

Digital tank gauging Systems for Shipboard applications

.....the advantage is clear

The new generation of digital tank gauging instrumentation combines PSM's 30 years of marine instrumentation know how with the latest technologies.

Embedded intelligence and clever system architecture that adopts digital signal transmission in preference to conventional analogue 4-20mA signal loops means simplified installation and reduced

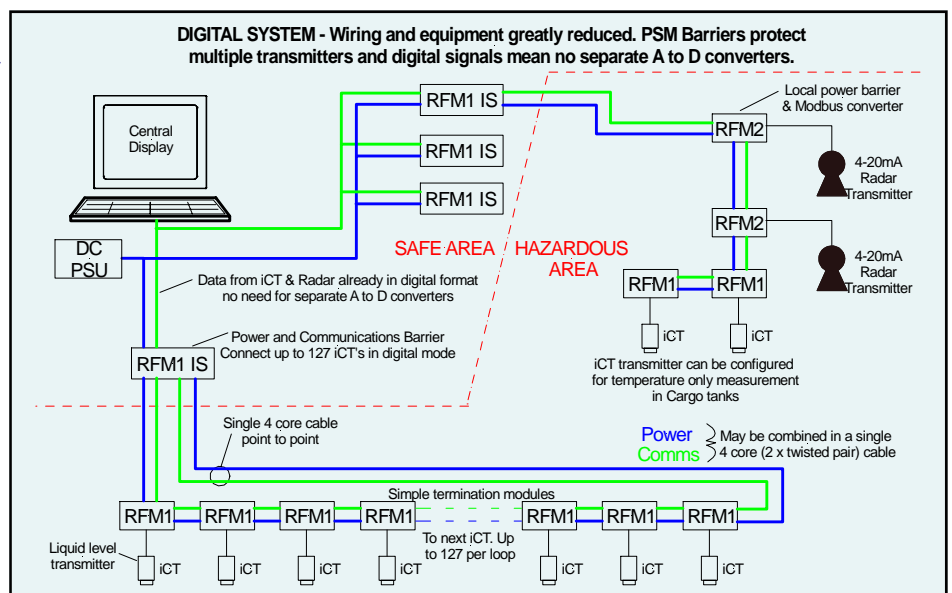
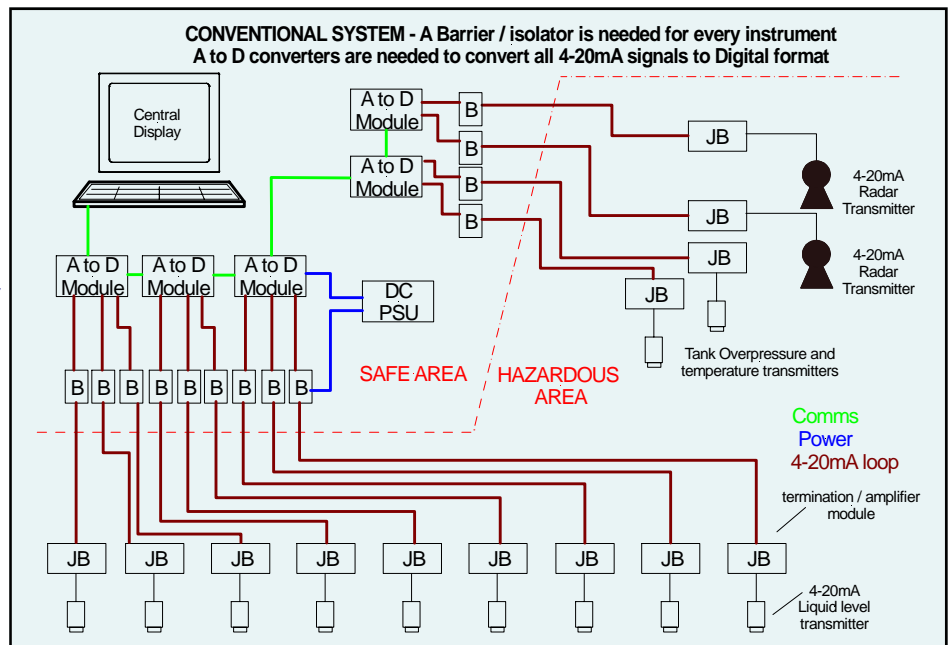
equipment and cabling costs for the shipbuilder, and ease of use, simple servicing, enhanced performance and long-term reliability for the ship owner. Communication between instruments uses the proven and universally adopted Modbus protocol to provide reliable transmission over a simple 2-wire (twisted pair) RS485 cable link. The RS485 cable is connected in a point-to-point configuration from one instrument to the next.

PSM's range of Remote Function Modules (RFM's) are provided in different versions

to facilitate simple interconnection and convenient cable terminations in full compliance with ATEX Intrinsic Safety standards. PSM's "Tankview" P.C. based centralised display system provides both comprehensive set-up and diagnostic tools for configuration and maintenance of the measuring instruments, and in operational mode provides full graphical presentation of tank status. Both conventional analogue dial indicators and single or multi-channel digital indicators can be added for local display of specific tanks.

Clear advantages....

- ❖ **Reduced cabling and equipment requirements** – Instruments are interconnected in a "multi-drop" configuration where the cable goes from point-to-point rather than each instrument being run all the way back to the data acquisition module / central display.
- ❖ **Reduced power requirements** – Equipment run in digital mode has a much lower consumption, this enables multiple instruments to be connected via a single power / communications barrier for ATEX compliance instead of each instrument requiring its own barrier.
- ❖ **Remote setup** - Equipment can be addressed and calibrated remotely (from any point on the network), no need to be in, or even near, the tank.
- ❖ **Reduced Spares** – Units are interchangeable and configured after installation. Setup and diagnostic functions in the central display means instruments can be set up with no special equipment needed.
- ❖ **Data security** - All data stored in non-volatile memory both in the instrument and on the central monitor. Distributed intelligence enhances system reliability
- ❖ **Full Information** - Each instrument outputs a comprehensive report of tank status – In engineering units. This can be routed to other shipboard systems if required.
- ❖ **Self Monitoring** - Each instrument monitors its own health and will provide early warning of problems or of any alarm conditions arising.



The equipment range - defined by experience

PSM has 30 years solid experience of supplying marine tank gauging systems across all classes of Ships including oil / chemical tankers, bulk carriers, cruise ships, yachts, offshore rigs, trawlers, tugs, and workboats. We are the preferred supplier for a number of the world's navies, providing equipment fully compliant with the onerous shock, vibration and EMC / RFI standards the military require. The purpose-designed solutions we have developed for this most demanding sector are now available for the wider marine market. Instrument solutions are based on either hydrostatic or radar technology, each optimised to suit the application. Full details are provided by PSM's product literature, but to summarise some of the highlights:-

iCT – the intelligent hydrostatic transmitter

Intended for use on service, ballast, freshwater, draught, and smaller cargo tanks, the iCT bridges the gap between conventional analogue transmitters and new generation digital devices. For upgrades or replacements of old instrumentation it can operate as a 0.25% accuracy conventional 4-20mA transmitter but with the added benefits of embedded intelligence for simple user set-up. In dual mode it provides both analogue output and digital communication, and in digital only mode the full benefits of multi-drop connection are realised. The user is free to choose or change the operating mode. In digital mode the iCT also provides temperature measurement, further reducing the equipment requirement.



Sensor construction is fully submersible and uses a corrosion resistant body and ceramic measurement cell to ensure long-term suitability for all in-tank environments. The construction ensures protection against overload and shock pressure conditions.

When addressed in digital mode the performance of iCT is fully realised. Communicating directly with the central display with no digital to analogue conversion limiting resolution, the 16 bit arithmetic precision improves measurement accuracy to 0.1% under normal stable conditions. In digital mode up to 127 iCT's can be multi-dropped over a single 2 wire RS 485 network, with a single RFM-ISR safety barrier module providing protection for all.

iCT digital benefits

- ✿ *Remote access. The full functionality of any transmitter in the network can be accessed from any point.*
- ✿ *Accurate remote re-ranging and/or zero adjustment. There is no need to employ external test equipment and pressure generators. The unit does not even have to be removed from service.*
- ✿ *Accurate temperature measurement. In digital mode, the current process temperature may also be output.*
- ✿ *Monitoring of service conditions and extremes. iCT records the lowest and highest in service pressures and temperatures it has measured to assist in trouble-shooting.*
- ✿ *Tank characterisation. The digital output provides both liquid level and volume data corrected for non-linear shaped storage tanks using the programmable 25-point look-up table. The 4-20mA signal can also be corrected using this look-up table.*
- ✿ *Error reporting. Internal diagnostics continually monitor the health of the iCT. In the event of errors, e.g. the 4-20mA output becoming inaccurate, an error flag is set to notify the central monitor.*
- ✿ *Integral high, low, and deviation alarms with variable setpoint, debounce, and hysteresis*
- ✿ *Rate of change alarms. For the detection of tank leaks.*
- ✿ *Force zero/span. This fixes the analogue output to 4 or 20mA within a defined band of these points. The analogue output can also be forced to a programmable fixed value between 3 and 22.5mA for indication of faults.*
- ✿ *Analogue output control. The 4-20mA output can be set to any value irrespective of the actual input pressure, for proving and calibration of connected display equipment.*

Radar Transmitters

For tank level measurement on larger Cargo tanks Radar technology is generally preferred.

Depending upon the application PSM is able to offer a choice of solutions in partnership with industry leading manufacturers.

Both Pulse and FMCW Radar technology is available, the optimum choice will depend upon the combination of price / performance required. PSM or appointed Agent will be pleased to provide specific recommendations to suit your requirements.

Please refer to product data sheets for more details



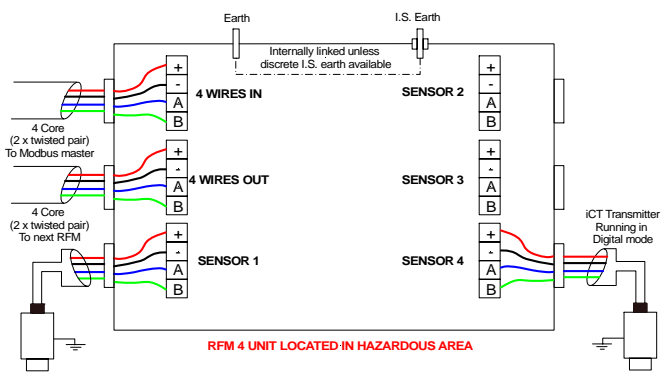
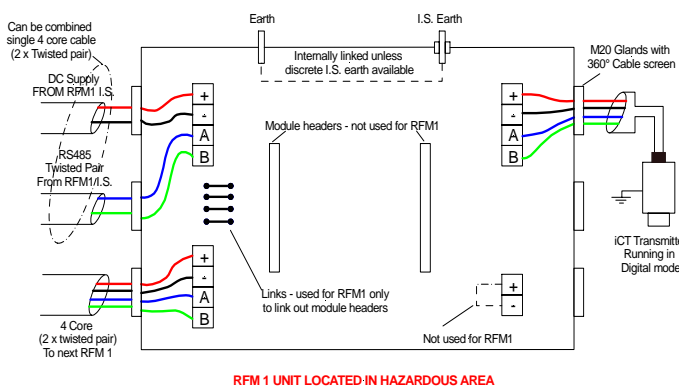
Remote Function modules

PSM's range of Remote Function Modules (RFM) provide a simple method of terminating all instrumentation cabling, and provide Zener barrier protection to ATEX intrinsically safe standards for both the power and communications circuits in the hazardous area. The RFM can be specified in a lightweight Epoxy coated Aluminium enclosure or a rugged Steel Galvanised enclosure suitable for mounting on open deck. Both are rated to IP67

RFM's maximise the multi-drop communications potential of PSM's instrument range enabling a simple point-to-point network to be created. Where the iCT is run in digital mode, its low power requirement means just one RFM-ISR barrier will protect an entire ship set of equipment (up to 127 iCT's)

Radar transmitters have higher power requirements due to the operating principle but even here a single RFM-ISR barrier can power and protect two radar devices and up to 6 iCT transmitters running in digital mode.

A range of termination modules, safety barriers, and Modbus processors

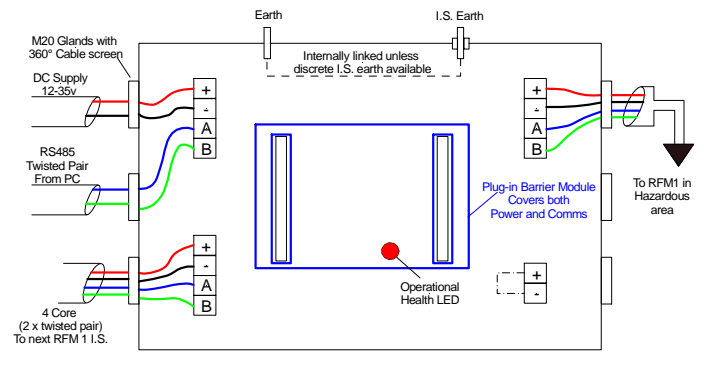
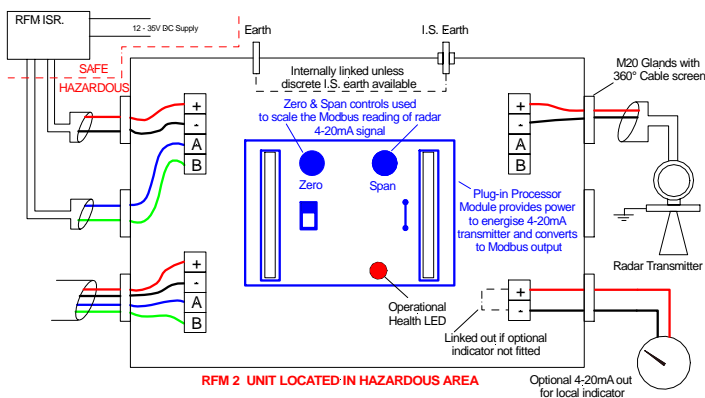


RFM1

A termination module providing convenient connection points for the iCT transmitter cable, and data & power input / output cables.

RFM4

A termination module providing connection for up to 4 iCT transmitters and data & power input / output cables.



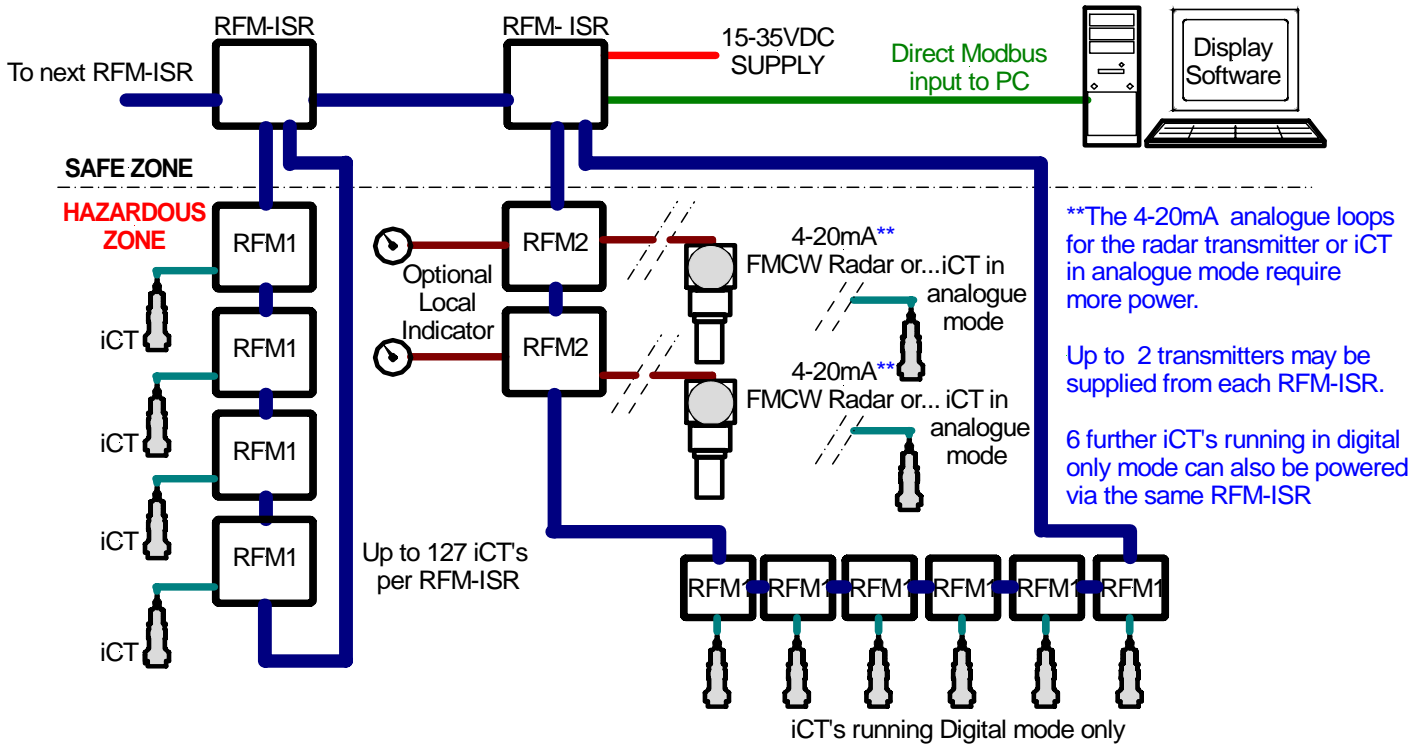
RFM2

This adds a processor module and power circuit to the basic RFM1 to provide a local supply voltage for a radar transmitter and convert the radar transmitters output to digital data that is then transmitted over the Modbus network.

RFM-ISR

This module provides Intrinsically Safe protection of both communications and power to units in the hazardous area. The RFM-ISR has an on board regulator and an active circuit to control energy levels in the hazardous area. As a result one barrier can protect up to 2 conventional (4-20mA) instruments and 6 iCT's in digital mode, or up to 127 iCT's in digital only mode.

Simple to install, simple to manage.



Approvals

PSM instrumentation is Type approved by many of the leading classification societies

- ✿ Lloyds
- ✿ DNV
- ✿ BV
- ✿ GL
- ✿ KR
- ✿ RINA
- ✿ Class NK
- ✿ ABS



Equipment is certified Intrinsically Safe for use in hazardous areas.

Equipment is tested to Naval EMC, Environmental, and Shock standards where required



advice & enquiries

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