37417B

easYgen-3000 Series (Package P2) Genset Control

Application

Software Version: 1.12xx & 1.13xx
Part Numbers: 8440-1842 / 8440-1843 / 8440-1844 / 8440-1845

Manual 37417B

WARNING

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all plant and safety instructions and precautions. Failure to follow instructions can cause personal injury and/or property damage.

The engine, turbine, or other type of prime mover should be equipped with an overspeed (overtemperature, or overpressure, where applicable) shutdown device(s), that operates totally independently of the prime mover control device(s) to protect against runaway or damage to the engine, turbine, or other type of prime mover with possible personal injury or loss of life should the mechanical-hydraulic governor(s) or electric control(s), the actuator(s), fuel control(s), the driving mechanism(s), the linkage(s), or the controlled device(s) fail.

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

CAUTION

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts.

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

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Important definitions

WARNING

Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation that, if not avoided, could result in damage to equipment.

NOTE

Provides other helpful information that does not fall under the warning or caution categories.

Revision History

Rev.	Date	Editor	Changes
NEW	08-06-19	TP	Release based on 37226B
A	09-03-05	TE	Minor corrections
B	09-10-28	TE	Minor corrections

Content

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Chapter 1.
General Information

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easYgen-3000 Series (Package 2)			
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easYgen-3000 Series - Application	this manual ⇨	37417	-
easYgen-3000 Series - Interfaces		37418	-
easYgen-3000 Series - Parameter List		37420	GR37420
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RP-3000 Remote Panel		37413	-

Table 1-1: Manual - overview

Intended Use The unit must only be operated in the manner described by this manual. The prerequisite for a proper and safe operation of the product is correct transportation, storage, and installation as well as careful operation and maintenance.

Chapter 2.
Basic Applications

Overview

NOTE

Please refer to the Configuration Manual 37415 for selection of the application mode. Depending on the application, different application modes are possible.

- Application mode {0} - [start/stop] - engine control - refer to page 10
  - Measuring of engine/generator parameters (i.e. voltage, frequency, current, power, coolant temperature, oil pressure, etc.)
  - Engine start/stop

- Application mode {1o} - [open GCB] - protection - refer to page 11
  - Measuring of engine/generator parameters (i.e. voltage, frequency, current, power, coolant temperature, oil pressure, etc.)
  - Engine start/stop
  - Engine/generator protection (relay output to open GCB)

- Application mode {1oc} - [open/close GCB] - 1-CB control - refer to page 12
  - Measuring of engine/generator parameters (i.e. voltage, frequency, current, power, coolant temperature, oil pressure, etc.)
  - Engine start/stop
  - Engine/generator protection (relay output to open GCB)
  - GCB operation (relay output to close GCB)

- Application mode {2oc} - [open/close GCB/MCB] - 2-CB control - refer to page 13
  - Measuring of engine/generator/mains parameters (i.e. voltage, frequency, current, power, coolant temperature, oil pressure, etc.)
  - Engine start/stop
  - Engine/generator protection (relay output to open GCB)
  - GCB operation (relay output to close GCB)
  - MCB operation (relay output to open and close the MCB)
  - Mains failure detection (AMF auto mains failure operation) and automatic engine start/stop

Application Mode {0}

This application mode may be used for isolated operation applications. In this case, the easYgen will function as an engine control.

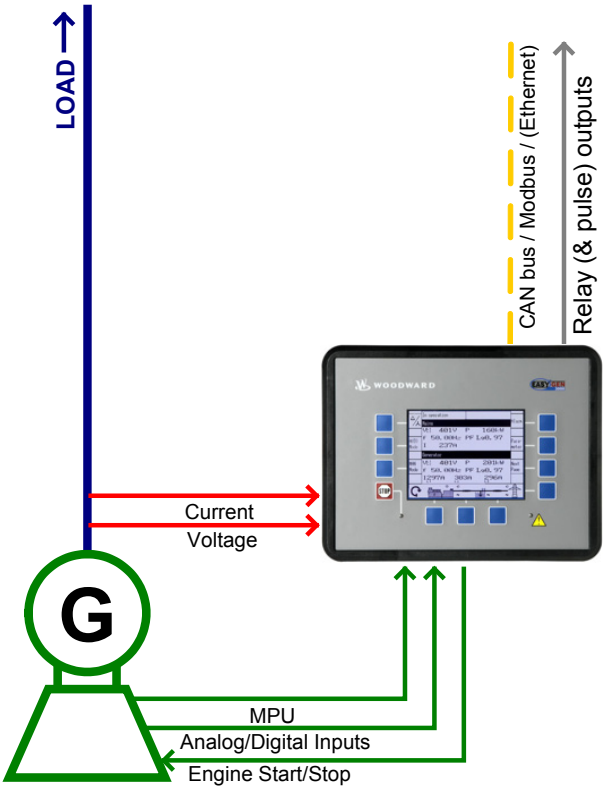


Figure 2-1: Application mode {0}

The easYgen requires in all application modes the feedback reply from the circuit breakers. These replies are used to define, whether it controls frequency, shares the load with other gensets, or performs active load control. The following feedback signals are used in this application mode and fixed to the respective discrete inputs:

- DI 7 "Reply MCB" (mains parallel)
- DI 8 "Reply GCB" (normally closed (break) contact)

NOTE

If the easYgen is intended to be operated in parallel with the mains, the mains voltage measuring inputs must be connected. If an external mains decoupling is performed, jumpers between busbar and mains voltage measuring inputs may be installed.

Application Mode {1o}

This application mode may be used for isolated operation applications. In this case, the easYgen will function as an engine control with generator and engine protection. The control unit can only open the GCB.

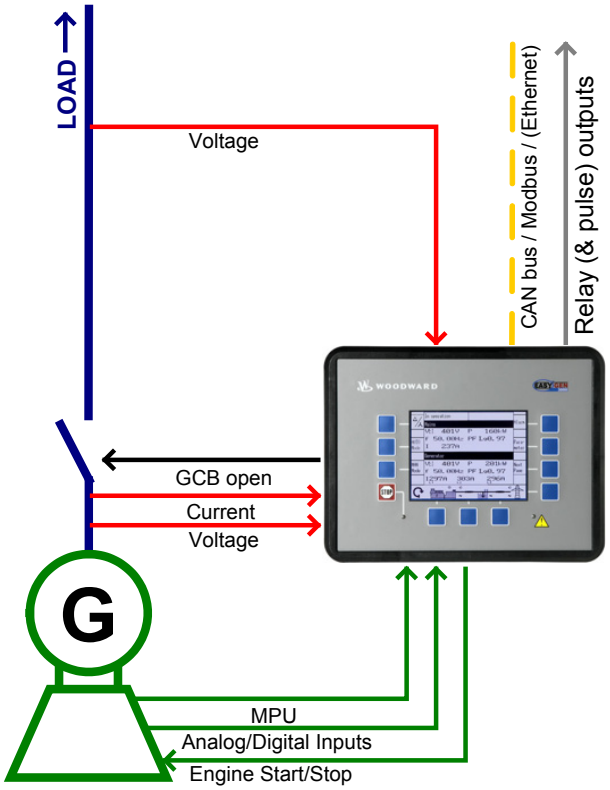


Figure 2-2: Application mode {1o}

The easYgen requires in all application modes the feedback reply from the circuit breakers. These replies are used to define, whether it controls frequency, shares the load with other gensets, or performs active load control. The following feedback signals and commands are used in this application mode and fixed to the respective discrete inputs and outputs:

- DI 7 "Reply MCB" (mains parallel)
- DI 8 "Reply GCB" (normally closed (break) contact)
- DO 7 "Command: GCB open"

NOTE

If the easYgen is intended to be operated in parallel with the mains, the mains voltage measuring inputs must be connected. If an external mains decoupling is performed, jumpers between busbar and mains voltage measuring inputs may be installed.

Application Mode {1oc}

This application mode may be used in applications, where only the GCB is operated by the easYgen. If it is used for isolated or mains parallel operations, mains decoupling should be performed by the GCB or an external provision. The easYgen will function as an engine control with generator and engine protection. The control unit can open and close the GCB.

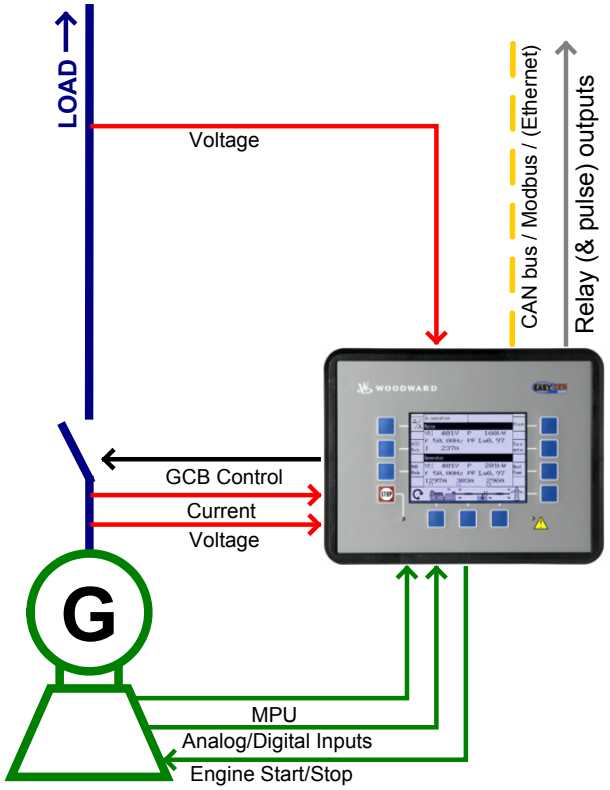


Figure 2-3: Application mode {1oc}

The easYgen requires in all application modes the feedback reply from the circuit breakers. These replies are used to define, whether it controls frequency, shares the load with other gensets, or performs active load control. The following feedback signals and commands are used in this application mode and fixed to the respective discrete inputs and outputs:

- DI 7 "Reply MCB" (mains parallel)
- DI 8 "Reply GCB" (normally closed (break) contact)
- DO 6 "Command: GCB close"
- DO 7 "Command: GCB open"

NOTE

If the easYgen is intended to be operated in parallel with the mains, the mains voltage measuring inputs must be connected. If an external mains decoupling is performed, jumpers between busbar and mains voltage measuring inputs may be installed.

Application Mode {2oc}

This application mode may be used for mains parallel operation. In this case, the easYgen will function as an engine control with generator, mains and engine protection. The control unit can open and close the GCB and the MCB.
An emergency mode (AMF operation) is only possible in this application mode.

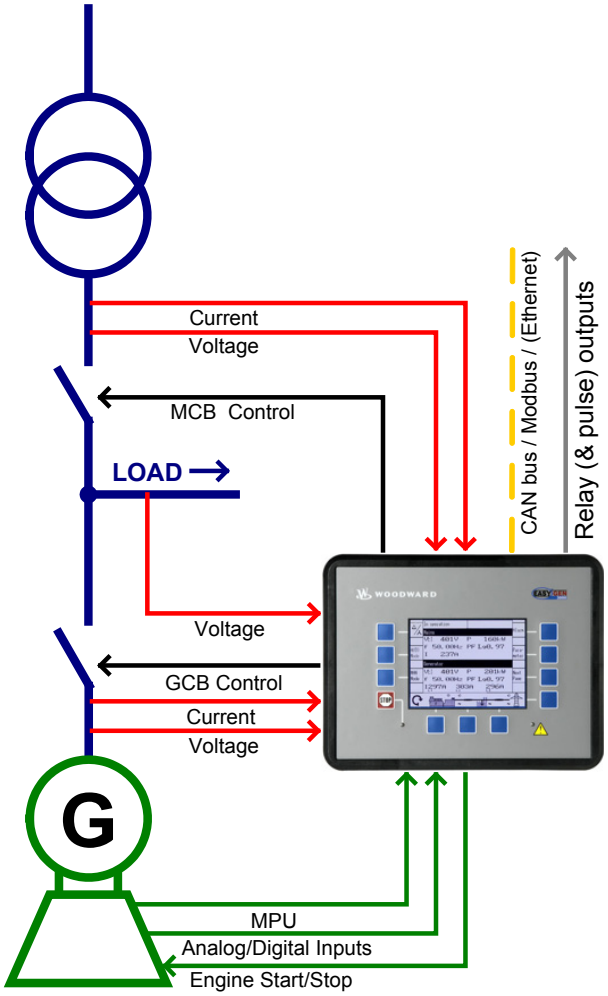


Figure 2-4: Application mode {2oc}

The easYgen requires in all application modes the feedback reply from the circuit breakers. These replies are used to define, whether it controls frequency, shares the load with other gensets, or performs active load control. The following feedback signals and commands are used in this application mode and fixed to the respective discrete inputs and outputs:

- DI 7 "Reply MCB" (mains parallel)
- DI 8 "Reply GCB" (normally closed (break) contact)
- DO 6 "Command: GCB close"
- DO 7 "Command: GCB open"
- DO 8 "Command: MCB close"
- DO 9 "Command: MCB open"

Chapter 3.
Multiple Genset Applications

Overview

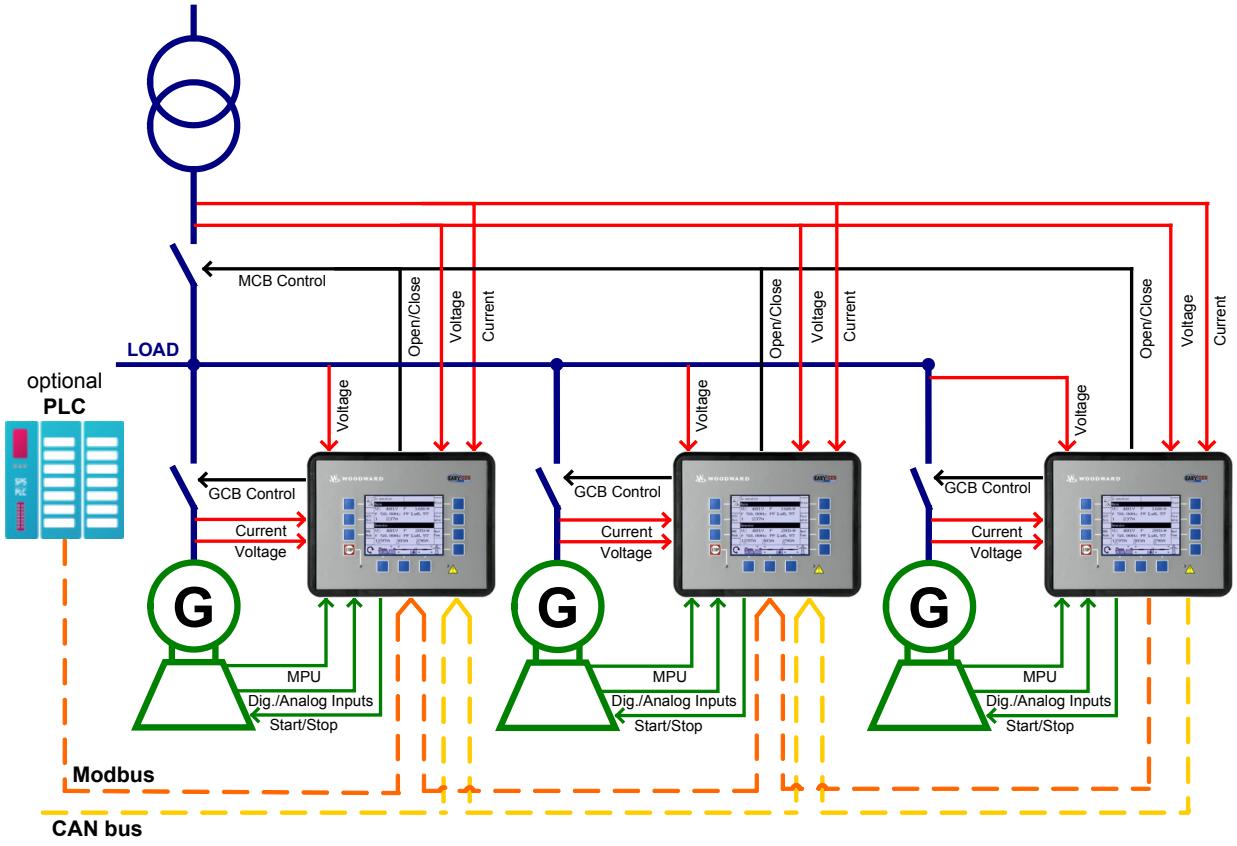


Figure 3-1: Multiple genset application mode

In a multiple-unit mains parallel application, all easYgens need the same signals for:
- mains voltage and current
- reply and release signal of the MCB

The open and close contacts from all controls must be wired in parallel.

Configuration Example

Mains Parallel Operation (mains interchange (import/export) power control)

The following example describes the configuration of a typical mains parallel operation with import/export power control at the interchange point and load-dependent start/stop.

Multiple generators are to be operated in parallel to the mains maintaining a stable power at the interchange point. The generators shall be started depending on the momentary load at the plant. An emergency operation in case of a mains failure is also intended. The load dependent start/stop function (LDSS) shall be enabled with a remote start request and during emergency operation. LDSS shall depend on the reserve power on the busbar. In case of a dead busbar (caused by a mains failure) all capable generators shall be started and operated with their minimum running time. No generator priority is considered. Generator selection shall be performed depending on the operating hours.

The following assumptions are valid for this example:

- 3 generators, each with 80 kW rated power, are available.
- The recommended minimum load for the generators is 40 kW.
- The minimum running time is 180 s.

Configuring Load-Dependent Start/Stop

From the main screen on the unit select Parameter -> Configuration -> Configure application -> Configure automatic run -> Load dependent start/stop and configure the following parameters:

ID	Parameter	Value	Comment
5752	Start stop mode	Reserve power	The reserve power at the interchange point is to be considered for LDSS
5753	Dead busbar start mode	All	All generators shall start in case of a dead busbar (mains failure)
5751	Base priority	5	The base priority for the genset is 5
5754	Fit size of engine	No	The generator rated power is not considered for LDSS
5755	Fit service hours	Equal	The remaining hours until next service are considered for LDSS
5756	Changes of engines	Off	No engine change will be performed
5759	Minimum running time	180 s	The minimum running time is 180 seconds

Table 3-1: Configuration of load-dependent start/stop

Configure the *LogicsManager* function "LD start stop" as shown in Figure 4-2 on page 20 to enable LDSS if a start request in automatic operating mode or emergency mode are enabled.

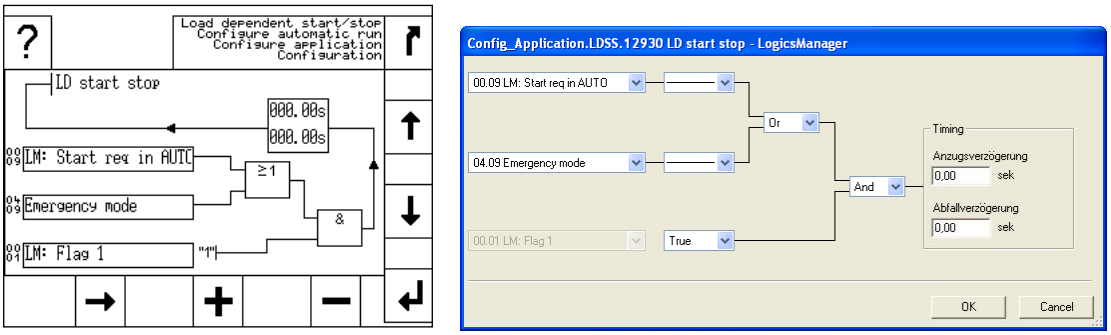


Figure 3-2: Example - configuring load-dependent start stop (LM)

Configuring Load-Dependent Start/Stop Isolated Operation

Additional assumptions are valid for isolated operation (IOP), i.e. in case of an emergency operation:

- A reserve power of 80 kW on the busbar shall be maintained, i.e. at least 2 generators are available in isolated operation for redundancy because no supporting mains are present.
- A hysteresis of 20 kW is required to avoid frequent starts and stops.
- The delay for adding another generator shall be 10 seconds.
- The delay for adding another generator shall be reduced to 3 seconds if a generator at the busbar is operating above its rated load (accelerated start of the next generator).
- The delay for removing a generator from the busbar shall be 180 seconds.

From the main screen on the unit select Parameter -> Configuration -> Configure application -> Configure automatic run -> Load dependent start/stop -> Isolated operation and configure the following parameters:

ID	Parameter	Value	Comment
5760	IOP Reserve power	80 kW	The reserve power in isolated operation is 80 kW
5761	IOP Hysteresis	20 kW	The reserve power hysteresis in isolated operation is 20 kW
5764	IOP Add on delay	10 s	The add on delay in isolated operation is 10 seconds
5765	IOP Add on delay at rated load	3 s	The add on delay at rated load in isolated operation is 3 seconds
5766	IOP Add off delay	180 s	The add off delay in isolated operation is 180 seconds

Table 3-2: Configuration of load-dependent start/stop IOP

Configuring Load-Dependent Start/Stop Mains Parallel Operation

Additional assumptions are valid for mains parallel operation (MOP):

- The first generator is only started if it is able to operate at a minimum load of 40 kW.
- A hysteresis of 20 kW is required to avoid frequent starts and stops.
- A reserve power of 10 kW on the busbar shall be maintained, i.e. at least 10 kW of generator capacity are available for short load peaks. Higher load peaks are supported by the mains.
- The delay for adding another generator shall be 30 seconds.
- The delay for adding another generator shall be reduced to 10 seconds if a generator at the busbar is operating above its rated load (accelerated start of the next generator).
- The delay for removing a generator from the busbar shall be 60 seconds.

From the main screen on the unit select Parameter -> Configuration -> Configure application -> Configure automatic run -> Load dependent start/stop -> Mains parallel operation and configure the following parameters:

ID	Parameter	Value	Comment
5767	MOP Minimum load	40 kW	The minimum load in mains parallel operation is 40 kW
5769	MOP Hysteresis	20 kW	The reserve power hysteresis in mains parallel operation is 20 kW
5768	MOP Reserve power	10 kW	The reserve power in mains parallel operation is 10 kW
5772	MOP Add on delay	30 s	The add on delay in mains parallel operation is 20 seconds
5773	MOP Add on delay at rated load	10 s	The add on delay at rated load in mains parallel operation is 10 seconds
5774	MOP Add off delay	60 s	The add off delay in mains parallel operation is 60 seconds

Table 3-3: Configuration of load-dependent start/stop MOP

Configuring Automatic Operation

From the main screen on the unit select Parameter -> Configuration -> Configure application -> Configure automatic run and configure the *LogicsManager* function "Start req in AUTO" as shown in Figure 4-2 on page 20 to start the generator in Automatic operating mode if discrete input [DI 02] ("09.02 Discrete input 2") is energized or a remote start request ("04.13 Remote request" = start via interface) is issued.

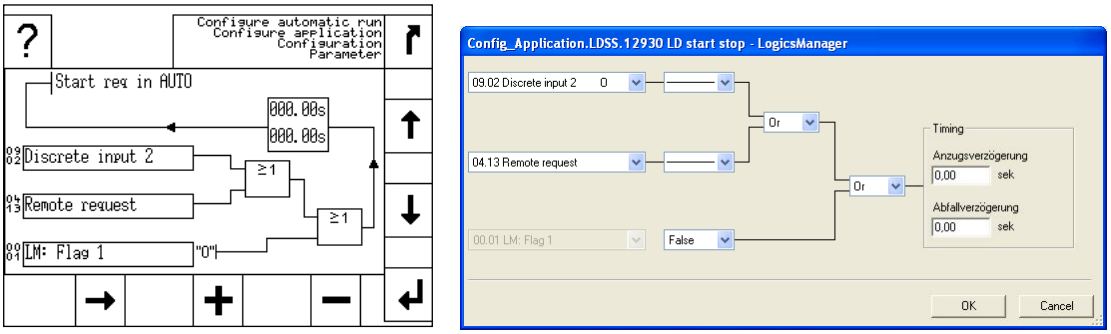


Figure 3-3: Example - configuring Start in Auto (LM)

Configuring Emergency Operation

The emergency operation is to be configured that it is initiated if the mains fail for at least 3 seconds or the MCB cannot be closed.

From the main screen on the unit select Parameter -> Configuration -> Configure application -> Configure emergency run and configure the following parameters:

ID	Parameter	Value	Comment
2802	On/Off	On	Emergency operation is enabled
2800	Mains fail delay time	3.00 s	Emergency operation is initiated if the mains fail for a t least 3 seconds
3408	Emerg. start with MCB failure	Yes	Emergency operation is initiated if the MCB fails to close

Table 3-4: Configuration of emergency operation

Configuring Import/Export Power Control

The power controller is to be configured to use the internal power set point 1, which is to be configured to 0 kW import power.

From the main screen on the unit select Parameter -> Configuration -> Configure application -> Configure controller -> Configure load control and configure the following parameters:

ID	Parameter	Value	Comment
5539	Load setpoint 1 source	05.04. Internal pwr. setp.1	The internal power set point 1 is used as load set point 1
5526	Load setpoint 1	Import	The internal power set point 1 is a import power value
5520	Int. load control setpoint 1	0 kW	The internal power set point 1 is configured to 0 kW

Table 3-5: Configuration of import/export power control

Chapter 4.
Special Application Examples

Generator Excitation Protection

The easYgen-3000 Series provides the user with power factor monitoring. These monitoring functions permit for protection of the generator over- and under-excitation. The power factor monitoring consists of a warning alarm and/or a shutdown alarm when enabled. An alarm and the specified action will be initiated if the monitored power factor surpasses the defined limits. Typically the generator is monitored for loss of excitation and/or over excitation in a mains parallel application. When a generator plant is paralleled against a utility, it is possible to control the power factor at a desired reference. When the plant is operated in an island mode or isolated parallel application, it is not possible to control the power factor. The load will dictate what the power factor is due to the reactive nature of the load.
Figure 4-1 shows a typical power factor (generator excitation) protection range, where the desired range of operation (green area) is from 0.7 lagging (capacitive) to 0.8 leading (inductive). When the power factor exceeds either of these limits by entering the yellow shaded areas starting at 0.7 lagging or 0.8 leading for more than 30 seconds, a class B warning alarm is initiated. If the power factor exceeds the desired range further and enters the red shaded areas starting at 0.5 lagging or 0.6 leading for 1 second, a class E alarm is initiated and the generator is shut down.

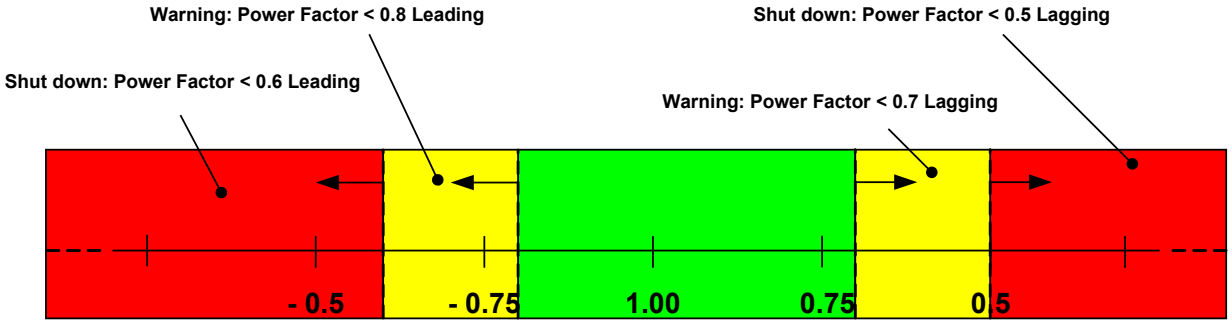


Figure 4-1: Example - generator excitation protection

In order to achieve the described protection, the power factor monitoring parameters (refer to Configuration Manual 37415 for more information) have to be configured according to Table 1-1: Manual - overview.

Generator power factor lagging level 1		
ID	**Text**	**Setting**
2325	Monitoring	ON
2329	Limit	+0.700
2330	Delay	30.00 s
2326	Alarm class	B
2327	Self acknowledge	NO
2328	Delayed by engine speed	YES

Generator power factor lagging level 2		
ID	**Text**	**Setting**
2331	Monitoring	ON
2335	Limit	+0.500
2336	Delay	1.00 s
2332	Alarm class	E
2333	Self acknowledge	NO
2334	Delayed by engine speed	YES

Generator power factor leading level 1		
ID	**Text**	**Setting**
2375	Monitoring	ON
2379	Limit	-0.800
2380	Delay	30.00 s
2376	Alarm class	B
2377	Self acknowledge	NO
2378	Delayed by engine speed	YES

Generator power factor leading level 2		
ID	**Text**	**Setting**
2381	Monitoring	ON
2385	Limit	-0.600
2386	Delay	1.00 s
2382	Alarm class	E
2383	Self acknowledge	NO
2384	Delayed by engine speed	YES

Table 4-1: Example - generator excitation protection

Configuring a Set Point Control via Analog Input

The following example illustrates how to configure an easYgen for using an external load set point via analog input [AI 03]. The external set point may be enabled using a switch, wired to discrete input [DI 09]. An analog 0 to 20 mA input is to be used where 4 mA corresponds with 0 % power (0 MW), 12 mA corresponds with 50 % power (1 MW), and 20 mA corresponds with 100 % power (2 MW).

Configuring the Rated Generator Power

From the main screen on the unit select Parameter -> Configuration -> Configure measurement and configure the following parameter:

ID	Parameter	Value	Comment
1752	Gen. rated active power [kW]	2000	Generator rated power of 2 MW

Table 4-2: Configuration of the rated generator power

Configuring the Analog Input for Real Power Set Point

From the main screen on the unit select Parameter -> Configuration -> Configure application -> Configure inputs/outputs -> Configure analog inputs -> Analog input 3 and configure the following parameters:

ID	Parameter	Value	Comment
1100	Type	Linear	A user-defined linear characteristic curve is to be used
1101	User defined min display value	+00000	A value of 000.00 % is displayed at the minimum of the input range
1102	User defined min display value	+10000	A value of 100.00 % is displayed at the maximum of the input range
1139	Sender value at display min.	020.00%	The sender value at minimum display is 20 % i.e. 4 mA
1140	Sender value at display max.	100.00%	The sender value at maximum display is 100 % i.e. 20 mA
1120	Sender type	0 - 20mA	A 0 to 20 mA sender is used on the analog input
1103	Monitoring wire break	Low	If the analog signal falls below 2 mA, a wire break is indicated
1104	Wire break alarm class	Class B	An alarm of class B will be issued in case of a wire break
1105	Self acknowledge wire break	No	A wire break is not automatically cleared after it has been repaired
10116	Filter time constant	Off	No filter time constant is applied to the analog signal
3636	Bargraph minimum	+00000	The start value for the bargraph display of the analog input is 00000
3637	Bargraph maximum	+10000	The end value for the bargraph display of the analog input is 10000

Table 4-3: Configuration of the analog input for real power set point

The following parameters may only be changed using ToolKit and serve for a more detailed display of the analog value:

ID	Parameter	Value	Comment
1125	Description	ActivePower SP (%)	Analog input [AI 03] is labeled with "ActivePower SP (%)" on the display
1135	Value format	000.00%	The value format of the bargraph display of the analog input is "000.00%"

Table 4-4: Configuration of the analog input for real power set point - ToolKit only parameters

Configuring the Load Controller

The load controller is to be configured that it uses a fixed load setpoint 1 of 2 MW unless a switch energizes discrete input [DI 09] for enabling a variable load setpoint 2, which is controlled by analog input [AI 03].
From the main screen on the unit select Parameter -> Configuration -> Configure application -> Configure controller -> Configure load control and configure the following parameters:

ID	Parameter	Value	Comment
5539	Load setpoint 1 source	05.04 Internal pwr. setp.1	Internal power setpoint 1 is used as setpoint 1
5526	Load setpoint 1	Constant	A constant load is to be controlled for setpoint 1
5520	Int. load control setpoint 1	02000.0kW	A constant load of 2 MW is to be used for internal setpoint 1
5540	Load setpoint 2 source	06.03 Analog input 3	Analog input 3 is used as setpoint 2
5527	Load setpoint 2	Constant	A constant load is to be controlled for setpoint 2

Table 4-5: Configuration of the load controller

Configure the *LogicsManager* function "Setp. 2 load" as shown in Figure 4-2 on page 20 to enable load setpoint 2 if discrete input [DI 09] is energized.

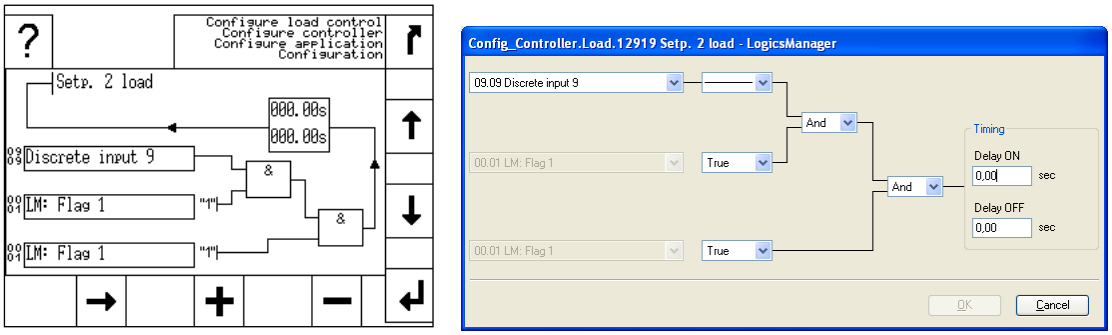


Figure 4-2: Example - configuring load setpoint 2 for [DI 05]

Viewing the Load Set Point on the easYgen

After the unit is configured as described above, the "Setpoint" screen may be viewed from the main screen by selecting Next page -> Setpoints.

Figure 4-3 shows the "Setpoint" screen with enabled load setpoint 2 ([DI 09] is energized). This is indicated by the figure "2" in fromt of the load setpoint section. A generator load of approx. 1 MW (~50 % or 12 mA) is displayed.

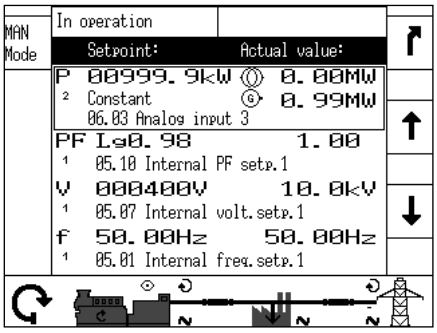


Figure 4-3: Example - Setpoints screen

The "Analog inputs" screen may be viewed from the main screen by selecting Next page -> Measured values -> Analog inputs/outputs.

Figure 4-3 shows the "Analog inputs" screen with the display of analog input [AI 03] at the bottom (labeled "ActivePower SP"). Analog input [AI 03] is displayed with an input signal of approx. 50 % (~12 mA or 1 MW).

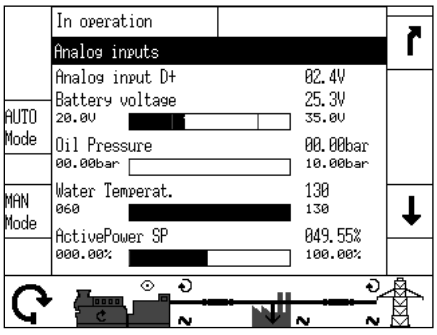


Figure 4-4: Example - Analog inputs screen

Creating Self-Toggling (Pulsing) Relays Using *LogicsManager*

Various functions are possible with the *LogicsManager*. This is a simple example of a relay output that toggles from energized to de-energized in automatic mode with adjustable on and off time. This pulsing relay may be combined with a flexible limit, which can be programmed with a function like low battery voltage to get a blinking warning light.

Relay 2 is the discrete output (DO 2) and Flag 5 is used as an auxiliary flag. Relay 2 will be ON (energized) for 2 seconds and then OFF (de-energized) for 2 seconds as long as the easYgen is in automatic mode.

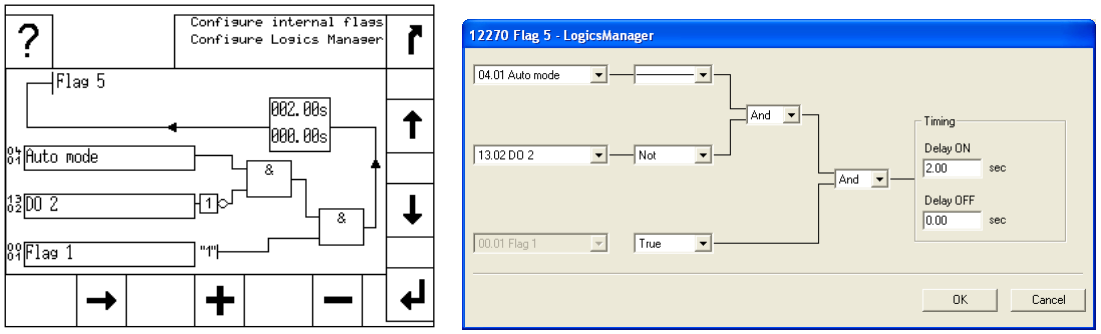


Figure 4-5: Example - configuring Flag 5 for a pulsing relay

In this example is the Delay ON time in the *LogicsManager* of Flag 5 indicates how long the pause is. The Delay OFF time of Relay 2 is the pulse duration.

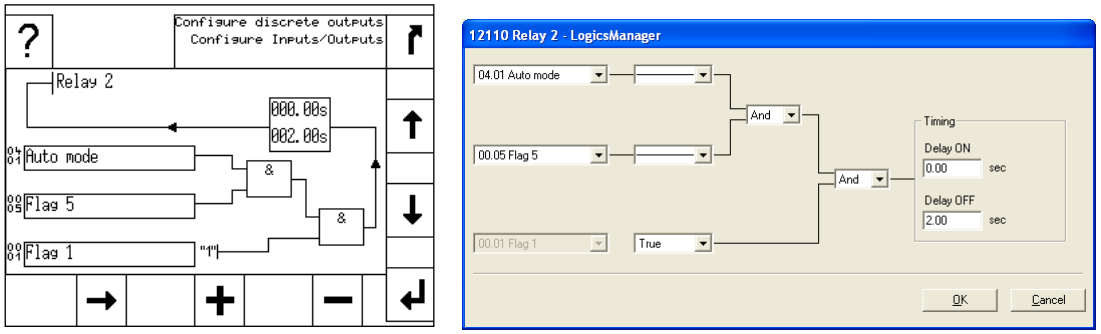


Figure 4-6: Example - configuring Relay 2 for a pulsing relay

Changing a Starter Battery Set Using *LogicsManager*

Various functions are possible with the *LogicsManager*. The following programming example shows how two relay outputs are energized by turns when discrete input 9 is energized. At first time, discrete output 11 will be energized, then, discrete output 12 will be energized, then discrete output 11 and so on.
This logic may be used to change between two starter battery sets for each starting cycle.
Configure Relay 11 and Relay 12 as well as the Flags 2, 3, 4, and 5 as shown in the following example. You may also use the discrete input, which starts the engine by default (DI 2) or any other input command instead of discrete input 9; for example the command variable 03.06 "Engine released".

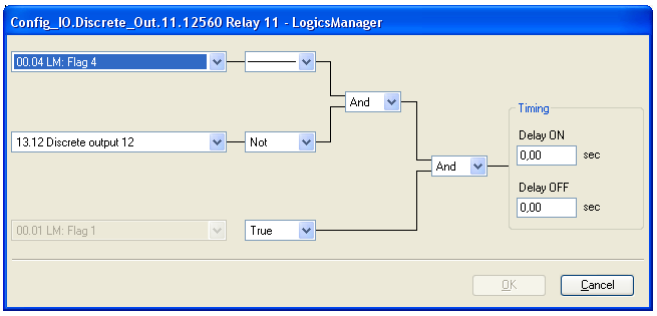


Figure 4-7: Example - configuring Relay 11 for a battery change logic

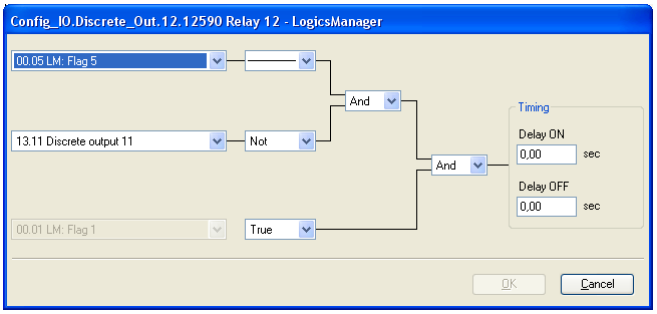


Figure 4-8: Example - configuring Relay 12 for a battery change logic

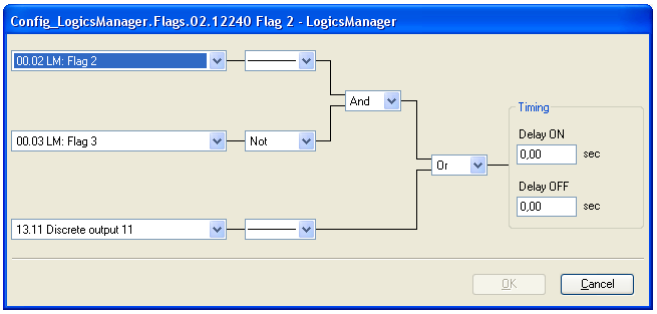


Figure 4-9: Example - configuring Flag 2 for a battery change logic

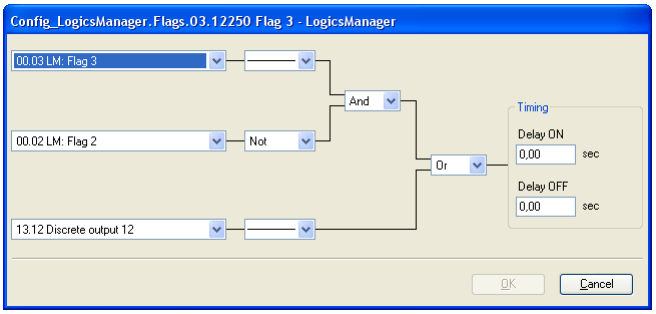


Figure 4-10: Example - configuring Flag 3 for a battery change logic

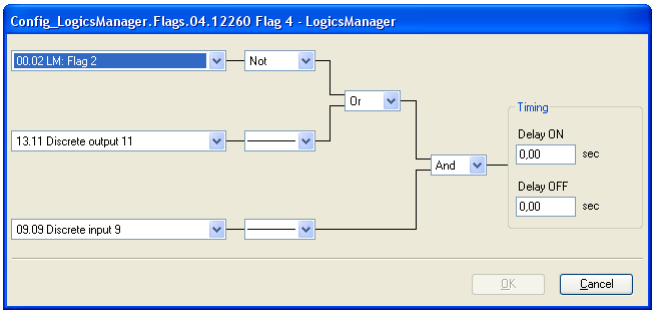


Figure 4-11: Example - configuring Flag 4 for a battery change logic

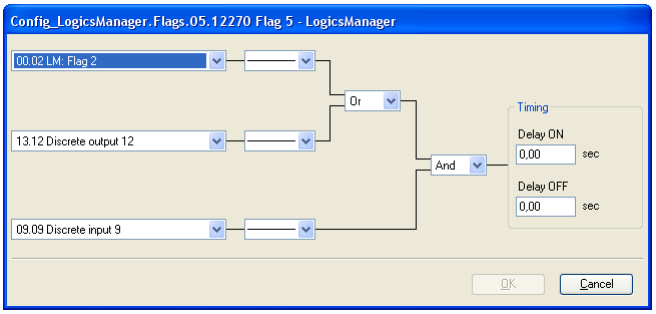


Figure 4-12: Example - configuring Flag 5 for a battery change logic

Performing Remote Start/Stop and Acknowledgement

The easYgen-3000 Series controller may be configured to perform start/stop/acknowledgement functions remotely through the CAN bus or Modbus. The required procedure is detailed in the following steps.

NOTE

Refer to the operation manual 37416 for a detailed description of the navigation through the various display screens. A detailed description of the individual parameters may be found in the configuration manual 37415.

Be sure to enter the password for code level 2 or higher to be able to access the required configuration screens.

Refer to the configuration manual 37415 for a description of the installation, configuration and usage of the ToolKit visualization and configuration application.

Preliminary Conditions

We recommend to reset the unit to factory settings before proceeding. Refer to the System Management section of the Parameters chapter in the configuration manual 37415 for reference. The *LogicsManager* factory settings are shown in the Factory Settings section of the *LogicsManager* appendix of the configuration manual 37415.

Operating Modes

Two operating modes may be used with remote control:

1. STOP
2. AUTOMATIC

It is possible to fix the operating mode using the *LogicsManager* function 00.16 "Operat. mode AUTO" (parameter ID 12510).

The Operat. mode AUTO *LogicsManager* function (parameter ID 12510) can be configured as shown in Figure 4-13. AUTOMATIC operation mode is always enabled.

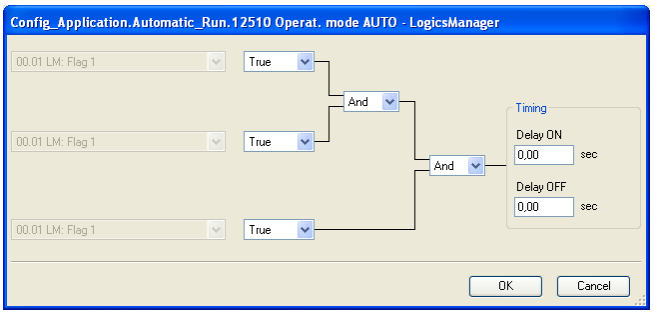


Figure 4-13: Configuration - Operat. mode AUTO

If an alarm of alarm class C through F occurs in AUTOMATIC operating mode, the control does not return to STOP operating mode if the alarm is cleared after acknowledgement and a restart is initiated.

It is also possible to configure a discrete input for controlling the operating mode using the *LogicsManager* function 00.16 "Operat. mode AUTO" (parameter ID 12510) and 00.18 "Operat. mode AUTO" (parameter ID 12530).

The Operat. mode AUTO *LogicsManager* function (parameter ID 12510) can be configured as shown in Figure 4-13. AUTOMATIC operation mode is enabled as soon as discrete input 9 is energized.

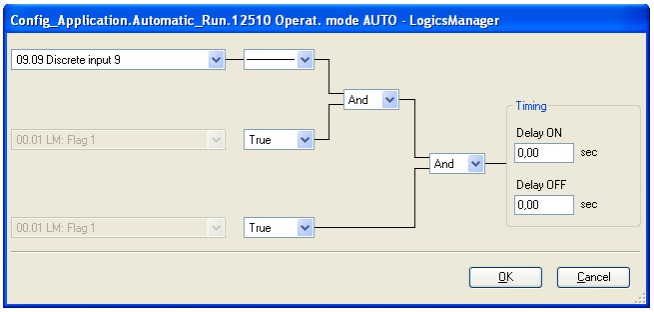


Figure 4-14: Configuration - Operat. mode AUTO

The Operat. mode STOP *LogicsManager* function (parameter ID 12530) can be configured as shown in Figure 4-13. STOP operation mode is enabled as soon as discrete input 9 is de-energized.

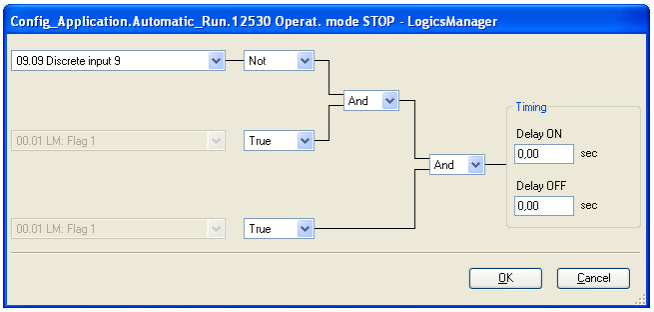


Figure 4-15: Configuration - Operat. mode STOP

Setting Up a Test With or Without Load

There are a lot of different opinions of the behavior of a proper test mode. The easYgen-3000 Series can support the following two modes: **Test with load** and **test without load.** Both modes work only in automatic mode. The correct test mode depends on your local specifications.

Test With Load

This is the *LogicsManager* function "Start req. in AUTO" (parameter 12120). No special message appears on the display. If the mains fail during start in auto, the unit keeps running until the mains return and the mains settling time is expired or the conditions for "Start req. in AUTO" are FALSE again. It depends on which is longer active.

Test Without Load

This is the *LogicsManager* function "Start w/o load" (parameter 12540). If the conditions for this *LogicsManager* function are TRUE, the engine will provide an automatic starting sequence and keep the generator running until this function is FALSE again. Then the unit will perform an automatic stop sequence and remain stand by in auto mode. The message "Start w/o load" is displayed during the test without load. If the mains fails during test without load and the emergency mode is enabled, the unit will take over the load.
It will open the MCB and close the GCB. When the mains return, it will transfer the load back to the mains according to the configured breaker transition mode after the mains settling timer has expired. The engine will keep running until the conditions for "Start w/o load" are FALSE again.

Example for test without load: The engine shall start once a month and run for one hour without overtaking the load. The test day shall be every fifteenth of a month (with flag 2). A relay output can be configured that this test is running, e.g. for a signal lamp.

The following settings are to be made for the timer:

ID	Parameter	Value	Comment
1663	Active day	15	The active day is enabled every fifteenth of the month
1662	Active hour	10	The active hour is enabled between 10:00 and 11:00 am every day

Table 4-6: Timer configuration

The *LogicsManager* function Flag 2 (parameter ID 12240) can be configured as shown in Figure 4-16. Flag 2 becomes TRUE as soon as the configured active day and active time is reached.

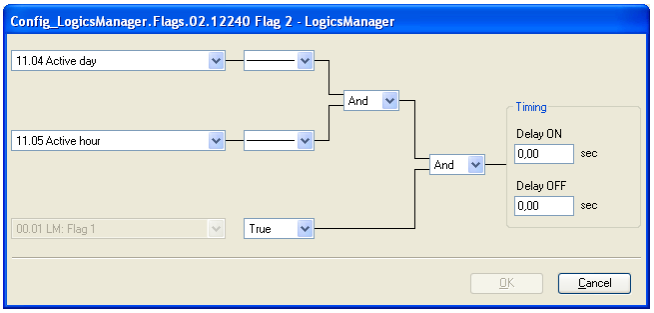


Figure 4-16: Configuration – Flag 2 (timer)

The Start without load *LogicsManager* function (parameter ID 12540) can be configured as shown in Figure 4-17. Start without load mode is enabled as soon as Flag 2 becomes TRUE.

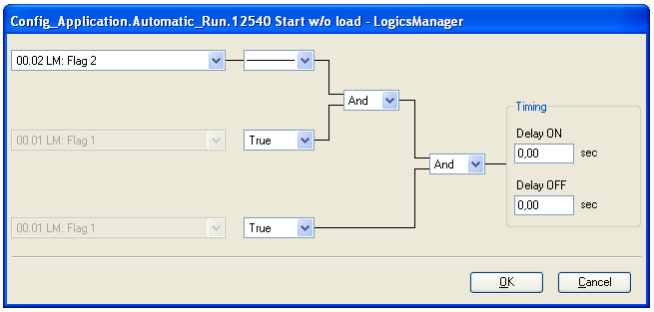


Figure 4-17: Configuration - Start w/o load

Remote Start/Stop and Acknowledgement

The easYgen may be started, stopped, or acknowledged with Modbus or CAN protocol via the interface. Two logical command variables are available for this in the *LogicsManager*:

04.13 Remote request
04.14 Remote acknowledge

Configuration of the *LogicsManager* Functions via HMI and/or ToolKit

Start Request in AUTOMATIC Operating Mode

Navigate to the "Configure automatic run" screen by pressing the following softkeys in this sequence:
Parameter -> Configuration -> Configure application -> Configure automatic run

Navigate to the entry "Start req in AUTO" by using the ↓ and ↑ softkeys and press ↵ to enter the "Start req in AUTO" *LogicsManager* screen.

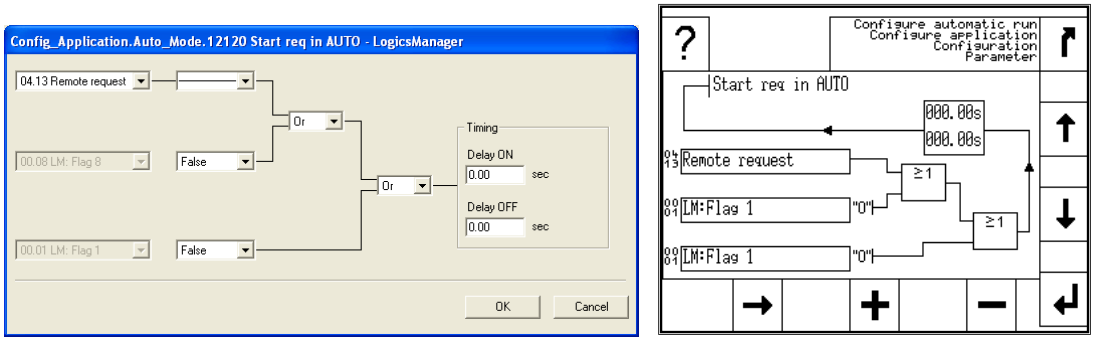


Figure 4-18: Example - remote start request

Configure the "Start req in AUTO" *LogicsManager* function as above using the ↓ and ↑ as well as + and − softkeys and Confirm the change by pressing the ↵ softkey:

With this setting, the "Start req in AUTO" *LogicsManager* output becomes TRUE as soon as the remote request signal is enabled.

Press ↱ until you return to the start screen.

NOTE

The *LogicsManager* commands 2 and 3 may be used to configure additional conditions like discrete inputs, which must be energized to be able to issue the remote start request.

External Acknowledgement

Navigate to the "Configure automatic run" screen by pressing the following softkeys in this sequence:
Parameter -> Configuration -> Configure monitoring -> Miscellaneous

Navigate to the entry "Ext. acknowledge" by using the ↓ and ↑ softkeys and press ↵ to enter the "Ext. acknowledge" *LogicsManager* screen.

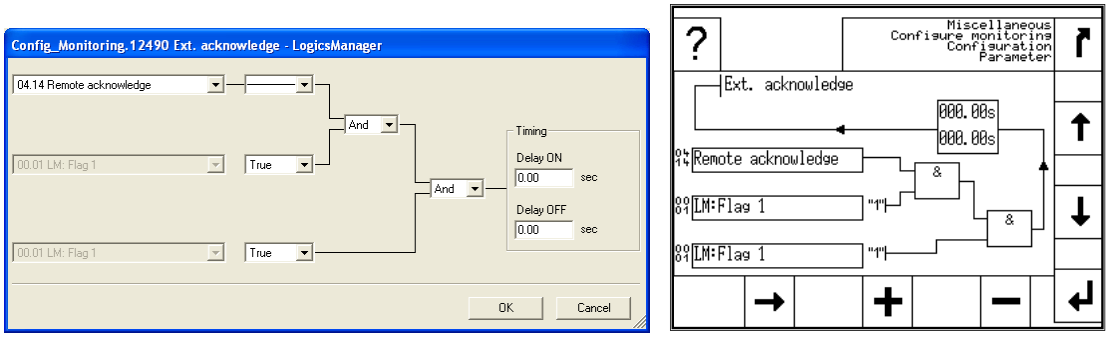


Figure 4-19: Example - remote acknowledgement

Configure the "Ext. acknowledge" *LogicsManager* function as above using the ↓ and ↑ as well as + and − softkeys and Confirm the change by pressing the ↵ softkey:

With this setting, the "Ext. acknowledge" *LogicsManager* output becomes TRUE as soon as the remote acknowledge signal is enabled.

NOTE

The *LogicsManager* commands 2 and 3 may be used to configure additional conditions like discrete inputs, which must be energized to be able to issue the remote acknowledge command.

Please refer to the Interface Manual 37418 for a description of how to configure the *LogicsManager* functions via Modbus.

NOTE

All interfaces access to the same bits. The command variable "04.13 Remote request" remains enabled in the easYgen until a new command is sent or the power supply failed or is removed.

Remote start: The command variable "04.13 Remote request" changes to "1" (high) if the start bit (ID 503, bit 0) changes from "0" to "1". The command variable "04.13 Remote request" changes to "0" (low) if the stop bit (ID 503, bit 1) changes from "0" to "1" (refer to Figure 4-20 on page 29).

Acknowledgement: The command variable "04.14 Remote acknowledge" reflects the acknowledgement bit (ID 503, bit 4).

An acknowledgement is generally performed twice:

- 1st change of the logical output "External acknowledge" from "0" to "1": Silence horn
- 2nd change of the logical output "External acknowledge" from "0" to "1": Acknowledges all inactive alarms

ATTENTION

The easYgen does NOT react on the disabling of the start bit, but only on the enabling of the stop bit. This has the advantage that it is not required to maintain the connection established for the whole time in case of a remote start.

The following figure shows the reaction of the command variable on the various changes of the bits:

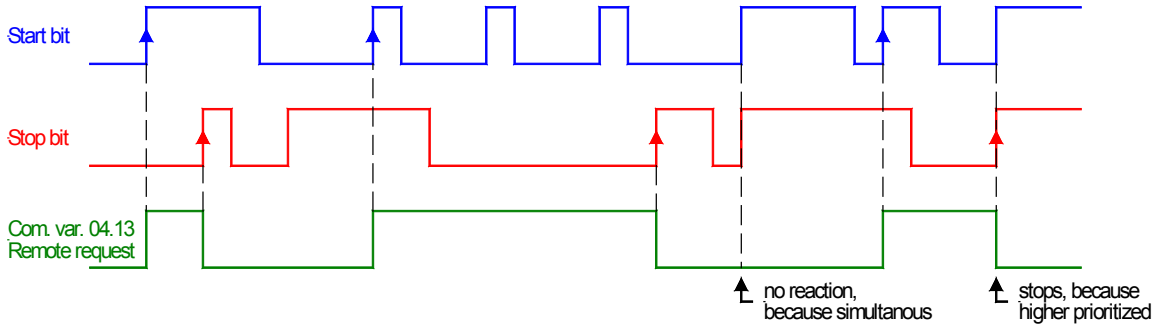


Figure 4-20: Example - command variable

Enabling the bits may be performed with several methods:

Bit Enabling via Modbus Protocol and RS-485 Interface

The parameter Modbus Slave ID must be configured. The control bits are sent on address 503 for a start via Modbus.

Bit 0 Start
Bit 1 Stop
Bit 4 Acknowledgement

Bits 2 and 3 must be "0" (for the watchdog).

Please refer to the Interface Manual 37418 for a description of how to enable control bits via Modbus.

Bit Enabling via CANopen Protocol and CAN Interface 1

Protocol CANopen: For further information refer to the interface manual 37418 and the CANopen file *.eds, which is delivered with the unit.

Please refer to the Interface Manual 37418 for a description of how to enable control bits via CAN bus.

Connecting an IKD 1 on CAN Bus 1

We recommend to connect external expansion boards, like the Woodward IKD 1 to CAN bus 2. This CAN bus offers preconfigured settings for operating several expansion boards including the IKD 1.

However, it is also possible to connect an IKD 1 to CAN bus 1. Proceed as follows for this.

easYgen Configuration

Refer to the easYgen-3000 Series Configuration Manual 37415 for the configuration of the unit and the parameters concerned. Refer also to the easYgen-3000 Series Interface Manual 37418 for a description of the data objects.
The easYgen may either be configured directly using the display screens or using the ToolKit software. The following screenshots show both options.

Transmit PDO

The easYgen must be configured for sending objects with the index 8001 (external DOs 1 to 8) and 3 x 8000 on CAN ID 181 (hex) every 20 ms on TPDO1. This is used to send messages to an external device. For this, TPDO1 must be configured as follows:

ID	Parameter	Value	Comment
9600	COB-ID	181 (hex) / 385 (dec)	The COB-ID is configured to 181 (hex) or 385 (dec)
9602	Transmission type	255	Data is automatically broadcasted (transmission type 255)
9604	Event timer	20ms	The event timer is configured to 20 ms
8962	Selected Data Protocol	65000	Data protocol 65000 is selected

Table 4-7: Configuration of TPDO1 for an IKD 1

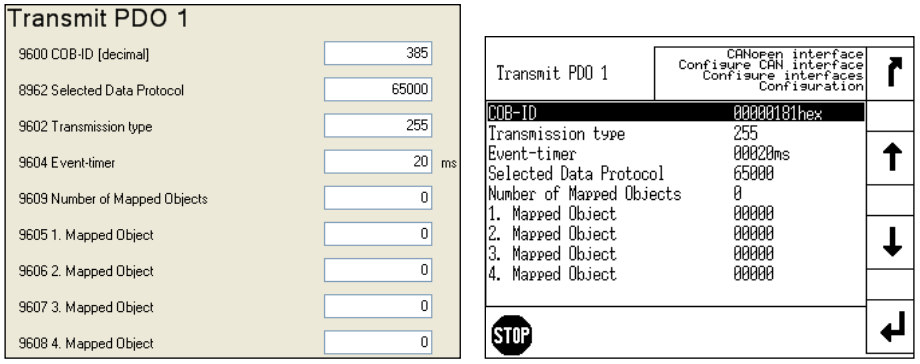


Figure 4-21: Configuration of TPDO1 for an IKD 1

Receive PDO

The easYgen must be configured for receiving data on an RPDO. The data received on CAN ID 201h is interpreted as object with the index 8011 (external DIs 1 to 8). For this, RPDO1 must be configured as follows:

ID	Parameter	Value	Comment
9300	COB-ID	201 (hex) / 513 (dec)	The COB-ID is configured to 201 (hex) or 513 (dec)
9121	Event timer	2000ms	The event timer is configured to 2000 ms
8970	Selected Data Protocol	65000	Data protocol 65000 is selected

Table 4-8: Configuration of RPDO1 for an IKD 1

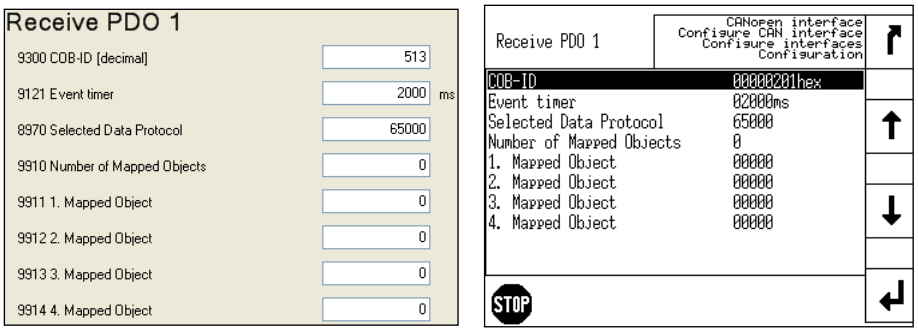


Figure 4-22: Configuration of RPDO1 for an IKD 1

IKD 1 Configuration

Refer to the IKD 1 Manual 37135 for the configuration of the unit and the parameters concerned. Please note that the DPC cable (P/N 5417-557) together with the LeoPC1 software is required to configure the IKD 1.

The IKD 1 must be configured as follows to communicate with an easYgen:

ID	Parameter	Value	Comment
-	CAN Node ID	0	The CAN node ID is configured to 0
-	CAN ID receive data	385 (dec)	The CAN ID for receive data is configured to 385 (dec)
-	CAN ID send data	513 (dec)	The CAN ID for send data is configured to 513 (dec)
-	Physical state only	Yes	Only the physical state of the IKD 1 inputs is evaluated

Table 4-9: Configuration of the IKD 1

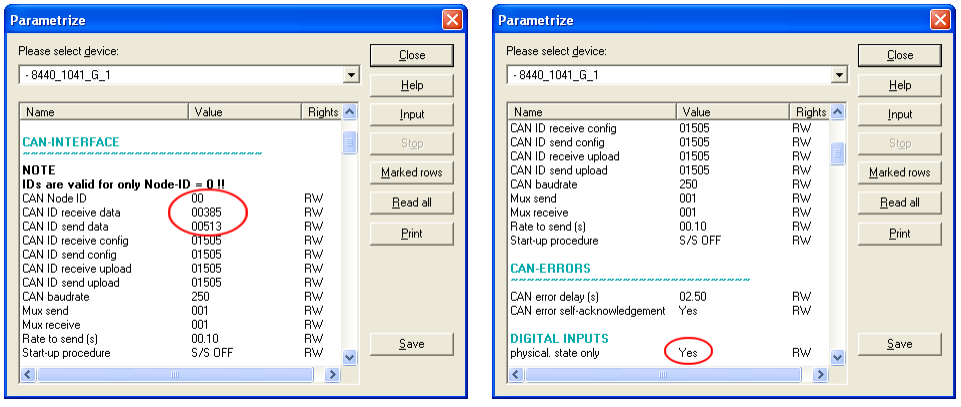


Figure 4-23: Configuration of the IKD 1

Baudrate Configuration

The baud rate must be configured identical in the easYgen and the IKD 1. The following example shows the configuration of both units to 250 kBd:

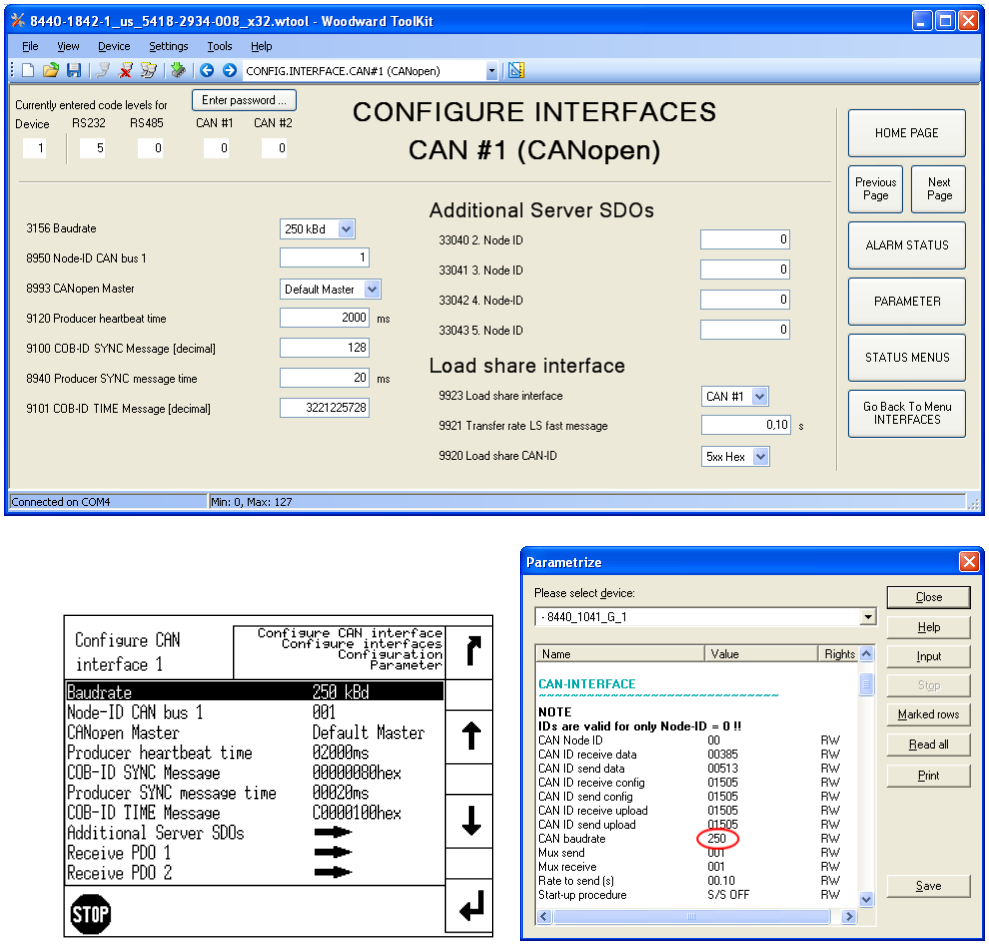


Figure 4-24: Configuration of the baud rate

Configuration for a Second IKD 1

If a second IKD 1 shall be connected to the easYgen, the following settings must be made to TPDO2 and RPDO2 in the easYgen:

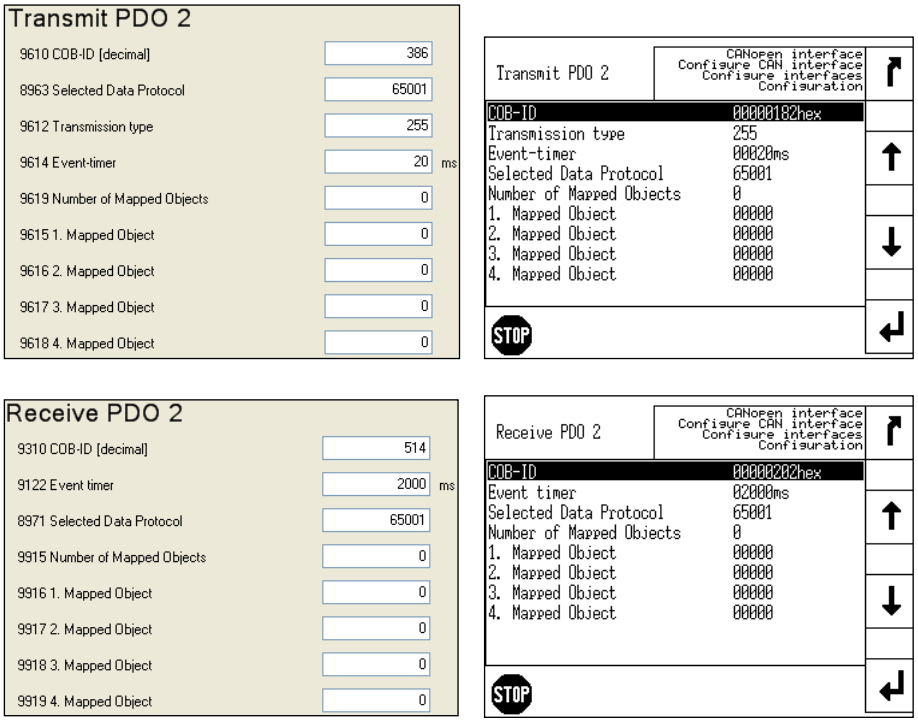


Figure 4-25: Configuration of the easYgen for a second IKD 1

The second IKD 1 must be configured as follows to communicate with an easYgen:

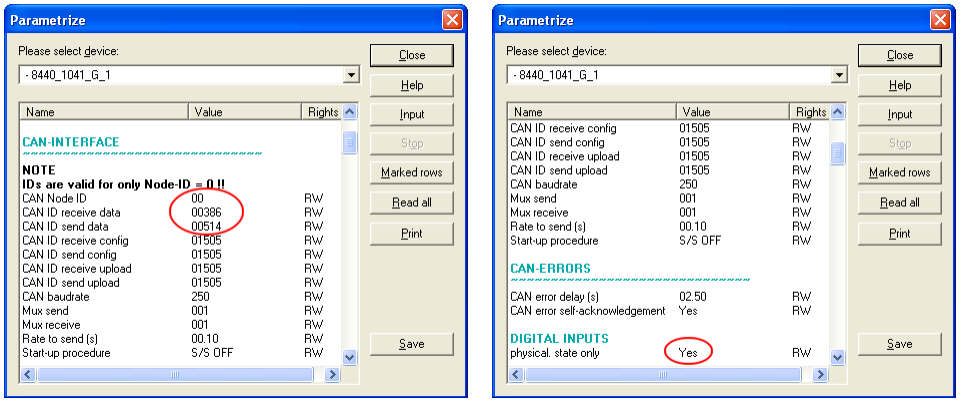


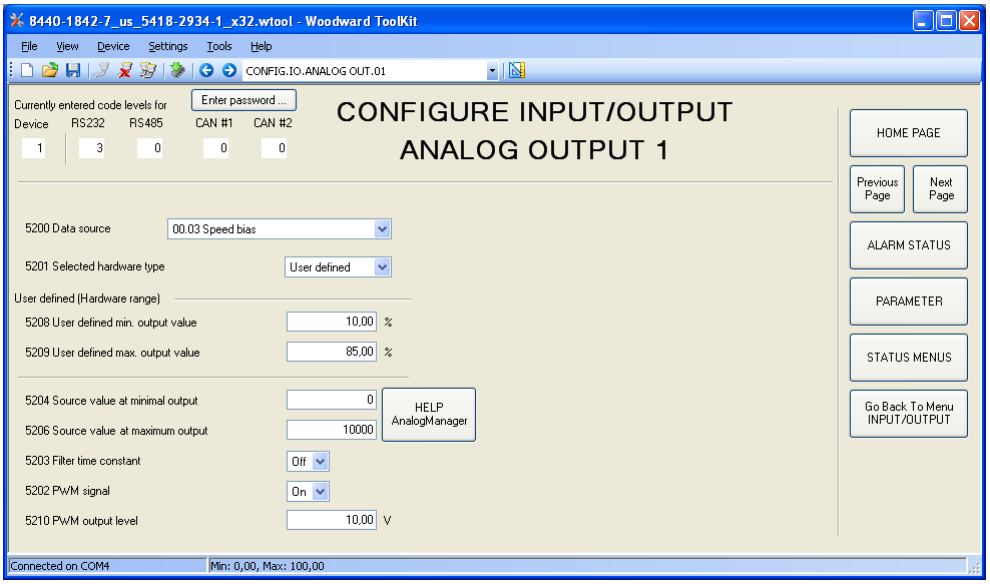
Figure 4-26: Configuration of the second IKD 1

Configuring a PWM Duty Cycle for a CAT ADEM Controller

If a PWM signal shall be used with a CAT ADEM speed controller, the duty cycle must be limited between 10% and 85%. For this, the following settings must be made to the respective analog output (the following parameter IDs and figures refer to analog output 1; however, another analog output may also be used):

ID	Parameter	Value	Comment
5200	Data source	[00.03] Speed bias	A speed signal will be output
5201	Selected hardware type	User defined	A user-defined hardware type will be used
5208	User defined min. output value	10.00%	The minimum output value of the user-defined hardware type is 10%
5209	User defined max. output value	85.00%	The minimum output value of the user-defined hardware type is 85%
5202	PWM signal	On	The PWM signal is enabled
5210	PWM output level	10.00V	The PWM output level is configured to 10 V

Table 4-10: Configuring a PWM duty cycle for a CAT ADEM controller



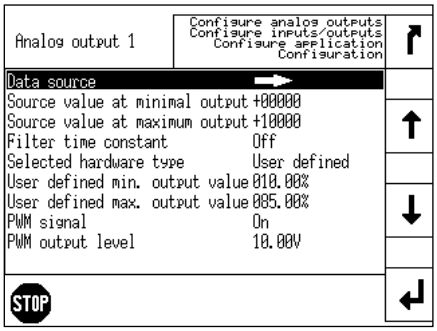


Figure 4-27: Configuring a PWM duty cycle for a CAT ADEM controller

Connecting a GSM Modem

Figure 4-28: Connecting a GSM modem

Function

It is possible to establish a cellular connection to the system using a GSM modem. This application is intended for mobile use. It is also interesting to trigger a call in case of an alarm with this application. The GSM modem provides a discrete input for this, which can trigger e.g. a short message (SMS) (depending on the network provider, it can also be possible to send a fax message).

Different actions can be performed 'online' using the ToolKit application software, which is delivered on the CD-ROM with the control. These actions include:

- Configuration
- Visualization
- Transfer settings to and from the hard drive

Preconditions for this Example

- easYgen-3000
- Straight serial cable for connecting the easYgen with the GSM modem
- Wireless modem INSYS GSM 4.2 with antenna (http://www.insys-tec.de)
- SIM card with data transfer enabled (to be enabled by the GSM provider)
- PC or notebook with Windows OS 2000, XP, or Vista with modem (we recommend to use the Windows standard driver for older modems (e.g. ELSA Microlink 56k) if the dedicated driver does not work)
- Application software ToolKit version 2.2 or higher
- Configuration files available (*.sid, *.wtool)
- FAX/SMS receiver for receiving alarm messages

NOTE

If a SIM card is used, which is enabled to send SMS messages, an SMS can be sent by the GSM modem. To establish a data connection, data transfer has to be enabled by the network provider.

NOTE

The INSYS GSM Modem 4.2 has two discrete inputs, which can be used to send two different alarm messages. One relay of the easYgen is required for each alarm message.

NOTE

The easYgen does not send AT commands to the connected modem. The dispatch of an alarm message is performed by the modem after energizing a discrete input.

If a different modem is used, this has to accept incoming calls automatically and establish a connection between calling PC and easYgen.

Connection

It is possible to issue an active call in case of a malfunction using a relay of the relay manager. Connect the easYgen and the modem with the power supply as directed.

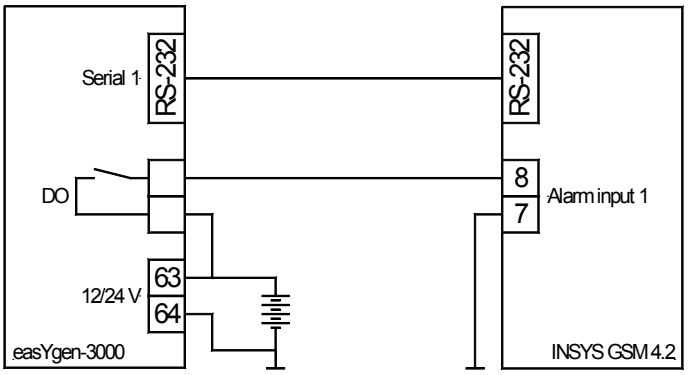


Figure 4-29: GSM modem connection

NOTE

Use the *straight* RS-232 cable delivered with the GSM modem for connecting the easYgen with the modem.

When commissioning the system, use a null modem cable to configure the easYgen via a PC with ToolKit.

easYgen Settings

Configure the following setting in the easYgen (refer to the Configuration Manual 37415) to connect to the modem for configuration purposes (the same settings must be configured in the modem):

ID	Parameter	Value	Comment
3163	Baudrate	9600 Bd	The baud rate is set to 9600 Baud
3161	Parity	No	The transmission protocol is configured without parity
3162	Stop bits	One	The transmission protocol is configured with one stop bit
7901	Enable ServLink protocol	Yes	The ServLink protocol is enabled

Table 4-11: Configuring the easYgen for GSM modem connection

NOTE

If the transmission quality of the phone line is poor, the baud rate should be lowered since no data flow control is performed between easYgen and modem.

Generally, the connection via modem is a bit slower than a direct connection of PC and easYgen.

Configure the relay(s) connected with the modem using the easYgen *LogicsManager* (refer to the Configuration Manual 37415).

ToolKit Settings

In ToolKit, select Connect… from the Device menu to open the Communications window. Select the modem (this must be installed and configured under Windows) from the network list, enter the phone number and click the Connect button to establish a connection with the modem.

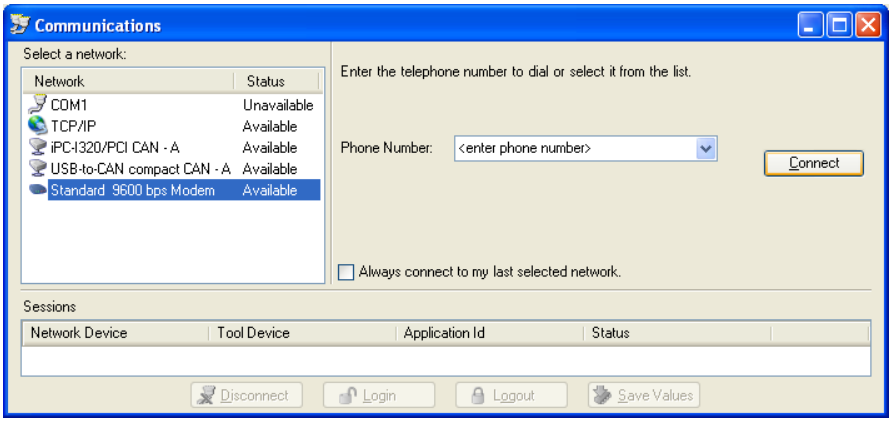


Figure 4-30: Connecting ToolKit with a GSM modem

GSM Modem Settings

INSYS Microelectronics provides the application software HS-COMM to configure the GSM modem for the application. Refer to the operation manual of the modem for detailed information.
The following settings show an example for sending an alarm message as a short message.
Descriptions of the individual parameters can be taken from the operation manual of the modem.

Settings Using the Configuration Software

Make the following settings on the Basic Settings tab. These settings configure the modem to accept an incoming call for remote configuration. The phone number and text can be configured as required.

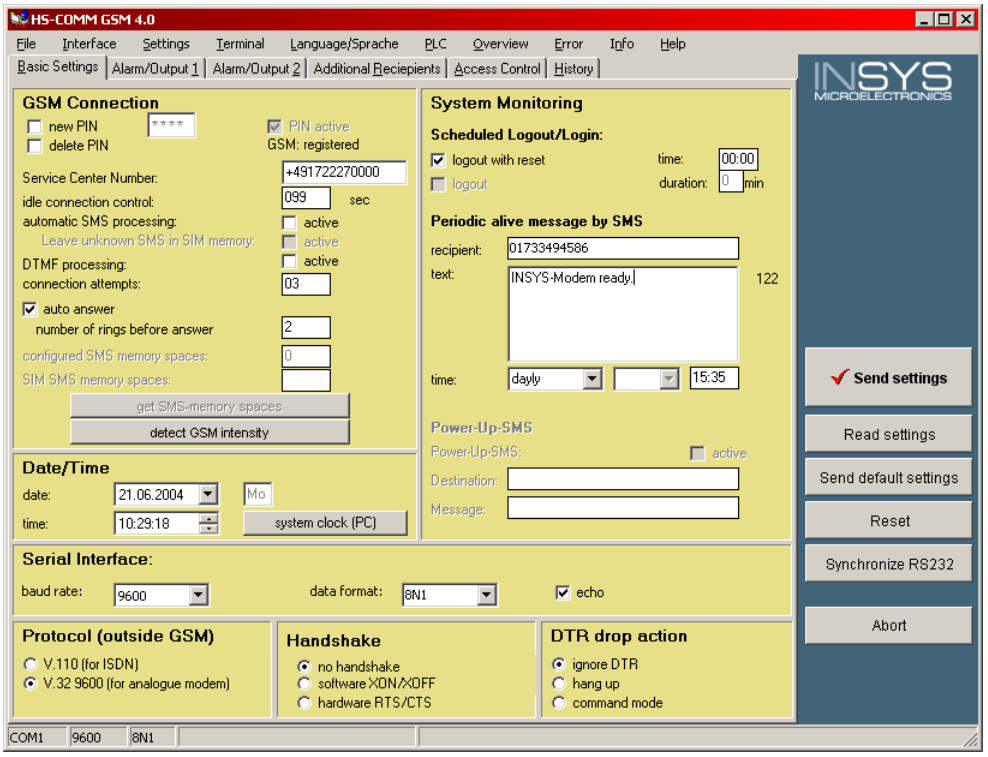


Figure 4-31: Configuring the GSM modem software

Make the following settings on the Alarm/Output 1 tab. The phone number and the text can be set as required.

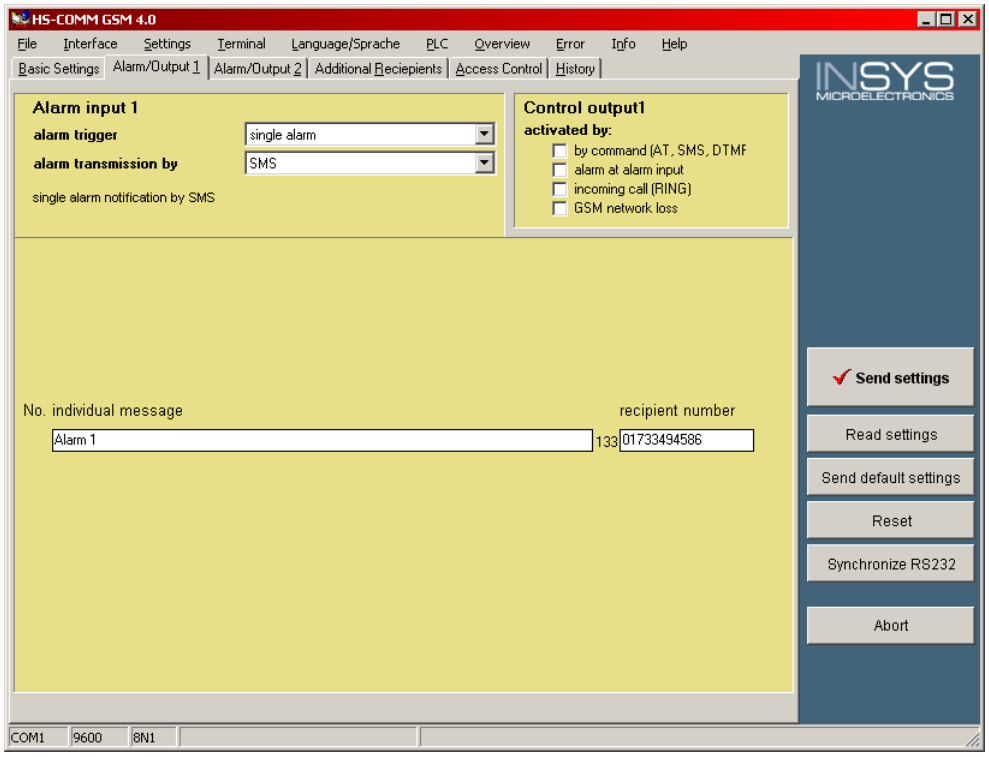


Figure 4-32: Configuring alarm input 1 in the GSM modem software

Make the following settings on the Alarm/Output 2 tab. The phone number and the text can be set as required.

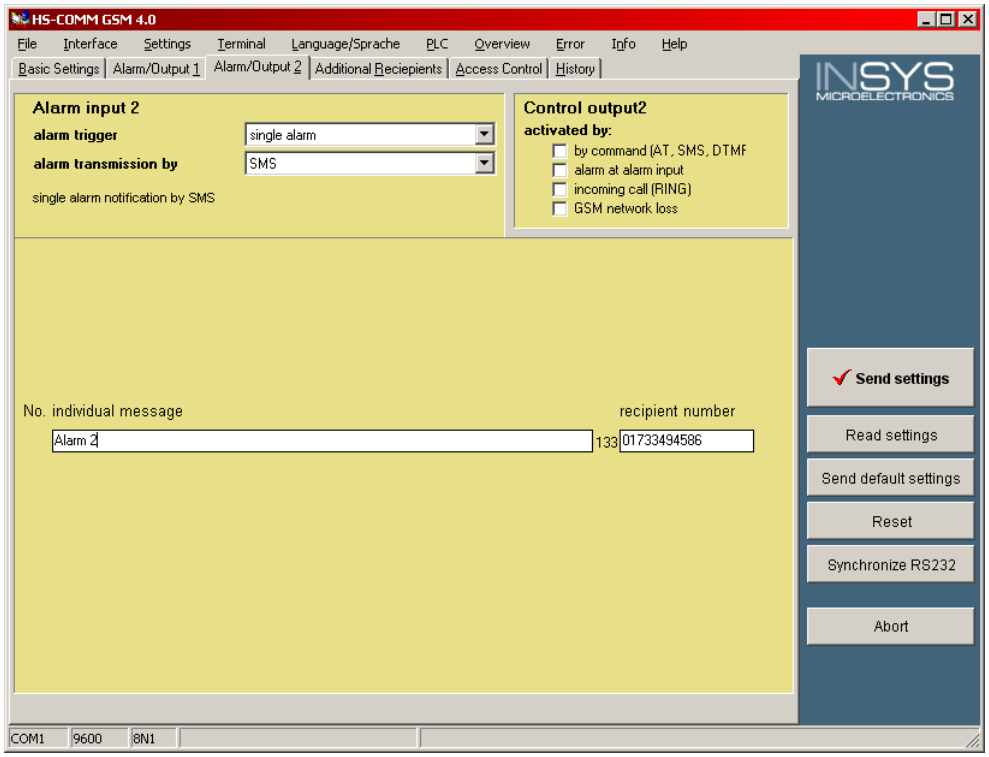


Figure 4-33: Configuring alarm input 2 in the GSM modem software

Connecting a Landline Modem

Figure 4-34: Connecting a landline modem

Function

It is possible to establish a phone connection to the system using a modem. This application is intended for stationary use, where a steady remote control is required.
It is also interesting to trigger a call in case of an alarm with this application. The Phoenix modem provides a discrete input for this, which can trigger e.g. a call or a fax message.

Different actions can be performed 'online' using the ToolKit application software, which is delivered on the CD-ROM with the control. These actions include:

- Configuration
- Visualization
- Transfer settings to and from the hard drive

Preconditions for this Example

- easYgen-3000
- Straight serial cable for connecting the easYgen with the modem
- Phoenix PSI data/fax modem/RS232 (www.phoenixcontact.com)
- PC or notebook with Windows OS 2000, XP, or Vista with modem (we recommend to use the Windows standard driver for older modems (e.g. ELSA Microlink 56k) if the dedicated driver does not work)
- Application software ToolKit version 2.2 or higher
- Configuration files available (*.sid, *.wtool)
- FAX/SMS receiver for receiving alarm messages

NOTE

Sending an SMS via the fixed-network line may be enabled by the network provider.

NOTE

The Phoenix PSI-Data/Fax-Modem/RS232 has one discrete input, which can be used to send an alarm message. One relay of the easYgen is required for the alarm message. It is also possible to use the switch output of the modem to operate a discrete input of the easYgen, for example for a remote start.

NOTE

The easYgen does not send AT commands to the connected modem. The dispatch of an alarm message is performed by the modem after energizing a discrete input.

If a different modem is used, this has to accept incoming calls automatically and establish a connection between calling PC and easYgen.

Connection

It is possible to issue an active call in case of a malfunction using a relay of the relay manager. Connect the easYgen and the modem with the power supply as directed.

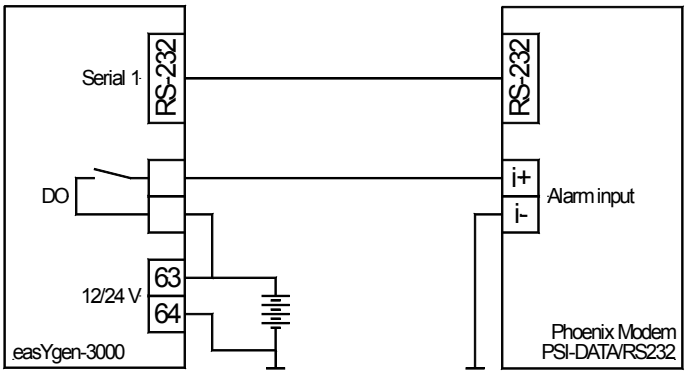


Figure 4-35: Landline modem connection

NOTE

Use a *straight* RS-232 cable (not delivered with the modem) for connecting the easYgen with the modem.

When commissioning the system, use a null modem cable to configure the easYgen via a PC with ToolKit.

easYgen Settings

Configure the following setting in the easYgen (refer to the Configuration Manual 37415) to connect to the modem for configuration purposes (the same settings must be configured in the modem):

ID	Parameter	Value	Comment
3163	Baudrate	4800 Bd	The baud rate is set to 4800 Baud
3161	Parity	No	The transmission protocol is configured without parity
3162	Stop bits	One	The transmission protocol is configured with one stop bit
7901	Enable ServLink protocol	Yes	The ServLink protocol is enabled

Table 4-12: Configuring the easYgen for landline modem connection

NOTE

If the transmission quality of the phone line is poor, the baud rate should be lowered since no data flow control is performed between easYgen and modem.

Generally, the connection via modem is a bit slower than a direct connection of PC and easYgen.

The maximum baud rate depends on the used modem. The easYgen supports the following baud rates: 2400, 4800, 9600, 14400, 19200, 38400, 65000, and 11500 Bauds.

Configure the relay(s) connected with the modem using the easYgen *LogicsManager* (refer to the Configuration Manual 37415).

ToolKit Settings

In ToolKit, select Connect… from the Device menu to open the Communications window. Select the modem (this must be installed and configured under Windows) from the network list, enter the phone number and click the Connect button to establish a connection with the modem.

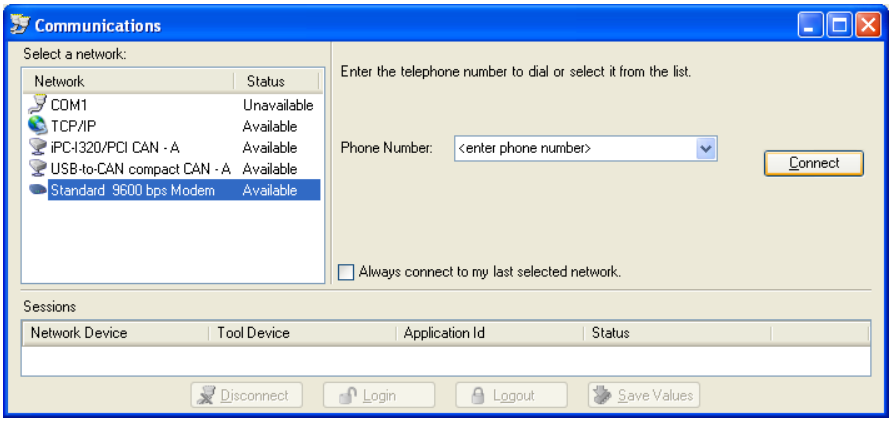


Figure 4-36: Connecting ToolKit with a landline modem

Phoenix Modem Settings

The settings refer to an example for sending an alarm message via fax.
Descriptions of the individual parameters can be taken from the operation manual of the modem.

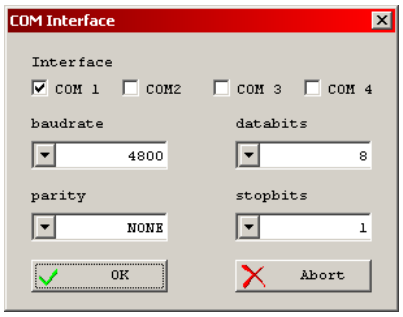
DIP Switches

All DIP switches are set to OFF (default state).

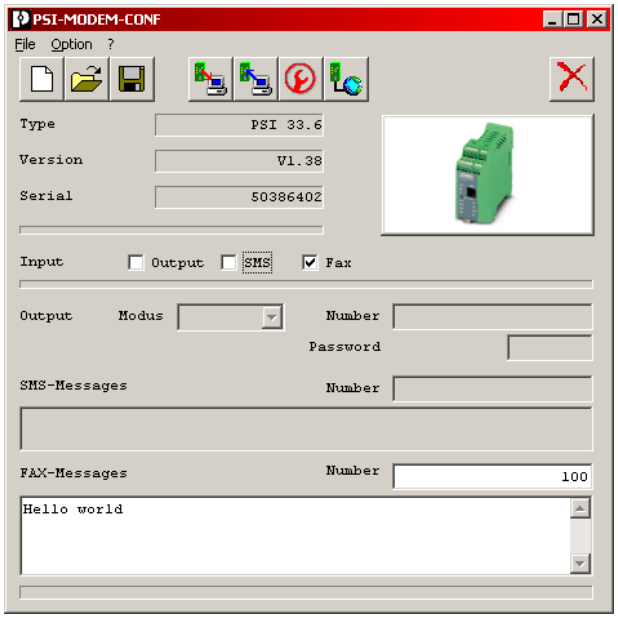
Settings using the configuration software

Phoenix provides an application software to configure the modem for the application. Refer to the operation manual of the device for detailed information.
The following settings form an example for sending an alarm message via fax.
Descriptions of the individual parameters can be taken from the operation manual of the modem.

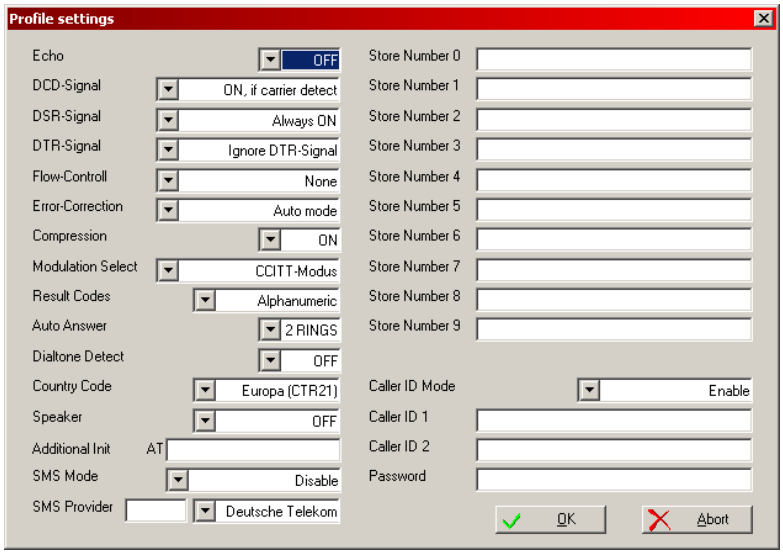
To configure the modem, proceed as follows.



Configure the COM port



The phone number and the text can be set as required.



These settings configure the modem to accept an incoming call for remote configuration.

Wiring Self-Powered DIs

In order to create self-powered discrete inputs, it is required to connect battery negative (B-) to ground and PE (terminal 61). Moreover, DI common (terminal 66) must be connected to Power supply 12/24 V (terminal 63, minimum wire size 0.5 mm² (20 AWG)).
Now, it is possible to energize the discrete inputs against ground.

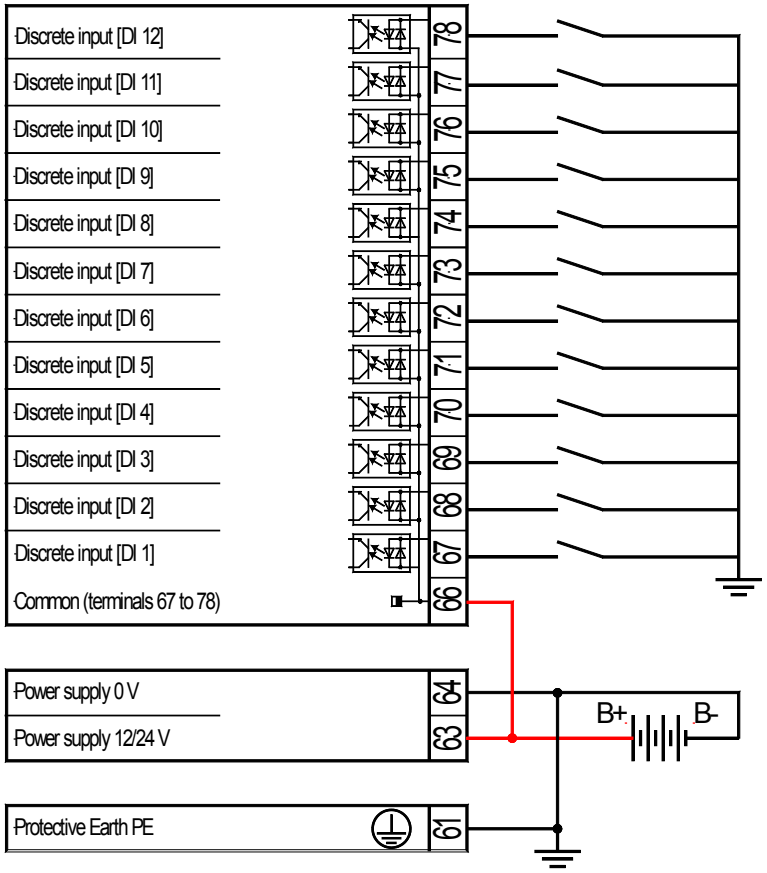


Figure 4-37: Wiring self-powered DIs

Connecting Analog Inputs in Series (Multiple Devices)

The analog inputs of the easYgen-3000 Series are galvanically isolated. This enables a series connection for up to 3 analog inputs. This connection allows for example to share a power setpoint for up to 3 devices.

The example shows the terminal numbers for the analog input #3, but in principle it works for all analog inputs which support a 0-20 mA signal.

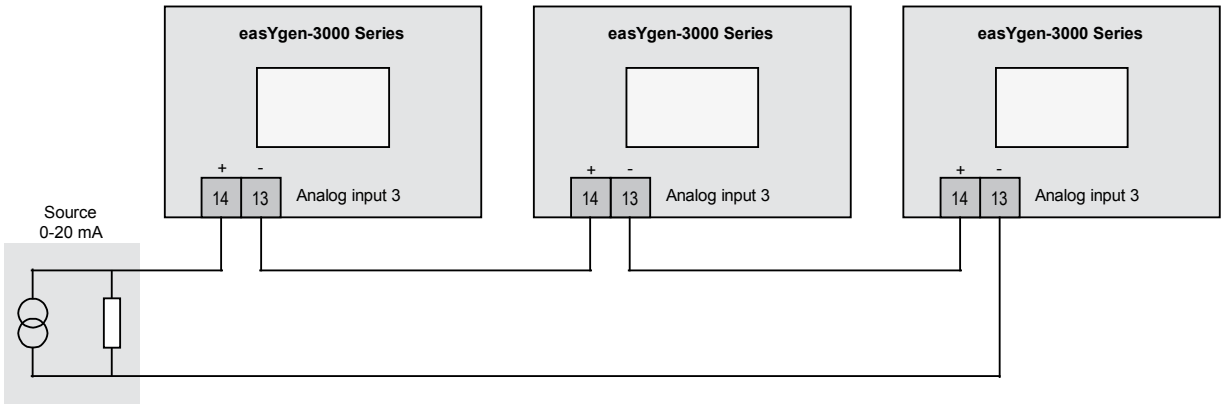


Figure 4-38: Example – connecting analog inputs in series

Phoenix Expansion Modules

Supported Phoenix Modules

Bus coupler	Discrete outputs	Discrete inputs	Analog outputs	Analog inputs
IL CAN BK	IB IL 24 DO 2	IB IL 24 DI 2	IB IL AO 2/SF	IB IL AI 2/SF
	IB IL 24 DO 8	IB IL 24 DI 4		IB IL TEMP 2 UTH
	IB IL 24 DO 16	IB IL 24 DI 8		IB IL TEMP 2 RTD
	IB IL 24 DO 32	IB IL 24 DI 16		
	IB IL 24/230 DOR4/W	IB IL 24 DI 32		

Table 4-13: Supported Phoenix Modules

Possible Combinations

The possible combinations of Phoenix modules are listed below. The parameters display the maximum extension. It is also possible to connect fewer modules. For example choose parameter ID 9941 (12AI 4AO) for connecting 10 AI and 1 AO. It is possible to use multiple Phoenix modules with one bus coupler. Each single value in the marked screenshot can be handled by one bus coupler.

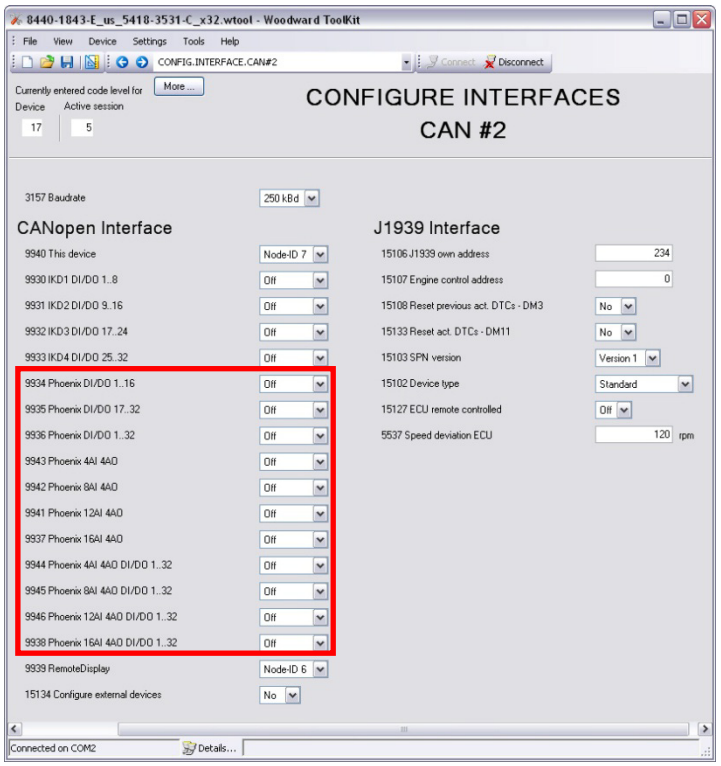


Figure 4-39: Configuring the Phoenix modules

	Phoenix Di/DO 1..16	Phoenix Di/DO 17..32	Phoenix Di/DO 1..32	Phoenix 4AI 4AO	Phoenix 8AI 4AO	Phoenix 12AI 4AO	Phoenix 16AI 4AO	Phoenix 4AI 4AO DI/DO 1..32	Phoenix 8AI 4AO DI/DO 1..32	Phoenix 12AI 4AO DI/DO 1..32	Phoenix 16AI 4AO DI/DO 1..32
Phoenix Di/DO 1..16		x		x	x	x	x				
Phoenix Di/DO 17..32	x			x	x	x	x				
Phoenix Di/DO 1..32				x	x	x	x				
Phoenix 4AI 4AO	x	x	x								
Phoenix 8AI 4AO	x	x	x								
Phoenix 12AI 4AO	x	x	x								
Phoenix 16AI 4AO	x	x	x								
Phoenix 4AI 4AO DI/DO 1..32											
Phoenix 8AI 4AO DI/DO 1..32											
Phoenix 12AI 4AO DI/DO 1..32											
Phoenix 16AI 4AO DI/DO 1..32											

Table 4-14: Possible combinations of Phoenix modules

NOTE

There is a maximum of three bus couplers on the CAN bus. There is also a maximum of 16AI 4AO DI/DO 1..32, which must not exceeded in all possible combinations.

Setup

Baud rate

Set the Baud rate of CAN #2 in the easYgen and the Phoenix module to the same value. All members on the CAN bus need to have the same baud rate.

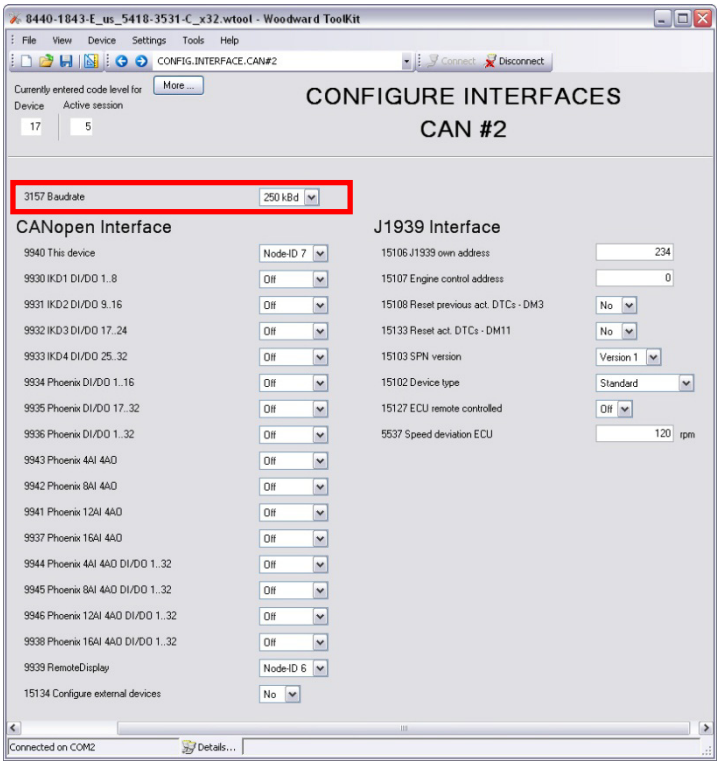


Figure 4-40: Configuring the interface baud rate

Each bus coupler has 10 DIP switches. These switches are located on the left side of the CANopen bus coupler. DIP switches 1 through 7 are used to set the node address and DIP switches 8 to 10 are used to set the baud rate.

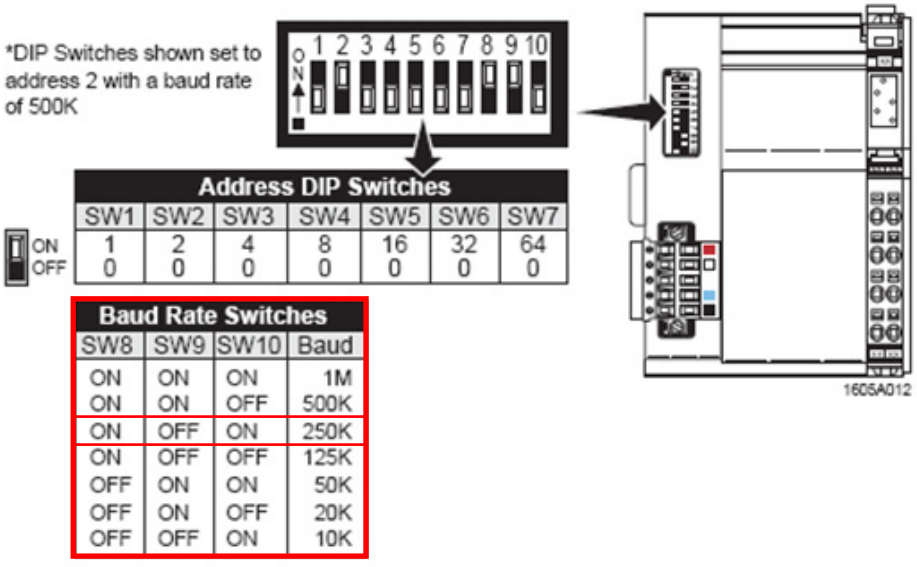


Figure 4-41: Set the Phoenix baud rate

Set the Node-ID

Set the Node-ID for the configuration you are using.

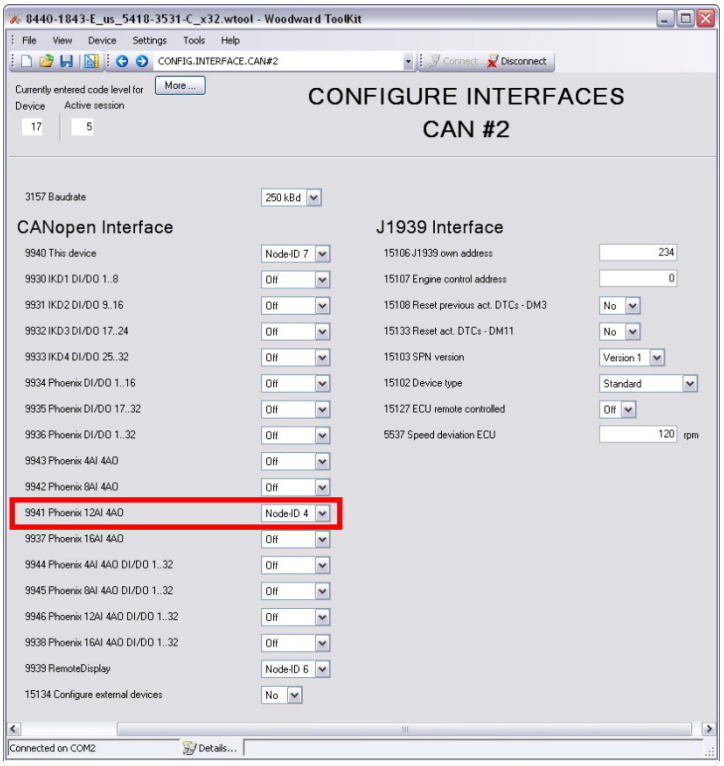


Figure 4-42: Enter the Phoenix Node-ID

The node address is set using DIP switches 1 through 7. DIP switch 1 is the least significant digit of the node address and DIP switch 7 is the most. Valid node address settings range from 1 to 127. Note that the UL power will need to be cycled in order to implement any changes to the node address. Node address 0 is reserved, and used to auto-configure the I/O attached to the module. The unit will not go online at address 0.

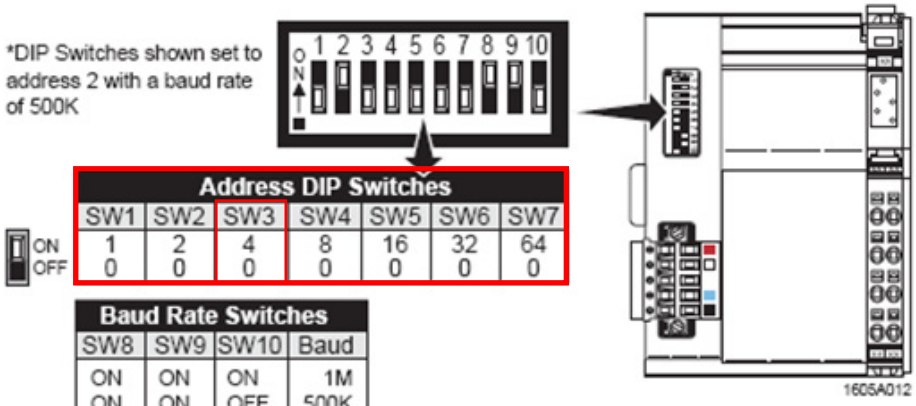


Figure 4-43: Set the Phoenix Node-ID

Confirm Your Changes

Initialize the startup routine in the phoenix device. Set parameter ID 15134 "Configure external devices" to "yes" to confirm your changes in the easYgen.

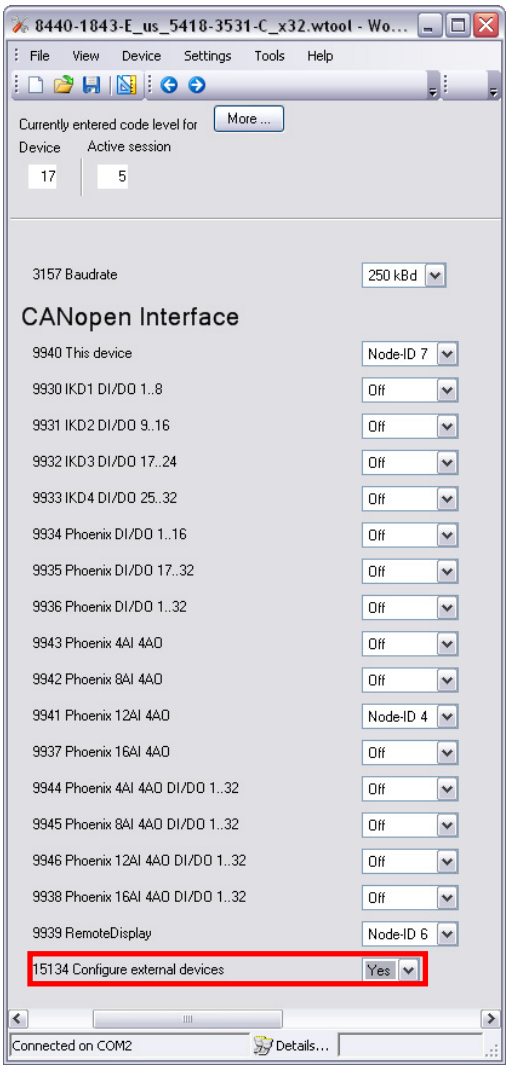


Figure 4-44: Confirming your changes

Configure External Inputs/Outputs

Configure External DI

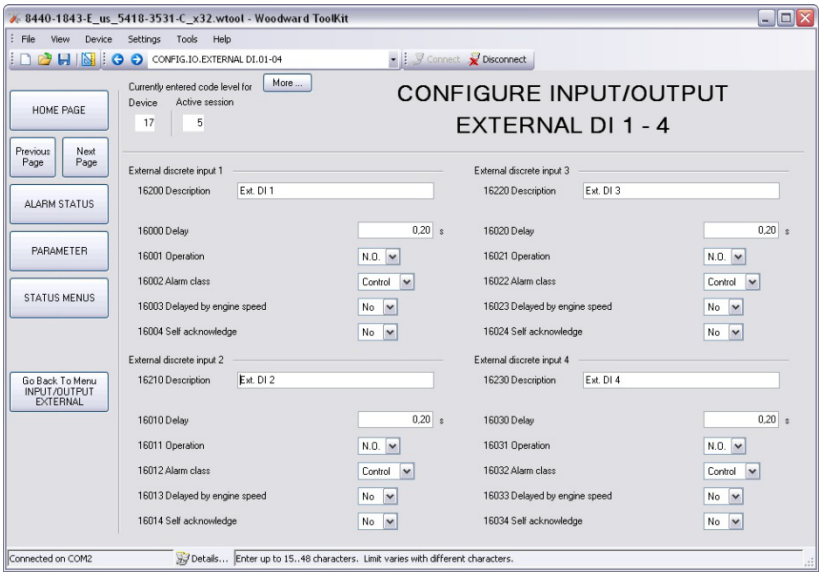


Figure 4-45: Configure external DI

Configure External DO

Click "Edit" Button to enter the *LogicsManager*.

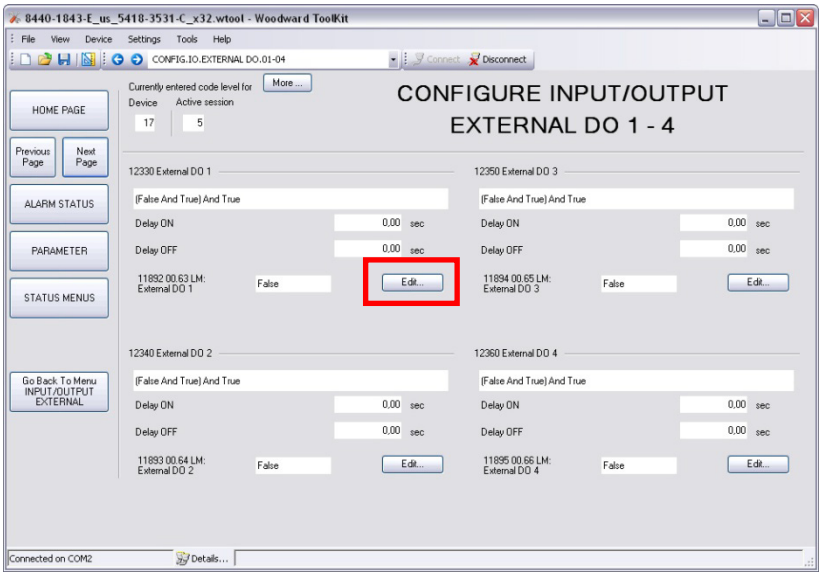


Figure 4-46: Configure external DO

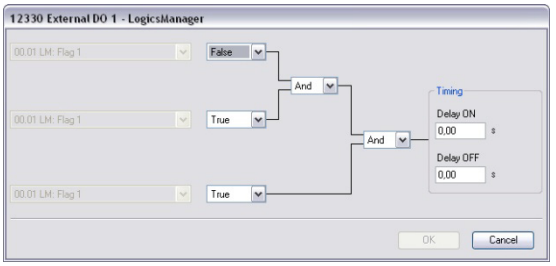


Figure 4-47: Configure the input condition

Configure External AI

For getting an analog input to work, there are 3 major settings to adjust. The parameter numbers are examples for the first analog input, they are different for the second one.

- Parameter ID 5851 "Type" defines the characteristic curve of the sensor.
- Parameter ID 5856 "Sender Type" defines the sensor hardware (be sure that this value matches with the wired and connected extension board).
- Parameter ID 5859 "Sender connection type" defines the wiring of the sensor.

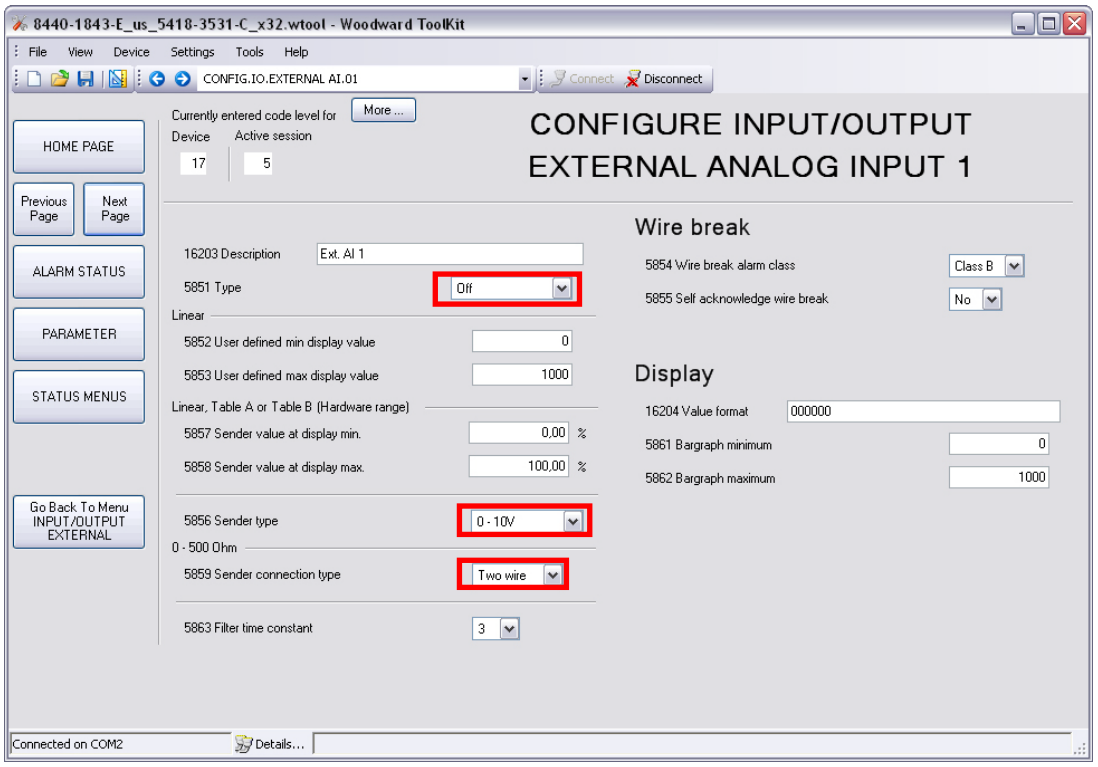


Figure 4-48: Configure external AI

The following table shows the possible configuration combination of the "Type" settings (parameter ID 5851) and the "Sender type" setting (parameter ID 5856).

Parameter Type	Sender Type	0 - 10V	±10V	0 - 20mA	±20mA	4 - 20mA	0 - 400 Ohm	0 - 4000 Ohm	Thermocouple	R0=100	R0=10	R0=20	R0=30	R0=50	R0=120	R0=150	R0=200	R0=240	R0=300	R0=400	R0=500	R0=1000	R0=1500	R0=2000	R0=3000
OFF																									
Linear		X	X	X	X	X	X	X	X																
Table A		X	X	X	X	X	X	X	X																
Table B		X	X	X	X	X	X	X	X																
Thermo couple type K									X																
Thermo couple type J									X																
Thermo couple type E									X																
Thermo couple type R									X																
Thermo couple type S									X																
Thermo couple type T									X																
Thermo couple type B									X																
Thermo couple type N									X																
Thermo couple type U									X																
Thermo couple type L									X																
Thermo couple type C									X																
Thermo couple type W									X																
Thermo couple type HK									X																
Pt DIN(R0)										X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pt SAMA(R0)										X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ni DIN(R0)										X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ni SAMA(R0)										X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cu10																									
Cu50																									
Cu53																									
Ni 1000(Landis)																									
Ni 500(Viessm.)																									
KTY 81-110																									
KTY 84																									

Configuration of sender type is not used
NOT ALLOWED
RIGHT CONFIGURATION

Table 4-15: Supported sender types

Configure External AO

By clicking the "Help" button, you get further information and examples regarding the format you need to choose. For a detailed description of all parameters see the configuration manual.

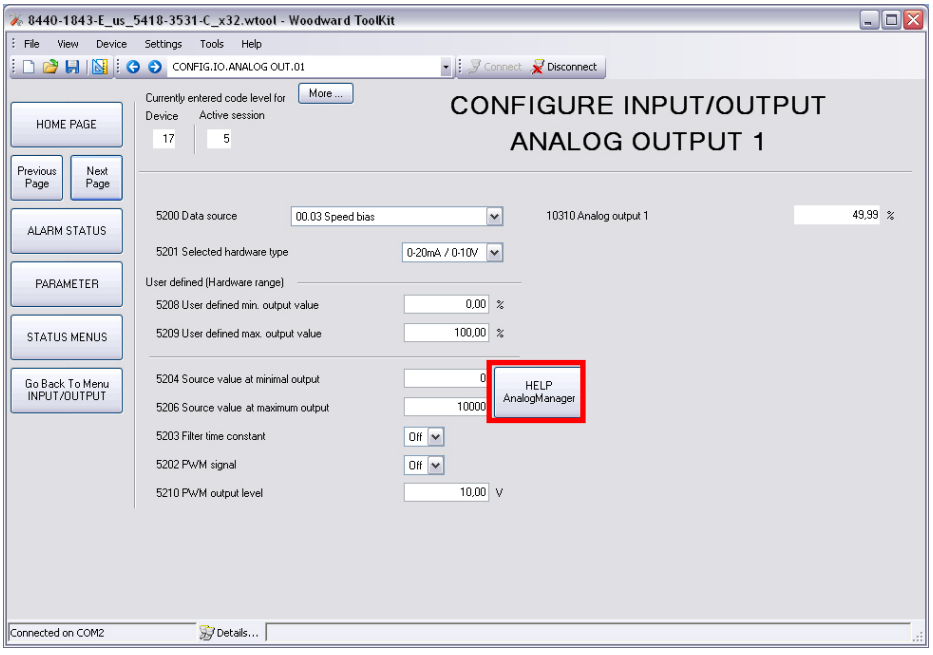


Figure 4-49: Example - configure AO 1

Confirm Your Changes

Set parameter ID 15134 "Configure external devices" to "yes" to confirm your changes in the easYgen.

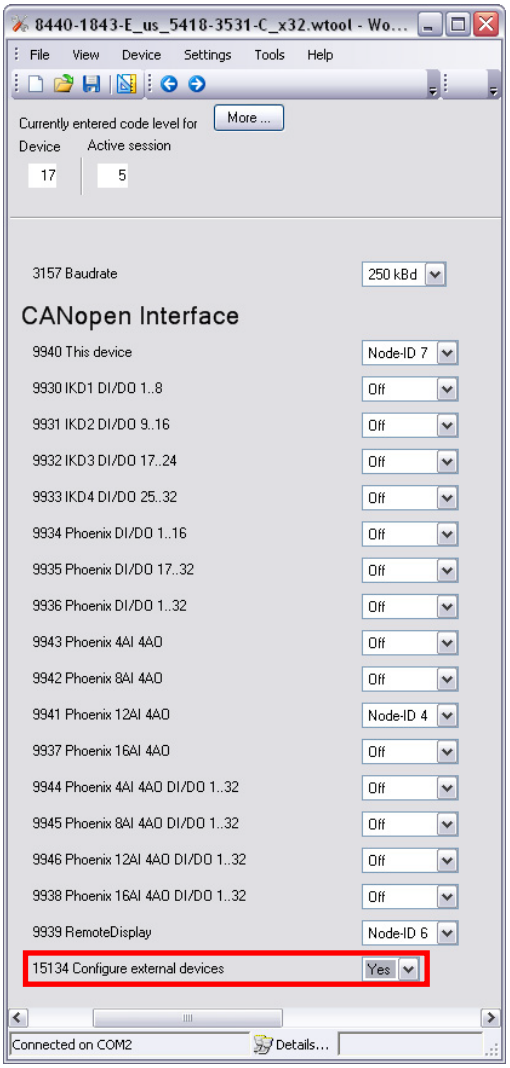


Figure 4-50: Confirming your changes

Chapter 5.
Examples for Load Sharing Applications

General Information

The following examples show different suggested configurations for load sharing applications. The number of gensets in a load sharing application is limited by the maximum CAN bus load. The CAN bus load again depends on the number of messages sent on the bus, i.e. the number of connected peripheral devices. We have tested the maximum number of gensets for the following common configurations.

It is not important for the following configurations whether Woodward IKD 1 or Phoenix expansion boards are used for the discrete I/Os, the bus load remains the same.

Any combination of Phoenix expansion boards of the Inline Modular (IL) series and Woodward IKD 1 DI/DO expansion boards is possible with the following restrictions:

- The total number of inputs and outputs must not exceed:
  - 32 discrete inputs
  - 32 discrete outputs
  - 16 analog inputs
  - 4 analog outputs
- A maximum of three CANopen bus couplers IL CAN BK-TC-PAC (Phoenix order no. 2718701) can be used
- Not all IKD 1 / Phoenix DI/O combinations are possible; Table 5-1 shows some possible combinations (the Phoenix DI/Os may be composed of any combinations of terminal blocks with 2, 4, 8, 16, or 32 inputs/outputs):

DIs 1 to 8	DIs 9 to 16	DIs 17 to 24	DIs 25 to 32
IKD 1 #1	IKD 1 #2	IKD 1 #3	IKD 1 #4
IKD 1 #1	IKD 1 #2	16 Phoenix DI/Os	
4 Phoenix DI/Os		IKD 1 #3	-
IKD 1 #1	-	8 Phoenix DI/Os	
IKD 1 #1	-	IKD 1 #3	-
16 Phoenix DI/Os		16 Phoenix DI/Os	
-	-	IKD 1 #3	IKD 1 #4

Table 5-1: IKD 1 - Possible Phoenix usage combinations

- Only the following Phoenix analog input terminal blocks may be used:
  - IB IL AI 2/SF-PAC (Phoenix order no. 2861302) for connecting 2 analog sources (0-20 mA, 4-20 mA, ±20 mA, 0-10 V, ±10 V)
  - IB IL TEMP 2 UTH-PAC (Phoenix order no. 2861386) for connecting 2 thermocouples
  - IB IL TEMP 2 RTD-PAC (Phoenix order no. 2861328) for connecting 2 RTDs
- Only the following Phoenix analog output terminal block may be used:
  - IB IL AO 2/SF-PAC (Phoenix order no. 2863083) for 2 analog outputs (0-20 mA, 4-20 mA, 0-10 V)
- The J1939 analog inputs have been tested with Axiomatic analog input modules

NOTE

The instructions in the Phoenix Contact manuals must be observed.

TPDOs may be used to transmit signals of an external board, which is connected to CAN bus 2, on CAN bus 1.

Example Configuration 1 (4 x easYgen-3100)

Max. 4 Gensets

CAN #1:
- ToolKit
- PLC

CAN #2:
- Maximum engine bus load
- Remote panel

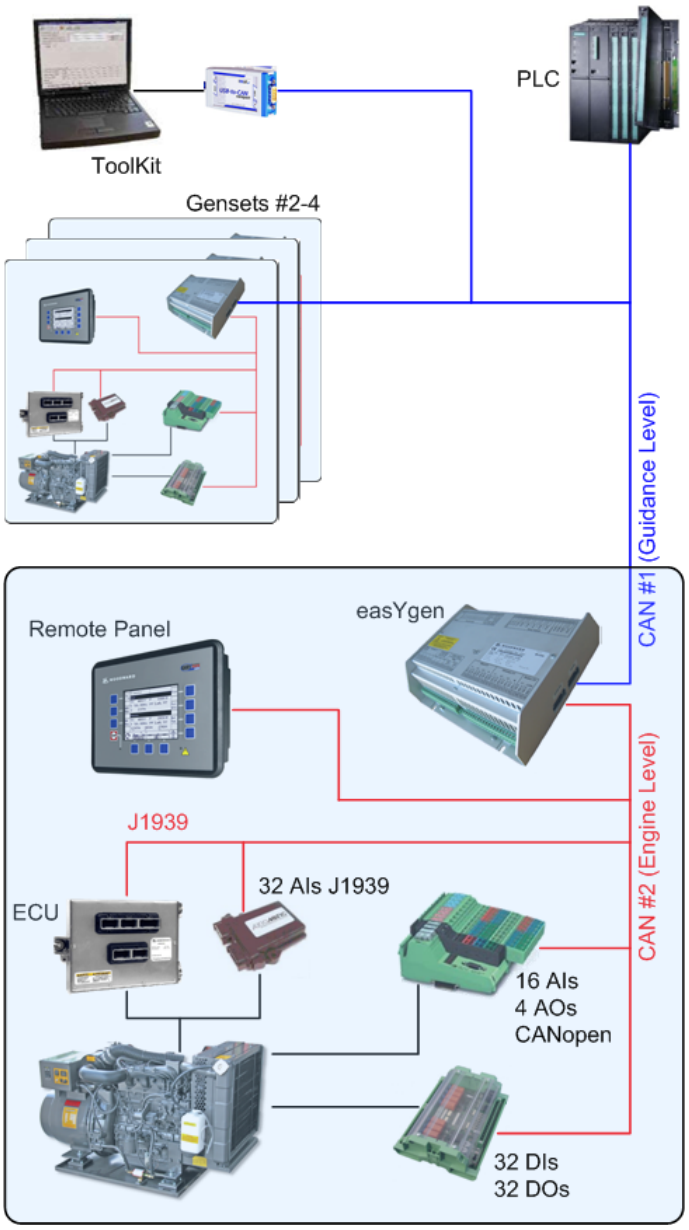


Figure 5-1: Example configuration 1

Example Configuration 2 (4 x easYgen-3100)

Max. 4 Gensets

CAN #1:
- ToolKit

CAN #2:
- Maximum engine bus load
- Remote panel

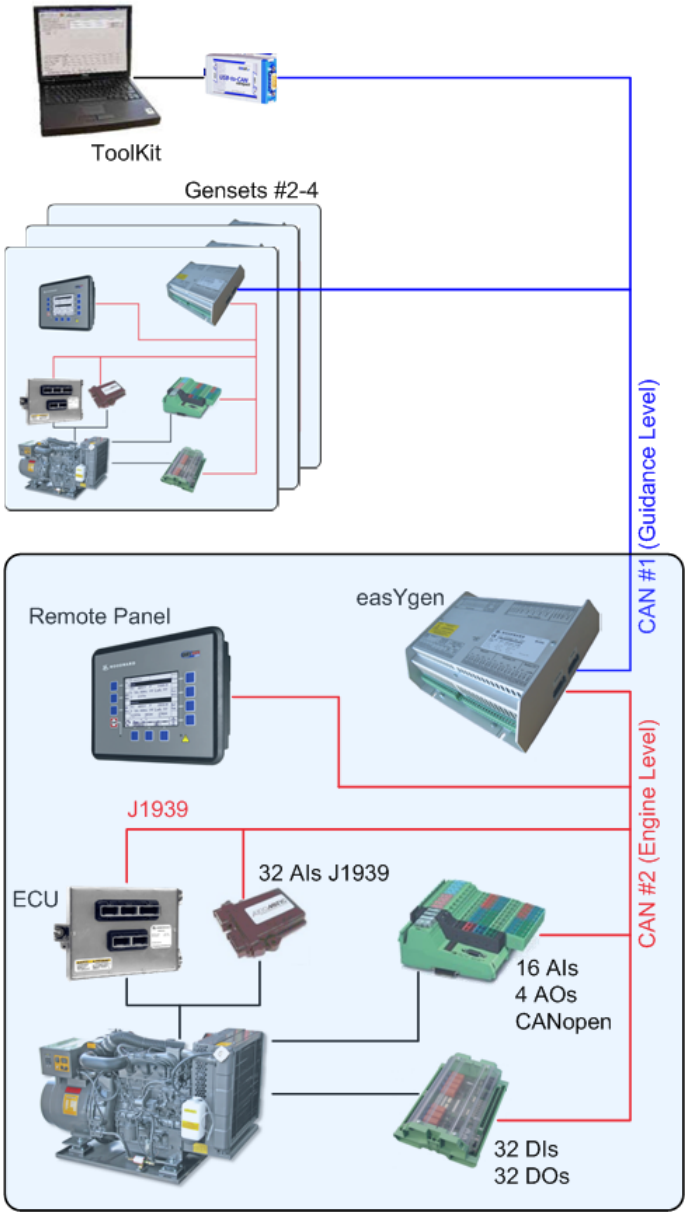


Figure 5-2: Example configuration 2

Example Configuration 3 (4 x easYgen-3200)

Max. 4 Gensets

CAN #1:
- ToolKit
- PLC

CAN #2:
- Maximum engine bus load

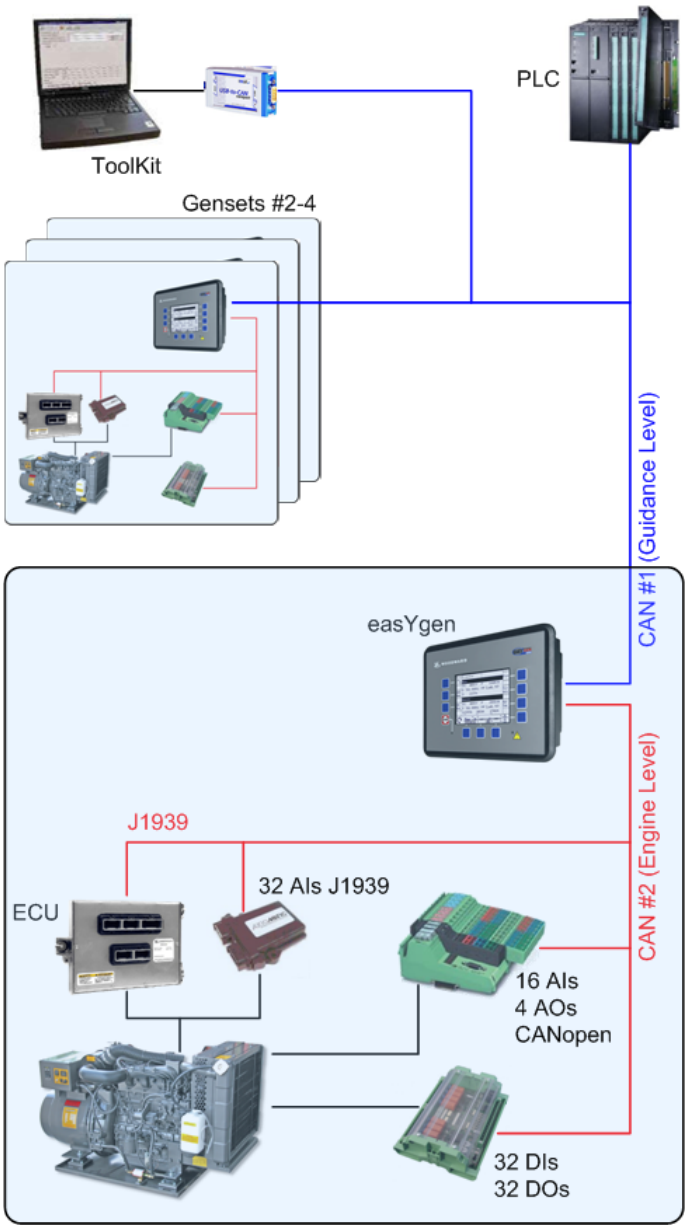


Figure 5-3: Example configuration 3

Example Configuration 4 (8 x easYgen-3200)

Max. 8 Gensets

CAN #1:
- PLC

CAN #2:
- Maximum engine bus load
- ToolKit

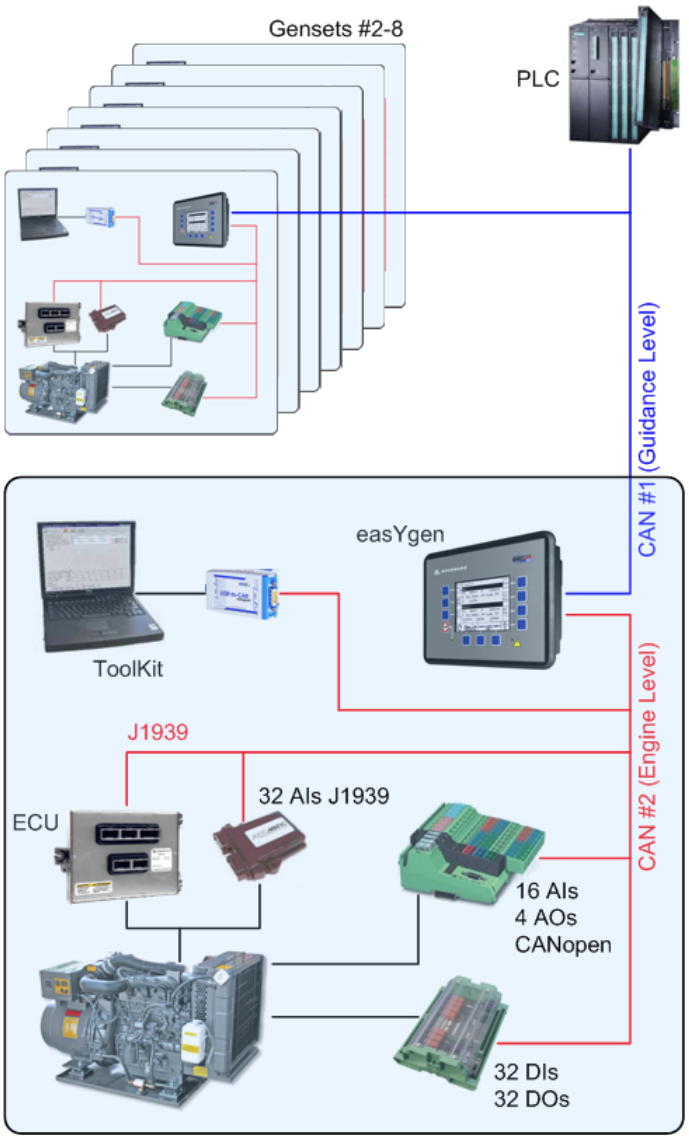


Figure 5-4: Example configuration 4

Example Configuration 5 (10 x easYgen-3200)

Max. 10 Gensets

CAN #1:
- PLC

CAN #2:
- Maximum engine bus load

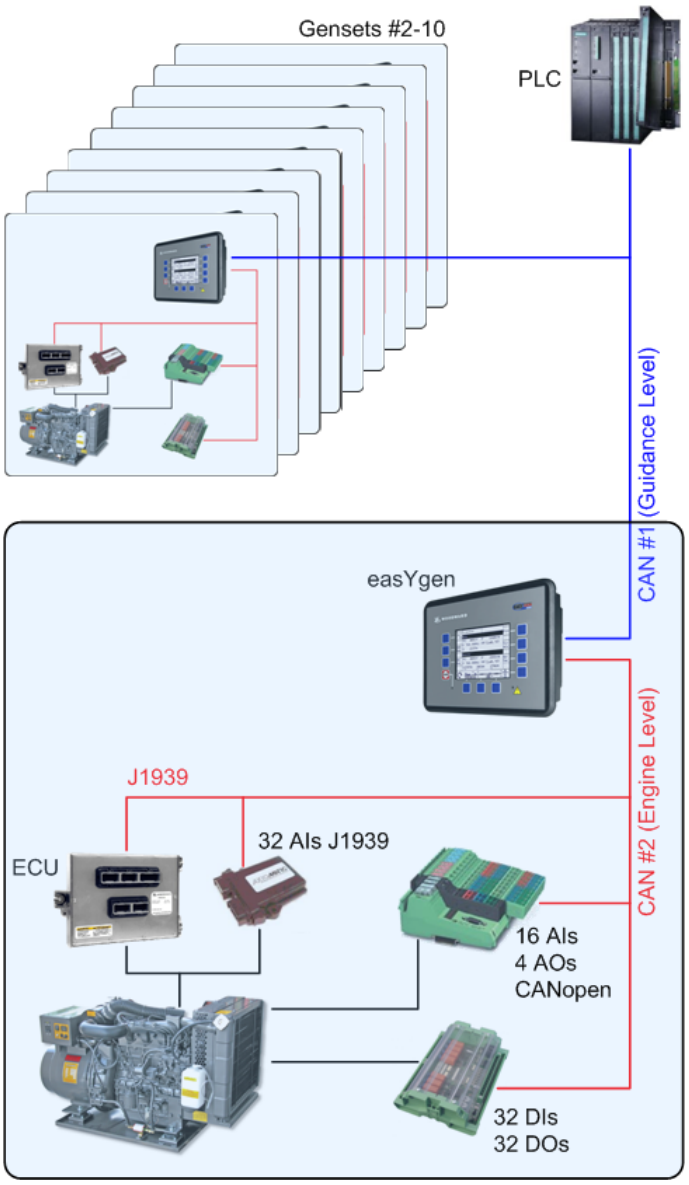


Figure 5-5: Example configuration 5

Example Configuration 6 (5 x easYgen-3200)

Max. 5 Gensets

CAN #1:
- ToolKit

CAN #2:
- Maximum engine bus load

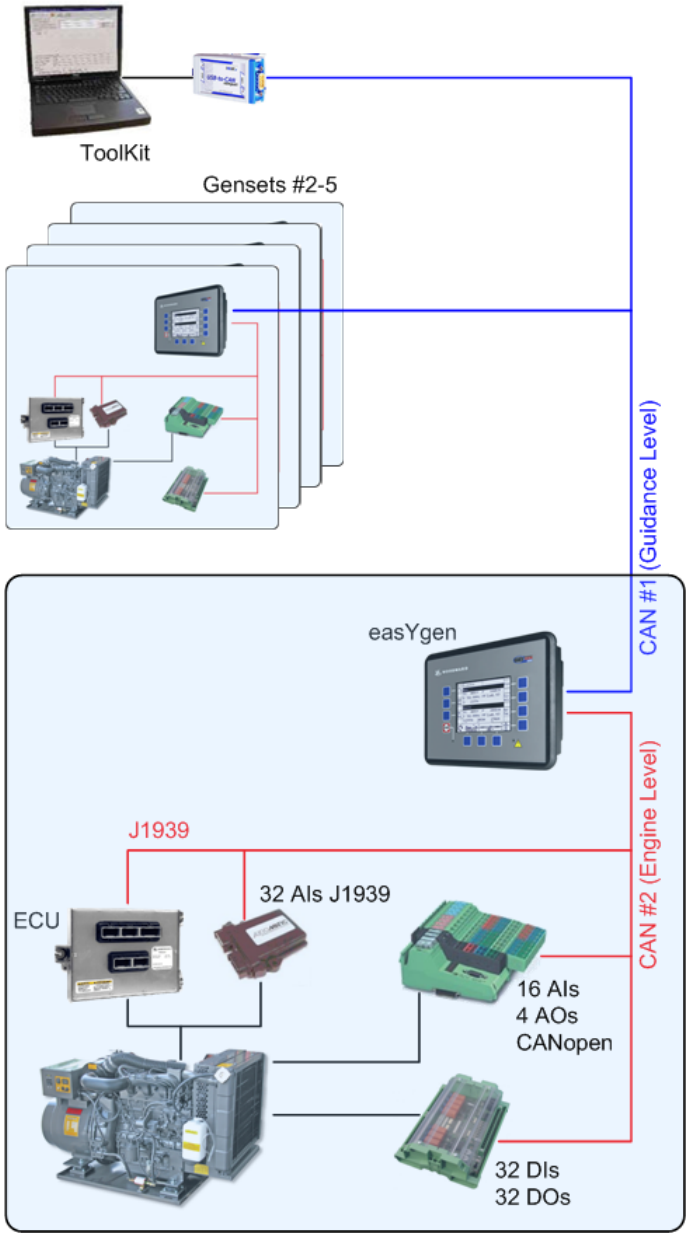


Figure 5-6: Example configuration 6

Example Configuration 7 (18 x easYgen-3200)

Max. 18 Gensets

CAN #1:
- load sharing line only

CAN #2:
- Maximum engine bus load
- ToolKit

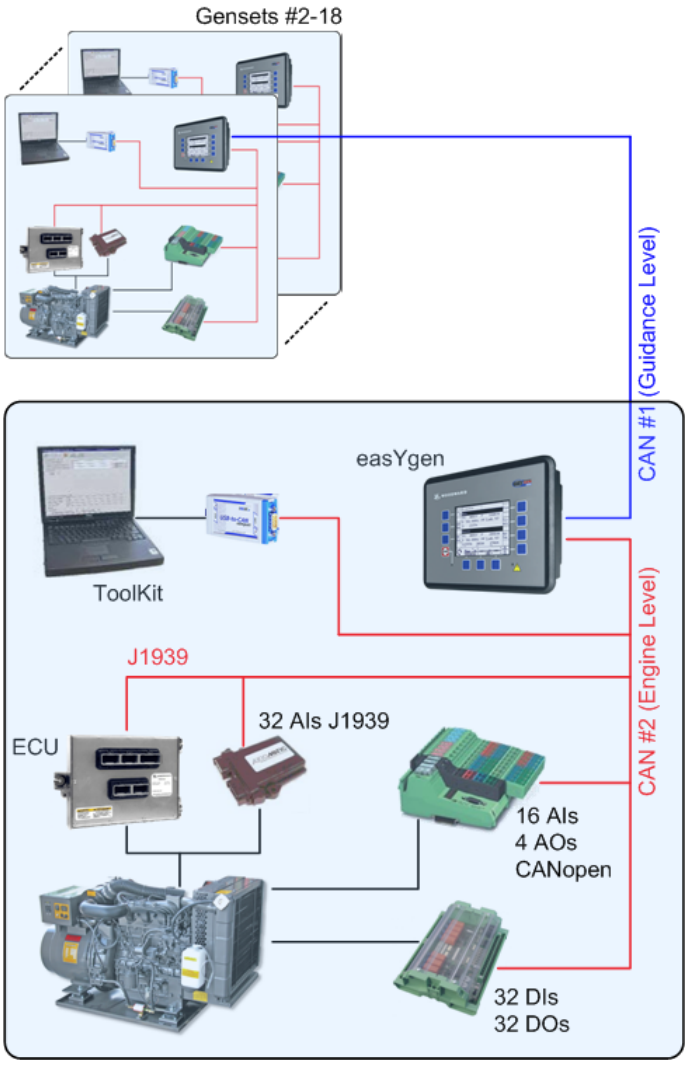


Figure 5-7: Example configuration 7

Example Configuration 8 (20 x easYgen-3200)

Max. 20 Gensets

CAN #1:
- load sharing line only

CAN #2:
- Maximum engine bus load

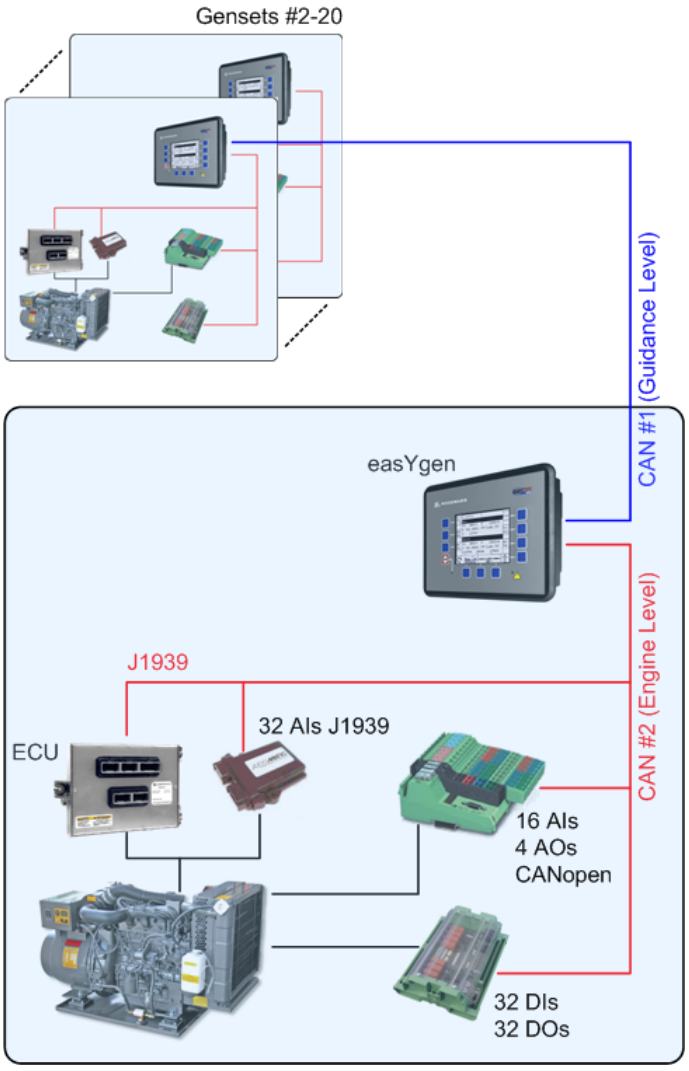


Figure 5-8: Example configuration 8

Example Configuration 9 (5 x easYgen-3200)

Max. 5 Gensets

CAN #1:
- ToolKit
- PLC

CAN #2:
- ECU
- 32 discrete I/Os
- 32 analog inputs

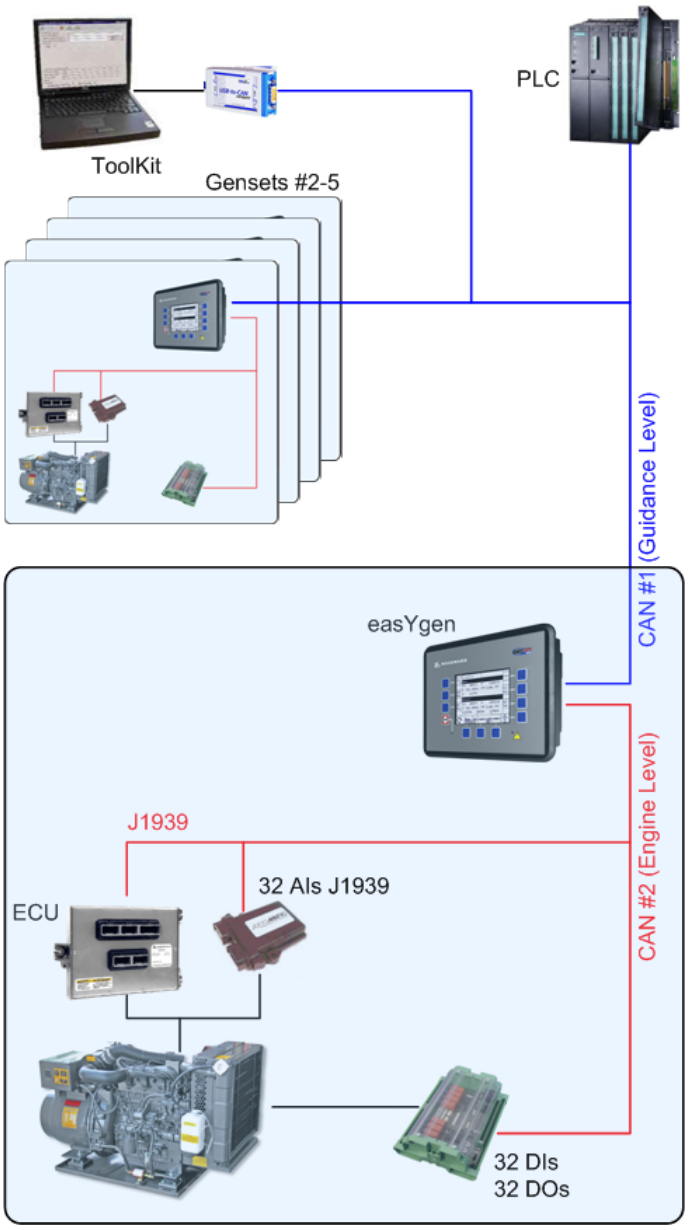


Figure 5-9: Example configuration 9

Example Configuration 10 (10 x easYgen-3200)

Max. 10 Gensets

CAN #1:
- PLC

CAN #2:
- ToolKit
- ECU
- 32 discrete I/Os
- 32 analog inputs

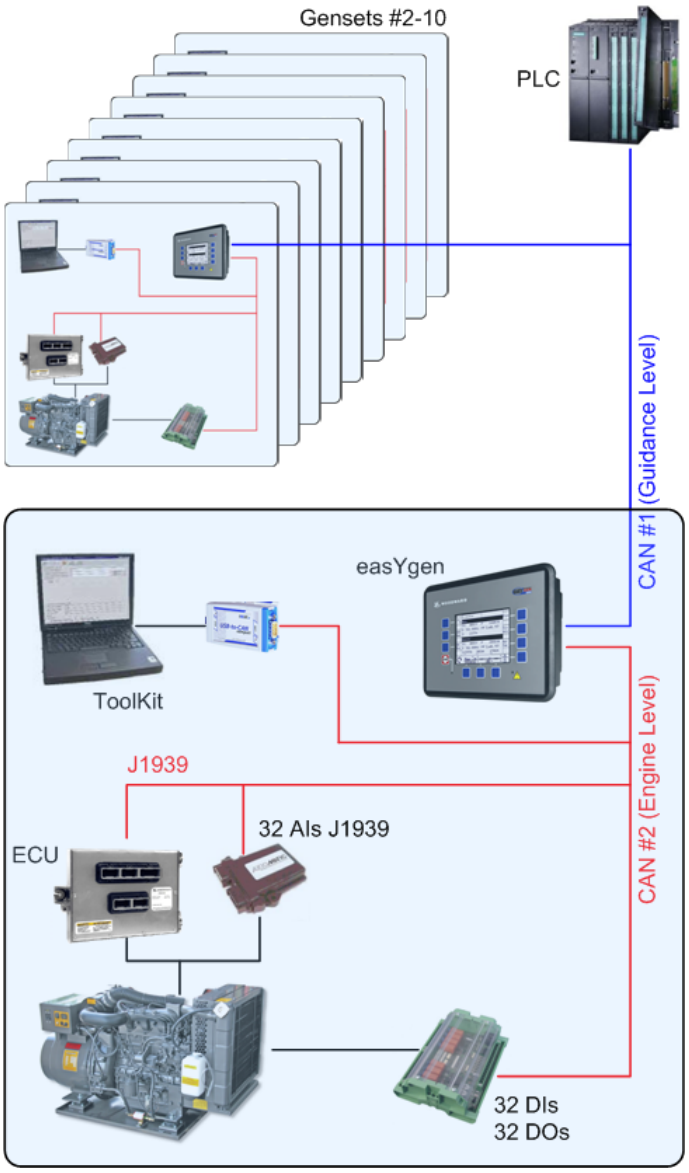


Figure 5-10: Example configuration 10

Example Configuration 11 (12 x easYgen-3200)

Max. 12 Gensets

CAN #1:
- PLC

CAN #2:
- ECU
- 32 discrete I/Os
- 32 analog inputs

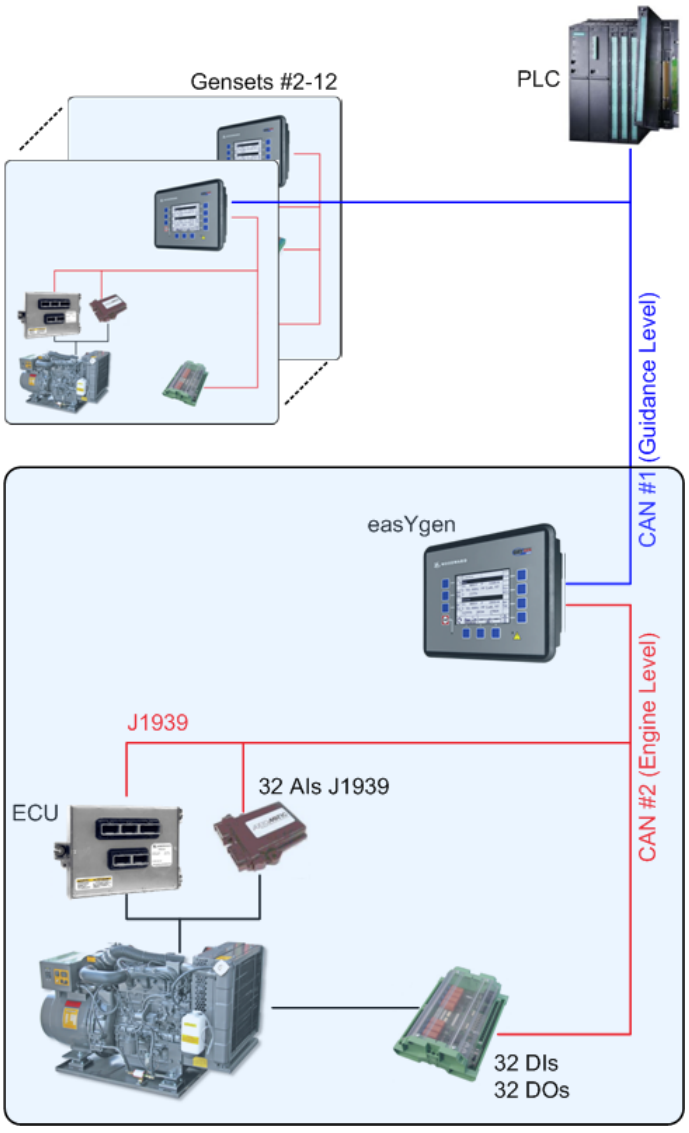


Figure 5-11: Example configuration 11

Example Configuration 12 (12 x easYgen-3200)

Max. 12 Gensets

CAN #1:
- PLC

CAN #2:
- ToolKit
- ECU
- 32 analog inputs

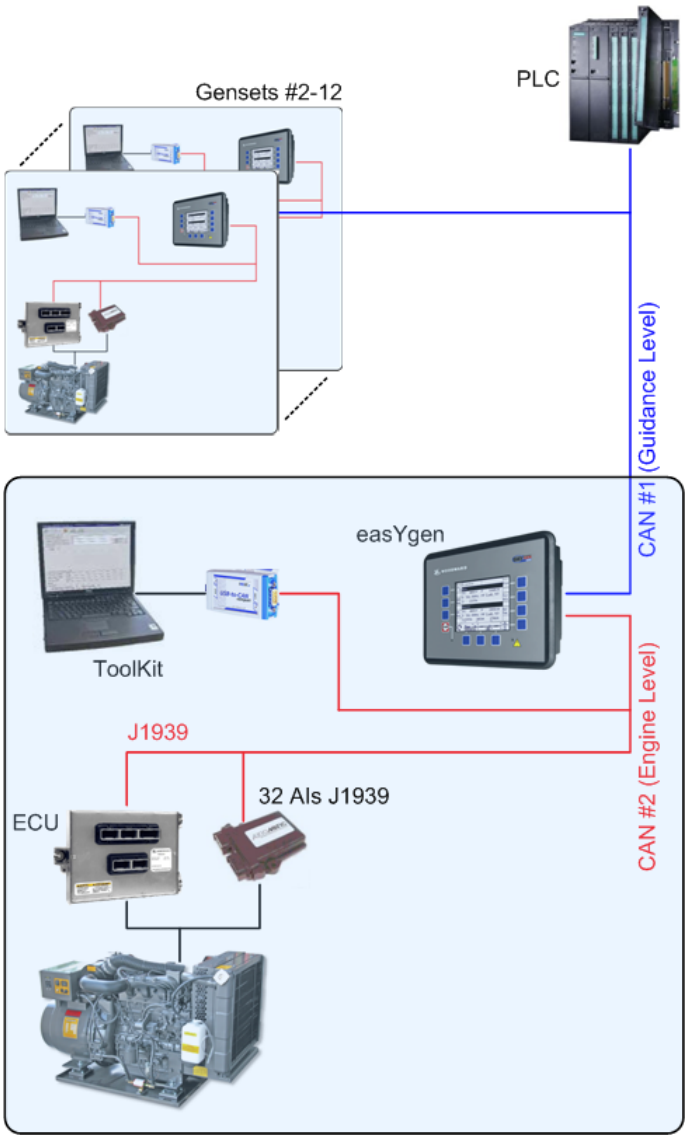


Figure 5-12: Example configuration 12

Example Configuration 13 (15 x easYgen-3200)

Max. 15 Gensets

CAN #1:
- PLC

CAN #2:
- not used

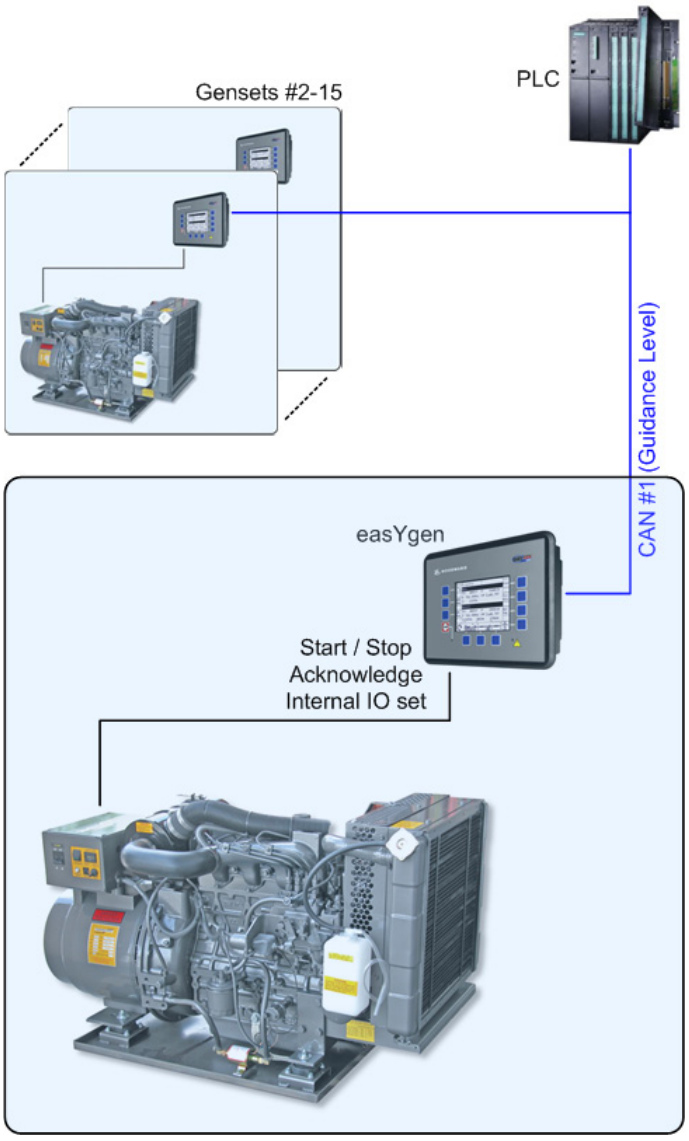


Figure 5-13: Example configuration 13

Example Configuration 14 (30 x easYgen-3200)

Max. 30 Gensets

CAN #1:
- load sharing line only

CAN #2:
- ToolKit

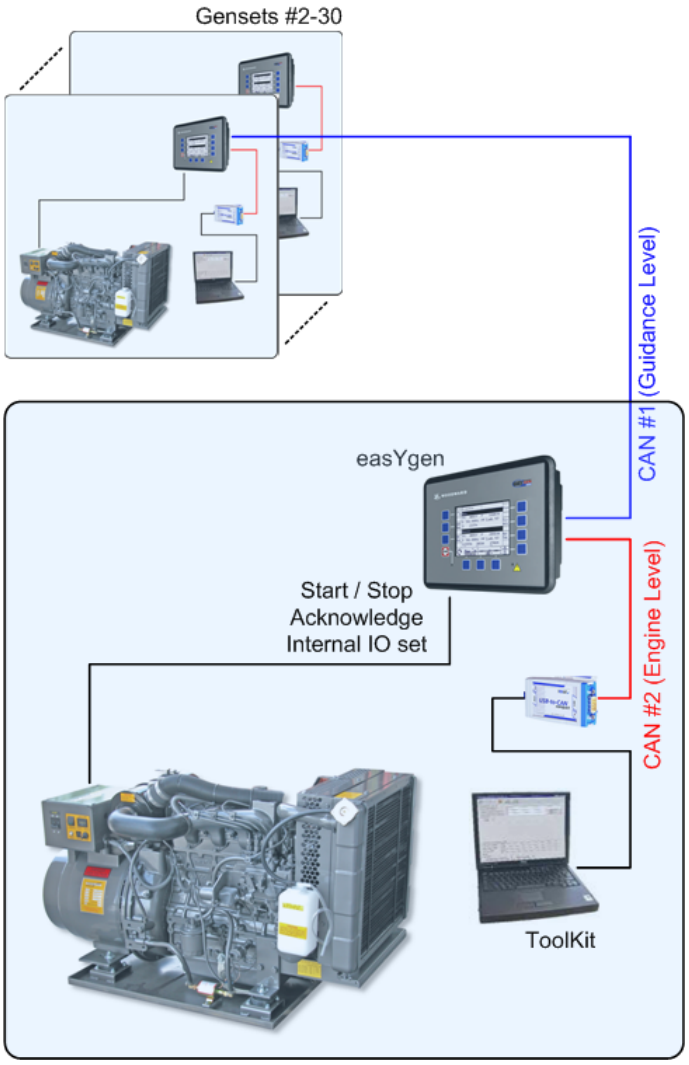


Figure 5-14: Example configuration 14

Example Configuration 15 (32 x easYgen-3200)

Max. 32 Gensets

CAN #1:
- load sharing line only

CAN #2:
- not used

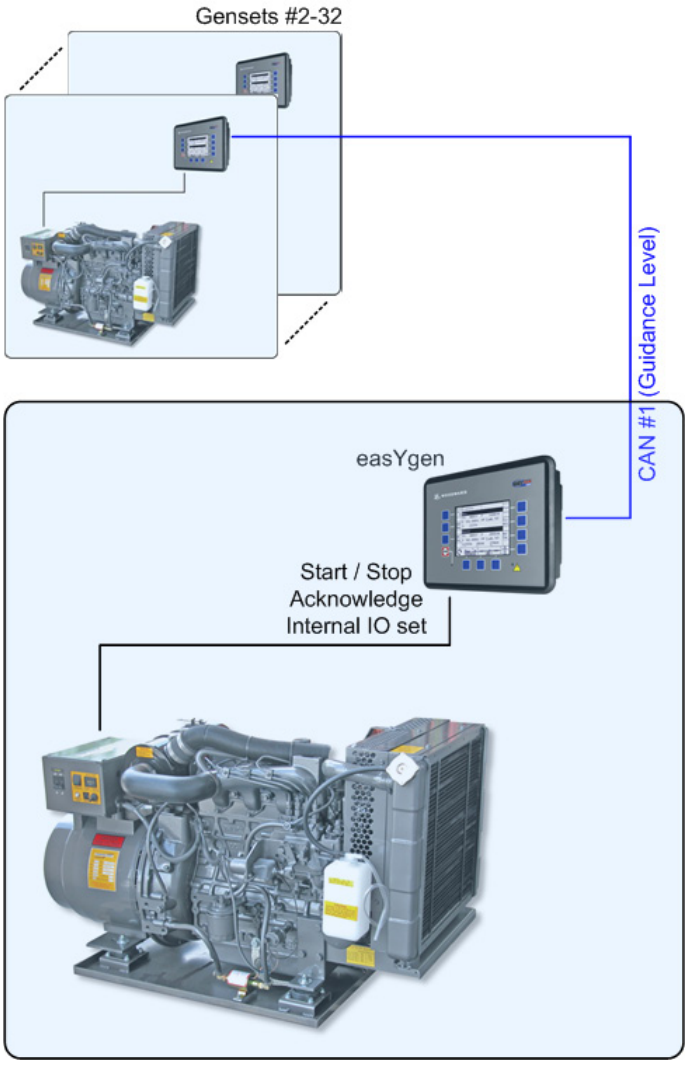


Figure 5-15: Example configuration 15

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