

*Compact Controller for Stand-by and Parallel Operating Gen-sets*

# **InteliSys<sup>®</sup>**

## **Modular Gen-set Controller**

*Operator guide for SPM, SSB, SPtM, SPI, MINT*

IS-CU

June 2005



## **Operator guide**



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# General guidelines

This guide provides general information on how to operate the IntelliSys controller.  
This guide is intended for everybody who is concerned with operation and maintenance of the gen-set.

## **Description of the controller system (with all options)**

IntelliSys IS-CU is a comprehensive gen-set controller for single and multiple generating sets operating in stand-by or parallel modes with CHP support. A modular construction allows upgrades to different levels of complexity in order to provide the best solutions for various customer applications. Optional synchronizer, isochronous load sharer, Mains and Generator protection allows for a total integrated solution for gen-sets in stand-by and parallel modes with single engine support.

IS-CU analog and binary inputs and binary outputs can be expanded by additional modules IS-AIN8, IS-BIN16/8, IGS-PTM and IGL-RA15.

The IntelliSys controllers are equipped with a powerful graphic display showing icons, symbols and bar-graphs for intuitive operation, which sets, together with high functionality, new standards in gen-set controls. The IntelliSys automatically starts the gen-sets, closes the Gen-set C.B. when all conditions are met, then stops the engine on external signal or by pressing push buttons.

The key feature of IntelliSys is its easy-to-use installation and operation. Predefined configurations for typical applications are available as well as user-defined configurations for special applications.

The additional programmable functions are available in each application:

- Programmable logic and timing functions
- Temp by power control loop
- Overheat protection
- Cylinders difference measuring and protection
- Additional setpoints

With hardware keys DONGLE, Island parallel and parallel to Mains operation can be achieved. Forward and reverse synchronizing, mains protection, load and power factor control, earth fault protection are the major functions provided.

## **Default applications**

There are five default applications: SPM, SSB, SPtM, MINT, MEXT.

SPM	Single prime mover, no mains.
SSB	Single stand-by, no synchronizing, break transfer.
SPtM	Single stand-by, forward and reverse synchronizing, parallel operation, peak shaving, soft load transfer.
SPI	Single stand-by, no MCB control, forward synchronizing, parallel operation, peak shaving, soft load transfer.
MINT	Multiple parallel, forward synchronizing, load and VAR sharing, power management, soft load transfer.

## **Detail documentation**

For more detail please refer to corresponding User guides (where –x-x means software version):

IS-SPM-x.x.pdf	WinEdit-MultiEdit-x.x.pdf
IS-SSB-x.x.pdf	Communiation guide-x.x.pdf
IS-SPtM-x.x.pdf	Application guide-x.x.pdf
IS-SPI-x.x.pdf	Troubleshooting guide-x.x.pdf
IS-MINT-x.x.pdf	

## **Text**

**PAGE**

(Capital letters in the frame) buttons on the front panel

*Break Return*

**Generator protections**

REMOTE START/STOP

(Italic) set points

**(Bold)** Set point group

(Capital letters) binary inputs and outputs

## Conformity declaration



Following described machine complies with the appropriate basic safety and health requirement of the EC Low Voltage Directive No: 73/23 / EEC and EC Electromagnetic Compatibility Directive 89/336 / EEC based on its design and type, as brought into circulation by us.

**Be aware that the binary outputs can change state during and after software reprogramming (before the controller is used again ensure that the proper configuration and setpoint settings are set in the controller)!!!**

**Be aware that gen-set can automatically or remotely start when following controller terminals are disconnected !!!**

- Mains voltage measuring and / or
- Binary outputs for MCB control and / or
- MCB feedback

Switch controller to OFF mode and disconnect the Binary outputs Starter and Fuel to avoid unexpected automatic start of gen-set and GCB closing.

## !!! CAUTION !!!

### ***Dangerous voltage***

In no case touch the terminals for voltage and current measurement!  
Always properly connect grounding terminals!

Take care when disconnecting In/Im3 terminals when the gen-set is stopped.  
For safety connect parallel to IntelliSys In/Im3 terminals two anti parallel diodes 10A/100V.

In any case do not disconnect generator CT terminals when the gen-set is loaded.

### ***Adjust set points***

All setpoints are preadjusted to their typical values. But the setpoints in the “**Basic settings**” settings group **!!must!!** be adjusted before the first startup of the gen-set.

**!!! WRONG ADJUSTMENT OF BASIC PARAMETERS  
CAN DESTROY THE GEN-SET !!!**

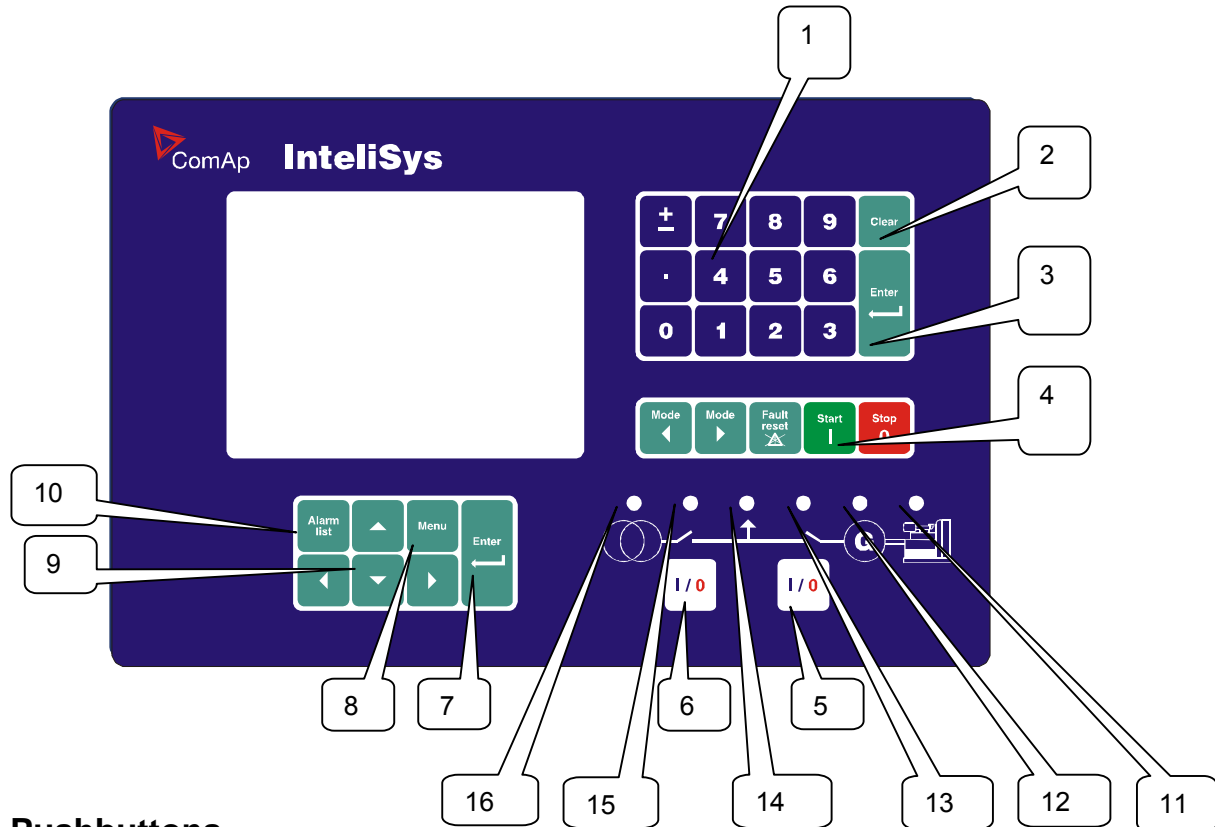
**The following instructions are for qualified personnel only.  
To avoid personal injury do not perform any action not specified in this User guide !!!**

### **Note:**

ComAp believes that all information provided herein is correct and reliable and reserves the right to update at any time. ComAp does not assume any responsibility for its use unless otherwise expressly undertaken.

# Operator interface

## Pushbuttons and LEDs



### Pushbuttons

1. Numeric keyboard for setpoints values adjusting, measure screen fast select
2. **CLEAR** Clears character left from the cursor (Back Space), Exit from MENU
3. **ENTER** Value confirmation (function is equal to 7.)
4. **MODE→** forward through gen-set operation modes OFF -> MAN-> SEM -> AUT->TEST.  
**←MODE** backward through gen-set operation modes OFF<- MAN<- SEM <-AUT<-TEST.  
**FAULT RESET** Acknowledges faults and alarms.  
**START** Starts the gen-set in MAN and SEM mode.  
**STOP** Stops the gen-set in MAN and SEM mode.
5. **GCB ON/OFF** When in MAN mode, opens and closes the GCB.
6. **MCB ON/OFF** When in MAN mode, opens and closes the MCB.

### Display handling

7. **ENTER** Menu, value item confirmation (function is equal to 3.)
8. **MENU** Switch to the IntelliSys Menu screen
9. **↑, ↓, ←, →** Select the IntelliSys Menu item
10. **ALARM LIST** Switch to the IntelliSys Alarm screen

## LEDs

11. Engine status LED
12. Generator status LED
13. GCB status LED corresponds with Binary input GCB feedback.
14. LOAD status LED
15. MCB status LED
16. Mains status LED

Three color LED status: green = operation, orange = warning, red = fail

## How to select gen-set mode ?

Use **MODE→** or **←MODE** to select requested gen-set operation mode OFF – MAN – AUT– TEST. It is not possible to go directly from OFF to AUT or TEST.

## Display menus

There are 3 display menus available: Measurements, Params and History  
Each menu consists of several groups of screens, except of history.

## How to view measured data?

Select **MENU** - Measurement screen.

Use **↑** and **↓** to select the group of screen with requested data and press **ENTER**.

Use **↑** and **↓** and **<** and **>** to select the screen with requested data.

Use short measure screen selection – e.g. pressing of **1** and **1** switches to first group – first screen.

Number of IntelliSys measuring screens changes (appears, disappears) depend on number of external modules IS-AIN, IS-BIN16/8 configuration.

## How to view and edit set points?

Select **MENU** - Params screen.

Use **↑** and **↓** to select setpoints group and press **ENTER**.

Use **↑** and **↓** to select the requested setpoint.. Use **<** and **>** like PgDn and PgUp buttons. Long hold of **<** and **>** buttons is like Home/End.

Select Set points item from the IntelliSys menu.

Password protected setpoints are marked by LOCK symbol.

## How to set password?

Press **.** button to Password entering and editing window.

Password is a four-digit number. Only setpoints associated with the entered password level can be modified.

Use **↑** or **↓** to select the desired password and then press enter.

## How to view the HISTORY menu?

Select **MENU** - History screen - Showhist and press **ENTER**.

Use **↑** and **↓** and **<** and **>** buttons to list all stored values.

**±** button switches between PgUp / PgDown and RowUp / RowDown history listing.

*Hint:*

For jump to selected record write record number and press **ENTER**.

## How to change the display contrast ?

Press **ENTER** and **↑** or **↓** at the same time to adjust the best display contrast.

Only in MEASUREMENT menu.

## How to check the serial number and software version?

Hold down **ENTER** and press **ALARM LIST**. On the display you can see IntelliSys INFO screen for 10 seconds.

InteliSys INFO screen contains:

- 1) *Controller name* (see **Basic setting** group)
- 2) InteliSys serial number (8 character number)
- 3) SW version:     firmware and configuration table number
- 4) Application:     e.g. SPtM
- 5) Branch:         InteliSys ...
- 6) Firmware release identification: IS-3.0 R: 01.10.2003
- 7) Terminal version:
- 8) Screen definition:
- 9) Encoding:             used characters set

Hint:

Only in MEASUREMENT menu.

Press **1** to switch to HELP screen.

Press **2** to switch to DONGLE features description.

## How to check dongle type

Go to info screen - hold down **ENTER** and press **ALARM LIST** then press **2** to Dongle screen.  
There is information describing software branch and application.

Example:

Dongle:   Standard  
1. IS-PCLSM

## How to find active alarms ?

Press **ALARM LIST** to switch to Alarm screen.

Inverted alarms are still active. Non-inverted alarms are not active, but not yet confirmed.

Press **FAULT RESET** to accept all alarms. Non-active alarms immediately disappear from the list.

Press **ALARM LIST** to return to previous screen.

New Alarm list record is indicated by ! symbol on status screen.

Hint:

Automatic jump to Alarm list is active only when the first measurement screen is active.

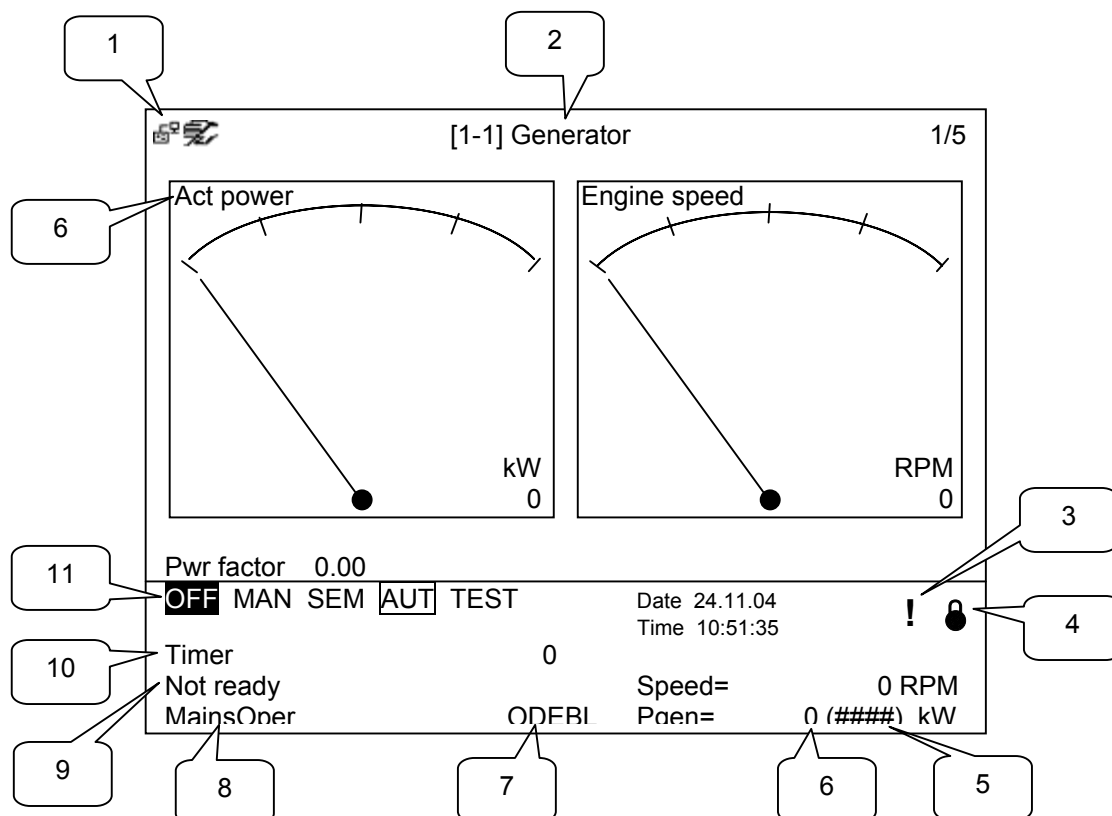
## When to use **GCB ON/OFF** and **MCB ON/OFF** buttons ?

In SEM and AUT mode these buttons are disabled.

In MAN mode are enabled, but before closing of GCB, generator voltage must be within limits. Internal protection against unsynchronized closing of both circuit breakers is implemented.

In TEST mode it is possible by pressing of these buttons to transfer the load from the mains to the gen-set.

## Description of MEASUREMENT screens



1. Remote communication indication.

Access lock indication. Symbol is visible when Access lock is active.

2. Measuring screen indication

[1-1] Generator 1/5	
[1-1]	Measure screen address. For jump to selected screen set this address from numeric keyboard.
Generator	Measure screen group name
1/5	The first screen from five in group.

3. Alarm list indication. Exclamation mark indicates the Alarm list is not empty. Flashing means new item appeared in Alarm list.

4. Indication of Password access from controller keyboard.

<b>Closed lock</b>	No password is set.
<b>Opened lock</b>	Password is set. Password level is visible in open lock.

5. Required gen-set power.

####	When <b>ProcessControl</b> :#SysLdCtrl PtM = LDSHARING
Number	When <b>ProcessControl</b> :#SysLdCtrl PtM = BASE LOAD

6. Actual gen-set power.

7. Indication of current gen-set power control or power limitation (why is the power reduced). Power limitation due to warming procedure is not indicated.

<b>O</b>	Overheat protection
<b>D</b>	Power derating
<b>E</b>	Export protection
<b>B</b>	Base load
<b>L</b>	Loadsharing

8. Electric Machine state indication.

9. Engine Machine state indication.

10. Timer – events counting time (e.g. prestart, cooling etc.).

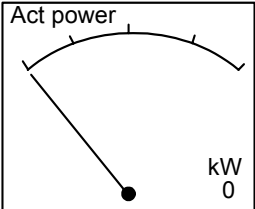
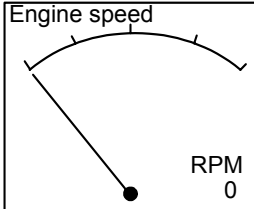
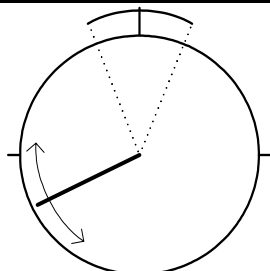
11. Controller mode indication. Black background indicates active mode (OFF in example above).

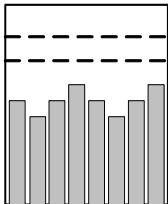
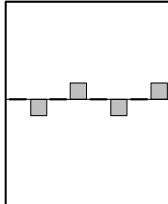


Mode in frame ( **AUT** in example above ) indicates where will mode return after binary input Remote OFF will be opened.

## Measuring screen list

Screen structure is different in different applications.

<b>[1-1] Generator 1/5</b>   Pwr factor 0,00	<b>[3-1] Synchronizing 1/1</b>  Slip freq 0,00 Hz Angle 0,0 ° Gen V L1-N 0 V Mns V L1-N 0 V  Volt match 123 000 SpdRegOut 0,00 V VoltRegOut 0,0 %
<b>[1-2] Generator 2/5</b> Gen freq 0,0 Hz Gen V Ph-Ph 0 0 0 V Gen V Ph-N 0 0 0 V Gen V Ph-N ..... .. Bargraph.....  Gen current 0 0 0 A Gen current ..... Bargraph .. ..  Max load surge 0,00 P/s Act load surge 0,00 P/s	<b>[4-1] Anl inputs 1/1</b> IS-CU Anl input 1 0,0 °C AI1..... .. Bargraph..... IS-CU Anl input 2 0,0 °C AI2..... .. Bargraph..... IS-CU Anl input 3 0,0 °C AI3..... .. Bargraph..... IS-CU Anl input 4 0,0 bar AI4..... .. Bargraph..... Batt volt 24,0 V Batt volt .... .. Bargraph.....
<b>[1-3] Generator 3/5</b> Act power 0 kW per phase 0 0 0 kW React Pwr 0 kVAr per phase 0 0 0 kVAr Appar pwr 0 kVA per phase 0 0 0 kVA Pwr factor 0,00 per phase 0,00 0,00 0,00 Pg derated 0 kW	<b>[5-1] Bin inputs CU 1/1</b> BI1 ..... 0 BI9 ..... 0 BI2 ..... 0 BI10 ..... 0 BI3 ..... 0 BI11 ..... 0 BI4 ..... 0 BI12 ..... 0 BI5 ..... 0 BI13 ..... 0 BI6 ..... 0 BI14 ..... 0 BI7 ..... 0 BI15 ..... 0 BI8 ..... 0 BI16 ..... 0
<b>[1-4] Generator 4/5</b> StatusLdShed NoLdShed EarthFaultCurr 0 A  iCB string	<b>[6-1] Bin outputs CU 1/1</b> BO1 ..... 0 BO9 ..... 0 BO2 ..... 0 BO10 ..... 0 BO3 ..... 0 BO11 ..... 0 BO4 ..... 0 BO12 ..... 0 BO5 ..... 0 BO13 ..... 0 BO6 ..... 0 BO14 ..... 0 BO7 ..... 0 BO15 ..... 0 BO8 ..... 0 BO16 ..... 0
<b>[1-5] Generator 5/5</b> kWhours 0 kVArhours 0 NumStarts 0 RunHours 0 h NextServTime 0 h	<b>[7-1] Pwr management 1/1</b> Engine priority 1 TotAvlbPnom 0 kW TotRunPnom 0 kW TotRunPact 0 kW  ActRes/%Load 0 kW% ActRes/%Load... .. Bargraph.....  CAN16 1000000000000000 CAN32 0000000000000000

<b>[2-1] Bus</b> <span style="float: right;"><b>1/1</b></span> Bus freq <span style="float: right;">0,0 Hz</span>  Bus V Ph-Ph <span style="float: right;">0 0 0 V</span>  <div style="border: 1px solid black; padding: 2px;"> Bus V Ph-N.....   .....   ... Bargraph..... </div>	<b>[8-1] Bin inputs</b> <span style="float: right;"><b>1/1</b></span> BI1 ..... 0      BI9 ..... 0 BI2 ..... 0      BI10 ..... 0 BI3 ..... 0      BI11 ..... 0 BI4 ..... 0      BI12 ..... 0 BI5 ..... 0      BI13 ..... 0 BI6 ..... 0      BI14 ..... 0 BI7 ..... 0      BI15 ..... 0 BI8 ..... 0      BI16 ..... 0
	<b>[9-1] Bin outputs</b> <span style="float: right;"><b>1/1</b></span> BO1 ..... 0 BO2 ..... 0 BO3 ..... 0 BO4 ..... 0 BO5 ..... 0 BO6 ..... 0 BO7 ..... 0 BO8 ..... 0
	<b>[10-1] Analog inputs</b> <span style="float: right;"><b>1/1</b></span> Analog input 1..... 0 °C Analog input 2..... 0 °C Analog input 3..... 0 °C Analog input 4..... 0 °C Analog input 5..... 0 °C Analog input 6..... 0 °C Analog input 7..... 0 °C Analog input 8..... 0 °C
	<b>[9-1] Cylinder temps</b> <span style="float: right;"><b>1/2</b></span> <div style="text-align: center;">  </div> T Cyl I. Aver <span style="float: right;">400 °C</span>
	<b>[9-2] Cylinder temps</b> <span style="float: right;"><b>2/2</b></span> <div style="text-align: center;">  </div> T Cyl I. Aver <span style="float: right;">400 °C</span>

**Hint:**

Additional screens are automatically generated when external units are configured.  
Screens [8.1] up to [8.7] are inputs of extension units IS-BIN16/8.  
Screens [9.1] up to [9.4] are outputs of extension units IS-BIN16/8.  
Screens [10.1] up to [10.8] are analog inputs of extension units IS-AIN8.  
Screens [9.1] up to [9.4] are cylinder temperature indication based on IS-AIN8 analog inputs.

# Mode and function description

There are four gen-set operation modes: OFF - MAN – AUT – TEST in SSB and SPtM application. There are three gen-set operation modes: OFF - MAN – AUT in SPM and MINT application.

To select the mode use **MODE→** or **←MODE**.

## OFF mode

- No start of the gen-set is possible. Outputs STARTER, GCB CLOSE/OPEN and FUEL SOLENOID are not energized.
- No reaction if buttons **START**, **STOP**, **GCB ON/OFF** are pressed.
- When power-cut comes, MCB CLOSE/OPEN opens. After mains returns, MCB CLOSE/OPEN closes with *MCB close del.*

## MAN mode

- 1) To start the gen-set press **START**.
- 2) When the generator voltage is within limits (adjusted in the setpoints group **Generator protections**) GCB green LED on the front panel lights.
- 3) Press **GCB ON/OFF** to close the GCB. If the generator voltage is out of the limits, controller does not respond to the **GCB ON/OFF**.
  - a) If controller detects dead bus, immediately closes GCB OPEN/CLOSE output.
  - b) If controller detects voltage on the bus, starts synchronizing.
- 4) To stop the engine press **STOP**
  - a) controller unloads the gen-set, opens GCB CLOSE/OPEN. Unloading is active only when binary input MCB feedback is closed or other gen-set is connected to bus. In other case GCB CLOSE/OPEN opens immediately.
  - b) Gen-set is cooled and stopped.

### Hint:

Controller does not respond to the binary input SYS START/STOP. The gen-set is fully in manual control; there is no automatic way to stop it (except protections). The gen-set stays running until STOP button is pressed.

Controller does not take place in Power management in MINT, MEXT application

## SEM mode

**START** button starts the gen-set.

- Controller closes GCB to dead bus.  
When Mains is within limits and MCB is ON, Controller starts synchronizing and closes GCB when synchronizing conditions are met. Gen-set remains running in parallel.
- When Mains failure is recognized during parallel operation - Controller opens MCB.
- After mains recovers Controller synchronizes MCB and returns to parallel operation

**STOP** stops the gen-set.

In case of mains failure the gen-set starts automatically. After mains recovery stops automatically (MCB synchro, soft transfer). This AMF function is the same as described below in AUT mode. Other automatic starts/stops (peak start/stop, binary input Rem Start/stop) are not active. Load control options are the same as in AUT mode.

### Hint:

InteliSys does not respond to **GCB ON/OFF**, **MCB ON/OFF** buttons.

## AUT mode

### AMF

- 1) Mains failure is recognized
  - a) IntelliSys opens MCB (depends on setpoint **AutoMains fail: MCB opens on setting**)
  - b) After *EmergStart del* elapsed, IntelliSys starts the gen-set
  - c) If mains recovers during the start-up process, IntelliSys closes MCB again after *MCB close del* and stops the gen-set.
- 2) When the gen-set is started and the generator voltage and frequency is within limits (adjusted in menu Generator protections) IntelliSys closes the GCB. If the generator voltage is out of the limits for *MaxStabil time*, IntelliSys alarms the failure and stops the gen-set.
- 3) After mains recovers:
  - a) After *MainsReturn del* IntelliSys starts synchronizing to mains, closes the MCB and starts unloading.
  - b) After the *Breakers overlap* delay IntelliSys opens the GCB.
  - c) The gen-set is cooled and stopped.

### Remote start/stop

Gen-set starts automatically, when binary input REM START/STOP is closed and stops by opening it.

### Peak shaving

Gen-set can start and stop automatically according to consumption from the mains (object). *IE measurement* must not be set to NONE and **ProcessControl: PeakAutS/S del** must be greater than 0.

If Mains import value exceeds for more than **ProcessControl: PeakAutS/S del**

**ProcessControl: PeakLevel/Start**, engine starts automatically.

If Load consumption (Mains import + Gen-set power) drops for more than **ProcessControl: PeakAutS/S del** below **ProcessControl: PeakLevel/Stop**, engine stops.

#### Hint:

Engine does not stop, if other condition for automatic starts are active.

Example: If peak stop condition occurs, but REMOTE START/STOP is active, engine stays running.

IntelliSys does not respond to **GCB ON/OFF**, **MCB ON/OFF**, **STOP**, **START** buttons and corresponding remote WinEdit or Modbus commands.

Set **Basic setting: FltRes GoToMAN** = ENABLED to avoid automatic engine start when pressing **FAULT RESET** after Shut down or Slow stop alarm.

**!!!! VERY IMPORTANT !!!!!**

Engine can start automatically without warning when pressing **FAULT RESET** after shut down alarm.

## TEST mode (SSB and SPtM only)

The setpoint *Ret from test* influences the behavior of TEST mode.

**Caution:** The gen-set starts automatically and is always running in TEST mode!

### The setpoint *Ret from test* = MANUAL

1. While TEST mode is selected, gen-set automatically starts and is running unloaded.
2. To load the gen-set with load supply interruption
  - a. Power cut comes or
  - b. **MCB ON/OFF** button is pressed

When power cut or **MCB ON/OFF**: IntelliSys opens MCB, after *Return break* elapses, IntelliSys closes GCB.

When the mains recovers gen-set remains island running !
3. To load the gen-set without load supply interruption
  - a. **GCB ON/OFF** is pressed
  - b. Binary input TEST ON LOAD is closed

In this case IntelliSys synchronizes gen-set to mains, closes GCB, *Breaker overlap* time runs in parallel and then opens MCB.

When the mains recovers gen-set remains island running !

4. To stop the gen-set select other mode than TEST

While TEST mode is selected, gen-set is running unloaded.

When power cut comes IntelliSys opens MCB.

After *Return break* elapses, IntelliSys closes GCB.

When the mains recovers:

1. After the *MainsReturn del* IntelliSys starts back synchronizing to mains and closes MCB.
2. The gen-set remains running in parallel for *BreakerOverlap* time, opens GCB and remain running unloaded.

To stop the gen-set select other mode than TEST

Hint:

IntelliSys does not respond to **GCB ON/OFF**, **STOP**, **START** in *Ret from test* = AUTO.

Engine automatically starts, when TEST mode is selected.

Engine can start automatically without warning when pressing **FAULT RESET** after shut down alarm.

## Load control modes in parallel to mains

### Baseload

**Process control:** *Load CTRL PTM* = BASELOAD

Gen-set power is kept on value given by *Baseload* setpoint.

### Internal Import export

**ProcessControl:** *Load CTRL PTM* = IMP/EXP

**Process control:** *IE measurement* = IM3 CT INPUT

Gen-set load is controlled to keep the import load at the level given by setpoint **Process control:** *Import load* value.

IntelliSys measures Import/Export value via CT connected to In/Im3 terminals.

### External Import export

**Process control:** *Load CTRL PTM* = IMP/EXP

**Process control:** *IE measurement* = ANALOG INPUT

Gen-set load is controlled to keep the import load at the level given by setpoint **Process control:** *Import load* value.

Real I/E power value is measured from the Analog input *LdCTRL:ExtI/E*.

### Temperature control by gen-set power

Gen-set load is changed to keep required temperature *TempByPwr Treq* on analog input *LdCtrl:TByPwr*.

If the temperature measured from analog input "*LdCtrl:TbyPwr*" exceeds value *TbyPwr Treq* the gen-set power is decreased gradually to *Min Power PtM*. If the temperature drops below *TbyPwr Treq* the gen-set increases the power gradually up to *Nominal power*

Hint:

Sampling time of Temperature by power control loop is 20 seconds.

Requested power value *ActReqPower* is visible on the controller measure screen. Decreasing of Requested gen-set power according to *TbyPwr* control (does not decrease Nominal power value) has no influence on generator protection limits (different from Power derating function).

### Overheat protection

Function is active when **ProcessControl:**Overheat prot = ENABLED

**Analog input:** *LdCtrl:TbyPwr*

**Setpoints:** Same as described in previous paragraph ( temperature by power control)

The function is similar to the Temp by Power. But in this case the requested load can vary between *Mim Power PtM* and *Baseload* (if *Load control* = BASELOAD).

Hint:

Requested temperature should be set a bit higher as operational temperature.

## Export protection

Function is active when **ProcessControl**:Export prot = ENABLED.

**Process control:** *IE measurement* must not be set to NONE!

This function limits the requested **gen-set** power to keep Import power higher or equal to the setpoint *Import load*.

## Genset warming

---

Engine warming period starts after GCB is closed to parallel operation. The required **gen-set** load (e.g. Baseload) is reduced to **Engine params**: *Warming load*.

Engine warming is finished when **Engine params**: *Warming temp* is reached but latest after **Engine params**: *Max warm time*. Warming temperature is measured on Analog input Warming temp.

Genset Load is increased to Baseload (or to different value due to Import/Export function) after Warming is finished.

## Power derating

---

This function linearly **decreases gen-set nominal power** according to analog input value.

Gen-set power starts decreasing when temperature measured by Analog input Derating temp exceeds *DeratingStart* value.

Gen-set power is at *DeratedPower* value when temperature measured by Analog input Derating temp is equal or higher than *DeratingEnd* value.

# Alarm management

Following alarms are available:

Binary alarms	Analog alarms		Block type
	Alarm type	Active	
No protection			
Warning	None	Over	All the time
Shutdown	Wrn+shut down	Over + Fls	Run only group 1
Slow stop	Wrn+Slow stop	Under	Run only group 2
Electric protection	Wrn+El.protection	Under + Fls	Run only group 3
Off load	Cylinder		

Each active alarm is recorded to history and indicated on Alarm list screen. Detection of each binary input alarm is fix 1 sec time delayed. Analog input Alarm detection is usually based on two levels (e.g. wrn and sd). The Sensor fail activates or does not activate binary output common Alarm depends on configuration. Use WinEdit to modify binary or analog inputs configuration.

## **Warning (Wrn)**

When a warning occurs, only alarm outputs and common warning output are closed, no other action is performed.

See [List of possible events](#) in chapter Remote control and data logging

## **Shut down (Sd)**

When a shut-down alarm occurs, IntelliSys opens outputs GCB CLOSE/OPEN, FUEL SOLENOID, STARTER to stop the engine immediately. Alarm outputs and common shutdown output are closed. Active or not reset protection disables start.

See [List of possible events](#) in chapter Remote control and data logging.

## **Slow stop (Stp)**

When a slow stop protection occurs, the behavior of the gen-set is similar like Stop button pressing (unloading, GCB open, cooling, stop). Alarm outputs and common slow stop output are closed. Active or not reset protection disables start.

See [List of possible events](#) in chapter Remote control and data logging

## **Electric protection (EIProt)**

In case of this alarm GCB is opened immediately and the engine goes to cooling. Alarm outputs and common unl output are closed. Active or not reset protection disables start resp. GCB closing.

See [List of possible events](#) in chapter Remote control and data logging

## **Off load**

When Off load protection is active GCB is opened immediately but the engine does not go to cooling state – stays running for 60 second and then, if in AUT mode, the gen-set is stopped. Alarm outputs and common unl output are closed. Active Off load protection disables start respectively GCB closing.

When Off load protection is not active (Binary input is opened) the gen-set starts again and GCB closes again without Fault reset (in AUT, if a request for run – e.g. REM START/STOP – is still active).

## Mains failure

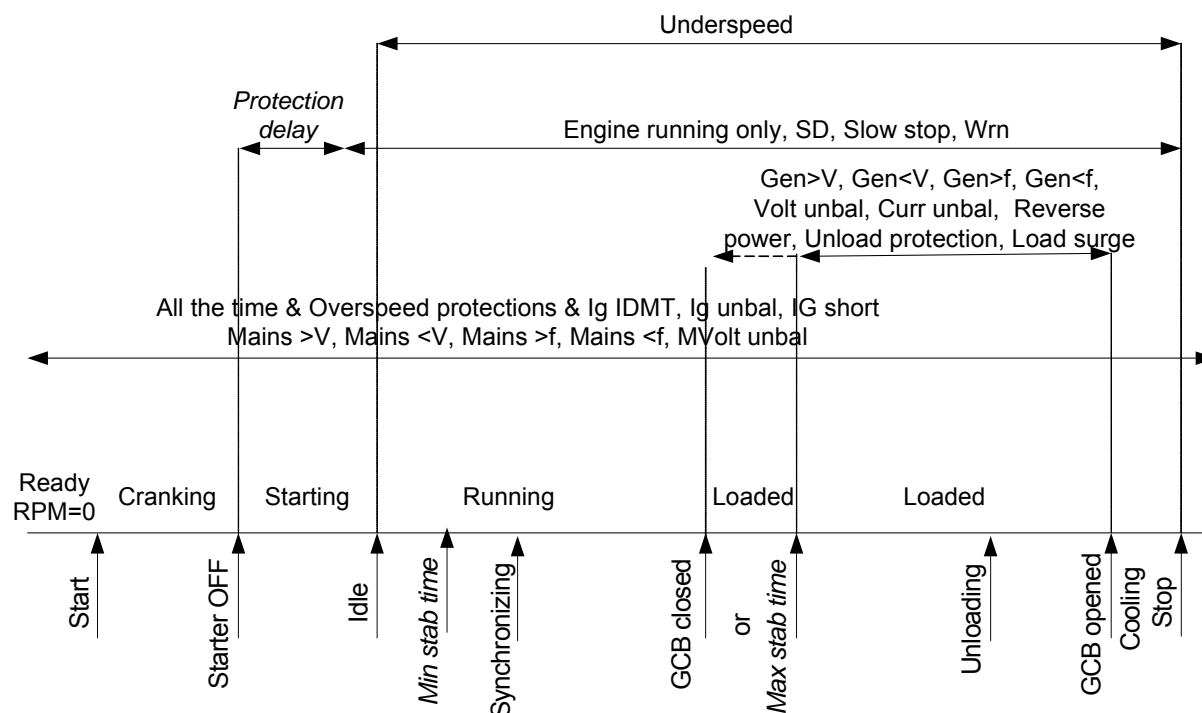
Mains failure detection depends on **Auto mains failure** setpoints (levels and delays) adjusting. When the mains failure comes up, mains circuit breaker is opened.

### Hint:

Only the first mains failure reason is written to history.

Mains failure is not written to alarm list!

## Alarm time chart



## GCB, MCB fail detection

MCB or GCB fail detection is based on breaker command comparing with binary input breaker feedback.

## Sensor fail detection

Sensor fail FIs is detected when measured value is 6 percent out of selected characteristic range. The controller screen will display ##### instead of the measured value.

## Alarms indication

There can be following actions when Alarm is active (depends on Alarm type and configuration):

- Alarm list record
- History list record
- Active call (when is enabled and modem is installed)
- Controller front panel LED indication
- Binary output ALARM is closed when Alarm is active or when was deactivated and FAULT RESET button was not pressed to confirm.  
Binary output ALARM opens when Alarm was deactivated (no other Alarm is active) and FAULT RESET button was pressed to confirm.
- Binary output HORN is closed for adjustable time when any new Alarm occurs.
- Corresponding value reading (binary input state, analog input value, generator voltage, .. ) is inverse (e.g. **100** ) on Controller screen when value is out of limits (binary input protection is active).



# Remote control and data logging

## ***Direct connection to the PC***

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InteliSys can be connected directly to the PC via the RS232 interface.  
Use the standard RS232 null modem cable to connect PC with InteliSys.

## ***PC software - WinEdit***

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On the PC (for direct or modem connection) has to be installed the ComAp's software package WinEdit.  
(based on Windows 95 or newer platform)

WinEdit enables:

- read the quantities,
- adjust all set points,
- read the history,
- control the engine,
- configure the controller,
- select software configuration,
- modify alarm inputs and outputs,
- direct or modem communication,
- receive active calls.

## ***History file***

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InteliSys stores a record of each important event into the history file. The history file contains several hundreds records. When the history file is full, the oldest records are removed. History record structure depends on local configuration.

## ***Remote modem communication***

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Remote modem communication with controller is available when modem or GSM modem is connected to controller. It is possible to read all values check or change setpoints, view history record and download aig archive file.

## **Modem connection**

Open WinEdit, Type connection = Modem. During modem connection are available all functions like from direct connection.

## **Active calls**

If the function is enabled and selected alarm comes up, the controller opens a connection to the remote PC (selected phone number) automatically and send an aig archive file containing, among others the history file, to the PC.

## **Active SMS message**

If the function is enabled and selected alarm comes up, the controller sends a SMS to the selected phone number. A GSM modem must be connected to the controller to enable this function. The SMS contains a copy of the alarm list to help the operator to diagnose the situation.

Example of active SMS message:

```
#Gen-set name:AL=(Wrn PrimWater temp, !Emergency stop)
```

## ***Controller firmware and archive files***

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There are only two types of software files in InteliSys:

Archive file ais (e.g. SPtM-3.3.ais for SPtM application)  
Firmware file mhx (e.g. IS-3.3.mhx)

## **Controller software modification**

Controller software is distributed in

Complete installation pack on CD (include WinEdit, MultiEdit and detail user and application guides)  
iwe pack for simple import of new SW version to corresponding WinEdit directories. Iwe sw pack contains mhx file(s) and ais archives. Use WinEdit Options - Import firmware command to import iwe.

## **Controller application modification or change**

WinEdit direct connection – Controller – Software configuration – Select or Modify

Select = application change (e.g. from SSB to SPtM)

Modify = configuration change (Input, Outputs, protection, password setting, .. etc modification)

## **Controller firmware upgrade**

WinEdit direct connection – Controller – Programming – select required firmware version – click Write to IG.

# Technical data

## Power supply

Voltage supply	8-36V DC
Consumption	0,22 A for 24V supply 0,17A for 36V supply 0,69A for 8V supply
Battery voltage measurement tolerance	2 % at 24V
RTC battery life-cycle	10 year

### Hint:

When internal RTC battery becomes flat IntelliSys function (e.g. Ready for stand by) does not change until controller power supply is switched off.

After the next power switch on controller:

- Stays in the INIT state (not possible to run gen-set)
- All History records disappear except Wrong params record
- Alarm list is empty
- Time and Date values are set to zero
- Statistics values are random

## Operating conditions

Operating temperature	-10..+60°C
Storage temperature	-30..+80°C
Flash memory data retention time	10 years
Protection front panel	IP65
Humidity	95% without condensation
Standard conformity	
Low Voltage Directive	EN 61010-1:95 +A1:97
Electromagnetic Compatibility	EN 50081-1:94 (EN 61000-6-3) EN 50081-2:96 (EN 61000-6-4) EN 50082-1:99 (EN 61000-6-1) EN 50082-2:97 (EN 61000-6-2)
Vibration	5 - 25 Hz, $\pm 1,6$ mm 25 - 100 Hz, $a = 4$ g
Shocks	$a = 200$ m/s <sup>2</sup>

## Dimensions and weight IS-CU

Dimensions	290 x 190 x 60 mm
Weight	1000g