

# **RUDDER ANGLE**

INDICATION SYSTEMS



# STAYING THE COURSE AT SEA

## Rudder angle solutions for all ship types

A frontrunner in marine bridge instrumentation for decades, DEIF offers a full range of rudder angle indication systems covering both 4-20mA current loop system, +/-10V systems, and CAN systems. For instance, you can combine DEIF's analogue or CAN-based rudder angle transmitters (RTA/RTC) with display-based illuminated indicators (XDi) and create your very own, customised solution. Digitally accurate, you can even calibrate one unit and broadcast automatically to all other units on board!

### General features available:

- ▶ Complete and type approved system
- ▶ Superior accuracy and flexibility
- ▶ Robust design and performance
- ▶ NMEA output to your Voyage Data Recorder (VDR)
- ▶ Analogue or CAN rudder angle transmitter and signal lines
- ▶ Calibration on one indicator and broadcast to all others
- ▶ Indication of both measured and commanded rudder angle possible

### Uncompromising quality – fully tested & approved

All DEIF marine products are type-tested and tried in the harshest possible conditions before market release to ensure outstanding levels of accuracy, robustness, reliability and water-proof housing.

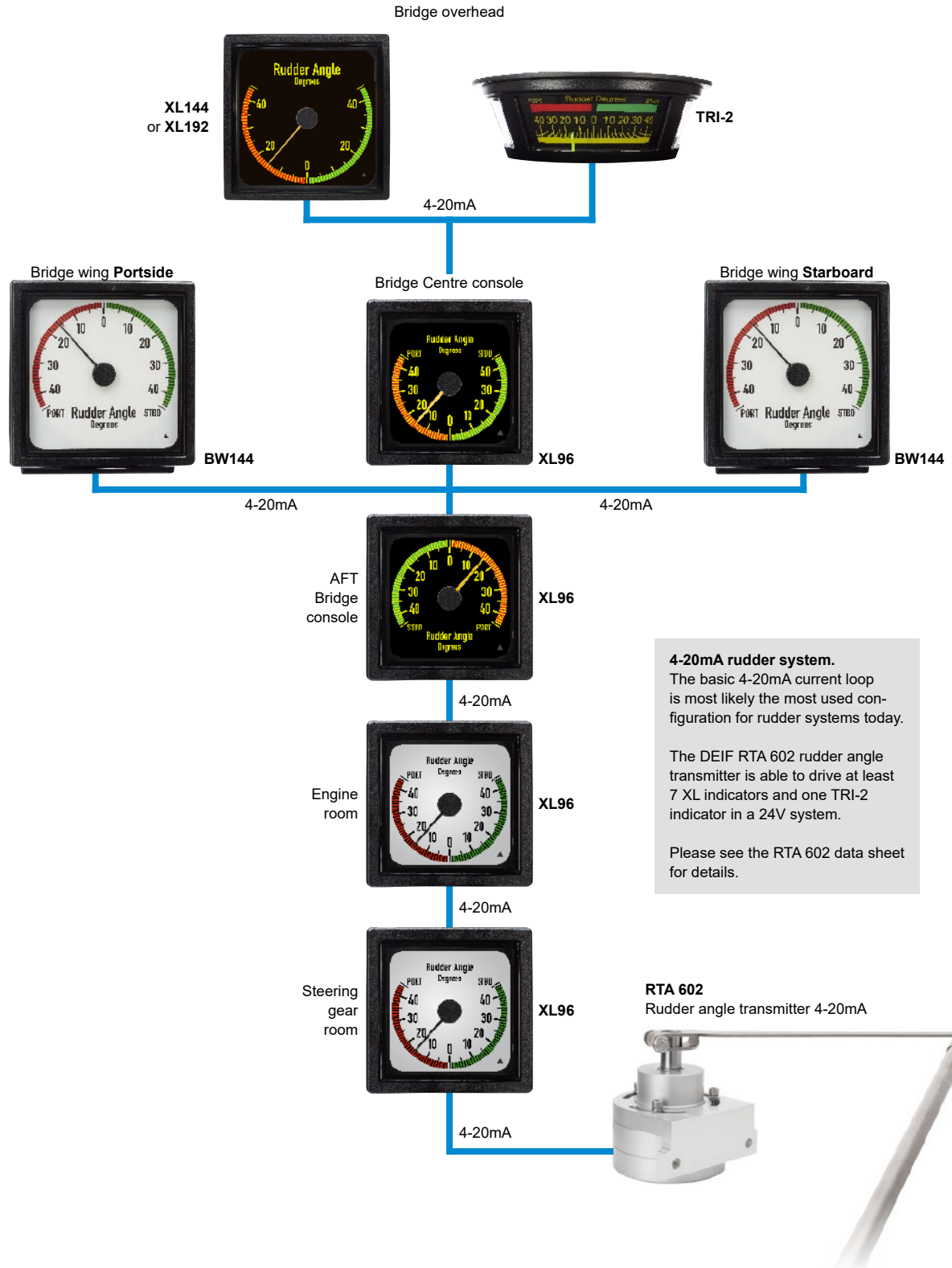
The tests are carried out in our own in-house test centre by our meticulous staff of specialised engineers. The test centre is part of our ISO 9001 certified quality management system and houses some of the most advanced testing facilities in the world. They allow us to carry out all the relevant tests for marine classification approvals, CE marking, MED approvals, UL, etc. – under our own roof.

Stay the right course – choose DEIF.



# 1. Rudder system

4-20mA



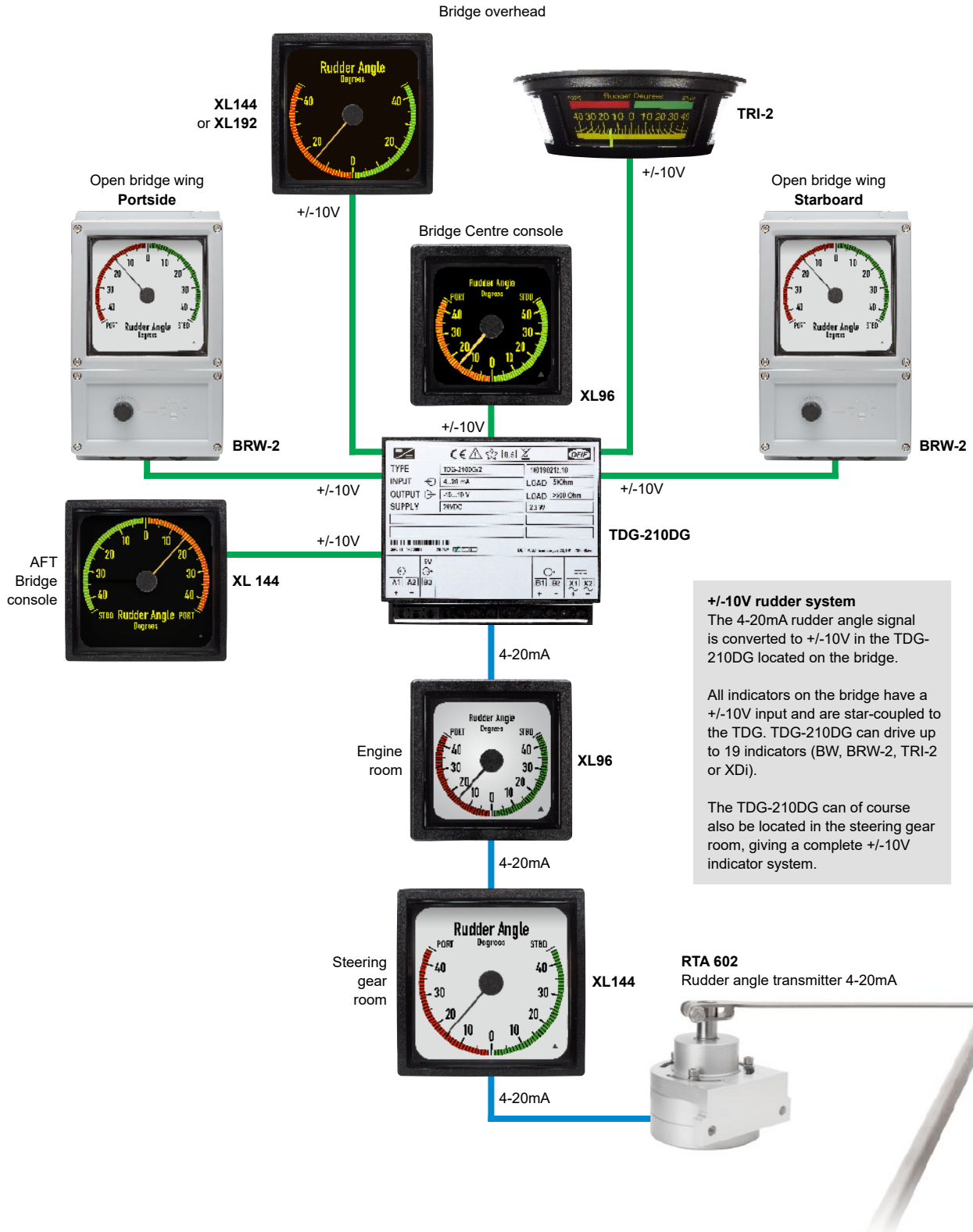
**4-20mA rudder system.**  
The basic 4-20mA current loop is most likely the most used configuration for rudder systems today.

The DEIF RTA 602 rudder angle transmitter is able to drive at least 7 XL indicators and one TRI-2 indicator in a 24V system.

Please see the RTA 602 data sheet for details.

## 2. Rudder system

+/-10V



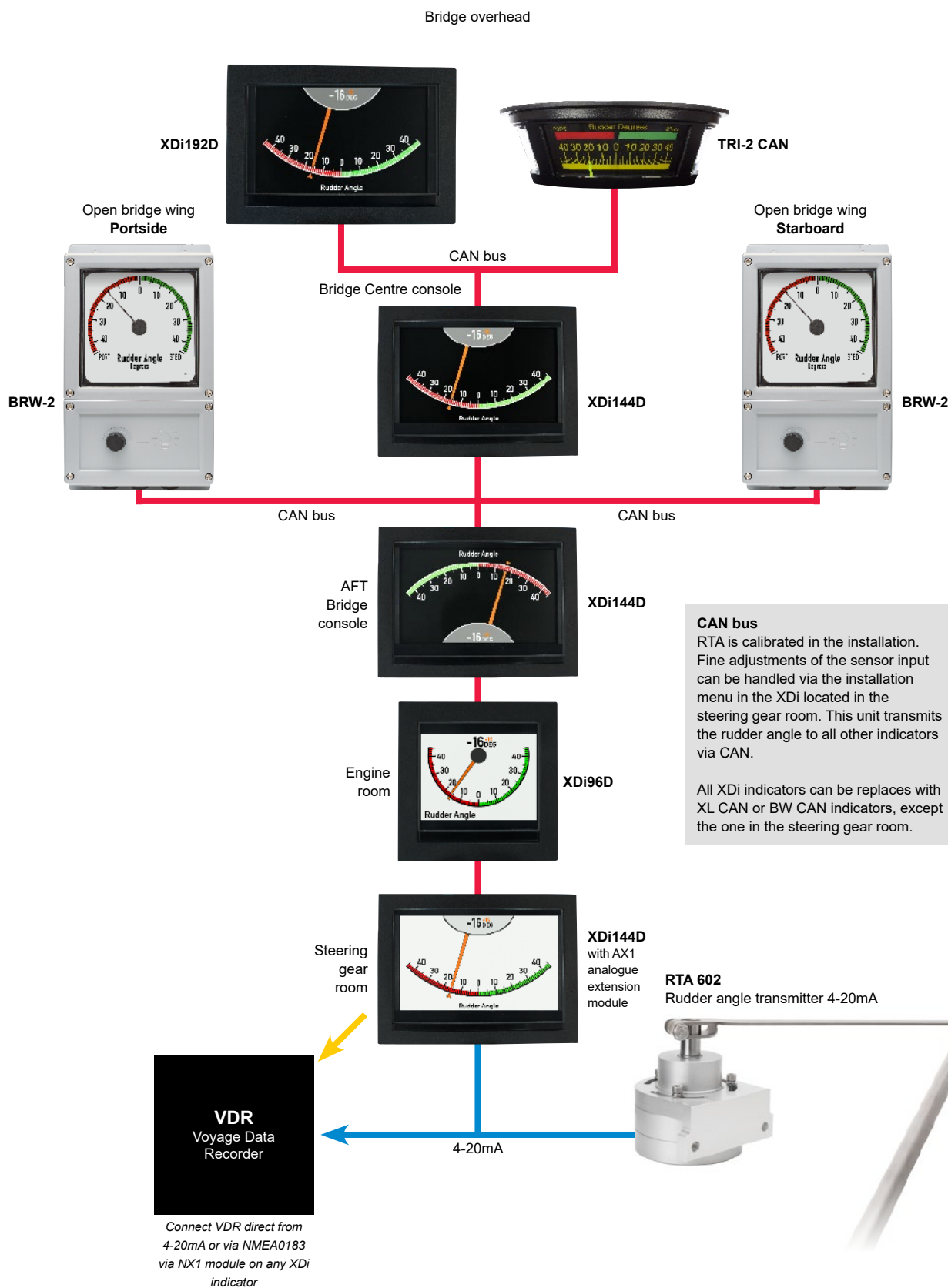
**+/-10V rudder system**  
The 4-20mA rudder angle signal is converted to +/-10V in the TDG-210DG located on the bridge.

All indicators on the bridge have a +/-10V input and are star-coupled to the TDG. TDG-210DG can drive up to 19 indicators (BW, BRW-2, TRI-2 or XD1).

The TDG-210DG can of course also be located in the steering gear room, giving a complete +/-10V indicator system.

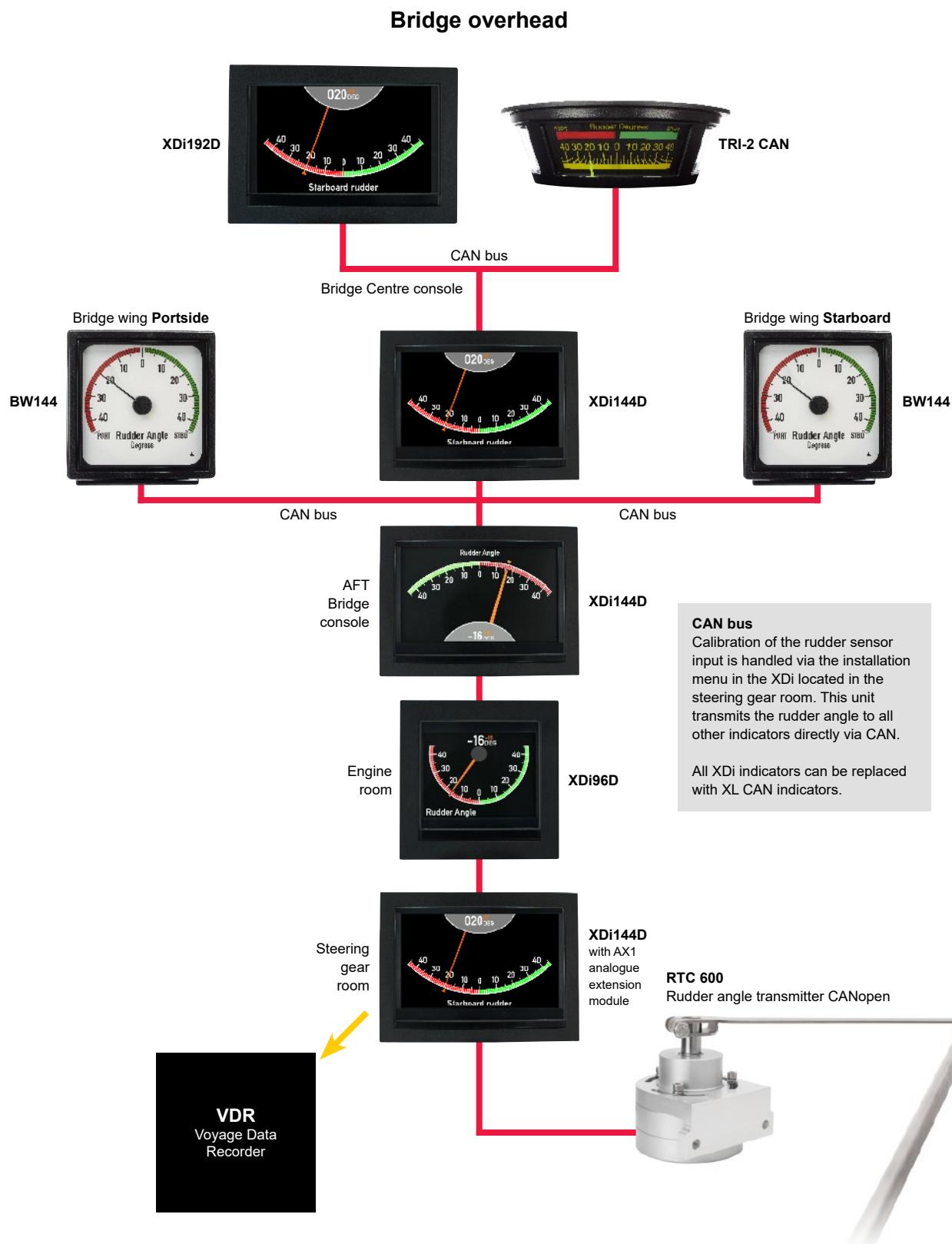
# 3. Rudder angle indication system

4-20mA/CANopen



# 4. Rudder system

## CANopen



# Illuminated bridge indicators

## Platform overview

### Digital accuracy, analogue or display-based readability

DEIF's range of sturdy illuminated bridge indicators features high accuracy, meeting or exceeding international standards for optimal readability and precision.

### Analogue indication: The XL series

Offering digital accuracy and analogue readability, the well-proven XL series is based on DEIF's patented microprocessor-controlled X-coil technology. The range is available for panel, ceiling and bridge wing mounting with a variety of stocked standard designs. Custom designs are available on request.

### Display-based indication: The XDi series

A game changer in bridge instrumentation, DEIF's new, patented illuminated indicator display series, XDi, offers highly accurate display-based indication. The compact, easy-to-install, versatile and user-friendly revolution in bridge instrumentation, gives you more flexibility and the ability to configure and make repairs on-site. The XDi series replaces mechanical scales and pointers with high quality displays without compromising DEIF customisation standards and maintaining approvals for rudder applications.

#### XL series



#### XDi series



Features	XL series	XDi Dual
Analogue or Dual (COS/SIN) input	V/mA	V/mA* Selectable
Backlight dimmer	Analogue/CAN	CAN/Analogue*/Digital*
CANopen interface	1 or 2	2
Day/night scale	Fixed	Day/night (dusk)
DIN Cut out	Q72, Q96, Q144, Q192	Q96, 144 × 96, 192 × 144
Display sizes		3.5, 5, 7"
Extention modules		AX1, DX1, NX1
Indication/readout	Fixed (needle/disc)	Selectable
Library with multiple virtual indicators		×
Outdoor bridge wing indicator	×	
Relay output		×*
Scale type	Printed scale	TFT Display
Serial – NMEA0183 (IEC61162-1)		Output*
X-coil indicator	×	
XDi Net		×
Commanded rudder indication		×

\* Extension module required



# Product type overview

## Indicators & transmitters

### Indicators



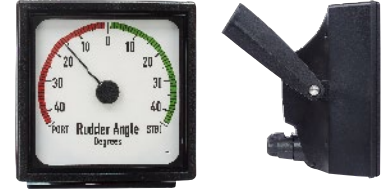
#### Flexible display indicator

Display-based illuminated bridge indicators with preinstalled designs.



#### Illuminated indicator

Digital accuracy, analogue readability. Panel mounting.



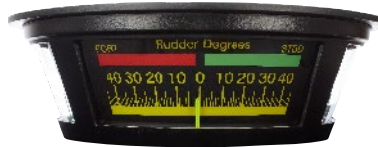
#### Bridge wing indicator

Digital accuracy, analogue readability. In-/outdoor mounting.



#### Bridge wing indicator

Digital accuracy, analogue readability. Outdoor mounting.



#### Panorama rudder angle indicator

250 ° reading of rudder position. Analogue or CAN input.

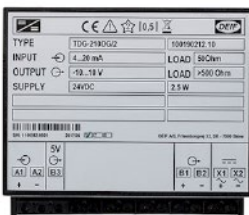
### Transmitters



#### Rudder angle transmitter

No touch magnetic angle detection technology. Analogue or CANopen.

### Insulation amplifiers



#### TDG-210DG

DC/DC amplifier with galvanic separation between input and output.

# Flexible display indicator

## The game changer in illuminated bridge instrumentation



DEIF's XDi illuminated indicator display series is a compact, easy-to-install, versatile and user-friendly revolution in bridge instrumentation.

The ultimate all-in-one solution, the XDi saves you panel space and installation time, gives you greater choice, more flexibility and the ability to configure and make repairs on-site.

With the XDi series, we have replaced mechanical scales and pointers with high quality displays, taking indicator performance to a new level without compromising DEIF customisation standards and maintaining approvals for rudder applications.

XDi features high accuracy analogue readout (no mechanical or parallax's reading error), high precision digital readings, wide viewing angle and optimised day and night colour pallets, even a custom dusk pallet.

The XDi Dual variants are a perfect fit for rudder applications and can be ordered with a DEIF standard indicator library – or you can have your own customised.

Already a market-leader with record delivery times, the XDi series also enables us to ship your orders even faster.

DEIF's XDi rudder angle indicators are approved by MED and other major classification societies. They are also MED-certified as a part of a rudder system. DEIF has developed the XDi series cooperating closely with DNV GL.

### XDi features

- ▶ TFT graphical LED 3.5, 5 or 7" display
- ▶ Multiple virtual indicator layouts selectable from library
- ▶ Standard and custom scale designs
- ▶ Commanded rudder (selectable)
- ▶ XDi-Net – a short-cut to CAN bus
- ▶ Reduced wiring and installation
- ▶ Instant repairs on board
- ▶ Analogue and digital readout combined
- ▶ Analogue or CAN input
- ▶ NMEA0183 output (IEC61162-1)
- ▶ Standard day and night designs
- ▶ Dusk designs on request
- ▶ MED and other relevant class approvals

Variants	No. of input values
XDi 96 Dual	1 or 2
XDi 144 Dual	1 or 2
XDi 192 Dual	1 or 2

Variants	Cutouts
XDi 96 Dual	92 x 92mm
XDi 144 Dual	138 x 92mm
XDi 192 Dual	186 x 138mm

### Dimmer options

Waterproof (IP66) dimmer box for indicators, 10kOhm potentiometer\*

Dimmer potentiometer 1kOhm\*

Front frame w. buttons for dimming

\* AX1 extension module required

### Variant overview



XDi 96 Dual



XDi 144 Dual



XDi 192 Dual

# XDi – indicator libraries

## Game-changing functionality made simple

### Library

The library contains a range of indicators and product profiles. During installation, the setup wizard guides you through the selection process.

### Product Profile – PP

The library contains one or more PP's to ease the installation setup. A PP contains default parameters for the CAN bus, dimmer groups and input type, warning and sound. Default parameters can be changed from the XDi menu.

### Virtual Indicator – VI

A library may contain more than 100 predefined virtual indicators. The VI contains the graphical design which can be either DEIF standard designs or unique custom designs placed in a custom library made by DEIF. The graphical design is fixed to comply with the relevant marine standards and cannot be changed by the user.

### Virtual Indicator Setup – VS

Each virtual indicator has one or more VS profiles to select for easy configuration. Each VS defines a unique setup for all inputs, outputs, controls and selectable headlines for the related virtual indicator. Default parameters can be changed from the XDi menu.

### DEIF standard rudder angle indicator library

The standard rudder indicator library is available in FWD or AFT designs and with day and night scale. It contains the following scale ranges:

- ▶  $\pm 40^\circ$
- ▶  $\pm 45^\circ$
- ▶  $\pm 50^\circ$
- ▶  $\pm 70^\circ$

To order, please state the following when you contact us:

- ▶ Library owner 000001
- ▶ Library number 031

Please contact your DEIF representative for assistance if you need customised scale designs.

### Setup



### Setup Wizard

An automatic guide makes setup very easy, even without prior training.

### Surveyor Information

Select the info screen for a complete status of the selected and locked set-up.

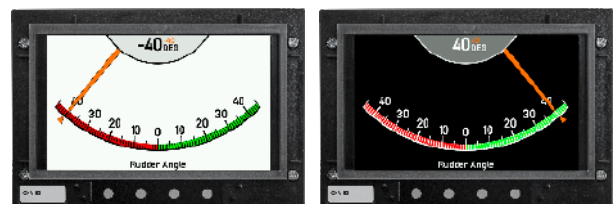
### On-site choices



### Indicator headline

Integrated headline option reduces variants.

### Day & night scales

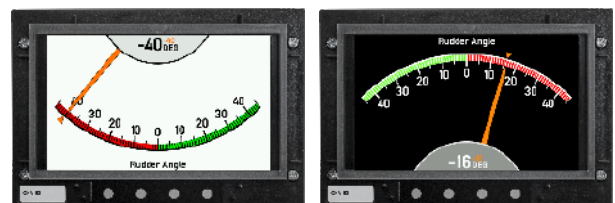


### Day

Standard library contains both day and night designs.

### Night

### FWD & AFT



### FWD

Standard library contains both FWD and AFT designs.

### AFT

# XDi – standard & customised indicator libraries

## Tailored to your needs

### Standard indicator library

DEIF standard libraries contain a selection of indicators presenting dual or multiple data in a common design line. The different indicator types are collected in application-specific libraries to make selection and ordering easier. The standard indicators for applications requiring wheel-marking are approved according to the Marine Equipment Directive (MED).

### Updating is simple

With a built-in USB interface on the rear side of the XDi, upgrading units with new libraries or other updates is a simple and easy procedure. All standard and your customised libraries are available for free download and can easily be uploaded to your XDi.

### Customised indicator libraries

Categorised according to application types, the indicators you need may be placed in different standard libraries. Since XDi units can hold just one library at a time, you will find it beneficial to order your XDi with the correct library.

#### Customisation level 1

If you often use the same combination of standard indicators, for instance from the azimuth, tunnel thruster and rudder libraries, it may well prove beneficial for you to have your own customised library created which contains your preferred indicators (copied from standard libraries). DEIF offers to compile and pre-install such a custom library in your indicators for a small one-off fee.

#### Customisation level 2

To match your system needs and reduce setup time during installation it may be cost-effective for you to have some of the standard indicators or default setup parameters slightly changed. The fee is slightly higher than for customisation level 1.

#### Customisation level 3

Full customisation is for those requiring unique designs in line with their company profile. DEIF's knowledge and experience in this field secures optimised graphical designs and system integration for the entire custom library. Please contact DEIF for a quotation based on your requirements.

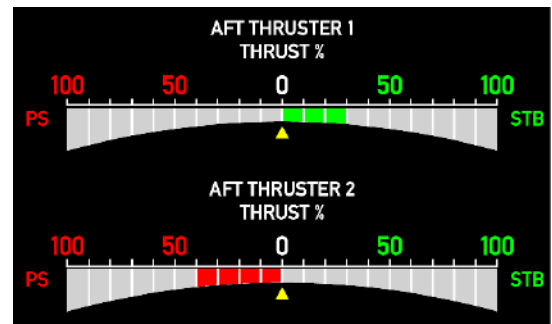
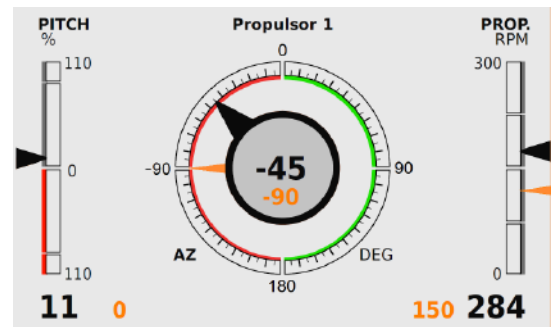
#### Logo on front frame

For those looking to brand XDi with their own company logo, DEIF recommends placing the logo on the removable front frame. Logos can be added to the virtual indicator designs, but will take up valuable display space, thus reducing flexibility and readability.

### Examples of customised indicators



### Examples of customised indicators



# Illuminated panel indicator

Digital accuracy, analogue readability



Patented range of illuminated panel indicators designed to indicate a wide range of rudder angle designs. These indicators are based on microprocessor-controlled X-coil technology.

## XL scale designs

DEIF offers a wide range of recommended standard scale designs. The range has been designed to meet international standards for optimal readability and precision – see [www.deif.com](http://www.deif.com) for the current list.

DEIF can also handle customised scale designs, adding logos/text or create a new visual layout to identify your brand.

## XL features

- ▶ High shock/vibration resistance (robust)
- ▶ Class 0.5 accuracy
- ▶ Analogue or CANopen interface (sCAN)
- ▶ Optional IP66 protection
- ▶ LED illumination
- ▶ Q72, Q96, Q144 and Q192 cutouts

## Variants

## Minimum cutouts

XL72	68.5 x 68.5 mm
XL96	92.5 x 92.5 mm
XL144	138.5 x 138.5 mm
XL192	186.5 x 186.5 mm

## Dimmer options

Waterproof (IP66) dimmer box for indicators, 10kOhm potentiometer

Dimmer potentiometer 1kOhm

## Variant overview



XL

# Outdoor bridge wing indicator

Digital accuracy, analogue readability, outdoor mounting



Patented range of illuminated bridge wing indicators for outdoor mounting based on microprocessor-controlled X-coil technology. DEIF stocks a wide range of recommended standard scale designs for rudder angle indication.

The range meets international standards for optimal readability and precision – see [www.deif.com](http://www.deif.com) for the current list. DEIF also handles customised scale designs.

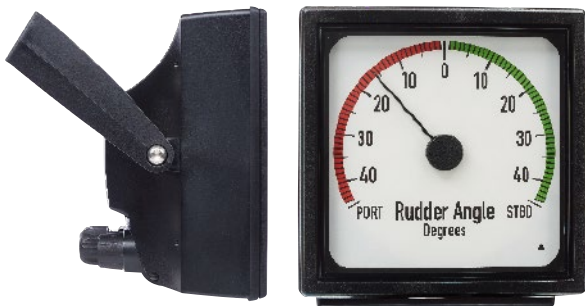
For outdoor mounting, we recommend all-white scales.

## BRW-2 features

- ▶ Outdoor bridge wing mounting
- ▶ Front-mounted dimmer
- ▶ High shock/vibration resistance (robust)
- ▶ Class 0.5 accuracy
- ▶ Analogue or CANopen interface (sCAN)
- ▶ IP66 protection
- ▶ LED illumination

# Indoor & outdoor bridge wing indicator

Digital accuracy, analogue readability, indoor & outdoor mounting



Patented range of illuminated bridge wing indicators for indoor and outdoor mounting based on microprocessor-controlled X-coil technology. DEIF stocks a wide range of recommended standard scale designs for rudder angle indication.

The range meets international standards for optimal readability and precision – see [www.deif.com](http://www.deif.com) for the current list. DEIF also handles customised scale designs.

For outdoor mounting, we recommend all-white scales.

## BW features

- ▶ Indoor and outdoor bridge mounting hanging or standing on pivot foot
- ▶ Rear-mounted dimmer
- ▶ High shock/vibration resistance (robust)
- ▶ Class 0.5 accuracy
- ▶ Analogue or CANopen interface (sCAN)
- ▶ IP66 protection
- ▶ LED illumination

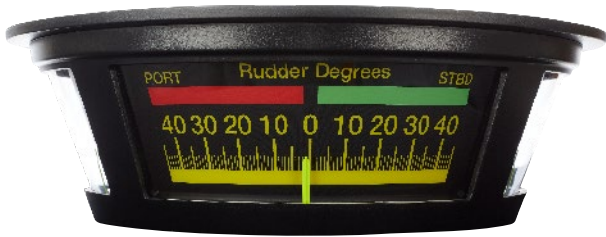
## Variants

BW144

BW192

# Panorama rudder angle indicator

Quick & easy reading from angles up to 250 °



TRI-2 is applied for the indication of the rudder position on the bridge. The indicator consists of a robust moving coil system equipped with three pointers mounted on a common shaft. The TRI-2 is available with CAN or analogue input.

With its large scales, the TRI-2 ensures a quick and easy reading of the rudder position from any angle up to 250 ° and from a distance of up to 5 metres from the indicator. The TRI-2 is housed in a matt black case for ceiling suspension.

## TRI-2 features

- ▶ 3 extra large, easy-to-read scales
- ▶ Readable from up to 5 meters
- ▶ Black or white scales
- ▶ Long-life LED illumination
- ▶ Built-in dimmer
- ▶ Analogue interface or CAN

## Variants

## Features

TRI-2	Analogue input
TRI-2 CAN	CAN-based input

# Rudder angle transmitter

## Indication of rudder, azimuth & pitch angles



DEIF's rudder/azimuth angle transmitters convert the rudder or azimuth thruster's position angles into either electrical current signals or digital data values with a 16 bit resolution (+/-180deg. = +/-32767).

Unlike potentiometers, DEIF's angle transmitters use a "no touch" magnetic angle detection technology. The technology guarantees optimal accuracy and performance and longer life for the transmitters as they have no electromechanical parts.

DEIF's rudder and azimuth systems are MED-approved for easy use and immediate class approval.

The robust mechanical design and IP67 protection make the transmitters ideal for use aboard any ship.

### General features

- ▶ "No touch" magnetic angle detection – no wear & tear
- ▶ Accuracy < 0.25°
- ▶ Analogue or CAN bus output for direct connection of one or more indicators
- ▶ Angle position range from +/- 20° to +/-180°
- ▶ Continuous shaft rotation
- ▶ Clockwise/counterclockwise, zero set & max./min. adjustment

### Variants

### Features

RTA 602	Analogue. 2 wire 4 to 20 mA DC. Ø19mm stainless steel shaft for direct rudder connection. Available with 90° mounting bracket Directly compatible with DEIF's RT-2 rudder angle transmitter*.
RTC 300	CAN bus. Ø6mm standard axel.
RTC 600	CAN bus. Ø19mm stainless steel shaft for direct rudder connection. Available with 90° mounting bracket Directly compatible with DEIF's RT-2 rudder angle transmitter*.

\* Not recommended for new designs

### Variants

### Features

Mounting bracket	Available for RTA 602 and RTC 600
Position linkage	Available for RTA 602 and RTC 600 Length: 317 mm
Adjustable lever	Available for RTA 602 and RTC 600 Max. length: 1127 mm

### Variant overview



RTA 602

RTC 600

RTC 300

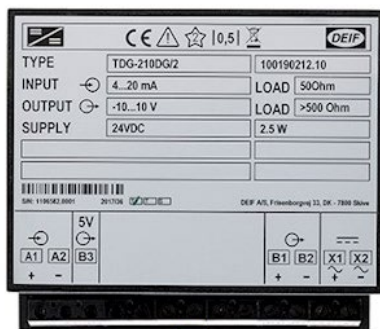
RTA 602

w/position linkage and lever



# Insulation amplifier

## Conversion of measuring signals

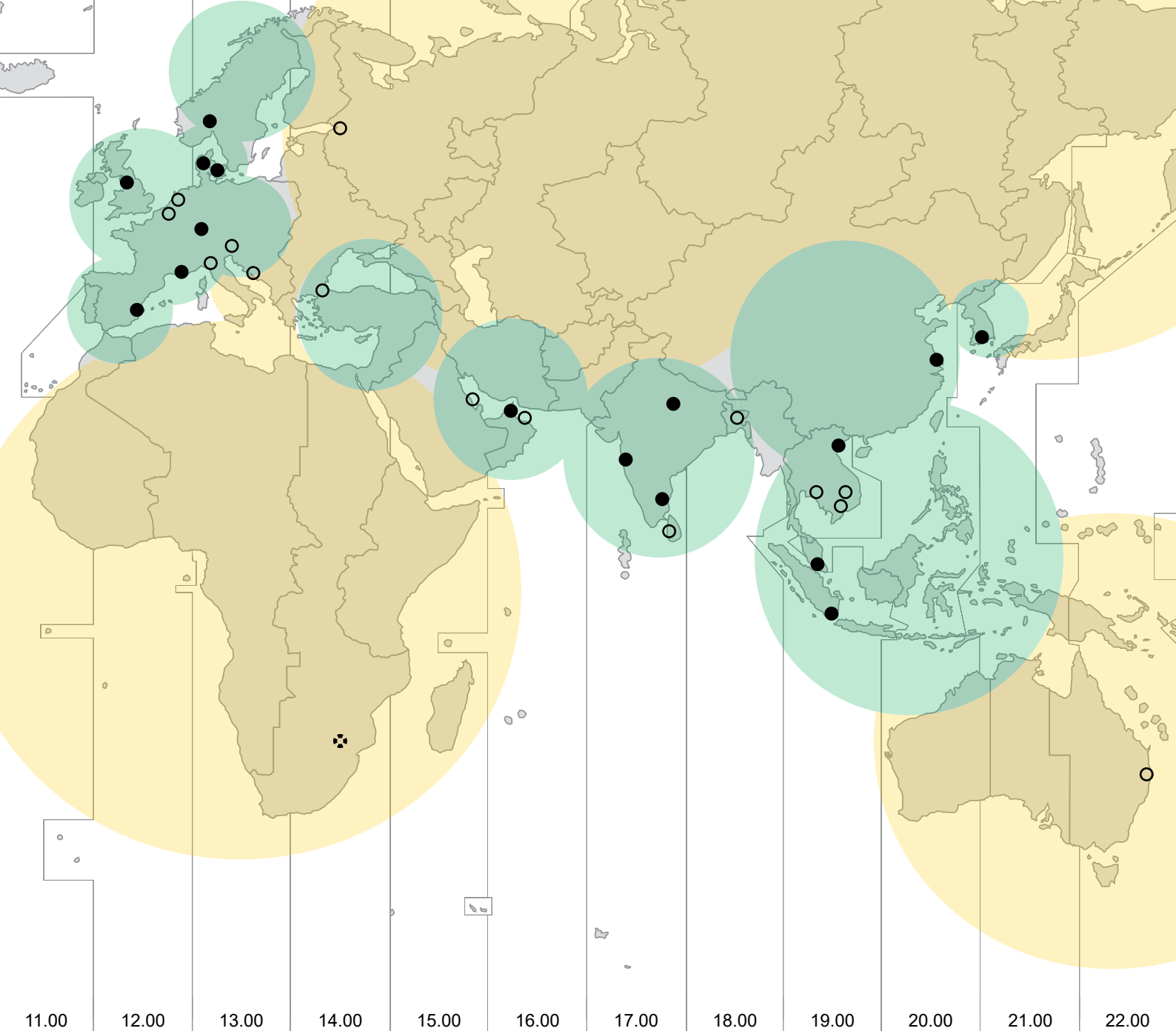


### TDG-210DG features

- ▶ Conversion of measuring signal
- ▶ Aux. voltage: 57.7...440 V AC or 24...220 V DC

TDG-210DG is a CE-marked DC/DC amplifier with galvanic separation between input and output.

The TDG-210DG has been MED-approved as part of a rudder system and is typically used for converting e.g. 4-20mA to  $\pm 10V$  or 0-10V.

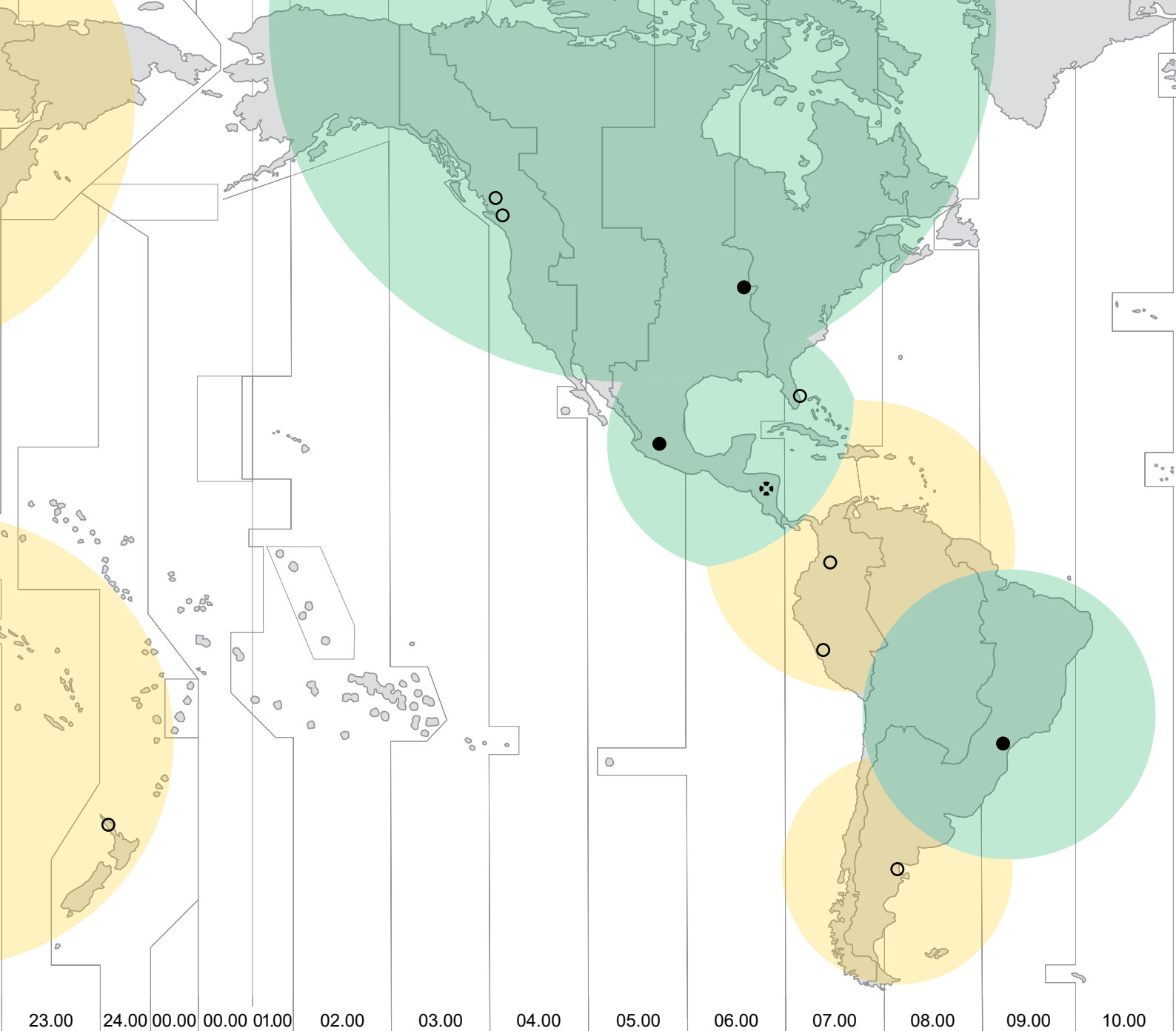


# OUR 24/7 GLOBAL REACH

## We want to maximise your uptime

Offering you unrivalled response times, the DEIF Group's extended reach means we are on call for maintenance, repairs, replacements or upgrades 24/7/365 with regional and local anchors guaranteeing a "glocal" view.

- ▶ Sales offices, competence centres and training facilities in 17 key markets
- ▶ Global distributor, system integrator and trusted service partner network
- ▶ Day-to-day spare part delivery, 3 year supply of spare parts for standard controllers.



-  DEIF Office
-  DEIF Distributor
-  DEIF Service Partner

## The DEIF group

- |   |  |   |
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|  DEIF China        |  DEIF Korea       |  DEIF United Kingdom |
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