MultiSmart RTU

The ONLY RTU Designed for the Water & Wastewater Industry

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The MultiSmart remote terminal unit (RTU) is the latest in RTU and PLC technology for water and wastewater utilities. It boasts many unique water-industry features (see the Water Industry Benefits section), making MultiSmart the best "whole of life" cost solution.

Latest generation RTUs such as MultiSmart combine processor power with I/O flexibility and a standards-based approach to programming and communications.

Key RTU specifications of MultiSmart include:

- High-speed Intel processor
- Separate I/O processor board
- 32MB flash, 128MB RAM
- Ethernet and 3x high-speed 115 kB/s serial ports
- Up to 1000 I/O
- IEC61131-3-compliant—all five languages (with all the benefits of ISaGRAF 5)
- DNP3 level 2 and Modbus (RTU/ASCII/TCP)
- Flexible TCP, UDP and serial communications
- Support for serial radio, ethernet radio and all cellular modems
- Remote configuration and upgrade
- Datalogger for 50,000 events / 10M events with external CF card
- Compact flash port

The MultiSmart RTU is designed to ensure that complex applications don't affect the I/O capabilities of the unit—a common problem with any industry RTUs. This is achieved with a separate I/O processor board, and as I/O count is increased, more I/O processing is included. Your application will always function without compromising your I/O requirements.

The main processor is a high-end Intel processor with 32MB of flash memory and 128MB of RAM. All five IEC61131-3 languages are supported, with ISaGRAF workbench as the platform. There is support for multiple and cascaded PID loops and many other library functions from ISaGRAF.

The standard I/O modules include 4-20mA inputs and outputs, digital outputs via relays and volt-free digital inputs. The digital inputs have additional features (see the Water Industry Benefits section) as well as high-speed (1kHz) counters.

DNP3 is a flexible telemetry protocol that was originally designed for the needs of electricity utilities and has been more recently adopted by many water utilities in the UK, Australia and the US. The Multitrode DNP3 implementation has been independently tested and verified as meeting the standard.

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Water Industry Benefits

Monitoring Three-Phase Supply

One of the biggest challenges for the water and wastewater business is the geographic spread of assets, along with the need for three-phase power for pumping. In many locations three-phase power is often poor. Most installations with generic RTUs have only a phase-fail relay to identify power problems. However, these are usually set to trip on acute problems—to allow pumps to keep pumping.

A more useful preventive maintenance indicator would log systematic low voltage or phase imbalances, which cause pumps to fail after five years instead of 25 years. The MultiSmart RTU includes three-phase supply monitoring (direct phase-to-phase connection) and datalogging with configurable faults for under-voltage, over-voltage, phase imbalance, ground/earth fault and phase rotation.

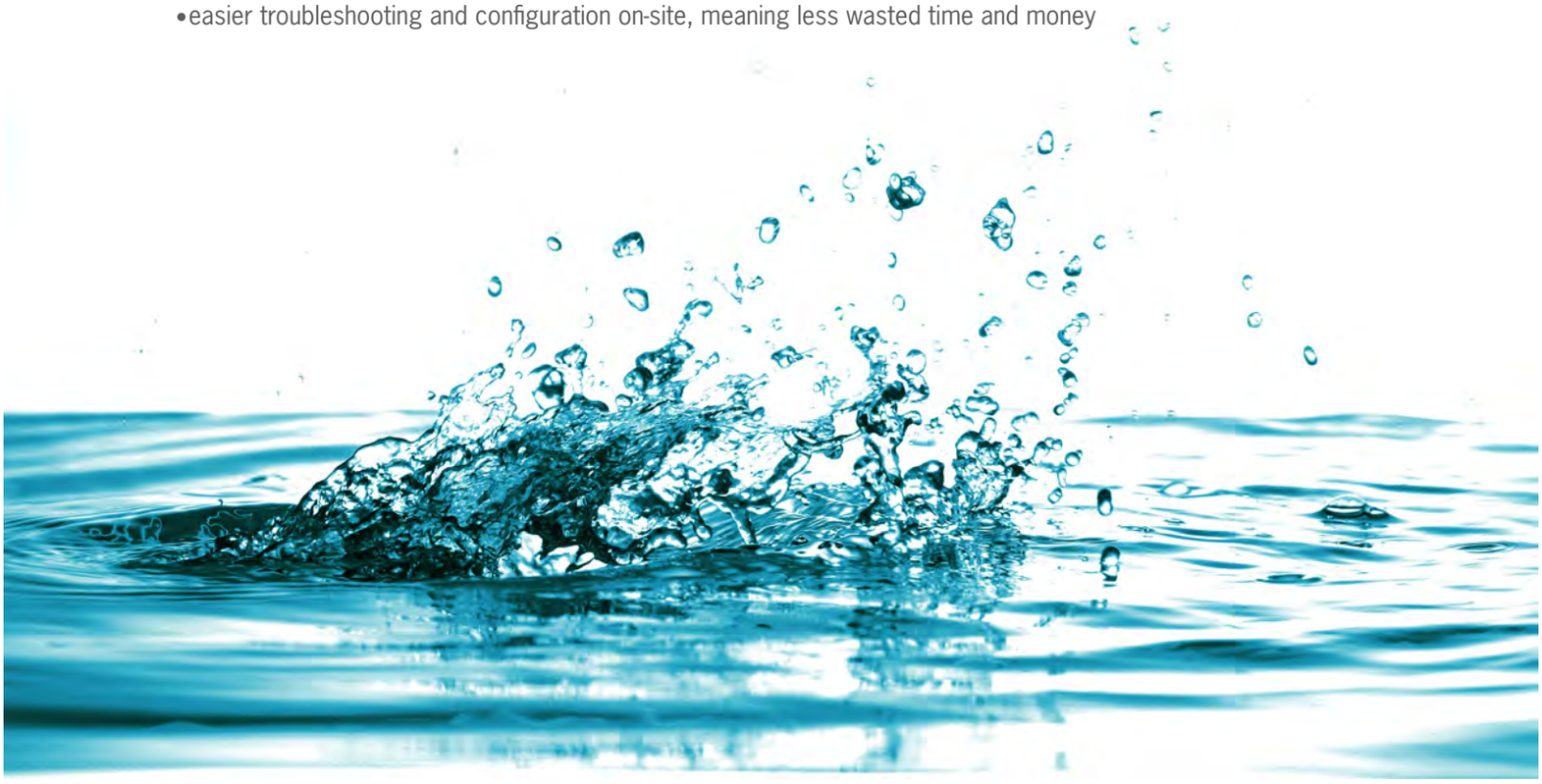
The benefits:
- a system with less premature failure of assets
- more verification that power supply companies are meeting contractual requirements
- better root-cause analysis of frequent trips

Display for Configuration and Process Variables

Most RTUs have display options, but, usually, they require a high programming investment—and therefore a programming maintenance investment.

The MultiSmart RTU is unique in that it has an optional large graphic display with both a complete configuration menu and process variable display already created. MultiTrode periodically updates the software, which is free for download at multitrode.com. The display can be installed in the panel, or one display can be carried around and plugged in while staff are on site.

The benefits:
- no HMI programming costs
- easier troubleshooting and configuration on-site, meaning less wasted time and money



The “Crisis Logger” - High Resolution Datalogging

MultiSmart has a unique feature in addition to the standard 50,000 event datalogger. Any tag can be configured as a “trigger” which will capture a snapshot of other tags both before and after the event. This allows the organization to datalog intensively when problems (or events of significance occur) without consuming bandwidth or memory when this data is not needed.

The benefits:
- better fault-finding and root cause analysis of problems
- less bandwidth required

Current Monitoring

One of the I/O boards includes inputs for three-phase currents for three-pumps (i.e., nine current inputs) via current transformers without any shunts or other signal conditioners. As a result, sophisticated current monitoring can take place, with SCADA diagnostics as well as local control. For example, the organization might choose to log changes in three-phase currents continually, or log phase imbalances when above a threshold, which might lead to long term problems. Various motor protection faults can also be created from this data.

The benefits:
- better asset management

Compact Flash Port

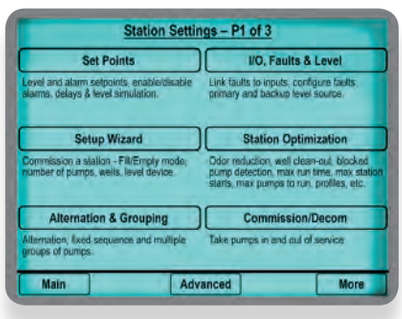
Bandwidth is often limited in communications infrastructure, but some sites have a requirement for intensive datalogging. Sometimes this is for engineering studies and other times for troubleshooting—root-cause analysis. The MultiSmart RTU has a compact flash port that allows the datalogger to be downloaded and also allows the user to update firmware and configuration.

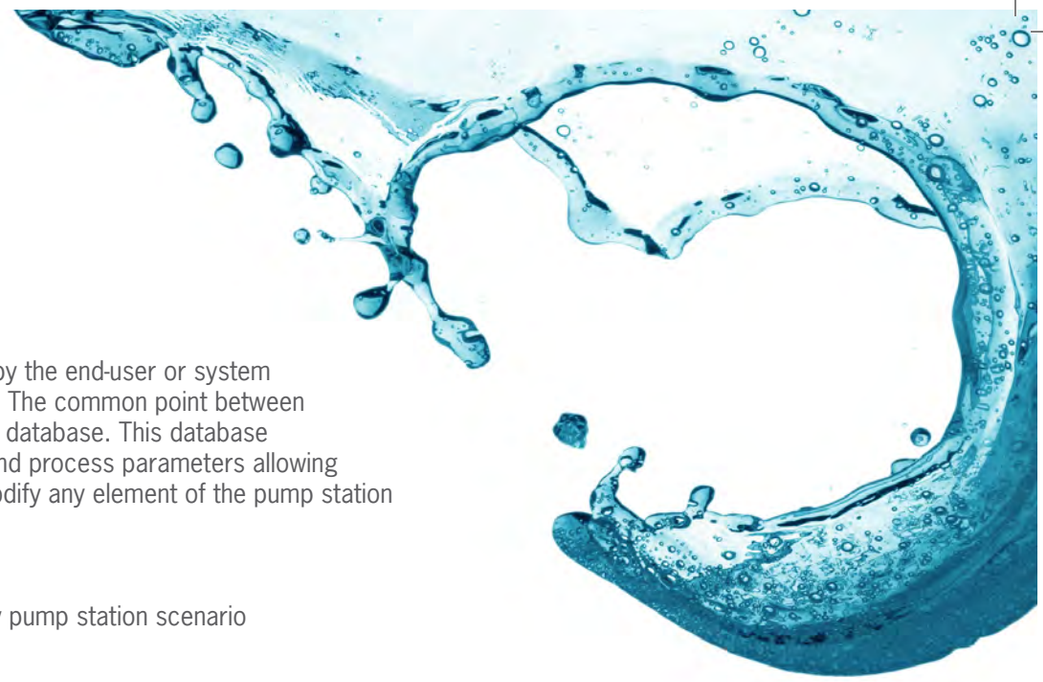
This can all be done remotely through the SCADA system, but where bandwidth is limited the compact flash capability allows operators to collect large data files or upgrade firmware or configurations.

Upgrade to Pump Station Manager

Many organizations continually invest in programming RTUs to control wastewater and water pump stations. These costs can be unnoticed but are often high and require some form of change management control to avoid the problems of different stations having different versions of code.

The MultiSmart RTU can be upgraded (via software) to a Pump Station Manager, which incorporates an extensive pump controller for up to 6 pumps. The pump station manager has a number of other modules for station management including energy management, motor protection and flow calculations.This software is maintained and regularly updated by Multitrode, with free upgrades for customers when new versions become available.

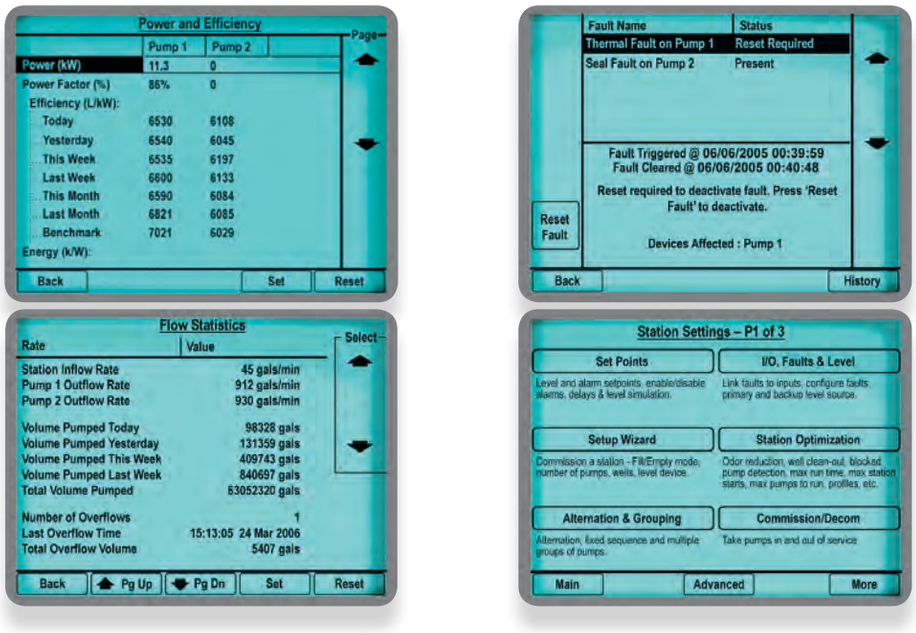




The software can still be altered by the end-user or system integrator with ISaGRAF modules. The common point between the two is the comprehensive tag database. This database includes all of the configuration and process parameters allowing the programmer to replace or modify any element of the pump station manager.

The benefits:

- extensive functionality for every pump station scenario
- operator interface
- engineering interface
- setup wizard for quick configuration
- station configuration through parameters rather than programming



Pump Sensor Relays Included

The MultiSmart RTU includes a number of interfaces for pump sensors – removing the need for many components often found in the panel. These include the Flygt miniCAS relay and most relays for conductive seal sensors. MultiSmart also includes support for conductive level sensors, such as the Multitrode probe.

The benefit:

- lower control panel cost
- better integration of pump sensors into the control panel and SCADA system

Support for WITS DNP3

The UK water companies formed the Water Industry Telemetry Standards group (ukwits.org) in 2003 to make some enhancements to the DNP3 standards which are needed in water and wastewater. Multitrode is proud to be one of the first companies with a WITS DNP3 RTU.

I can confirm that the integration of the MultiSmart system into our existing SCADA systems has been an absolute breeze.
The DNP3 server solution is, as you know, extremely simple to install and we have been able to integrate the MultiSmart systems across the Scottish region in literally a matter of minutes using the TOPServer DNP3 OPC driver.
Our client is extremely pleased with the implementation of this equipment which has provided operational security together with extremely valuable energy and operational data.
The client has also been impressed with the effortless integration of the MultiSmart units into the existing SCADA and PLC systems.
On the above basis I cannot recommend your systems highly enough – a market leader in cost and functionality and I would be more than happy to endorse your systems to a third party.

Darran Garforth, Engineering Director,
Sector 8 Solutions Ltd, UK

Specifications

Processor, Comms, I/O, Display, Power Supply, Environmental.

Processor Unit

Type:	Intel PXA255
Speed:	200MHz
Flash memory:	32MByte
RAM:	128MByte
Real time clock:	Yes
Serial ports:	RS232 x 3, 115kBit/s
Ethernet port:	10Mbit/s
Compact flash:	For firmware upgrades, configuration save/load, datalogging

RTU/communications

Protocols:	DNP3 level 2, WITS DNP3, Modbus (RTU, ASCII, TCP)
Media:	TCP, UDP, RS232, 3G/GPRS/CDMA (1XRTT), PSTN/GSM/CDMA,
Datalogging:	Change of state for digital, dead-band for analog. Date/time and quality stamped

PLC specification

Programming:	IEC61131-3 (configured via ISaGRAF workbench version 5)
Reference to existing functional blocks	Via tag database

Configuration & Firmware upgrade

Local:	Compact Flash card or Ethernet from PC
Remote:	Via DNP3 file transfer, or via FTP

I/O modules

IO-3PC: General I/O

DIN x 20:	DINx 20 configurable as contact closure, counter, MultiTrode probe input, seal, thermistor or FLS. Of these inputs: • 3 of the DINs have additional CLS capability • 2 of the DINs have additional high speed digital input capability (1kHz) • 1 of the DINs has additional failsafe probe capability
DOUT x 7:	DOUTx 4 isolated voltage free contacts DOUTx 3 common voltage free contacts All rated 240Vrms, 5A
AIN x 2:	2x 4-20mA inputs, 10bits, 0.2% resolution
AOUT x 1:	1x 4-20mA outputs, 10bits, 0.2% resolution
VIN x 3:	3-phase mains voltage inputs, 0.5% resolution.Up to 630V phase to phase

IO-3MP: Energy/Power Monitoring & Motor Protection board

IIN x 9:	3 sets x 3-phase current inputs, derived from CTs, 0.5% resolution
IRT 1000v x 3:	1000v dc to measure 0-20Mohm impedance on motor windings
DOUT x 5:	5x isolated voltage free contacts, rated 240Vrms, 5A
AOUT x 3:	3x 4-20mA output, 10bits, 0.2% resolution

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Ethernet IO Modules: General Analog and Digital I/O (connected via Modbus TCP to MultiSmart)

MSM-AD-8A / Adam 6017:	8x AIN, 16-bit, differential; 2x DO open collector to 30V (not UL listed)
MSM-AD-18D / Adam 6050:	12x DI, dry contact, 6x DO open collector to 30V (not UL listed)
Acromag 961EN-4006:	6x AIN, 16-bit, differential, UL listed
Acromag 983EN-4012:	12x DI or DO (any mix); DO open-drain to 35V DC max; DI active-low, buffered inputs, with a common connection, UL listed

Note: Any Modbus or DNP3 I/O module can be connected to MultiSmart –the above parts have been integrated into the user interface.

User interface (Optional)

320 x 240 backlit LCD screen with soft-keys

Power supply & environmental

DC supply: (DC supply voltage is monitored to 5% accuracy)	11v-28v
Power:	15W max. 11W max. (without IO-3MP board)
Ambient Temperature:	-10°C to +60°C
Storage Temperature:	-40°C to +80°C
Humidity 5% to 95%:	non-condensing
Mains supply & battery backup:	Option

Physical Product

Controller Dimensions:	H 173 x W 217 x D 159 (mm) H 6¾ x W 8½ x D 6¼ (in)
IP Rating:	IP20
Faceplate Dimensions:	H 144 x W 250 x D 42 (mm) H 5⅝ x W 9⅞ x D 1⅝ (in)
IP/Nema:	IP55 / Nema 12

Please note: I/O and software modules supplied depend on the configuration purchased. All specifications subject to change without notice.

Supply Protection

Under-voltage fault, Over-voltage fault, Phase imbalance fault, Phase rotation fault.

Datalogger

Configured by setup wizard, but any event/fault can be added/deleted. Analog & accumulators logged on deadband. 50,000 events logged to internal memory – can be copied to Compact Flash. 10,000,000 events can be logged to external 2GB C.F. card.

Fault Module

Pre-configured fault module to reduce programming requirements.

Upgrade Option to Pump Control

See the MultiSmart Pump Station Manager for functional details

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