Flexible, powerful yet simple controls for gen-sets and engines

www.ipu.co.uk/controls
High performance solutions made simple
IPU is one of the most respected names in the engine control and power protection industries. Our service ethos has been central to the business’ continued growth. The Engine Control Division delivers more than 40 years’ experience, exceptional training facilities and total dedication to helping customers through a project’s entire life-cycle. Our team is certified to the same level as our manufacturers’ own engineers.

IPU represents a wide range of electronic products and components for diesel and gas engines. IPU’s controls support a wide range of applications from power generation to industrial engines, off-highway vehicles, construction machinery and marine engines.

We have partnered world-leading controls manufacturers such as ComAp and GAC to offer a market-leading product portfolio. It includes power control solutions, generator controls, multi-engine load sharing, protection relays and the latest remote control and monitoring solutions.
Whatever your application and whatever your control requirements, the IPU Engine Controls team will work with you to engineer the very best solution to meet your precise specification – from concept to completion.

IPU’s engineers are factory-trained and certified to the same standard as our manufacturer’s own engineers.

**Concept**

**Communications**
IPU’s remote communication specialists will guide you towards the most effective methods of communicating with your equipment, protecting your investment and boosting productivity.

**Software**
Our controls experts can provide support on PLC integration and configuration of controller inputs/outputs to provide you with endless control and command possibilities.

**Hardware**
Our experienced technical sales team will help you identify the ideal controls package to suit your application’s technical requirements, environmental considerations and classification regime.
Completion

Installation
IPU provide practical advice on installations to ensure your schedules are maintained and the projects proceed in accordance with your plans and specifications.

On-site Commissioning
Our trained and experienced engineers can work with you on-site to ensure that the control equipment functions according to your requirements.

Training
With decades of accumulated controls experience, we provide exceptional, AMPS-approved education courses in our well-equipped training facility.

Aftersales
Our team can provide free, out-of-hours hotline support to help your engineers meet demanding deadlines.
Our comprehensive range of gen-set controls cover applications from simple MRS (Manual / Remote Start) generators through to complex, multi-generator facilities with synchronizing and load-sharing.

From the IntelliNano\textsuperscript{NT}, a cost-effective unit that meets the needs of small applications, through to the IntelliSys\textsuperscript{NT}, a sophisticated, expandable control for difficult applications, our ComAp controls offer excellent flexibility, simplicity and usability. We have a solution for every application.

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<th>GEN-SET CONTROLS</th>
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<td>IntelliNano\textsuperscript{NT} AMF</td>
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<td></td>
<td>Simple control for standby gen-set</td>
<td>Standby gen-set control with remote monitoring</td>
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Featuring...
- Communication via CAN J1939 or Modbus to a wide variety of EFI engines
- Super-fast processing speed
- Multi-language user interface support
- In-depth event history logging
- SMS and email alerts
- User-friendly remote control and monitoring
- Flexible and expandable inputs/outputs
- Common set-up software across the range

Your benefits...
- Simple to use
- Effortless installation
- Easily configured to your exact requirements
- Straightforward trouble-shooting and diagnostics
- Total integration with your engine system
- Outstanding support

Numerous expansion options...
A comprehensive family of expansion modules and control accessories suitable for the whole range of generator controllers – as well as marine and industrial control units, including:
- Speed control modules, input/output expansion modules, load sharing interfaces, communication modules, internet bridges, RS232 & RS485 interfaces, etc.
Our advanced range of gen-set controls have evolved to simplify the installation, configuration and management of complex power generation applications. The InteliMains\textsuperscript{NTC} BaseBox has been specifically developed to provide an easy solution for applications that combine multiple groups of gen-sets. This one controller is powerful and flexible enough to suit numerous applications simply by using different software suites. No other manufacturer makes complex applications so simple.

**InteliMains\textsuperscript{NTC}**

**Features**
- Integrated PLC programmable functions (same size as InteliSys\textsuperscript{NTC} BaseBox)
- Selectable measurement ranges for AC voltages and currents 120 / 277 V, 0–1 / 0–5 A = High voltage applications support
- Inputs and outputs configurable for various customer needs
- Controller redundancy
- RS232 / RS485 interface with Modbus support; Analog / GSM / ISDN / CDMA modem support; SMS messages
- The RS232 / RS485 interface can serve as a bridge to all other controllers at the site (via CAN bus)
- Event-based history (up to 1000 records) with customer-selectable list of stored values; RTC; statistic values
- Interface to remote colour display unit InteliVision 5 or InteliVision 8
- DIN-Rail mount
- Bipolar binary outputs – possibility to use BO as High or Low side switch
- Secondary isolated RS485 interface
- Ethernet connection (RJ45)
- USB 2.0 slave interface

**Benefits**
- Easy solution even for complex systems with groups of gen-sets – less wiring and components
- Can be used as bus-tie synchronizer or feeder controller
- Graphical site schematic for easy site overview – aggregates in one place all important system parameters
- Many types of communication – easy supervision and servicing
**MCB (Mains Circuit Breaker) and MGCB (Master Generator Circuit Breaker) applications**

**Features**
- AMF function based on mains failure, outputs a signal to start the gen-set group
- Many SPtM-equivalent mains parallel modes (SysBaseload, Analog Extern SysBaseload, Import / Export, Analog Extern Import / Export, Temp By Power)
- Peak shaving
- Test mode (Test on load for the complete gen-set group)
- Two application layouts – MCB only or MCB+MGCB control (see schematics)
- Mains measurement: U, I, Hz, kW, kVAr, kVA, PF, kWh exp., kWh imp., kVAhr exp., kVAhr imp.
- Bus measurement: U, Hz
- Sum gen-sets kWh and kVAhr
- Selectable partial or full MCB and / or MGCB control
- Load Shedding – 3 steps; selectable based on gen-sets power or mains import
- High voltage application support – AC voltage measurement range selectable 277 / 120V

**BTB (Bus-tie Breaker) application**

**Features**
- Bus Left measurement: U, I, Hz, kW, kVAr, kVA, PF, kWh exp., kWh imp., kVAhr exp., kVAhr imp.
- Bus Right measurement: U, Hz
- Manual or automatic selection of the gen-set group (side) to be influenced during synchronizing
- Selectable partial or full BTB control measurement range selectable 277 / 120V

**FDR (Feeder) application**

**Features**
- Manual or automatic connection of the load to the bus bar
- Load prioritization
- Load shedding on each feeder
- LCB (Local Circuit Breaker) closing supervision
- Possibility to monitor remotely status of each feeder (connection to other InteliMainsNTC BaseBox and gen-set controllers on site)
IPU supplies an integrated range of control solutions for all on-board ship engines and generators using CAN-based technology.

The controls harness the latest technology to give highly-flexible and reliable controls with outstanding command and monitoring features. ComAp’s marine controls log all key performance values: speed, temperature, pressures and currents. This log is invaluable when analysing and diagnosing alarms or changes in an engine’s performance.

All ComAp marine controls are easily integrated into a ship or boat’s control system using Modbus or Modbus/TCP protocols. They feature a flexible, user-configurable input/output structure to match your precise needs.

Our pre-sales support team can pre-configure your controls for a simple ‘plug and play’ installation.

ComAp marine controls are type-approved by all major marine classification societies and have been extensively tested according to IEC 60255.
The InteliDrive range provides flexible control for industrial applications such as pumps, compressors, drilling rigs, fire pumps, construction equipment and electric motor controls. InteliDrive controls can be tailored to meet the specific requirements of your application.

As with all ComAp products, they come with outstanding control, monitoring and protection features. They communicate with standard and proprietary CAN J1939 protocols to a wide range of EFI engines.

InteliDrive Mobile is an innovative control that provides excellent control capability in harsh applications. It excels in unforgiving mobile applications and will withstand extreme temperatures.

Its robust construction will endure typical industrial shocks and vibration. With an extremely flexible input and output structure, InteliDrive Mobile can be customised to meet individual day-to-day machine control requirements such as drive control, process control, platform-level supervision and enhanced engine management.
ComAp WebSupervisor is a web-based system designed for monitoring and controlling ComAp controls through the internet. This system offers a number of benefits to help optimize revenue as each piece of equipment can be individually monitored for all important operation values.

The system works by sending regular updates to a remote, secure server which then stores the information safely, ready to be seen by selected users.

Connection to the server is easily accessible to any registered user through an internet-enabled device (PC, tablet or smartphone). Equipment can be monitored at any time in any location.

The system provides powerful administration and robust security through notifications such as event-generated emails created and sent to specific users to give fast and efficient updates.

All ComAp controllers offer a wide range of communications options.

You can receive a constant stream of data via GPRS, Ethernet, RS485 and RS232, enabling you to make important decisions about your remote equipment. You can receive alarm announcements as they happen, monitor a wide range of engine performance parameters, accurately assess failure modes and remotely control equipment without the need for personal site visits.

- Wireless remote monitoring
- On-line alarm notifications
- Remote system monitoring provides fuel savings
- Cost-saving from more efficient service planning
- Fewer service call-outs
- Totally mobile solution
- Historical and current data gathering
- Automatic reporting
- Works across all GSM networks
- Reliable global coverage
- Modbus

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AirGate technology allows ComAp controllers to connect to the internet using the existing network infrastructure, negotiating firewalls and VPN systems and removing the requirement for static IP addresses. Following a simple online registration process, the AirGate technology in a controller is activated, then, even if the IP address changes, you can keep track of the remote equipment. AirGate is supplied completely free of charge to all ComAp controller customers.
**E/COM**

**E/COM reduces gen-set operating costs.**
The web-based programme monitors diesel or gas gen-set fleets in remote locations.

E/COM provides fleet managers and engineers with a powerful set of tools to control and gather data from scattered fleets of rental generators or isolated facilities with on-site power generation.

E/COM displays a wide range of engine and generator parameters and offers a variety of alarm functions. Fuel consumption, engine temperatures and pressures can be measured. Detailed insight into the generator’s power output and performance is provided via any web-connected device.

E/COM allows for the automatic or manual reset of single gen-sets or fleets. The powerful software allows you to choose which faults cannot be reset so potentially hazardous resets can be prevented.

E/COM’s map mode shows a colour-coded display of the current status of managed sites. This highly visual format communicates information quickly to staff.

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**E/LOG**

**E/LOG reduces equipment breakdowns and increases uptime.** The web-based software package enables you to capture and trend engine performance measurements and identify impending problems.

E/LOG can record readings from an engine’s J1939 management system, retro-fitted sensors or any analogue or binary input. Data can be transmitted live or, when using an on-board data logger, uploaded periodically via a GPRS connection. As well as recording a wide variety of engine parameters, E/LOG can capture and track equipment location via on-board GPS.

E/LOG has no limit for storing historical data and can be used to monitor past faults and running cycles. It can be used to ensure that operators use the equipment within its recommended operating guidelines.
ComAp G59 mains protection relays are the ideal solution for all parallel-to-mains power generation sources: wind turbines, solar installations, CHP plants and hydro-electric sites.

**MainsPro**

MainsPro is the world’s best-selling G59 protection relay for parallel-to-mains applications. It provides adjustable voltage, frequency and ‘loss of mains’ protection to safeguard both the mains grid and the local generator. Its anti-islanding support protects engineers from harm when working to rectify mains faults.

Easy to install and intuitive to use, practical features such as automatic reset, remote information and reliable monitoring make the MainsPro the perfect choice for any G59, G59/2, G59/3 & G83 application.

*Watch our 2 minute explanation of mains protection.*

InteliPro

InteliPro is a highly flexible interconnection mains decoupling relay. It offers all the features of the MainsPro plus additional communications options, more comprehensive event logging and a host of advanced options:

- Export limitation to avoid tariff penalties for over-supply
- Poleslip protection to prevent a mismatch between mechanical input power and electrical output power
- Power factor evaluation to prevent penalties for supplying power outside limits
- Heartbeat signal to indicate a major failure
- Dynamic grid support to maintain equilibration within the network in case of short voltage disturbances
- AC reclosing to stop excessive closing and reduce switchgear service costs

The InteliPro conforms to G10, G59, G59/2, G59/3, G83 and IEEE 1547 requirements. Its extensive protective functions meet the strictest utility interconnection requirements. It can be used in numerous distributed generation applications such as renewables, fuel cell, biomass and combined heat and power (CHP).

Advanced communications, remote monitoring and data/event logging make InteliPro an ideal solution for your smart applications.
GAC engine governing products breathe new life into older, mechanically-controlled gen-sets running on either diesel or gas. Cash-strapped economies in the developed and developing world can benefit from an electronic governing system’s ability to improve an older gen-set’s power performance. The route to better power does not always mean a new gen-set.

These engine control systems range in cost and sophistication from single-speed isochronous governors to advanced multi-engine, load-sharing, power control systems. GAC diesel and gas engine governors are ideal for original equipment applications and retrofit upgrades.

John Deere Case Study
John Deere 3, 4 and 6 cylinder industrial and generator-driven engines are fitted with mechanical governors as standard. IPU supplies integral fuel pump actuators to upgrade these engines to electronic governing with variants for both Bosch and Stanadyne fuel injection pumps. These electronic governor packages are suitable for retro-fitting to John Deere engines in any application but are particularly suited to power generation appliances.

- IPU can provide complete kits for John Deere engines fitted with Stanadyne DB4 or Bosch P-Type pumps with RSV mechanical governor on the 6081
- Both industrial variable-speed drive and fixed-speed systems can be supplied
- Single or parallel generator operation or variable-speed industrial application
- 12 or 24V systems
- Isochronous operation is only for single running controls (ESD 2244-12/24)
- Isochronous and switchable droop operation for parallel running (ESD S120/5520E)
- High-reliability and 2-year warranty
- Competitive and proven systems
- Full technical support from IPU
Engine Speed Control Units
GAC governing systems give precise engine speed control by comparing the measured speed from the magnetic pickup to an internal reference. Adjusting the current supplied to the actuator changes the engine speed more accurately than mechanical controls. A comprehensive range of engine speed controls are available to meet any application from basic isochronous operation to multifunction controls. The range offers switchable isochronous/droop operation, low smoke start-up, speed switch relay contacts and advanced microprocessor-based digital controls.

Engine Actuators
GAC’s proportional electromagnetic actuators deliver more precise control of the fuel delivery mechanism than is available from a purely mechanical device. They are available as highly-reliable rotary and linear models. They require no maintenance and can accommodate virtually any linkage configuration. The range includes actuators that fit fuel pumps from Stanadyne, Delphi, Bosch and other manufacturers as well as remote actuators that connect via a linkage to a throttle or stop lever.

Magnetic Speed Sensors
Speed sensors are available in various lengths in both imperial and metric threads. Wire leads, military connectors or automotive connectors are also available.

Fuel & Ignition Management Systems
GAC offers an advanced engine management system with exhaust emissions control technologies. GAC’s total system approach results in a cost-effective solution that offers the greatest potential for improvements in both engine efficiency and exhaust emissions while providing many features.
The IPU training centre provides the ideal environment to learn more about ComAp and GAC generator control and management products. The courses are tailored to meet the needs of each customer. We offer familiarization training for salespeople and managers as well as more in-depth specialist training for design, test, installation and commissioning engineers.

Our training facility has proved to be very popular. It gives engineers real-time, hands-on experience of synchronising gen-sets in a live, safe environment. Trainees gain a comprehensive understanding of control set-up, software configuration, remote control and monitoring capabilities.

The expanded training facility in our new HQ can replicate situations engineers will actually encounter on-site such as configuring multiple gen-sets, working with multiple mains applications and synchronising groups of gen-sets across bus-tie breakers. After training, engineers can go on-site having already worked on the application they need to configure. This saves time and ensures new installations work reliably.
Customer Testimonial

“The training has enabled us to establish the true capability of our units on the Eurofighter test and ensured we set-up the equipment to a higher standard in the future. The environment was very good and with the equipment wired up ready to go we were able to explore the full potential of the equipment in a way we wouldn’t be able to back at BAE Warton. There is no doubt that you get more out of this than reading the manual”.

Mike Alder – technical specialist at BAE SYSTEMS.
Combine the power of diesel with the economy of gas.

ComAp’s simple bi-fuel conversion dramatically reduces operating costs. With gas being significantly cheaper than diesel in many parts of the world, a bi-fuel conversion lets a diesel engine use gas as its primary fuel. Diesel becomes the ‘standby fuel’ used only during start-up and under peak load.

A bi-fuel conversion requires no engine modification and brings benefits in every application:

- It combines affordable diesel engines with inexpensive gas
- It is an economic solution for all engines
- It allows a flexible use of fuel
- It maintains the diesel engine’s guaranteed power output
- It is efficient and safe
- It extends engine life and reduces maintenance costs
How does it work?

ComAp Bi-Fuel is a fully automatic, dynamic self-modulating solution fitted with a gas throttle actuator. The solution maximises gas usage automatically by increasing and decreasing the gas flow as loads vary; it requires no manual adjustment.

The bi-fuel solution has a fully independent control system that can switch to 100% diesel operation at any time.

ComAp’s DENOX knock detector and control prevents engine knocking. It makes the engine run using the most efficient gas-diesel ratio without risking damage. The bi-fuel solution constantly monitors key engine performance parameters. It does not interfere with the original equipment manufacturer’s safety measures or any other control system.

Fuel costs per year

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Hybrid power systems combine diesel and renewable forms of power generation. They are well-suited to islands, mines and other remote locations where renewable sources supplement the power generated by diesel gen-sets.

The cost of diesel and the difficulty in transporting it to remote locations makes hybrid power an attractive option. ComAp controls bring diesel and renewable power sources together to provide an economical energy solution that matches the reliability of traditional diesel-only systems.

Hybrid power solutions aim to deliver between 20% and 50% energy from renewable sources. ComAp’s advanced controllers (InteliSys\textsuperscript{NT}, InteliGen\textsuperscript{NT}, InteliCompact\textsuperscript{NT} and InteliMains\textsuperscript{NT}) can manage the smooth operation of up to 32 gen-sets to ensure a smooth and reliable power supply. They manage the output from gen-sets of different sizes, power outputs and from different manufacturers, automatically choosing the most efficient combination of power sources.
## ANSI Codes and Mains Protections

### ANSI Codes

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<tr>
<th>IntelNano™</th>
<th>IntelLite™</th>
<th>IntelCompact™</th>
<th>IntelGen™</th>
<th>IntelGen™ BaseBox</th>
<th>IntelSys™ BaseBox</th>
<th>IntelMains™ BaseBox</th>
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<td>Phase rotation**</td>
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<td>Overload</td>
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* Fixed setting
** Fixed setting

### Mains Protections

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<td>Pole slip</td>
<td>78PS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC reclosing relay</td>
<td>79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rate of change of frequency + ROCOF filter</td>
<td>81R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Binary switches: Ext. trip, Fault reset, Activate/de-activate, Alternative parameters</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Optional feature, activation via ComAp application. Please contact your nearest ComAp distributor to get more information.

www.ipu.co.uk/controls