



## FICHA TÉCNICA DE PRODUTO

## PRODUCT DATASHEET

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HMI – Automação e Instrumentação, Lda.

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# Navigator 500 Hydrazine analyzer

Accurate and reliable measurement of hydrazine in high purity water

Measurement made easy



## Fast response time

- reduce chemical costs through optimized dosing to feedwater

## Low cost of ownership

- low reagent consumption provides up to 8 weeks continuous measurement
- 'pumpless' design with no moving parts reduces maintenance requirements

## Integrated constant-head unit

- controls sample flow at optimum level during pressure fluctuations, simplifying installation and commissioning

## Automatic pH buffering and temperature compensation

- maintains accurate measurement during unstable process conditions, ensuring optimal dosing and minimizing chemical usage

## Comprehensive diagnostics

- provides sensor condition and analyzer status data

## Connect multiple wet-sections to a single transmitter

- reduces footprint and installation costs

# Navigator 500

## Hydrazine analyzer

### The Navigator 500 range

The Navigator 500 range of analyzers from ABB are designed for high purity water treatment applications and power cycle chemistry monitoring.

The analysis and signal conditioning is conducted within the Navigator 550's advanced wet-section that houses the sensing technology. The accurate measurement result is transmitted digitally to the Navigator 540 transmitter.

The Navigator 540 universal transmitter enables connection of up to 4 different Navigator 550 wet-sections and is available with optional features such as SD card data retrieval and graphical trending, as well as additional outputs and communication options.

The following parameters are available in the Navigator 500 range:

#### Navigator 500

- Sodium
- Dissolved Oxygen
- Hydrazine

#### Navigator 500 hydrazine

The Navigator 500 hydrazine provides continuous monitoring and control of power station boiler feed water / steam condensate.

The wet section houses ABB's uniquely designed electrochemical cell that accurately measures the amount of hydrazine in the water. This accuracy is reinforced by automatic pH buffering and temperature compensation, ensuring that readings reflect the actual feedwater conditions. Measurement results are updated digitally to the Navigator 540 transmitter where process trends of up to 4 separate wet-sections can be viewed locally on the color display. Users of this system also benefit from the Navigator 500 hydrazine's low maintenance requirements, ease-of-use, simple calibration and proven sensing performance.

Process data, together with the content of alarm and audit logs within the transmitter, can be saved to removable media for record keeping and analysis using ABB's DataManager Pro data analysis software.

#### Navigator 540 transmitter



Sodium  
Hydrazine  
Dissolved Oxygen

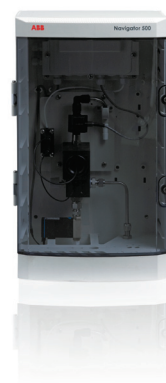


Sodium

#### Navigator 550 wet-sections



Hydrazine



Dissolved Oxygen

Fig. 1: Navigator 500 family

## Applications

Typical applications for the Navigator 500 hydrazine analyzer include:

- Monitoring and control of hydrazine dosing of boiler feedwater
- Monitoring dosing efficiency prior to economizer inlet

## Hydrazine in boiler feedwater

### The need for accurate dosing

To reduce dissolved oxygen levels, boiler feedwater is commonly dosed with hydrazine before it enters the boiler. Typically, dosing in a ratio of 3 parts hydrazine to the expected level of dissolved oxygen enables operators to achieve an acceptable concentration of below  $5\mu\text{gkg}^{-1}$ .

Hydrazine also reacts with soft haematite layers on the boiler tubes, forming a hard magnetite layer that protects the tubes from further corrosion.

To ensure that the correct amount of hydrazine is added to the boiler feedwater, measurements must be taken at both the point of dosing and the economizer feedwater inlet. Adding too little hydrazine results in higher levels of dissolved oxygen in the boiler and impairs the formation of magnetite on the boiler tubes, reducing their resistance to corrosion. Adding too much is unnecessarily wasteful and incurs higher chemical treatment costs.

### The Navigator 500 solution

The Navigator 500 hydrazine analyzer provides a continuous measurement of the level of hydrazine in boiler feedwater, enabling the chemical dose to be controlled automatically. The information provided by the analyzer enables the exact dose to be administered in response to the actual level of dissolved oxygen present. This avoids both the expense associated with overdosing and the costly corrosion damage caused by under-dosing.

The ability to add up to 4 wet-sections to one transmitter also enables measurement of samples from different points in the boiler feedwater line. This offers not only an economic and compact solution, it also helps to minimise the risk of under- or over-dosing by providing a precise picture of hydrazine levels between the feedwater dosing and economizer inlet.

Operators are also able to mix-and-match other parameters within the Navigator 500 range, with a single transmitter able to accept readings from ABB's Navigator 550 dissolved oxygen and sodium wet-sections.

# Navigator 500

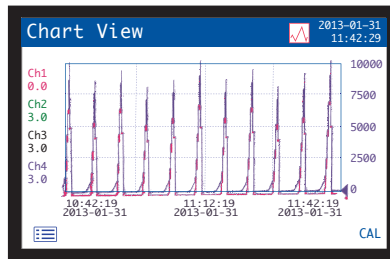
## Hydrazine analyzer

### Overview of Navigator 500 hydrazine analyzer



#### Transmitter

- Simple navigation and easy-to-use menu system



#### Graphical trending

- Measurement trends of each connected wet-section can be easily and clearly viewed locally on the graphical color display

No.	Event	Date	Time
01	Power Failure	2013-01-31	11:14:18
02	Power Recovery	2013-01-31	09:29:39
03	Power Failure	2013-01-23	12:30:29
04	Power Recovery	2013-01-21	12:29:44

#### Full audit trail logs

- Diagnostic messages, alarm events, calibration details and system activity are stored in the transmitter audit logs for review

#### Low reagent addition

- Easy access for reagent replacement

#### Smart board

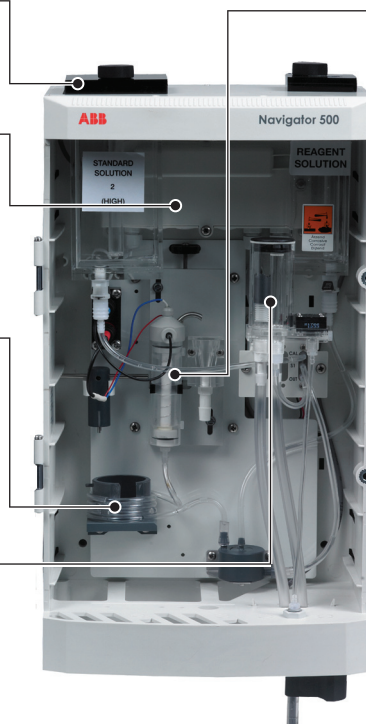
- Stores sensor calibration data and calculates measurement result

#### Mixing coil

- Reagent is added via microporous disc to provide up to 8 weeks continuous operation
- No moving parts minimize maintenance requirements

#### Adjustable constant-head unit

- Provides simple adjustment of sample flow rate to hydrazine sensor
- Stabilizes flow conditions during sample pressure changes



#### Continuous hydrazine measurement using electrochemical technology

- ABB hydrazine cell can be refurbished by the user to maximize sensor life

#### SD card or USB archiving

- Data recorded in the transmitter's internal memory can be archived to a removable Secure Digital (SD) card or USB stick

#### Flexible communications

- A user-configurable range of outputs and communication options are available including Ethernet connectivity

#### Automatic calibration

- Verifies analyzer performance

## Navigator 540 transmitter



## Navigator 550 hydrazine wet-section



Features and benefits of the Navigator 540 transmitter include:

### Connect multiple wet-sections to a single transmitter

- Mix-and-match up to 4 different single-stream wet-sections in the Navigator 500 range

### 'Plug-n-play' capability

- Automatic wet-section recognition and configuration

### Simple to operate

- Intuitive navigation through the operator menus with ABB's standardized 6-key layout

### Password protected security

- Dual access level security, enabling separate user access levels to basic and advanced settings

The Navigator 550 hydrazine wet-section has been designed to be used in conjunction with the Navigator 540 transmitter; either alone or in combination with other Navigator 550 wet-sections.

# Navigator 500

## Hydrazine analyzer

### Accurate and reliable measurement

The Navigator 500 hydrazine analyzer has been designed for ease-of-use and maintenance simplicity, while offering the benefits of flexible communication and advanced data acquisition.

#### Measuring principle

The sample enters the analyzer via the user-adjustable constant-head unit mounted within the enclosure that removes the effect of changes in sample pressure and flow-rate. Overflow from the constant-head unit drains into a tundish at the bottom of the enclosure.

The constant sample flow passes through the calibration valve manifold into the reagent dosing chamber where an alkali reagent is added via a micro-porous disc to raise the pH of the sample to 10.5. The dosed sample passes through a mixing coil before entering the hydrazine sensor.

The hydrazine sensor comprises a central ceramic tube inside a gel-filled outer jacket. A silver cathode wire is wound round the outer surface of the tube and a spiral platinum anode is inserted down the center.

Sample flows up through the tube, over the platinum anode and out to waste. Electrical contact between the two electrodes is made via the ionic transport through the porous ceramic tube. The resultant current is proportional to the concentration of hydrazine in solution.

The hydrazine sensor and its overflow funnel are mounted on a sub-panel whose height, relative to the standard solution, can be adjusted to provide the correct rate of flow through the sensor.

A temperature sensor, fitted in the hydrazine sensor flowcell, measures the temperature of the sample.

The signal from the hydrazine sensor and the temperature sensor is passed to the smart board located within the Navigator 550 wet-section. The smart board accurately calculates the hydrazine measurement result and transfers it digitally to the Navigator 540 transmitter.

### Simple automatic calibration

The Navigator 500 hydrazine analyzer can be easily calibrated against a solution containing a known hydrazine concentration. This not only verifies analyzer performance but also calculates sensor efficiency.

During calibration the sample flow to the sensor is stopped, enabling the calibration standard to be measured.

Once the calibration routine is complete, the sensor efficiency is calculated and displayed, providing the user with a valuable indication of sensor life.

Automatic calibrations can be scheduled to occur from daily to monthly, but it is advised to use freshly-prepared calibration standards to ensure maximum accuracy as hydrazine solutions degrade with time.

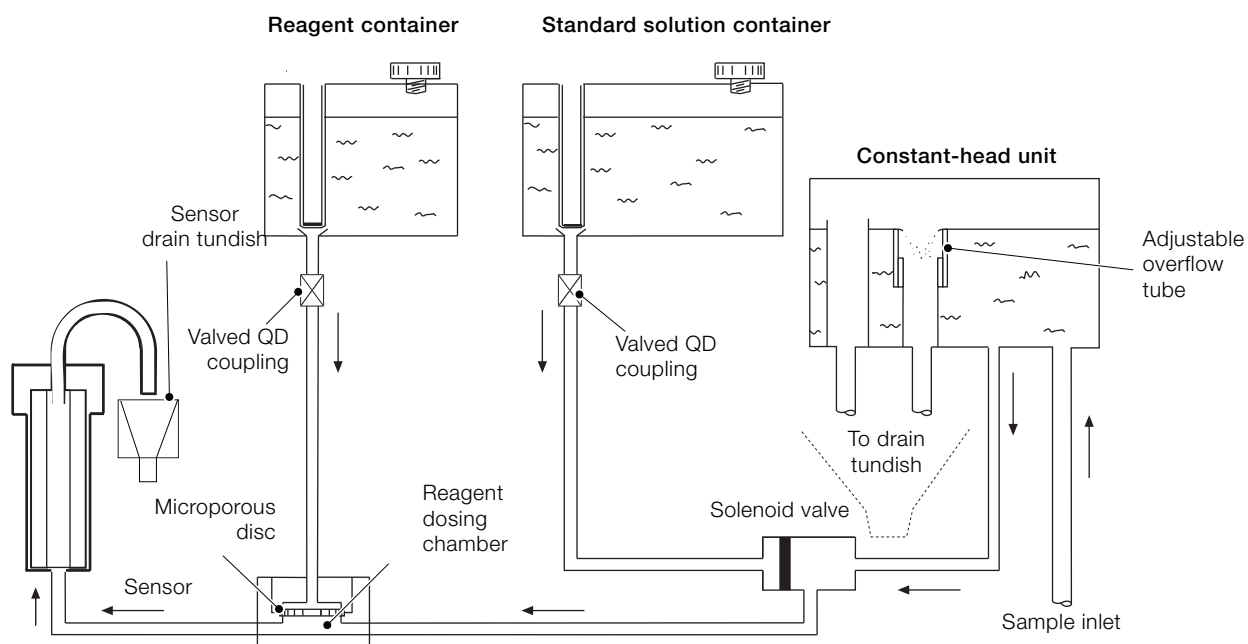


Fig. 2: Schematic flow diagram



# Navigator 500

## Hydrazine analyzer

### Specification – system

#### Operation

##### Measuring range

0 to 1000 ppb

##### Units of measure

ppb, µg/l, µg/kg

##### Accuracy

±3 % of reading or ±1 ppb, whichever is the greater

##### Repeatability

±3 % of reading or ±1 ppb, whichever is the greater

##### Response time

<2 minutes for a 90 % step change

##### Resolution

0.1 ppb

##### Temperature compensation

5 to 55 °C (41 to 131 °F) automatic using a Pt1000

##### AutoCal frequency

Programmable from 1 to 7 days or 1 to 8 weeks

##### Sample temperature

5 to 55 °C (41 to 131 °F)

##### Sample pressure

1.5 bar gauge (21.7 psi) maximum

##### Sample flow rate

100 to 400 ml/min

##### Sample connections

1/4 in. ID flexible tubing to barbed connector

#### Environmental data

##### Ambient operating temperature:

0 to 55 °C (32 to 131 °F)

##### Ambient operating humidity:

Up to 95 % RH non-condensing

##### Storage temperature:

–20 to 70 °C (–4 to 158 °F) without sensor

0 to 55 °C (41 to 131 °F) with sensor

#### Approvals, certification and safety

CE mark

UL (pending)

CSA (pending)

##### General safety

EN61010-1

Pollution category 2

Insulation category 2

#### EMC

##### Emissions & immunity

Meets requirements of IEC61326 for an industrial environment and domestic emissions

#### Maintenance

##### Periodic calibration:

User-defined

### Specification – wet-section

#### Mechanical data

##### Protection

IP54

##### Dimensions

Height:

480 mm (18.90 in)

Width:

290 mm (11.41 in) – door shut

Depth:

185 mm (7.28 in) door closed – minimum  
(excluding fixing brackets)

Weight:

4.5 kg (10 lb)

#### Electrical

##### Power supply ranges (supplied by transmitter)

24 V DC max.

##### Power consumption

8 W max.

## Specification – transmitter

### Operation

#### Display

89 mm (3.5 in) color 1/4 VGA TFT, liquid crystal display (LCD) with built-in backlight and brightness / contrast adjustment

#### Language

English, German, French, Italian, Spanish

#### Keypad

6 tactile membrane keys:

Group select / left cursor, view select / right cursor, menu key, up, down, enter key

#### No of inputs

Up to 4 single-stream or 1 multi-stream wet-section.

### Mechanical data

#### Protection

IP66 / NEMA 4X

#### Dimensions

Height:

194 mm (7.64 in) minimum (excluding glands)

Width:

214 mm (8.42 in) – excluding glands

Depth:

98 mm (3.85 in) door closed – minimum (excluding fixing brackets)

Weight:

1.5 kg (3.3 lb)

#### Materials of construction

Glass-filled polycarbonate

### Security

#### Password protection

Calibrate and Advanced – user-assigned

Service level access – factory-set

### Electrical

#### Power supply ranges

100 to 240 V AC max., 50 / 60 Hz  $\pm 10$  %  
(90 to 264 V AC, 45/65 Hz)

#### Power consumption

<10W

### Terminal connections rating

AWG 26 to 16 (0.14 to 1.5 mm<sup>2</sup>)

### Analog outputs

2 standard

2 optional

Galvanically isolated from the rest of the circuitry, 500 V for 1 minute. Range-programmable source and range 0 to 22 mA, maximum load 750  $\Omega$  @ 20 mA

### Relay outputs

4 standard

2 optional

Fully-programmable. Contacts rated at 2 A @ 110 / 240 V.

Standard relays are changeover. Optional relays are normally closed (N/C).

### Digital inputs / outputs

6 standard, user-programmable as input or output

Minimum input pulse duration: 125 ms

Input:

volt-free or 24 VDC (conforms to IEC 61131-2)

Output:

open-collector, 30 V, 100 mA max.

(conforms to IEC 61131-2)

### Connectivity / communications

#### Ethernet (optional)

TCP/IP, HTTP

### Data logging

#### Storage

Measurement value storage (programmable sample rate)

Audit Log\*, Alarms Log\*, Calibration log, Diagnostics log,

Configuration changes

#### Chart view

On local display

#### Historical review

Of data

#### Data transfer

SD card interface / USB stick – Windows-compatible FAT file system, data and log files in Excel and DataManager Pro compatible formats

\*Audit Log and Alarm Log data are stored in the same log file.

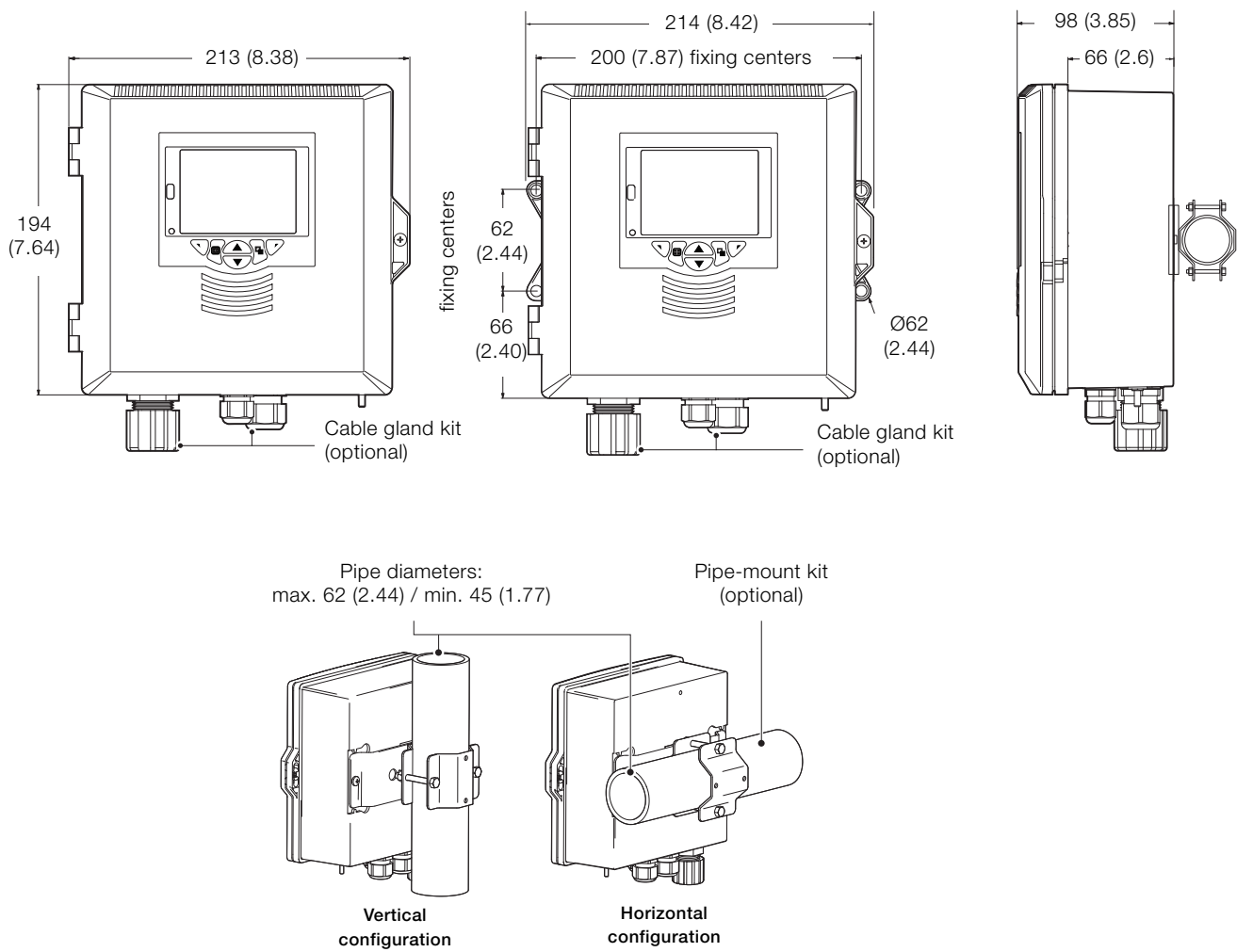
# Navigator 500

## Hydrazine analyzer

### Overall dimensions

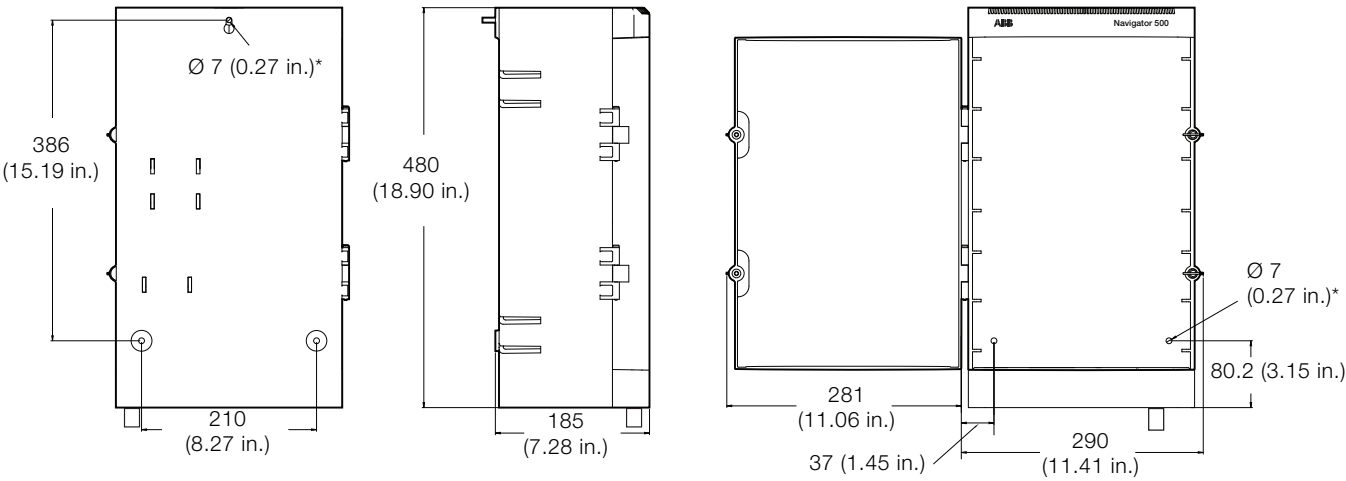
#### Transmitter

Dimensions in mm (in.)



Wet-section

Dimensions in mm (in.)

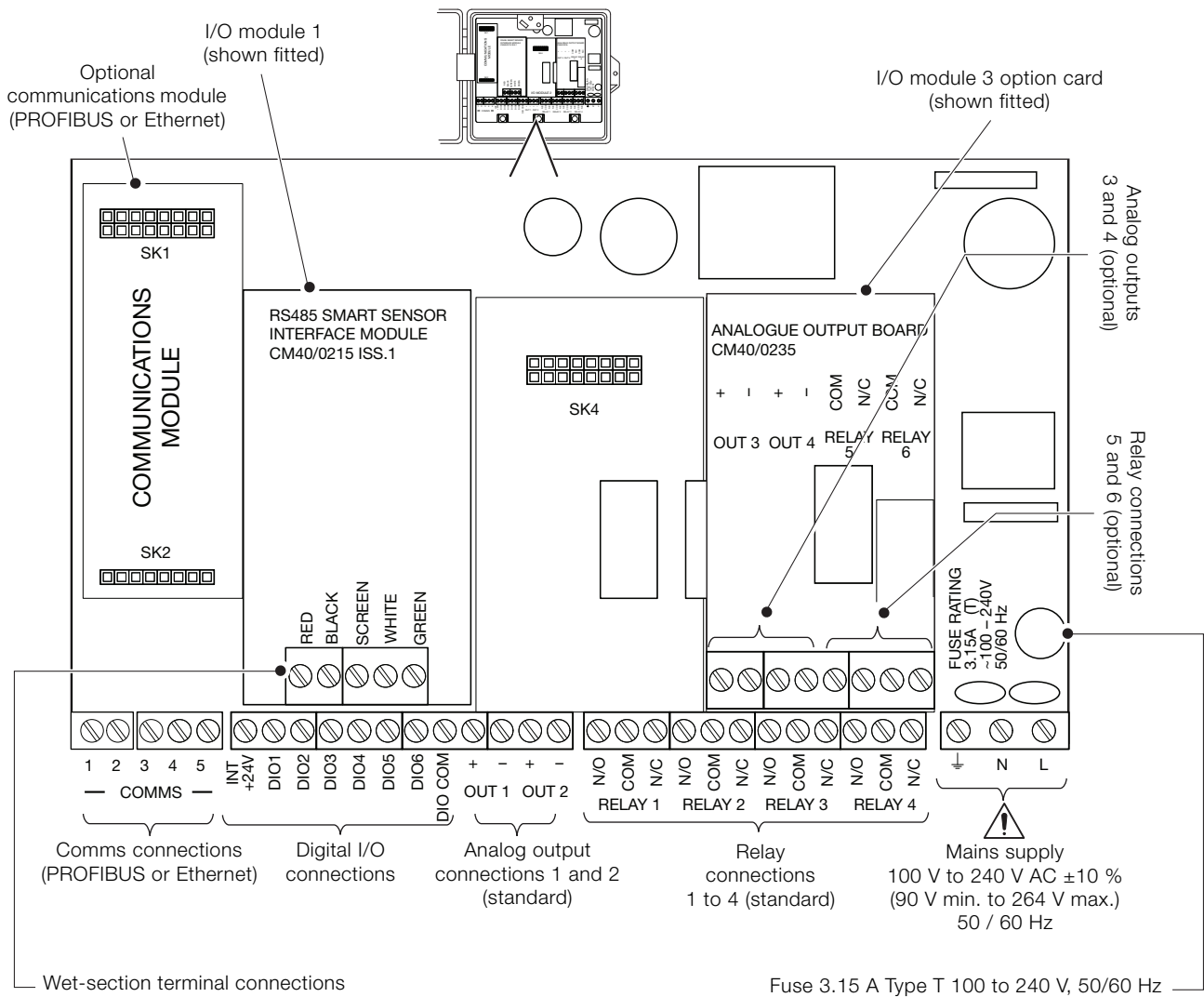


# Navigator 500

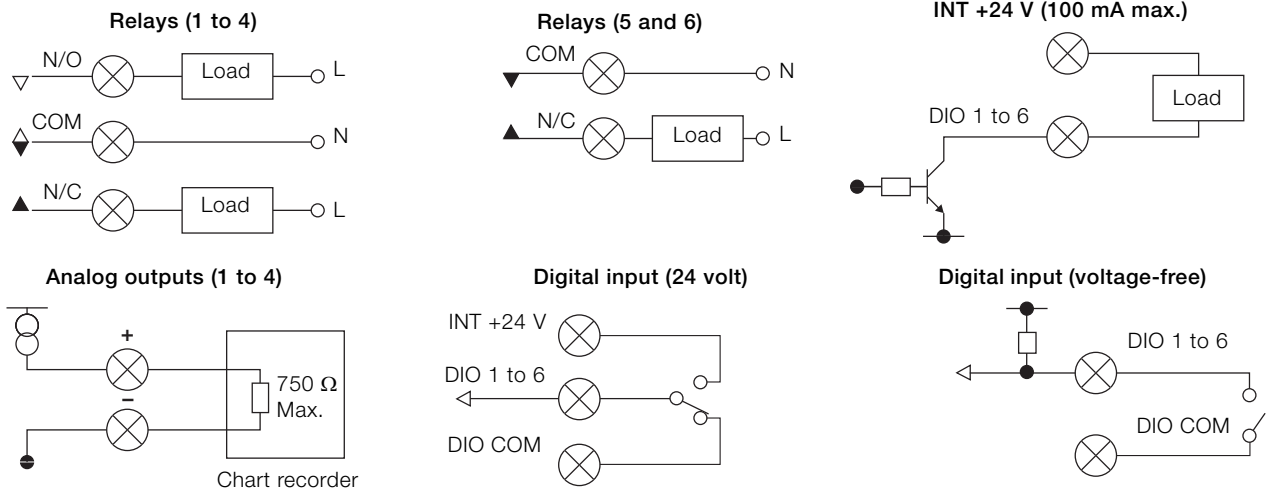
## Hydrazine analyzer

### Electrical connections

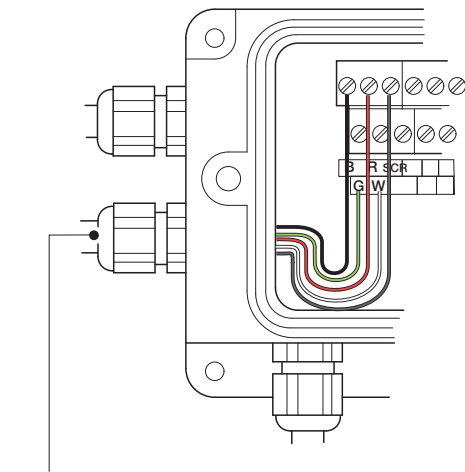
#### Transmitter



## Digital I/O, relays and analog output



## Wet-section (applicable only to multiple wet-section systems)



### Additional serial cable connections to multiple wet-sections

Red – R (24 V)  
 Black – B (0 V)  
 Green – G (Data +ve)  
 White – W (Data -ve)  
 Screen – SCR

# Navigator 500

## Hydrazine analyzer

### Ordering Information

#### Wet-section

Navigator 500 hydrazine analyzer	AHM550/	X	X	X	X	XX	XX	XX	XXX	XX	XX
Build revision	Reserved	A									
Measurement range	Standard (0 to 1000 ppb)	1									
Enclosure type	Wall	W									
Number of streams	Single stream	1									
Sensor type	Standard					S1					
	Supplied without sensor					Y0					
Process connection type	6 mm fitting						A1				
	1/4 in. fitting						B1				
Optional ordering codes											
Add 1 or more of the following codes after the standard ordering information to select any additional options.											
Sample measurement options	Sample flow measurement							S1			
Signal cable length and type	(supplied without signal cable as standard)										
	1.5 m (approx. 5 ft) cable, terminal connection								SC1		
	5 m (approx. 15 ft) cable, terminal connection								SC2		
	10 m (approx. 30 ft) cable, terminal connection								SC3		
	20 m (approx. 60 ft) cable, terminal connection								SC4		
Test certificate	Test certificate									CD	
Documentation language *	(supplied in English as standard)										
	German										M1
	Italian										M2
	Spanish										M3
	French										M4
	English										M5

\* Commissioning instructions are supplied with each transmitter.

Comprehensive operating instructions are available as a free download from [www.abb.com](http://www.abb.com) or printed copies can be ordered as additional items.

## Transmitter

Navigator 540 transmitter		AWT540/	X	X	X	X	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
<b>Build revision</b>																
Reserved			A													
<b>Enclosure type</b>																
Wall mount				1												
<b>Display type</b>																
Color (standard)					A											
<b>Power supply</b>																
90 to 260 V AC, 50 to 60 Hz						1										
<b>Channel 1</b>																
Digital, wired sensor connection							B1									
Without							Y0									
Reserved								Y0								
Reserved									Y0							
<b>Output signal</b>																
Without										Y0						
Additional output card (2 current outputs + 2 relays)										Y2						
Ethernet										E1						
Profibus DPV1										D1						
<b>Data storage</b>																
Without										Y0						
SD card function										D1						
USB function										D8						
<b>Optional ordering codes</b>																
Add 1 or more of the following codes after the standard ordering information to select any additional options.																
<b>Accessories</b>																
Panel mount kit													A2			
<b>Test certificate</b>																
Test certificate														CD		
<b>Documentation language</b> * (supplied in English as standard)																
German															M1	
Italian															M2	
Spanish															M3	
French															M4	
English															M5	
<b>Cable entry options</b>																
Metric gland pack (9 glands)																U1











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	Natural Gas Measurement		Pressure Measurement
	Recorders and Controllers		Temperature Measurement

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