



Integrated Support System for iCT Level Temperature and Pressure Transmitters

The Integrated Support System (ISS) is a PC based software application, running in the windows environment. It communicates with PSM's iCT range of transmitters using industry standard Modbus protocol, to provide full remote configuration and data acquisition / display capabilities. During commissioning or system changes ISS allows the user to simply and precisely tailor connected transmitters for their intended duty. In normal operation ISS continuously monitors the connected iCT's, reading current measured values and checking for correct operation. The ISS display will show the current level / volume / pressure / temperature values, and also any active alarms / errors reported by the iCT. The standard ISS configuration, diagnostic and display tools are provided free of charge, and optional enhanced versions are available providing full graphic presentation and interface with other software packages.

Connecting ISS Connecting iCT

ISS uses the RS485 industrial serial communications standard. Up to 128 transmitters** may be connected on a single screened twisted pair cable, which can be up to 1500 meters long.

ISS can be connected to any point on the RS485 data loop. PSM's optional Remote Function Module (RFM) has provision for local temporary connection of a laptop and for permanent installations the RS485 cable is run to the central PC.

Connection of the RS485 signal to the PC requires either an RS485 to RS 232 Serial port converter, or an RS485 to USB converter. In either case PSM can provide a low cost module, either as a stand alone device or packaged with a power supply to provide 24V DC power to the iCT which enables an entire network to be interconnected on a single 4 core point to point cable.

Where the iCT's are to be operated in digital only mode their low power requirement means it is possible to employ the 500mA supply available from the USB port to drive the loop directly.**

** Actual loop powering is subject to consideration of ATEX limitations for Intrinsically safe installations. Please refer to PSM for guidance

PSM's optional Remote Function Module (RFM) provides a convenient means of cable termination for both the analogue and digital outputs of the iCT. It's capabilities are detailed in PSM data Sheet DAT030.

Using ISS

ISS has several layers of operation. Firstly as a configuration and commissioning tool, secondly as a diagnostic tool for troubleshooting, and finally as an on-line monitoring device, which collects data from any of the connected iCT transmitters and provides a complete status display. The enhanced versions of ISS also enable

output of data to other PC resident applications, either locally or via a network connection, in a variety of formats. PSM will be pleased to discuss specific requirements

ISS operates just like any other Windows™ application and will be immediately familiar. It is a Multi-Document Interface, meaning specific areas are opened within their own window.

ISS can be set to automatically check the USB port on start-up to determine if one or more iCT's are connected. Any iCT's

detected will be interrogated and their parameters saved within iSS against each iCT's unique serial number. If no iCT's are detected, or the user requests it, the ISS will switch to off-line mode, which enables configuration files to be manually created, that contain settings for all parameters.

Off-line mode allows an entire installation of transmitters to be pre-defined without being at the location. To implement these settings, the user can connect to any point on the RS485 network and download to all iCT's.

Key iCT / iSS Features

- In digital mode, any transmitter can be accurately re-ranged from any point on the RS485 network without the need to physically access it to apply pressure.
- During factory calibration, a table is generated that uniquely characterises each iCT over its full pressure range. This table is compensated for the effects of temperature, non-linearity and hysteresis, and is stored in the transmitter's non-volatile memory. Unlike conventional analogue transmitters where the 4-20mA output is dependant on the sensor's displacement, it is possible to assign the 4 and 20mA points anywhere on this table. The user simply enters the pressure values at which 4mA and 20mA outputs are required and accurate recalibration is complete.
- The iCT incorporates a 12-bit ADC feedback circuit which constantly monitors the 4-20mA loop. The micro-controller compares its value with the digital signal and the user set calibration and ensures that it is accurate. If, under fault conditions, errors are beyond dynamic correction, an error "flag" is set within the iCT which can be read via the digital output. In addition and if required, the 4-20mA current output may be driven to a pre-determined fixed value. This option is user selectable, as is the actual current value within the limits 3 to 22.5mA.
- In digital mode the transmitter also provides a process temperature measurement accurate to within +/- one degree centigrade.
- For tank volume or any other applications requiring linearisation, iCT can be programmed with a 20-point look-up table, providing a direct output in volumetric rather than level terms.
- All configuration information in the iCT is stored in non-volatile re-programmable memory.

Configuration Parameters

Using ISS the user may amend the following:

Node address- this is set for each transmitter before installation into a multi-drop RS485 network. ISS detection of a single transmitter ignores the node address. Two identical node addresses will be indicated as an error by the ISS. During commissioning, the ISS will sequentially address a possible total 128 nodes and present information regarding respondents, nulls and conflicts. Manual or automatic re-ordering of the node addresses can then be invoked.

Transmitter calibrated range and zero / span settings – entered in engineering units.

Current loop scaling – the 4-20mA output may be assigned over all or any portion of the calibrated range, the zero may be offset or suppressed and the output may be inverted (i.e 20-4mA).

Tank profile table – this provides a 25-point “look-up” table to correct for a non-linear tank shape. The points may be taken directly from a sounding table and are entered as a comparison of tank height against tank volume.

Forced span- this enables the user to set a “deadband” around the maximum span so that the 4-20mA output is forced to 20mA when the actual level is within a selectable percentage value of the full span. The % values for above and below full span are independently adjustable.

Forced zero – this provides the same functionality as the forced span settings.

Specific gravity – entered as an actual value. This is used as an active scaling parameter, to correct the 4-20 output.

Rate of change (leak) detection for both level and temperature – there are two parameters to set. A) time and B) the acceptable % change. If the change is greater than the limit set, an error message will be transmitted when the transmitter is polled (in multi-drop mode) or periodically in single transmitter mode.

Absolute Alarms— the iCT has 2 independent alarm points configurable in respect of set-point, MOR / MOF, hysteresis, and deadband. An alarm may be either latching or non-latching and when energised sets the appropriate alarm “flag” for reading via the digital output

Set operational mode – selects digital only mode, or digital and analogue mode.



Data sheet
Intelligent Instrumentation



Diagnostic Mode

ISS provides a number of “tools” to assist an engineer in the initial commissioning or subsequent fault-finding of an iCT or equipment connected to it.

Force analogue output – to any value between 4 and 20mA, irrespective of applied pressure - for proving connected instrumentation.

Read maximum and minimum temperature the unit has been subjected to – in degrees centigrade..

Read maximum hydrostatic pressure and vacuum the unit had been subjected to – in selected Engineering Units.

Status Flags— the iCT has a number of error flags which are automatically set in response to internally detected errors or as a result of alarms being activated. These can be read at any time via the digital communication

Operational Mode

The following read-only information is available

Unit serial number – A 10 digit code which uniquely identifies the iCT.

Duty ID – free format field for customer advised detail, for example tank name.

Calibrated Range – in engineering units.

Total operational time – incremented hourly.

Factory set calibration parameters – these are presented as a ‘look-up’ matrix, in tabular form.

Node address

Serial number – unique to the transmitter

Current pressure – in selected units of measure

Current temperature – in Degrees Centigrade

Error / Status Flags

The operational modes available depend upon the supply voltage supplied. For a supply voltage between 6-12 v DC, the transmitter operates in digital-only mode. Above 12 V, to a maximum of 32 V, the analogue output may also be enabled.



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