- Existing Cam switch system can be replaced with this unit.
- Contactless position sensing of fuelrack.
- Intrinsically safe and galvanically isolated connections.
- Convenient adjustment of required switch points by means of teach button
- Lloyds approved switch cabinet.

CAM Switch Cabinet

Replacement for existing fuel rack indication on MAN B&W engines (also applicable on other engines with similar design)

System description:

MAN B&W engines use the position of the fuel rack in the safety and control system to switch on and off different auxiliary functions on the engine.

Existing system:
In the existing systems this is performed with discrete switches. The governor arm rotates the fuel rack shaft and this shaft rotates 8 adjustable cams. Each of these cams operate an independent limit switch. These switches are connected to the engine automation system and can perform following tasks (but is not limited to these):

- 1 GOS 1022 – On/Off alarm system
- 2 GOS 1022 – Release of engine operation
- 3 GOS 1022 – Suppression of low charge air temperature
- 4 GOS 1022 – Charge air temperature control off
- 5 GOS 1022 – Load dependent blow-by of charge air
- 6 GOS 1022 – Charge air temperature control on
- 7 GOS 1022 – Load dependent change of high speed cylinder lubricator
- 8 GOS 1022 – Closing of Load dependent blow-by valve when high load

The governor arm is also connected to an RVDT for fuel rack position indication. In the existing system each of the 8 cam/switch combinations need to be adjusted separately by adjusting the position of the cam or switch.

Replacement system:
The replacement system is a contactless system that, minimizes the number of components on the engine. This system makes it easier to adjust, more robust and less sensitive to wear and tear or pollution and vibration problems, because there are no limit switches used anymore. When installed close to the Process station or the Engine termination cabinet, the number of cables to the engine can be reduced to only one signal cable to two position sensors. The CAM switch unit consists of 2 position cams with each an independent inductive position sensor. The sensor signals are connected to several intrinsically safe signal converters, that have full galvanic isolation between inputs, outputs and supply voltage.

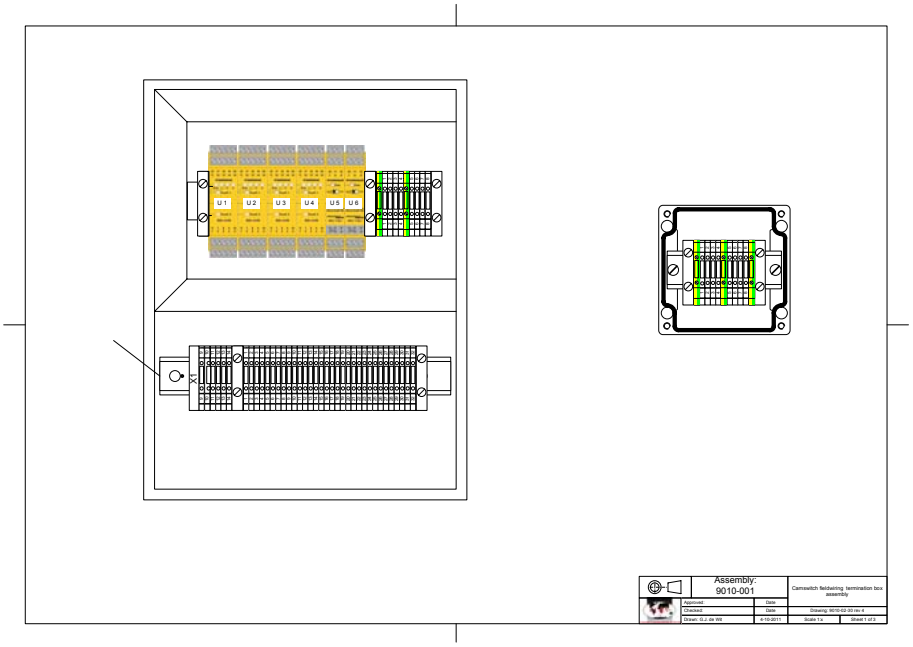
- Each sensor is connected to 2 signal converters, that each give two 4-20 mA output signals. These can be used for fuel rack position indication or as an input to the propeller pitch control units.
- Each sensor is connected to two intrinsically safe limit switch units, with each 3 contact outputs. The limit switch units use the analog position signal from the sensor to indicate a discrete position. The switching point for each of the total of 12 available potential free contacts is independently adjustable by means of a teach button on the front panel of the limit switch unit and can be adjusted to the required GOS 1022 positions.

The cabinet is a standard Rittal cabinet 300 x 400 x 155 mm cabinet with IP66 that contains all signal converters and limit switch units. Connections are done through a terminal strip in the bottom of the cabinet that contains all the required signals. The sensor connections are done through a Rittal field termination junction box 122 x120 x 80 mm. Included in the retrofit package are 2 fuel rack cams that have the correct shape to give a linear output signal from the sensor when the fuel rack moves from minimum to maximum fuel.
Optionally two brackets can be supplied to mount the inductive position sensors.

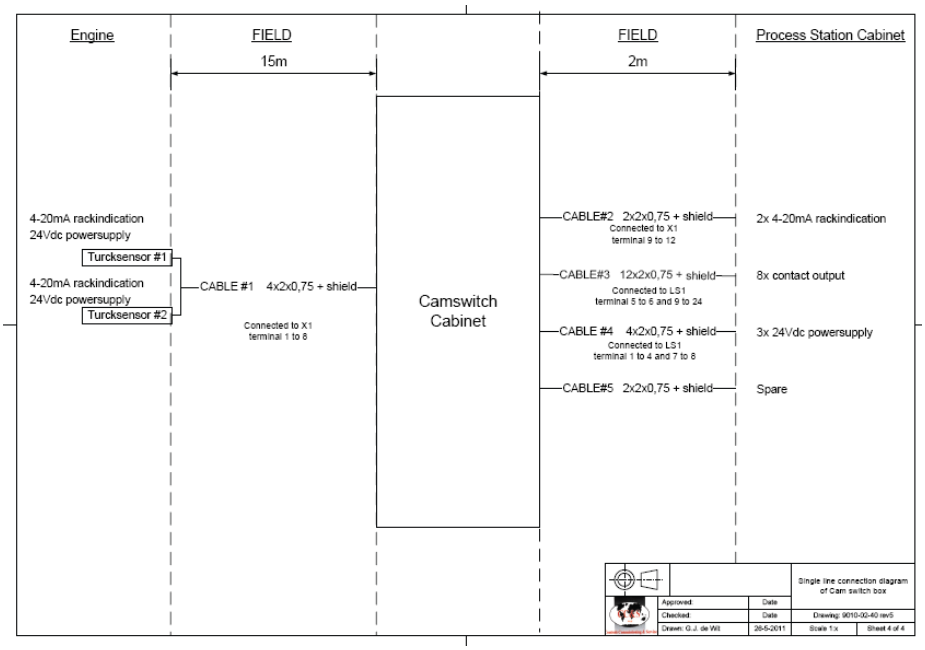
System functions & I/O

- 4 x Analog outputs (4-20 mA – $R_L \leq 500\Omega$) for fuel rack position indication.
- 12 x Discrete outputs (adjustable electronic limit switches with potential free contacts – 250VAC/6A) for discrete fuel rack position indication.

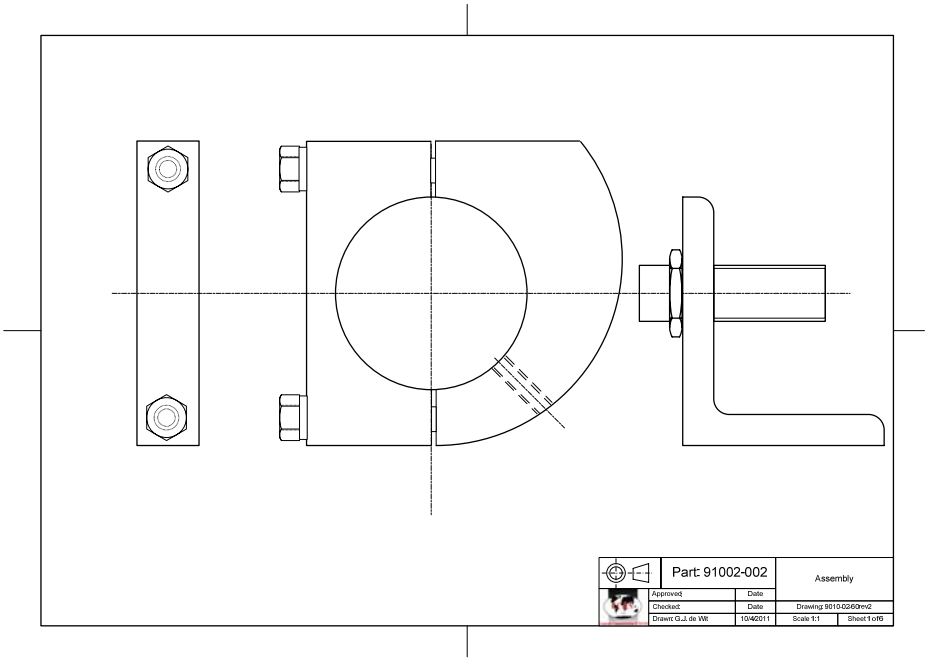
Cabinet layout



System layout



Fuel rack CAM and position sensor



Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested with satisfactory results in accordance with the relevant requirements of the LR Type Approval System.

This certificate is issued to:

PRODUCER	Control Commissioning and Service B.V. Aalsmeerdersdijk 156 1436 BA Aalsmeerderbrug The Netherlands
DESCRIPTION	Fuel rack position indication unit
TYPE	91002-001, CAM switch cabinet, connection box, Sensor Turck art. No. Ni10-M18-LiU
APPLICATION	Marine, offshore and industrial use
STANDARD	Environmental Categories ENV 4 for connection box, sensor and ENV 3 for CAM switch cabinet as defined in LR Type Approval System, Test Specification No. 1 2002.
ADDITIONAL TEST	Temperature -25 C degrees for 16h.

"This Certificate is not valid for equipment, the design, ratings or operating parameters of which have been varied from the specimen tested. The manufacturer should notify Lloyd's Register EMEA of any modification or changes to the equipment in order to obtain a valid certificate."

"When Rules and Standards mentioned in this certificate are changed within the validity of this certificate, than this certificate becomes no longer valid."

Certificate No.	10/30012
Issue Date	15 October 2010
Expiry Date	14 October 2015
Sheet	1 of 2

G.J. Vromans
Type Approval Department
Lloyd's Register EMEA

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