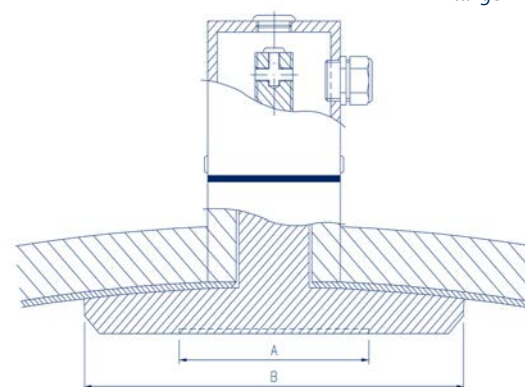
MMO anodes have an extremely low consumption rate. The titanium substrate remains constant throughout the design life of the anode. The anode house is made of uPVC and the cable can be terminated in both radial and axial direction.

The disc anodes have the following operating characteristics for standard coating.

Electrolyte	Max current density*
Fresh water	100 A/m ²
Brackish water**	100-300 A/m ²
Sea water	600 A/m ²



Flange mounted



Sleeve mounted

Model	A (mm)	B (mm)	I (A)
Ø 25 mm	25	42	0.30
Ø 60 mm	55	75	1.42
Ø 100 mm	95	200	4.25
Ø 150 mm	145	250	9.91

* Coating loadings can be increased or decreased depending on particular life/current density requirements.

** Current density should be determined in accordance with fresh water resistivity.

Copies of the five year product warranty are available on request.



Ribbon Anodes

For use in water



Ribbon Anodes

For use in water

3C Corrosion Control Company AB is Manufacturing Mixed Metal Oxide (MMO) ribbon anodes used especially for Impressed Current cathodic protection Systems.

The standard band anode consists of a titanium ribbon that has been coated with mixed metal oxide coating.

The titanium substrate meets ASTM standard B348, grade 1 or grade 2.

Ribbon anodes are available in standard lengths of 1m with two different sizes (ribbon width) 25.4 and 12.7 mm. Other sizes and current ratings are available upon request.

The MMO coating applied to the titanium ribbon has been designed for use in all cathodic protection applications. The coating consists of $\text{IrO}_2/\text{Ta}_2\text{O}_5$ MMO and is generally accepted by the cathodic protection industry to be satisfactory for both chlorine and oxygen evolving electrolytes.

Based on accelerated life testing conducted by an independent laboratory, the coating has proven to be superior or equivalent to other mixed metal oxide coating currently being used. A copy of this test report is available upon request.

Strict quality control procedures are followed throughout the coating process to insure proper coating adhesion and loading. Production of a quality product makes every step of the manufacturing process fundamental.

MMO anodes have an extremely low consumption rate. The titanium substrate remains constant throughout the design life of the anode.

The 3C ribbon anode is suitable for operations in fresh water, brackish water and sea water.

uPVC housing Dimensions:

Width mm	Length mm	Height mm	Mounting
245	1150	35	M10 Nylon Studs, Washers and Nuts

The ribbon anodes have the following operational characteristics for standard coating loadings in sea water:

Anode Width (net) mm	Anode Length (net) mm	Max. Current Output	Cable Size	Cable Entry
21.4	850	10.9 Ampere	1x10 mm ²	Bottom/Side
10.9	850	5.5 Ampere	1x10 mm ²	Bottom/Side



Reference Electrode

Ag/AgCl



Reference Electrode

Ag/AgCl

Specifications

Electrode element:	Ag/AgCl (Silver/SilverChloride)..
Electrolyte:	Sodium chloride, 3.5 % in an aqueous gel formula.
Potential:	0.25 V \pm 10 mV to Standard Hydrogen Electrode (SHE).
Batch variation:	\pm 10 μ V.
Drift:	Less than 1 mV in 24 hours, subject to temperature variation.
Life time:	Greater than 20 years.
Internal resistance:	Less than 2 k Ω .
Body material:	uPVC.

General

The Reference Electrode is a Silver/Silver Chloride element immersed in a gel electrolyte. For installation in flanges, threads or submerged on walls.

Storage

Store the electrode at a store room temperature between 5 and 25° C. Do not allow the electrode to freeze.

Keep the electrode in its package until you are ready to install it.

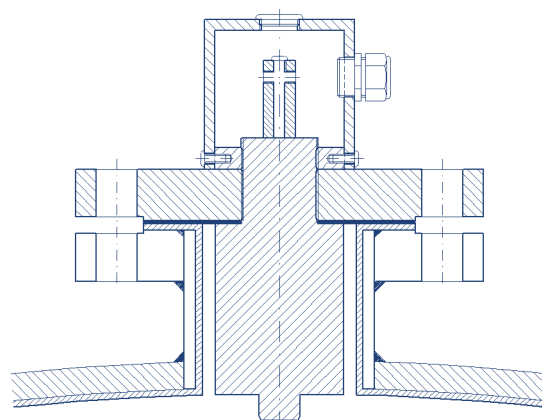
Preparation for use

The reference electrode is supplied ready to use and requires no special preparation.

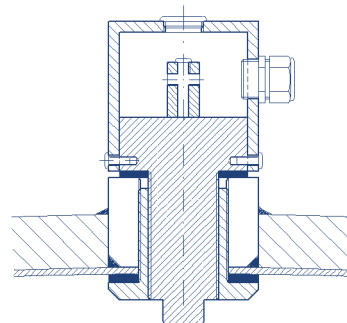
DO NOT touch the white disc in the head of the electrode by your fingers, or contaminate it with oil or grease.

Safety

The reference electrode contains no toxic materials. But in spite of that, wash your hands after installing the electrode, and observe the prevailing health & safety rules of the company.

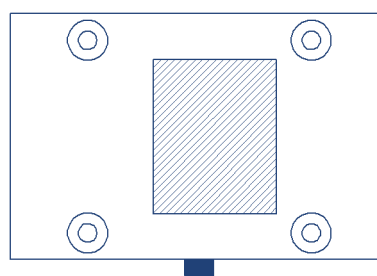


Flange mounted

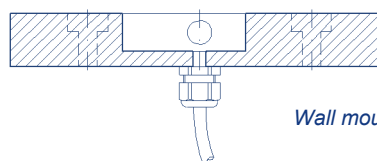


Sleeve mounted

TOP VIEW



SIDE VIEW



Wall mounted

Reference Electrode

Zinc



Reference Electrode

Zinc

Specifications

Electrode Element:	Pure Zinc
Drift:	Less than 1mV in 24 hours, subject to temperature variation.
Life time:	Greater than 20 years.
Body material:	uPVC.

General

The Reference Electrode element is of Zinc for installations in flanges, threads or submerged concrete walls.

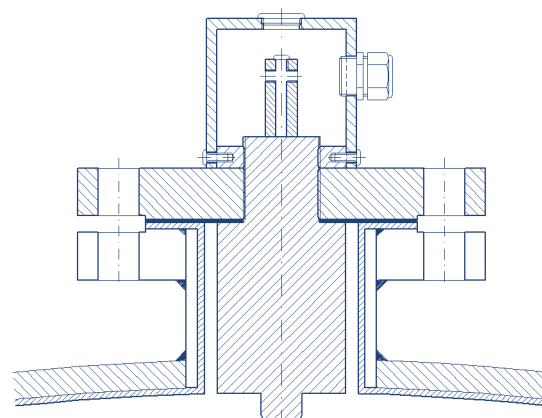
Storage

Store the electrode at a store room temperature between 5 and 25 °C. Do not allow the electrode to freeze. Keep the electrode in its package until you are ready to install it.

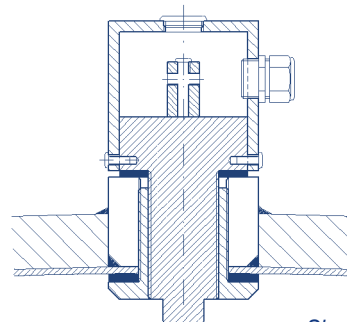
Preparation for use

The reference electrode is supplied ready to use and requires no special preparation.

Safety

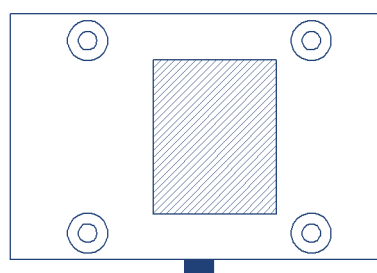


Flange mounted

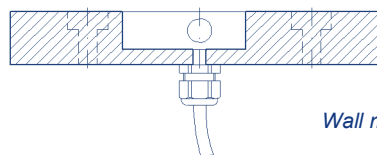


Sleeve mounted

TOP VIEW



SIDE VIEW



Wall mounted