1 Introduction

EGIM, the EMSO Generic Instrument Module, is designed to consistently and continuously measure parameters of interest for most major science areas covered by EMSO. This research infrastructure provides accurate records on marine environmental changes from distributed local nodes around Europe.

EGIM is able to operate on any EMSO node, mooring line, sea bed station, cabled or non-cabled and surface buoy. In fact a central function of EGIM within the EMSO infrastructure is to have a number of ocean locations where the same set of core variables are measured homogeneously: using the same hardware, same sensor references, same qualification methods, same calibration methods, same data format and access, same maintenance procedures.

2 Overall description of the EGIM

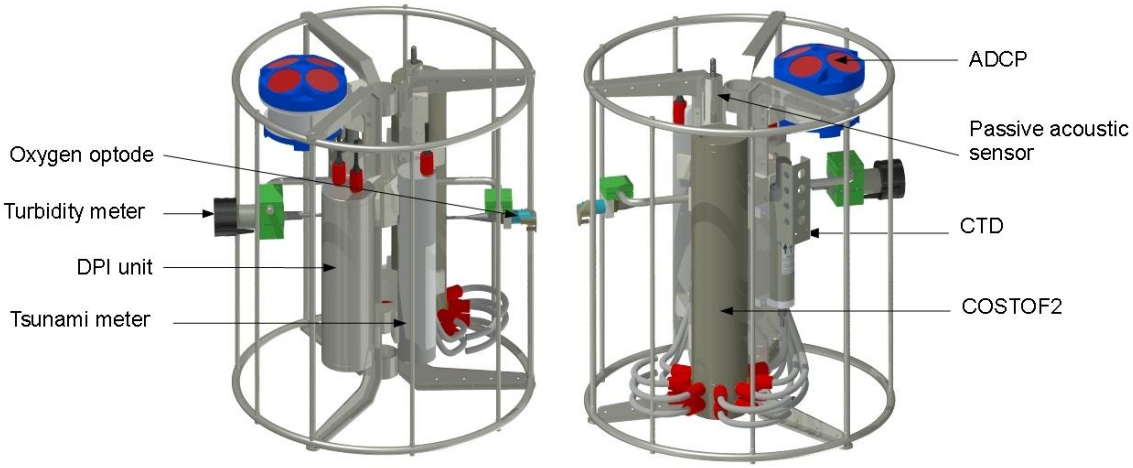

Figure 1 EGIM components

3 Technical specification of the EGIM

- Number of generic instruments: 6

Parameter	Sensors
Temperature, Conductivity, pressure	SEABIRD SBE37-SIP
Pressure	SEABIRD SBE 54 Tsunami
Dissolved O_2, temperature	AADI-3005214831 DW4831
Turbidity	Wetlabs FLNTUrdt
Ocean currents, Compass and tilt meter	Teledyne Workhorse monitor ADCP 300 KHz
Passive acoustics, Compass and tilt meter	OceanSonics icListen SB60L-ETH

Table 1 EGIM prototype sensor models

- Monitoring mode: cabled and non-cabled mode capabilities with
  - Embedded web server,
  - Mode self-management in case of power and/or Ethernet link loss,
  - Short-term backup batteries: 10 days
- Power input requirements: either 300VDC to 400VDC or 30VDC
- High precision time stamping provided by an embedded atomic clock with 5.10^{-11} drift
- Communication in air and underwater at short distance: WiFi link

- Dimensions: Ø 810mm H 925mm
- Maximal operating depth: 4830m[1]
- Temperature range for long term running:
  - 26°C (Maximal in-situ temperature)
  - -2°C in running mode
  - -20°c in sleeping mode
- Temperature range for storage: -20°C

4 Description of the EGIM components

a. CTD SEABIRD SBE37-SIP-P7000-RS232

http://www.ifremer.fr/esonetyellowpages/sensor.php?id=234
http://www.seabird.com/sites/default/files/documents/37-SIPbrochureNov14.pdf

Figure 2 CTD SEABIRD SBE37-SIP-P7000-RS232

b. SEABIRD SBE54 Tsunami meter

http://www.seabird.com/sites/default/files/documents/54BrochureAug15.pdf

Figure 3 SBE54 Tsunami meter

c. AADI-3005214831 Optode DW4831

[1] *Sensor providers generally give their specifications in meters assimilating 10 meters to 1 bars and the 6000m maximal depth specification stands for 600 bars. This is an estimation and for deep sea condition, the error is significant. In addition, a safety factor should be preserved between test and service pressure.*

Depth	*Service pressure*	*Test pressure*
6000 m	*625 bars*	*750 bars*
4830 m	*500 bars*	*600 bars*

Due certain component specifications, the EGIM functioning depth should be limited to 4830 meters.

Figure 4 AADI-3005214831 DW4831

d. WETlabs ECO FLNTUrtd

http://wetlabs.com/eco-flntu?qt-product_tabs=1#qt-product_tabs

Figure 5 WETlabs ECO NTUrtd

e. TELEDYNE RDI Workhorse monitor ADCP 300 kHz rated 6000m

http://www.ifremer.fr/esonetyellowpages/sensor.php?id=244

http://rdinstruments.com/product/adcp/monitor-adcp

Figure 6 TELEDYNE RDI Workhorse monitor

a. OceanSonics icListen HF(L) model SB60L-ETH

http://oceansonics.com/wp-content/uploads/Ocean-Sonics-Brochure-icListen-HF-Web.pdf

http://oceansonics.com/wp-content/uploads/icListen-Specs.pdf

Figure 7 OceanSonics icListen SB60L-ETH

f. COSTOF2

The COSTOF2 provides the following services to EGIM sensors:

- Energy distribution and control
- Measurement sequencing
- Indexation of the measurement data on a common high precision time base
- Measured data storage
- Communication with the external world
- Anti-fouling protection

The housing is made of Titanium alloy, the length is 745 mm and the diameter is 142 mm.

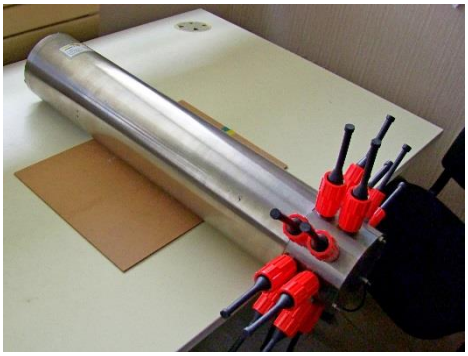

Figure 8: COSTOF2

g. DPI, “Data&Power Interface unit”

The Data&Power Interface unit is used to connect the EGIM on a cabled observatory. It transforms power to ensure a cabled interface to the EGIM in high voltage input configuration and provides energy to the EGIM in a short-term fail-soft mode in case of power loss. The housing is made of Titanium alloy.

Figure 9: DPI Unit

h. EGIM prototype frame

The EGIM frame protects the components and maintains them in the appropriate place before and during deployment. The EGIM is entended to be used undismounted from its frame, added as a whole to a mooring, a node or an external frame. The EGIM prototype frame is made of titanium. See G730400d_Assembled_EGIM_structure

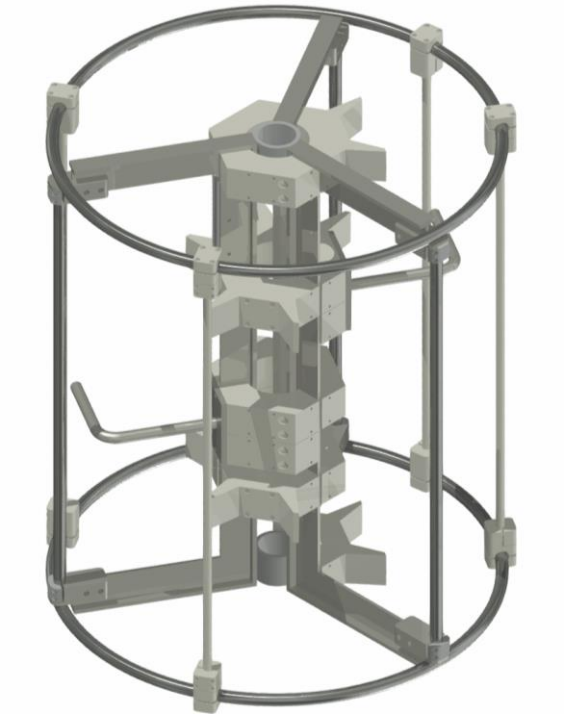

Figure 10 EGIM prototype frame

5 EGIM input and output lines

For complete cabling, Cabling scheme (Ifremer/G730011B)

a. EGIM input

There are two possible power ranges:

Input	Value

Power line Range A	300 to 400 VDC, 1 A With connection to the DPI
Power line Range B	30 VDC, 5 -12 A The nodes providing low voltage can connect directly to the COSTOF2. An input is available for the Ethernet link and another to the power supply.

Table 2 Input power specifications

b. Output power lines

OUTPUT	**VALUES**
Power line Number	12
Power line Voltage Range	5 -24 VDC
Power line Current Range	0 – 3 A

Table 3 Output power lines

a. Output communication lines

Criteria	
Total number of sensor outputs	16, including 1-wire outputs (4)
Serial output ports	12 ports
Configuration of the serial port	EIA-232, 422, 485 interchangeable via software
Ethernet connections	4
Configuration of the Ethernet port	10/100 mbps

Table 4 Output communication lines

6 Functioning modes

The EGIM has two nominal modes: an autonomous mode and a cabled mode.

When functioning in cabled mode, the EGIM can manage cable failure:

In case of power loss, the EGIM starts in a short-term fail-soft mode on rechargeable backup batteries of the DPI. The system reboots in autonomous mode. The Ethernet connection is shut downs. The system checks power and Ethernet regularly in order to recover cabled mode.

When the backup batteries have reached the lower limit, all the instruments are shut down and every 6 hours, the system checks power and Ethernet in order to recover cabled mode.

7 Tests

a. Check of the DPI output voltage

b. Check of the instrument output voltage on COSTOF2 for the 12 ports
Repeat from sensor2 to sensor12 (J09 to J19)

Sensors Power
Switch on sensor1 power with IO board web interface
Measure the voltage between pin 1 (OV) and 2 (+V)

The voltage must be 12V or 24V depending on the connector label

Table 5 Power to sensor tests

c. Communication tests between the EGIM and the node

   For sensor 4, 7 and 10: ping of the sensor address through Ethernet link

   For sensors 2, 4, 5, 7, 8, 10, 11: Test bidirectionnal communication between test terminal and transparent mode terminal through RS422/485 link, (baudrate = 9600 and baudrate = 115200

d. Check of connectors and cabling

e. Electrical continuity check

f. Mode management tests including the case of power or communication failure according to §6