INSTRUCTION MANUAL

INSTRUCTION MANUAL

SCS® Smart Control Systems SCS1000/3000

Configuration environment PDUsetup

E-T-A ENGINEERING TECHNOLOGY

CONTENTS

CONTENT

1. GENERAL INFORMATION

1.1 Safety instructions

This manual points out possible danger for your personal safety and gives instruction how to avoid property damage. The following safety symbols are used to draw the reader's attention to the safety instructions included in this manual.

Danger

There is a threat to life or health unless the following safety measures are observed.

Warning

Danger to man, machinery, materials or the environment unless the following safety measures are observed.

Caution

Danger of damaging the product or machinery and materials unless the following safety measures are observed.

Note

Information is provided to allow a better understanding.

For general safety instructions please see the overview included in the shipment.

1.2 Qualified personnel

This user manual must exclusively be used by qualified personnel, who are able – on their training and experience – to realise arising problems when handling the product and to avoid related hazards. These persons have to ensure that the use of the product described here meets the safety requirements as well as the requirements of the presently valid directives, standards and laws.

1.3 Use

The product is part of a continuous enhancement process. Therefore, there might be deviations between the product in hand and this documentation. These deviations will be remedied by a regular review and resulting corrections in future editions. The right to make changes without notice is reserved. Error and omissions excepted.

1.4 Delivery state

The product is supplied with a defined hardware and software configuration. Any changes in excess of the documented options are not permitted and lead to liability exclusion.

2. INTRODUCTION

2.1 Intelligent power distribution SCS1000/3000 and PDUsetup

The system size and high load currents are especially important within an ever more demanding vehicle architecture, where space in the vehicle is at a premium. The SCS1000 and SCS3000 series are extremely compact power distribution systems with integrated logic. The modules provide considerable functionality combined with high efficiency in one of the smallest form factors. The SCS1000/3000 are ideal in terms of their upgradeability for fleet modernisation and projects where space-savings are of the utmost importance.

The SCS3000 modules are ideal for a centralised system approach. Power distribution and control functions, such as logical connections, PWM and soft start are combined in one module. Multiple individual components can be replaced by a single one.

The SCS1000 is the ideal entry-level solution for small and decentralised system architectures and is the first step to vehicle digitisation.

Besides power distribution, the SCS1000 and SCS3000 provide more transparency on the load side, by feeding back the current and condition values. Additional safety is guaranteed by the integral electronic load protection, the enhanced inrush handling, the current limitation and the soft start functions. The inputs of the SCS modules can be configured as analogue or digital inputs and are ideal for detecting sensors installed.

The SCS1000 and SCS3000 modules have comprehensive communication interfaces. The connection to the vehicle system is made via up to three CAN channels. additionally live data from the system can be requested and observed for diagnostic purposes.

The SCS3000 and SCS1000 modules can be configured via the PDUsetup graphical programming interface. A comprehensive symbol library and communication settings guarantee flexibility. In addition, the PDUsetup enables simulation and diagnostic tools.

Figure 1 shows how the SCS3000 can be integrated into the on-board electrical system.

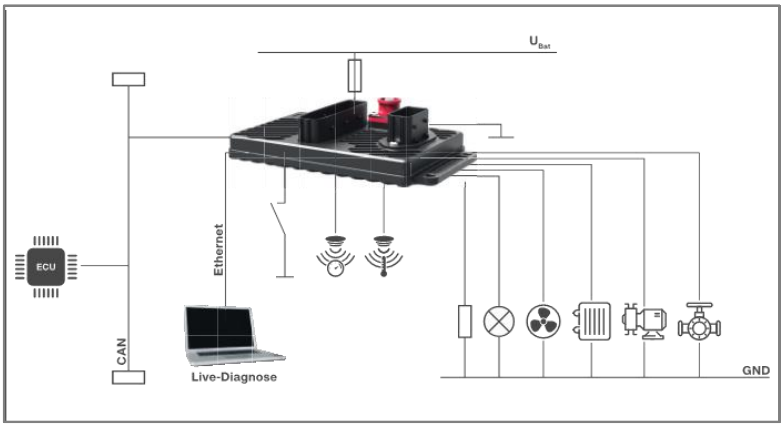


Figure 1: SCS3000 in the vehicle application

3. HARDWARE OPTIONS

An overview of the high-end modules of the SCS group is shown below.

Series	SCS3000-64	SCS3000-48	SCS3000-34
			
Load outputs	64	48	34
Total current	280 A	280 A	280 A
Max current/ channel	35 A (10 + 10)	35 A (10 + 10)	35 A (10 + 10)
Physical inputs	16	16	16
Commu-nication	CAN 2.0 B, Ethernet	CAN 2.0 B, Ethernet	CAN 2.0 B, Ethernet
IP rating	IP67	IP67	IP67
H-bridges	5	5	5

Series	SCS3000-16	SCS1000-16HS
		
Load outputs	16	16
Total current	200 A	160 A
Max current/ channel	35 A (6x)	32.5 A (4x)
Physical inputs	12	12
Communication	CAN 2.0 B, Ethernet	CAN 2.0 B, SAE J1939
IP rating	IP67	IP67
H-bridges	2	-

Please refer to the separate data sheets for detailed specifications.

The data sheet for the SCS1000 can be downloaded here.

The data sheet for the SCS3000 can be downloaded here.

3.1 Load outputs – Current limitation, inrush handling and soft start

In order to be able to switch loads with a high current rating, it is possible to connect load outputs of the SCS1000 and SCS3000 modules in parallel using the PDUSetup Software. Several outputs can be declared as a »team« via the configuration software.

All load outputs of the SCS1000 and SCS3000 are internally short circuit and thermally protected and have additional SMD fuses on the PCB.

Besides the configurable, active current limitation, the SCS modules support a multilevel control of inrush currents. This behaviour can be adjusted via the software.

Additionally, the SCS1000 and SCS3000 provide a diagnosis output with related reset input, which can also be configured via the PDUsetup software. The output is then used to connect an LED to ground.

Compared to the SCS1000, the SCS3000 modules have additional multifunctional outputs, that can be used as high side or low side outputs or as H-bridges. Furthermore, some channels are PWM capable.

The SCS3000 modules also allow you to configure soft start. This helps reduce high currents, that can occur during the switching of high electrical loads, e. g. inductive loads, cooling fans, electric motors, or coolers. When implementing start-up characteristics, inductive and resistive loads can be differentiated, and the soft start behaviour can be adjusted accordingly.

When using inductive loads, it is mandatory to use an appropriately rated flyback diode for this load to prevent the module from severe damage.

3.2 Physical inputs

The SCS1000 and SCS3000 modules have inputs that can be used as digital or analogue inputs.

The analogue inputs of the devices cover a voltage range of 0 – 32 VDC.

In addition, some inputs have internal 3 kΩ pull-up resistors to 5 V, which can be activated in the software to make the pins usable as thermistor inputs.

The module reads the voltage applied to the inputs and can be configured to send it as a CAN message to other bus devices. Sensors, that are installed in the proximity of the module, can easily be connected to the CAN bus via analogue inputs.

In addition, the data at the inputs can be further processed within the module, for example, to switch load outputs depending on analogue inputs, or to control the duty cycle of a PWM output.

All SCS3000 power distributors also have a dedicated wake input that can be used to wake the module from deep sleep mode on the hardware side. Furthermore, up to four additional inputs can be assigned with a wake-up function. These settings can be made via the PDUsetup software.

Please see section 6.2 for information on physical module addressing.

3.3 Communication interfaces

3.3.1 SCS1000-16

1 x CAN 2.0B, J1939 compatible
For control and data transmission, as well as for configuration and firmware updates

3.3.2 SCS3000-…

3 x CAN 2.0B
For control and data transmission (frames sent and received per selected CAN channel)
2 x 100 Mbit/s full duplex Ethernet
For module configuration and firmware updates, as well as live monitoring in the system, can also be used as an Ethernet switch.
1 x RS232C Serial interface
For the connection of external accessories and bootloader updates
1 x LIN Bus
Upon request

Do not apply more than 13 VDC to the RS232C interface of the SCS3000 modules, otherwise the device may be damaged.

4. MOUNTING

The device must be firmly mounted before connection of cables. Please use M6 (on the SCS1000) or M8 (on the SCS3000) mounting screws (tightening torque max. 6 Nm) for mounting via the through holes and M4 mounting screws (tightening torque max. 0.7 Nm) for mounting from the back.

The mounting hardware is not included in the scope of delivery.

Please ensure sufficient space for the mating plugs of the load terminals and the supply.

Please refer to the data sheets for detailed information on mounting and dimensional fixing drawings

Ensure that the device is installed in an area where the ambient temperature does not exceed 85 °

Please provide additional protection against overload in the supply line near the battery (VE+) according to the max. current.

SCS3000 and SCS1000 harnesses for testing purposes are not included in the scope of delivery, but can be obtained from E-T-A.

5. TESTS AND TECHNICAL DATA

5.1 Environmental tests and approvals

The modules in the SCS1000 and SCS3000 range were tested to:

Name	Chapter / section	Comments
E11	Directive R-10, regulatory status 5	VCA, SCS3000 approval mark E11*10R06/02*12120 SCS1000 approval mark E11*10R05/01*11361

The modules in the SCS1000 and SCS3000 range were tested to:

Name	Chapter / section	Description
ISO 16750-2	4.4	Superimposed alternating voltage
ISO 16750-2	4.6.1	Momentary drop in supply voltage
ISO 16750-2	4.6.2	Reset behavior
ISO 16750-2	4.6.3	Starting profile
ISO 16750-2	4.6.4	Load dump
ISO 16750-2	4.7.2	Reversed voltage
ISO 16750-2	4.8.2	Ground reference and supply offset
ISO 16750-2	4.10.1 / 4.10.2.1	Short circuit protection
ISO 16750-3	4.1.2.4	Passenger vibration @ temperature
ISO 16750-3	4.1.2.7	Commercial vibration @ temperature
ISO 16750-3	4.2.2	Extreme shock
ISO 16750-4	5.1.1	Low temp storage

ISO 16750-4	5.1.1.2	Low temp operational
ISO 16750-4	5.1.1	High temp storage
ISO 16750-4	5.1.1.2	High temp operational
ISO 16750-4	4.5.3.1	Temp cycle
ISO 16750-4	5.5.2	Salt spray
ISO 16750-4	5.6.2.2	Damp heat cyclic
ISO 16750-4	5.6.2.3	Composite temp and humidity
ISO 16750-4	5.6.2.4	Dewing
ISO 16750-4	5.7	Steady state damp heat
ISO 16750-5	4	Chemical loads
EN 60529		IP6x
EN 60529		IPx7
ISO 13766-1-2018 **ISO 14982-2009** **EN 13309-2010**	Combined test	Broadband electromagnetic emissions
ISO 13766-1-2018 **ISO 14982-2009** **EN 13309-2010**	Combined test	Narrowband electromagnetic emissions
ISO 13766-2-2018	Worst case threshold values	Immunity to electromagnetic radiation
ISO 13766-2-2018	Worst case threshold values	ESD
ISO 13766-2-2018 **ISO 14982-2009**	Worst case threshold values	Conducted transients

To prevent damage, after exposure to chemical loads, these must be immediately removed from the device.

6. CAN COMMUNICATION AND DIAGNOSTIC INFORMATION

The SCS1000 and SCS3000 modules are CAN controlled power distribution systems that provide diagnostic information. These products are modules that can be controlled by an ECU via the CAN bus, but also switch outputs independently and depending on the situation via logical links.

By configuration via the PDUsetup graphic programming environment, comprehensive logic functions and links between inputs and outputs can be realised in the device itself.

The CAN communication of the SCS1000 and SCS3000 can be freely configured using custom CAN functionality. It is possible to transmit information about the load current per channel as well as the switching status, the total current as well as the supply voltage and the voltage values at the analogue inputs.

In addition, commands can be received from the devices in the form of CAN frames.

6.1 Connection and CAN standard

The SCS1000 and SCS3000 support the CAN 2.0B standard and are SAE J1939 compatible. The products can therefore be used with other standard components in a CAN network without further adjustment and without using gateways. By assigning unique IDs for the modules, it is possible to operate more than one SCS module on the same bus.

The SCS1000 and SCS3000 are configured via the PDUsetup graphical programming software. For SCS1000 modules, the program created is uploaded exclusively via the CAN bus; for SCS3000 modules, the configuration can be carried out via Ethernet.

Commercially available CAN-to-USB adapters from Peak are supported for the connection between PC and SCS1000 and SCS3000 modules.

To enable the correct establishment of a connection to a module via CAN, make sure that the CAN-to-USB adapter has already been connected to the PC before starting the PDUsetup software.

For the SCS1000 the correct baud rate must be selected. By default, units are shipped at 500 kBits/s.

PDUsetup will try to access the CAN-to-USB adapter. If this is not desired, it can be deactivated by deactivating the checkbox (Figure 2). Please see chapter 7.1.27.5 for further information.

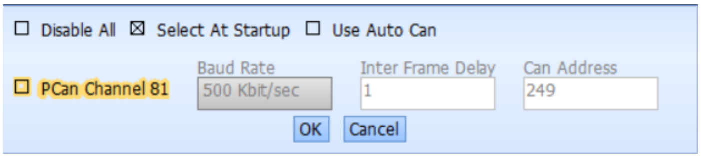


Figure 2: Checkbox for accessing CAN adapter.

6.1.1 Physical layer

For a reliable communication, the CAN physical layer should be built up to the specifications of ISO 11898-2, or SAE J1939-1x. Wiring should only be a twisted pair with terminating resistors at each end of the bus in a »daisy chain« arrangement (Figure 3).

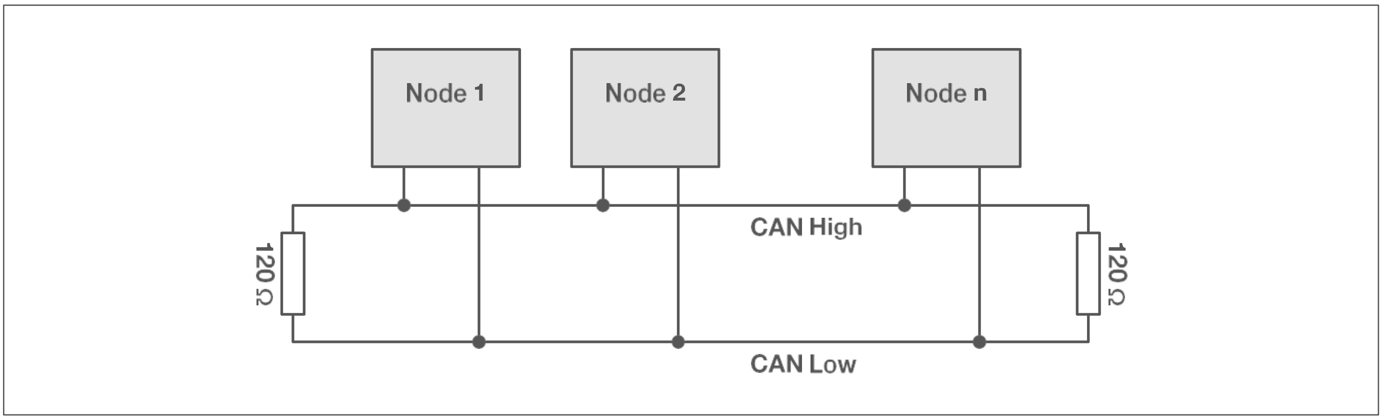


Figure 3: CAN network

The SCS1000 and SCS3000 have no integral CAN termination as standard. This could also be the case with devices made by other manufacturers. Please make sure to always provide sufficient CAN termination.

6.1.2 J1939 (SCS1000)

To easily process SAE J1939 conformable CAN frames with SCS1000 modules, PDUsetup 2.15.1966 or later introduces a new Address Override function in the Custom CAN Section. This function allows the easy integration of modules into SAE J1939 CAN systems implementing Node Addressing. The Address Override tick box in the J1939 Message ID editor causes the device's node address to replace either the source or destination section (depending on whether an J1939 RX or TX frame is created). The module's node address may be a preprogrammed one, one negotiated in the J1939 address claim procedure or a node address set via physical module addressing.

The SCS1000 node address can be set via »Device«, »Set SCS1000 Comms«.

The usage of CAN J1939 message IDs 0x1CEAxxxx, 0x1CEEFFxx and 0x1CEFxxxx are prohibited. Calibrations with these values will be rejected, as they conflict with the CAN message IDs used for communication between the PDUSetup software and SCS1000/3000 modules (PDUSetup »Device«, »Connect«).

6.2 Physical module addressing (PMA) (SCS1000)

With the Physical Module Addressing feature, the node address is set depending on the potential of chosen physical input pins. This means that depending on the physical wiring (e.g. different harness configurations) the module directly claims the desired node address after start up, without the need to set a source address inside the calibration.

Due to PMA, different modules can be configured with all the same calibration program and later be distinguished depending on the installation position inside the vehicle or machine. This minimises complexity during stocking, as well as errors during productions and replacement / maintenance.

By checking the Address Override tick box in the Custom CAN sections, the node address generated via PMA is automatically imported and flexibly used inside the CAN message structure of the configuration.

The bits used for PMA can be set via »Device«, »Set SCS1000 Comms«.

The input pins override the bits of the node address according to the following scheme:

Node addr. bit override	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Physical input	In 12	In 11	In 10	In 9	In 8	In 7	In 6	In 5

6.3 Integral electronic load protection, troubleshooting

The intelligent SCS1000 and SCS3000 power distribution systems have an integral electronic load protection.

In addition to disconnecting the individual load outputs in the event of an overcurrent or short circuit on the individual channel, this also includes the possibility of defining warning thresholds and implementing separate tripping characteristics for inrush currents. If outputs are defined as a team, an overload on one channel will cause all channels of the team to trip.

The trip current and the trip time of the load protection can be set for each channel via PDUsetup. This also applies to the trip behaviour in the event of an inrush and the configuration of the warning thresholds.

A tripping in case of undervoltage or too high board temperature is also configurable.

After the error has been eliminated, the channels can be switched on again remotely. This is done on the software side by sending a corresponding CAN message (see chapter 6.5), or via the physical reset input pin.

6.4 PDU data stream

It is recommended to use the custom CAN communication functionality instead of a data stream. The data stream functionality is only supported to provide complete backwards compatibility for older units.

The data streams are only usable with firmware version 2.17.XX and 2.18.XX. This firmware is not usable with new units. None the less, we recommend configuring the CAN communication using the custom CAN section. Import files to send the same data as with the data stream as well as documentation on data streams are available on request.

6.5 Error reset

There are two ways to reset an error if there is a fault.

Option 1: To reset on the hardware side, the corresponding reset pin must be briefly pulled to ground.

Option 2: Using PDUsetup the OUTPUT State “Reset” component into the schematic and link to an input event.

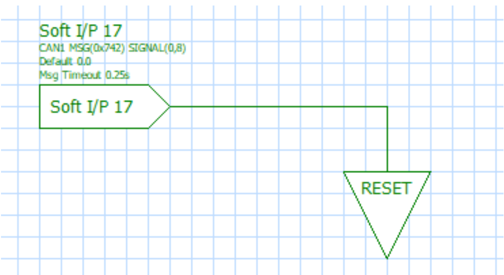


Figure 4: Reset symbol

6.6 Output states

Output state codes are defined as follows:

State 0: "OFF"

The output is off. It is not tripped.

State 1: "ON"

The output is active. It may be fully on or driving a PWM signal (any non-zero PWM duty counts as active). Any configured inrush / soft start procedure has completed successfully.

State 2: "INRUSH"

The output is active. It may be fully on or driving a PWM signal (any non-zero PWM duty counts as active). It is performing the configured inrush / soft start stage.

State 3: "ALARM"

The output is active, and the output current exceeds the configured alarm conditions. It may be fully on or driving a PWM signal (any non-zero PWM duty counts as active). Any configured inrush / soft start procedure has completed successfully.

State 100: "SOFT FUSE" (non-configurable software fuse)

The output is inactive. It is tripped and will remain so until the trip is reset. The trip was caused by the output current exceeding non-user-configurable protection conditions.

State 101: "TRIP"

The output is inactive. It is tripped and will remain so until the trip is reset. The trip was caused by the output current exceeding the user-configurable normal-operation maximum current trip conditions. Any configured inrush / soft start procedure completed successfully beforehand.

State 102: "INRUSH TRIP"

The output is inactive. It is tripped and will remain so until the trip is reset. If the output is configured for conventional (hard) start or capacitive soft start, the trip was caused by the output current exceeding the user-configurable maximum inrush current trip conditions during the configured inrush time. If the output is configured for inductive soft start, the trip was caused by the output being unable to reach a fully on state by the end of the soft start time without exceeding the soft start current.

State 103: "LOW CURRENT TRIP"

The output is inactive. It is tripped and will remain so until the trip is reset. The trip was caused by the output current dropping below the user-configurable minimum normal-operation current trip conditions. Any configured soft start procedure completed successfully beforehand.

State 104: "POWER V LOW"

The output is inactive. It is tripped and will remain so until the trip is reset. The trip was caused by the main supply voltage dropping below the user-configurable minimum voltage conditions for this specific output - this should not be confused with the global output disable as mentioned above ("Main Power State").

State 105: "BOARD TEMP HIGH"

The output is inactive. It is tripped and will remain so until the trip is reset. The trip was caused by the internal temperature exceeding the user-configurable maximum board temperature conditions for this specific output.

State 106: "HARD FUSE"

The output is inactive. It is tripped and will remain so until the trip is reset. The trip was caused by the output current exceeding a very high non-user-configurable level, triggering a near-instantaneous protection trip.

State 107: “NO START LOAD”

The output is inactive. Inductive soft start could not turn on the load and therefore an error is triggered.

State 200: "TEAM TRIP"

The output is inactive. It is tripped and will remain so until the trip is reset. The trip was caused by a protection action on a different output in this output's team.

State 201: "LS TEAM TRIP"

The outputs are inactive. It is tripped and will remain so until the trip is reset. The trip was caused by a protection action due to too high low side current. The SCS3000 (all variants) have a 50 A low side limit in total.

7. PDUSETUP CONFIGURATION SOFTWARE

The PDUsetup configuration software is used to create SCS1000 and SCS3000 configurations to control the behaviour of the modules. This is done with the help of a graphically displayed logic control.

Figure 5 shows the general structure of the configuration interface, which is described in more detail in the following chapters.

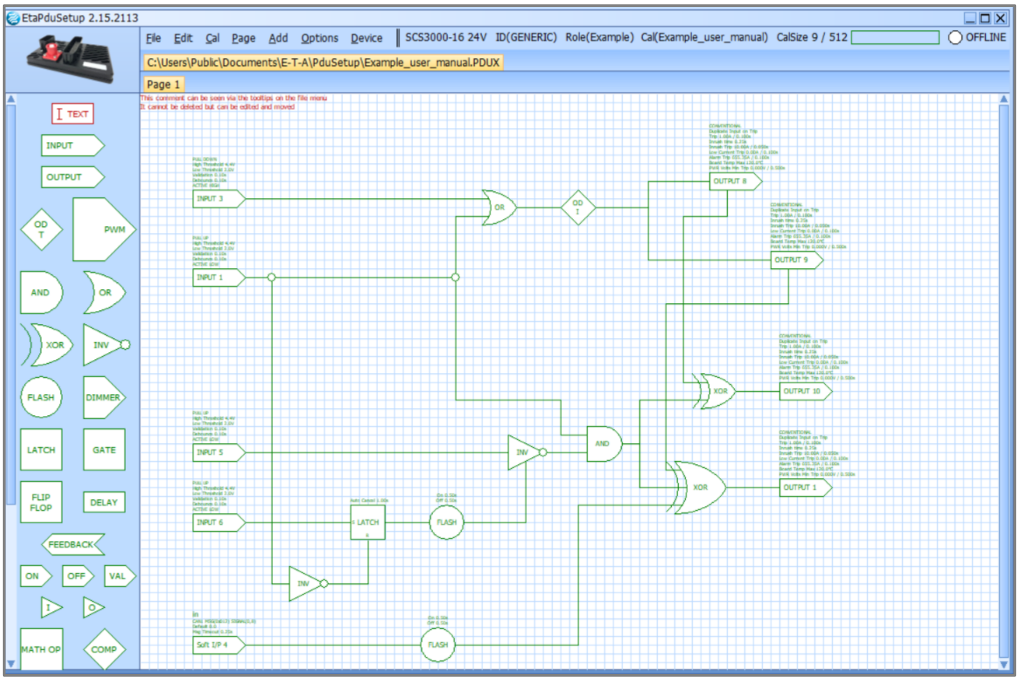


Figure 5: PDUsetup configuration interface

7.1 User interface

7.1.1 Menu bar

All menu buttons and menu sub-items can be accessed via keyboard shortcuts. Each option has an underlined letter marking its keyboard shortcut or the shortcut is displayed to the left of the drop-down menu.

The menu bar displays calibration information, such as the device being configured, the programme name and the size of the programme. On the far right of the menu bar, the connection status of a device is displayed.

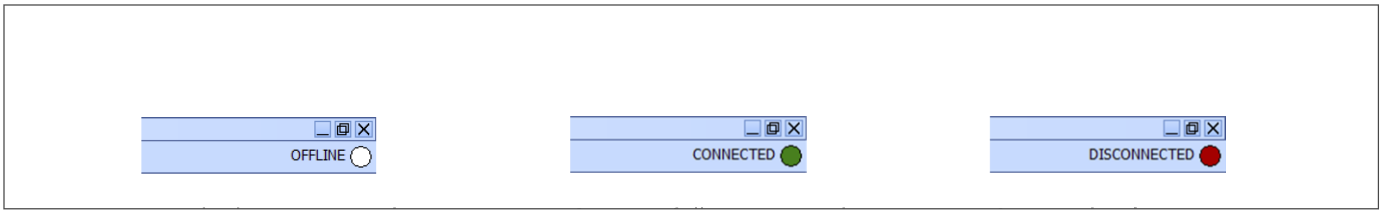


Figure 6: Display connection status

7.1.2 Selection of CAN baud rate

As PDU setup connects to the SCS1000 via CAN it claims the Peak adapter at start up. It is possible to choose the CAN baud rate manually or to enable automated CAN connect. Auto CAN will automatically listen to the CAN bus at different baud rates and pick the right one. Auto connect can be deactivated by accessing eta-NetServer, going to CAN adapter, and unselecting auto CAN.

Claiming the Peak adapter after starting up can be disabled by unchecking “Select at Startup” in etaNetServer.

In case no Peak adapter was found or the adapter was already claimed by a different program a message is shown.

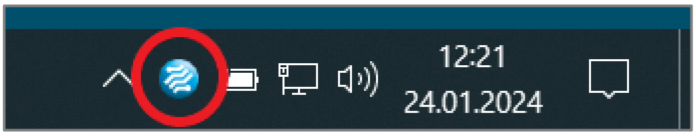


Figure 7: Opening etaNetServer

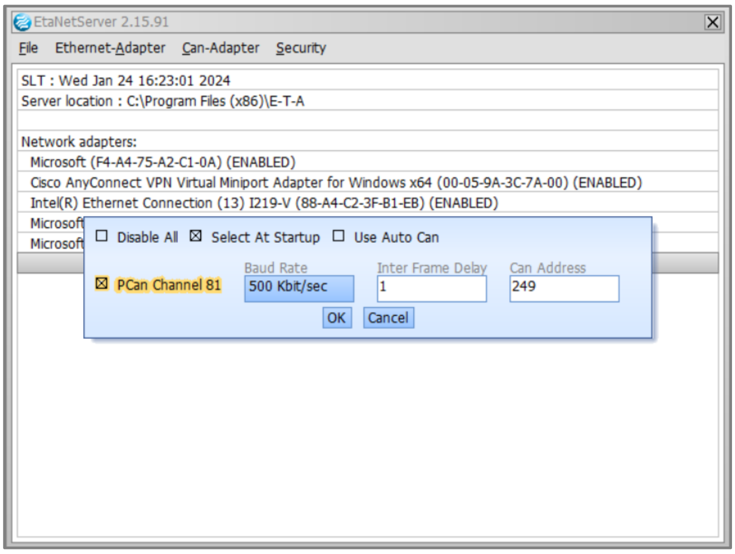


Figure 8: etaNetServer

7.1.3 Symbols

The component bar on the left side of the interface shows all available schematic diagram symbols. These can be grabbed and dropped into the schematic diagram area with the mouse or inserted via the »Add« menu.

7.1.4 Schematic diagram

The calibration schematic diagram can be divided into several pages to improve visibility. Each page can be given a name that appears in the tabs above the schematic diagram area. These tabs can be used to switch between pages. This is also possible via numerical links under the menu item »Page«.

The PDUsetup can be used to create configurations for more than one device at a time. A unique name is assigned to the respective module. The individual devices are displayed in tabs directly below the menu bar (Figure 9). These tabs can be used to switch between the modules and to display the respective schematic diagram pages. The selection of the respective device is also possible via numerical links under the menu item »Cal«.

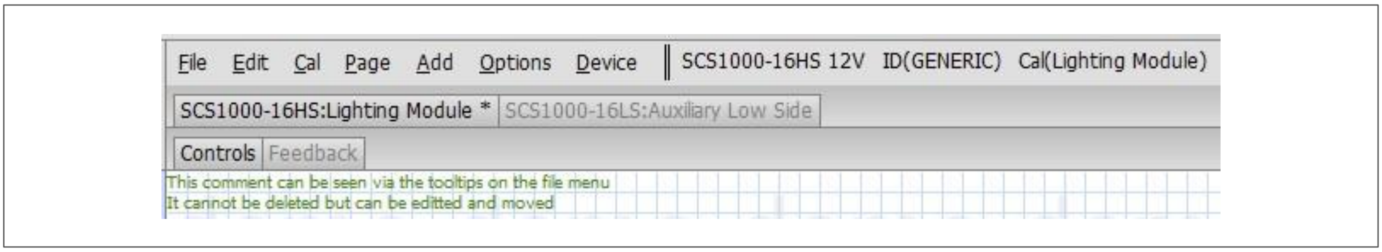


Figure 9: Multiunit configuration

7.1.5 Device information

Once a module is connected, device information is displayed on the right side of the screen. This includes the total current consumption, device temperature, voltage, »On time« and all other device messages (Figure 10).

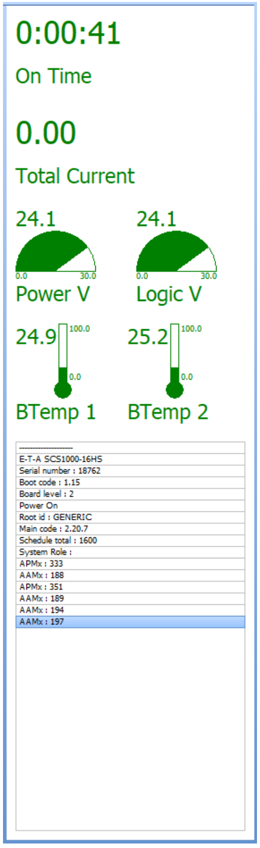


Figure 10: Device information

7.2 Configuration file

The calibration file is saved on the PC as .pdux file. It can be edited without a connected PDU.

7.2.1 PC

To create a new configuration, select »File«, »New« and select the module version for which the programme is to be created. The PDU type is required to create the list of available inputs and outputs. In addition, a unique name must be assigned to the selected device.

This procedure can be repeated to create several module configurations.

Load a previously saved calibration by selecting »File«, »Load«.

Save the calibration in the working directory with »File«, »Save« or in another location with »File«, »SaveTo«.

Select »File«, »Print« to print the current page in black and white as it is displayed. This includes the text and the respective simulation status.

Select »File«, »Save as text« (Q) to export all I/O information to a text file. This is saved in the working directory.

7.2.2 Working directory

The working directory is maintained across all applications and can be edited in PDUsetup. To change the current working directory, select »Working Directory« under »File«. Use »CREATE« to create a new folder in the current location. Use »SELECT« to select the current location as the new working directory. If the location has not been used before, a .cfg file will be created. Selecting »Working Dir Behaviour« allows the .cfg file to be edited. All .pdux files are saved in the PDUsetup folder without any other directories.

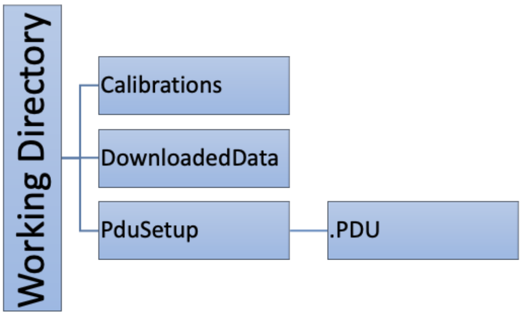


Figure 11: Structure of the working directory

7.2.3 Device

Retrieve a configuration from a connected PDU with »Device«, »Get«.

Program a connected module with the created configuration by selecting »Device«, »Set«. The device to be programmed must be selected via the serial number, to assure that the correct device will be programmed in case more than one is connected.

When programming is complete, device information and any messages describing configuration problems such as invalid current limits are displayed. Current limit values can be found in the data sheet of the respective device.

A connection to a device via »Device«, »Connect«, is only used for monitoring. In this state, no changes can be made to the configuration, nor can the device be programmed.

7.2.4 »Cal« options

These options affect the configuration file and can be found in the menu under »Cal«. In addition to the settings for bus communication, which are described in more detail in chapter 8.3.6, the following settings, among others, are available.

- **Legacy communication**
  Legacy communication is only available for firmware versions 2.18 or older and is no longer recommended to use. Please use custom can instead.
  The messages sent by this functionality are described in the annex.
- **Custom CAN**
  Custom CAN is used to configure the CAN Messages from and to the module, please see section 7.3.4 for detailed information.
- **IO summary**
  IO summary provides an overview of all the I/O within the calibration on one page.
  IO summary also shows live information when connected to the module.
- **Role or purpose string**
  Name of the role of this calibration.
- **Passphrase**
  Add a password that must be entered before the configuration can be displayed.
- **Hard fuse current**
  No longer relevant, only for backwards compatibility. Please use output settings.
- **Start simulation**
  Start simulation is used to test the calibration file logic while using only the program, there is no need to connect to a module.
- **Change type**
  Change the module type associated with the configuration file. This changes the number of physical I/Os available and must match the actual hardware that will be programmed.
- **Change operating voltage.**
  Selection between 12 V and 24 V power supply. This functionality is no longer needed, only for backwards compatibility.
- **Change identity**.
  An identity is a security feature that restricts access to devices. The calibration ID must match the device ID in order to configure a device. Offline, a PC must have the necessary permissions to display a restricted calibration.
  By default, all configurations are »Generic«, i.e. executable without restrictions.
- **Validate**
  This functionality validates your calibration prior to sending to a unit.
- **Revert**
  Undo the last change.
- **Enable expert frequency mode**
  Special mode for optimised internal frequency of computing. Please see chapter 7.6.3 for further information.
- **Enable PDU10 fault pin**
  No longer relevant, only for backwards compatibility.

7.3 Graphical user interface

In the following, the possibilities of creating calibrations are described in more detail.

7.3.1 Main display

The main display can consist of several tabs or pages that display a grid. The pages can be added, renamed, resized, and deleted under the »Page« menu. Here you will also find number shortcuts to switch between pages.

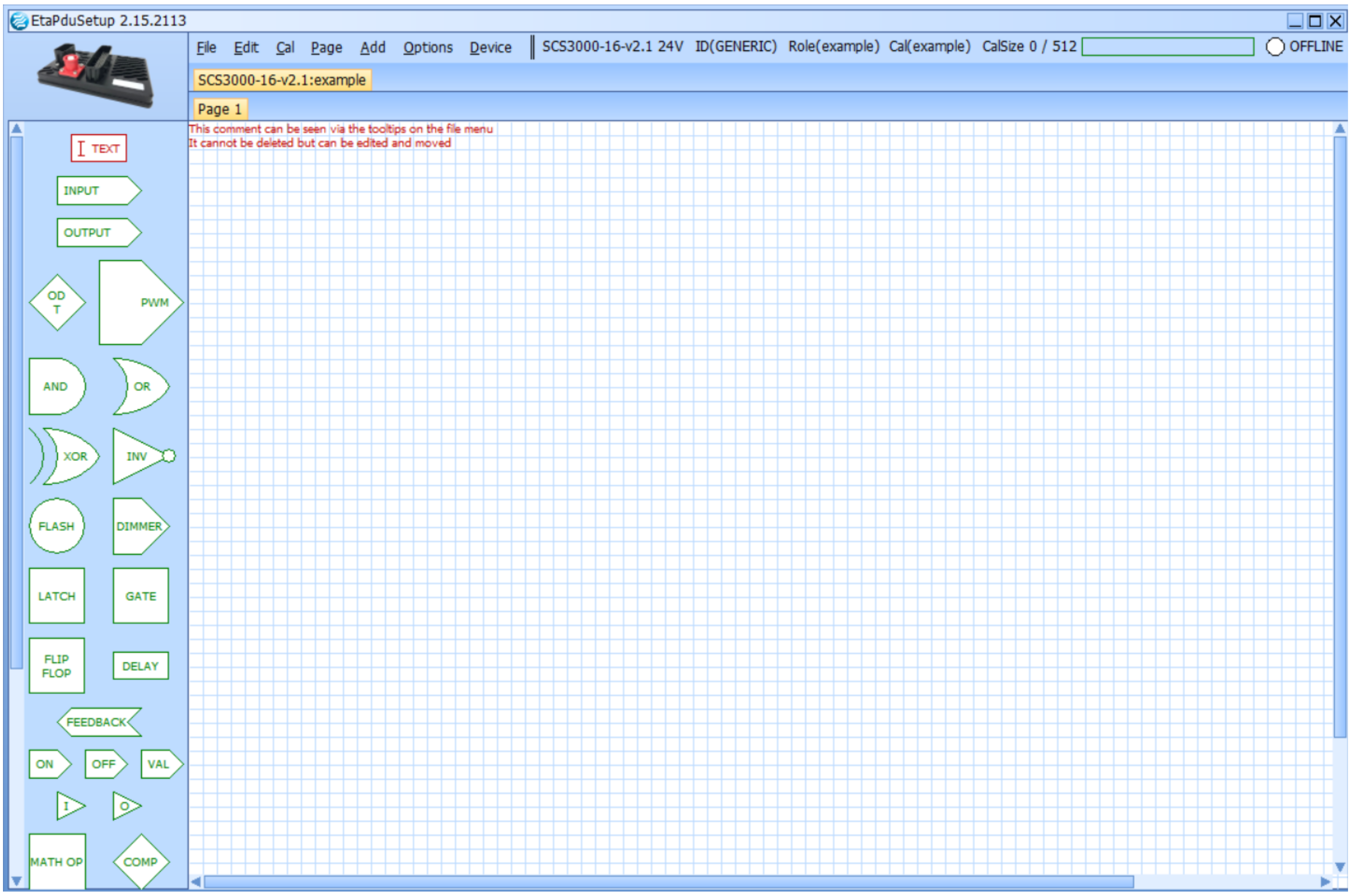


Figure 12: Main display

The menu bar displays the total calibration size and the connection status. The bar displayed represents the calibration size in relation to the total available memory.

In the upper left corner of the schematic diagram is a short information text, the so-called tooltip comment. This cannot be deleted but can be edited and moved. This comment is located on the first page created.

When the configuration creation is complete, it can be validated by selecting »Cal«, »Validate«. If validation fails, the error is displayed, and an indication of the cause is given (Figure 13).

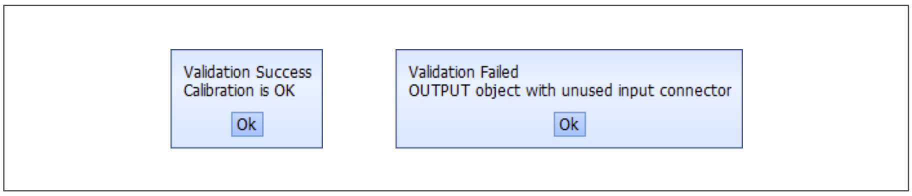


Figure 13: Configuration validation

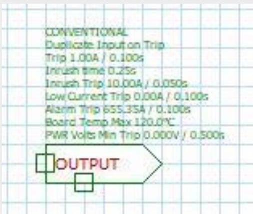
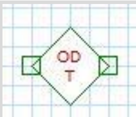
7.3.2 Symbols/ Components

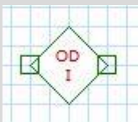
Components can either be dragged onto the display with the mouse from the component panel shown on the left side of the screen or added via the »Add« menu. They can then be dragged into position on the schematic diagram grid. Hold down <Ctrl> or draw a box to select multiple components. Select component nodes and drag to draw connections between them. Add connections to create bends by selecting part of the connection or the end of a loose connection. Components and connections can be deleted or more options displayed by right-clicking.

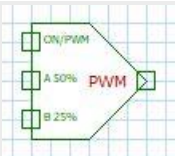
Limited number of components in SCS1000 configurations:

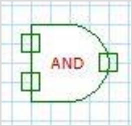
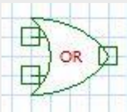
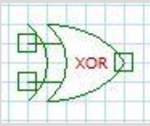
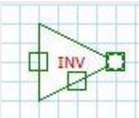
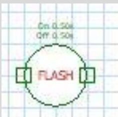
- The number of components that can be processed inside a SCS1000 configuration is currently limited to 128.
- Input and output symbols don’t count as components
- Trying to load a calibration including too many components to an SCS1000 can generate an error message of this type: “Invalid component cross reference index” or “unsupported logic”

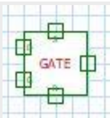
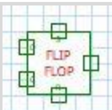
The following table describes the available symbols and how they work.

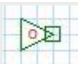
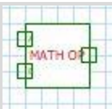
<table>
<tr><th>Name</th><th>Symbol</th><th>Description</th><th>Menu options
(right click on symbol)</th></tr>
<tr><td>Text</td><td>
</td><td>Insert text.</td><td>Edit or fix text. When the text is fixed, it cannot be moved or edited until it is unlocked.
All text is shown in red in the calibration.</td></tr>
<tr><td>Input</td><td>
</td><td>Physical input or soft input.</td><td>Other features (see 7.3.3.1).</td></tr>
<tr><td>Output</td><td>
</td><td>Physical output or soft output
Physical outputs have a »status output« that acts as a status signal.</td><td>- Add or remove the status output.
- Other features (see 0)</td></tr>
<tr><td>ODT</td><td>

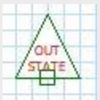

</td><td>Output distributor for multiple outputs.
Merged outputs (team) trip simultaneously.

Output distributor for multiple outputs
Merged outputs (team) trip independently.</td><td>Switch between individual or team distribution.</td></tr>
<tr><td>PWM</td><td>
</td><td>This is a legacy component and not required in 2.20.x and upwards firmware.</td><td></td></tr>
</table>

AND		Logical AND switches when all inputs are high.	Adding or removing additional input pins up to a maximum of four inputs.
OR		Logical OR switches when one or more inputs are high.	Adding or removing additional input pins up to a maximum of four inputs.
XOR		Logical exclusive OR switches when only one input is high.	Adding or removing additional input pins up to a maximum of four inputs.
INV		Logical negation. Invert the input.	Adding or removing the input control pin. Causes the inverter to operate only when the input is active.
Flash		Switching between high and low at set intervals	Setting the On/Off switching time.
Dimmer		Adjustable PWM output control. Switches between minimum and maximum duty cycle at a defined rate	Setting minimum and maximum duty cycle, as well as switching rate
Latch		LATCH TOGGLE: The output changes state when T (Toggle) is high. The output is set high when S (Set) changes to high and set low when R (Reset) changes to high.	Adding or removing set, toggle and reset input. Setting the automatic termination time that resets the latch after the specified time. Setting the Auto Cancel timer to zero disables it.

		LATCH CLK-TO-1. If only the optional SET and/or RESET inputs are used, there is no difference between these modes. The third optional input is now either a toggle input, which matches the behaviour of a LATCH in previous releases (except see section 5.2), or a clock input, which always sets the latch to 1 on a positive edge. This mode can be more convenient for processing physical momentary button inputs in particular.	Switch between LATCH TOGGLE and LATCH CLK-TO-1.
Gate		Output = D (data input) when G (gate input) is high. Output displays latch function when G is low. S sets output high until reset, R sets output low.	Adding or removing set and reset input.
Flip Flop		Output = D (data input) only with rising edge at C (clock input).	Adding or removing set and reset input.

		S sets output high until reset, R sets output low.	
Delay		Switch-on delay according to set time lag for on and off.	Setting the time lag, change to dynamic delay.
		The dynamic delay takes the validation delays from additional inputs, which may change in real time (even during the validation delay periods).	Setting the time lag, change to switch-on delay.
Feedback		Feedback loop to inputs	None
On (1)		Permanent high input	None
Off (0)		Permanent low input	None
Val		A defined analogue value	Set value.
Link In		Termination to continue at the associated link OUT (may be on another page)	Edit the link name for connection with link out.
Link OUT		Continuation of the signal from link IN (may be on another page)	• Determine which link IN is to be connected • »Goto LINK_IN« for quick jump to related link.
Math OP		Performs the selected mathematical operation with the applied values A and B and	Selection of the mathematical operation (add, subtract,

		makes the analogue value available at the output.	multiply, divide, min, max, counters etc).
Comp		Compares two values and sets output high or low depending on the defined comparison	Selection of the comparison function (greater than, less than, equal, unequal) and setting of a hysteresis
Event In		For activating special PDU features and behaviours, such as resetting the module via hardware pin, sending serial number and SW version via CAN, keeping module active/awake, etc.	Setting the event (reset, lamp, Power_ Hold, CAN_ver_Tx, OEM 1 – 8, etc.)
Out State		• For further processing of PDU-internal states and events, such as module tem- perature, voltage supply, potential of the wake pin, tripping of a channel, etc.	Setting the event (Fault, Wake, Re- set_SW, Tot_Current, Power_V, Logic_V, Board_Temp,CAN RX, etc.)
KP DIM		This component is for dimming a keypad and as a legacy component no longer needed.	

A soft input refers to an input received via CAN. A soft output refers to an output value sent via CAN.

The text of a component appears green when it is fully defined and red as soon as not all values and properties are set (Figure 14). A component is defined when all its input and output nodes are used and the properties are set correctly.

It is mandatory that all input and output pins are used or removed before simulation or programming.

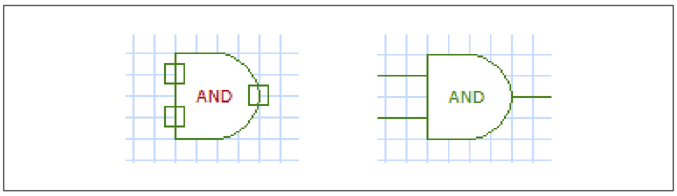


Figure 14: Symbold definition

7.3.3 I/O properties

All I/O property information can be seen in the schematic diagram above the component. These include the CAN address and byte number for soft I/Os.

7.3.3.1 Input properties

Figure 15 shows the settings for the input properties. The configuration options are described in more detail below

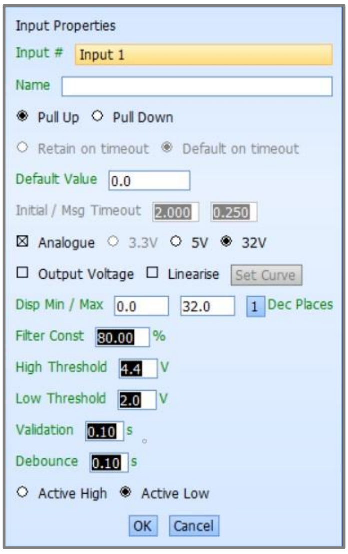


Figure 15: Input properties

Input#

Assignment of a physical input or a soft input (CAN). CAN inputs are set up under »Cal«, »Communications«.

Name

Enter a name that is displayed in the schematic diagram display.

Pull Up/ Pull Down (only for physical inputs)

Determines whether the input is in the high or low state when no input signal is present.

Retain on timeout/ Default on timeout (only for soft inputs)

Retain on timeout applies no change between CAN commands. Default on timeout allows you to reset the value of the soft input to the Default Value, if the message times out.

Default value (only for soft inputs)

Set the default value of the input if »Default on Timeout« is selected.

Initial/ Msg timeout (only for soft inputs)

Set the maximum amount of time that may elapse between two CAN input messages before a timeout is detected.

Analogue

Definition of the input as an analogue input

3.3V/ 5V/ 32V

This is the range for the physical input voltage. Some of these values will grey out depending on the unit and output selected.

Output Voltage

Outputs the incoming voltage into the schematic as a value.

Linearise

Outputs the incoming voltage into the schematic as a value. These values can be mapped using linearisation curves.

Disp Min/ Max

This setting defines the minimum and maximum limits from the incoming inputs into the schematic.

Filter Const

This functionality is a very simple way to smooth incoming signals, especially for signals expected to change slowly in reality (e. g. temperature sensors).

Please see table for approximate recursive filter cutoff frequency to filter constant.

%	99.4	96.9	93.9	91.0	88.2	85.5	73.2
Hz	1	5	10	15	20	25	50

High Threshold

Input of the upper voltage level from which the input is evaluated as high (for internal further processing as a digital signal).

Low Threshold

Input of the upper voltage level from which the input is evaluated as low (for internal further processing as a digital signal).

Validation

Requires an input signal to be consistent for the defined period of time before it is acknowledged as input. The validation causes a small delay but avoids unwanted switching operations due to short peaks (see Figure 16)

Debounce

When a change of state is detected, the input signal is immediately stabilised or debounced for the set period of time (see Figure 16).

Active High/ Active Low

Setting whether the input is active at high or low voltage level. The logic uses the active input state for further processing and not the voltage level.

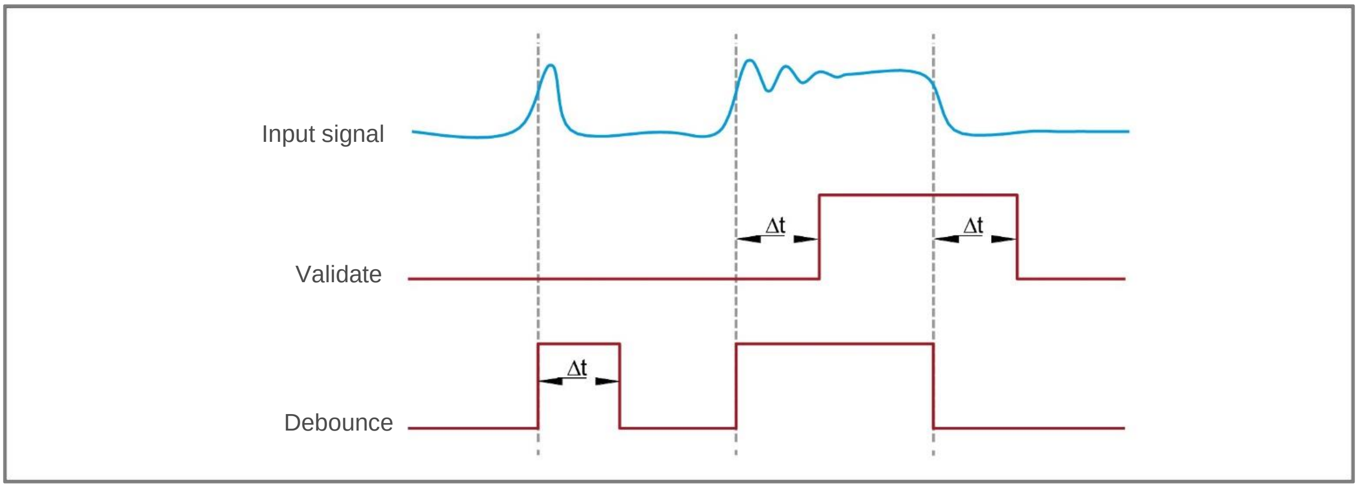


Figure 16: Validation and debounce

7.3.3.2 Output properties

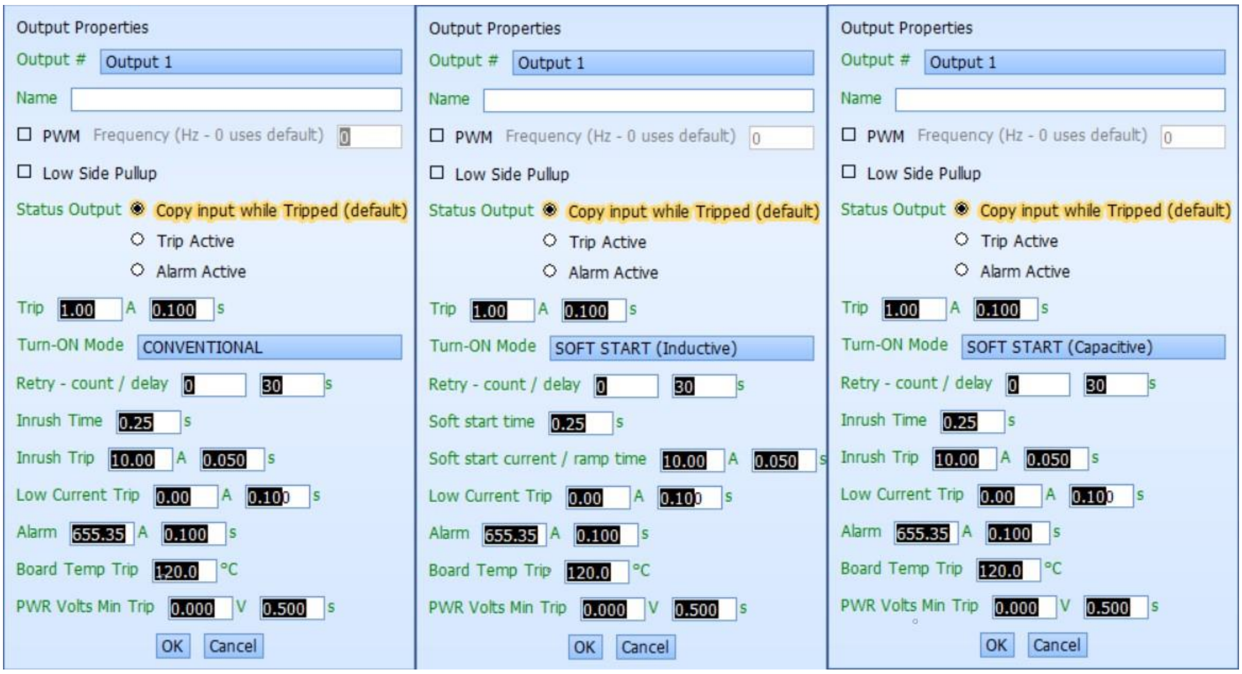


Figure 17: Output properties

Output#

Assignment of a physical high side output, a physical low side output or a soft output (CAN). CAN outputs are set up under »Cal«, »Communications«.

Name

Enter a name that is displayed in the schematic diagram display.

PWM

Definition of a physical output as a PWM output. The analogue value present at the symbol input is used to set the duty cycle. The positive analogue value corresponds to the duty cycle in percent.

The PWM frequency is set by default to the maximum possible frequency of the output (see SCS1000 and SCS3000 data sheet).

PWM must not be used with capacitive loads, as this might cause a malfunction of the output driver, SOFT START (Capacitive) must be selected if the loads will be capacitive

Low side pullup (only for low side outputs)

Activation of the low side pull-up to 5 V. This is intended for PWM logic where an input requires a full signal.

Status output

Selection of the status output behaviour.

Copy input while tripped – When an error occurs, the status output goes high when the output is on and stays low when the output is off.

Trip active – When an error occurs, the status output goes high regardless of the switching state of the output.

Alarm active – When the current exceeds the alarm value for the set alarm time, the status output goes high regardless of the trip condition.

Trip

The output triggers an error if the set trip current is exceeded for longer than the set time period. This switches off the faulty output.

Turn on Mode

Some specific kinds of loads might produce a significant inrush current. This peak might cause tripping of the outputs and therefore needs special handling.

Conventional - for devices with turn-on current within standard capability

The output is turned on without PWM.

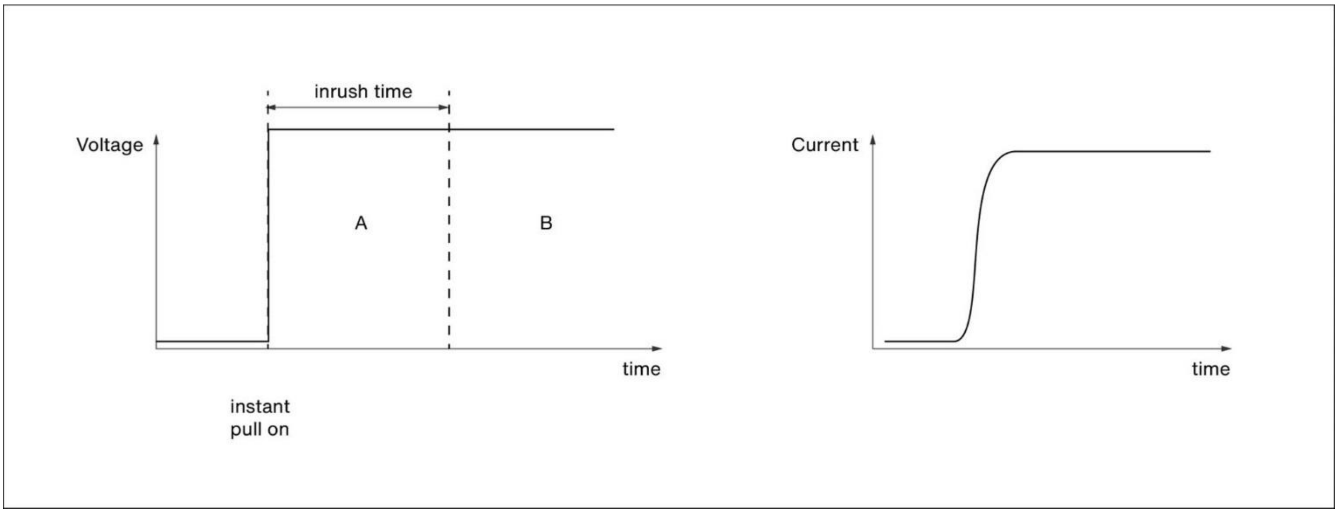


Figure 18: Conventional turn on mode

Capacitive - for devices with extremely high very-short-duration turn-on current (e.g. DC/DC converters)

The PWM will run a predefined pattern and not do any measurements. Soft start is ending after a defined time and after that the inrush limits apply for the rest of the inrush time.

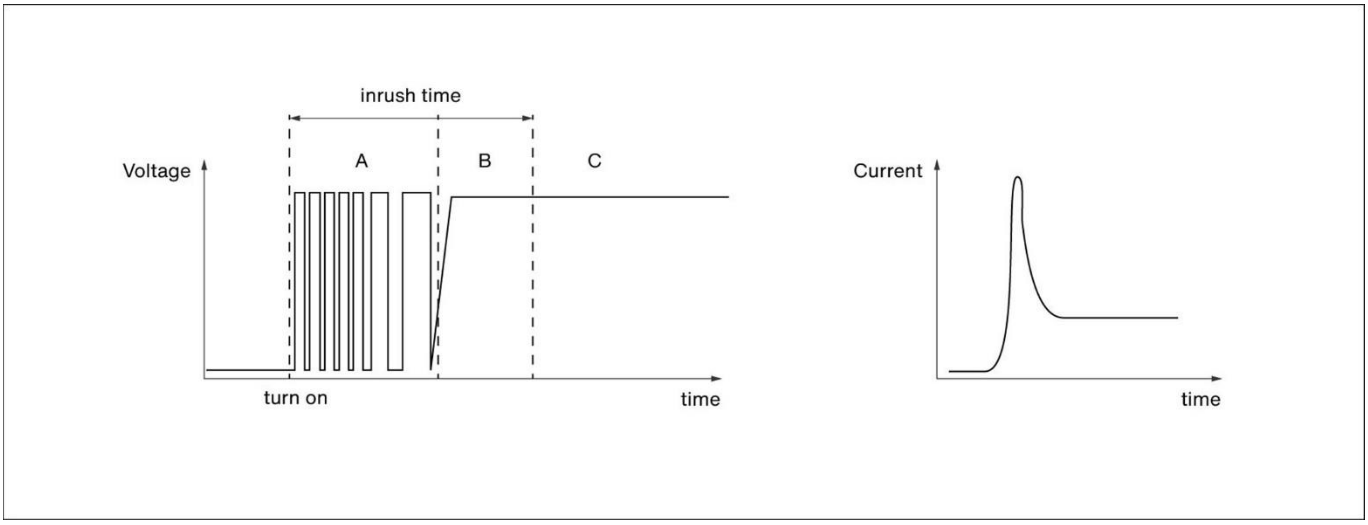


Figure 19: Capacitive soft start

Inductive - for devices with high turn-on current that decays much more slowly (e.g. fans) - the dashed line on the expected/example current graph is "unconstrained current e.g. fan inrush”.

The unit will use PWM for starting up the load and adapt the duty cycle based on current measurement. Soft start with PWM is ending as soon as 100% of the duty cycle is reached. If this is not achieved within inrush time, an Inrush Trip will occur.

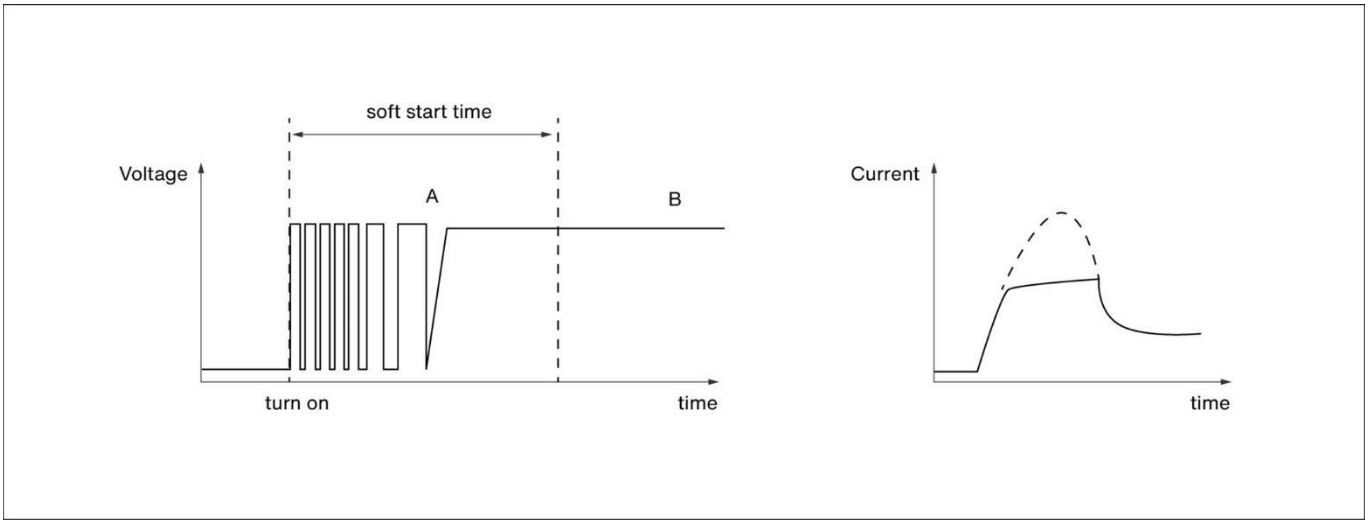


Figure 20: Inductive soft start

Retry-count / delay.

Number of retries in case an output could not be turned on. Delay defines the delay time between retrying.

Inrush time

Definition of the inrush phase duration. This determines how long the higher inrush allowance is active.

Inrush trip

During the inrush phase (inrush time), the the higher inrush trip value applies, instead of the standard trip current.

The output triggers an error if the inrush trip current is exceeded for longer than the set time period. This switches off the faulty output.

Soft start time

Definition of the soft start phase duration.

Soft start current / ramp time

Definition of the maximum current to which the system should limit. It must be higher than the normal current consumption during operation. The ramp time indicates the minimum time that must elapse before the output may be fully switched on.

Low current trip

The output triggers an error if the current is below the specified current for longer than the specified time.

Alarm

A CAN message is sent as a warning if the output current exceeds the specified value for longer than the specified time period. It also activates the status output of the respective output if »Alarm active« was selected.

Board Temp Trip

The output trips when the board temperature exceeds the set maximum temperature. In this way, outputs with low priority can be switched off in favour of others to prevent the module from overheating.

PWR Volts Min Trip

The output trips when the supply voltage falls below the defined voltage for the defined duration. This allows outputs with low priority to be switched off in favour of others in case of undervoltage.

Fault trips can be reset with a 'circuit reset' (activating the RESET device (event-in symbol) in the configuration or switching the physical RESET pin) or by switching the supply on and off.

7.3.3.3 Configuration of Soft Inputs and Outputs

Soft inputs and outputs can be configured using custom CAN. After defining the CAN variable, the corresponding soft input or output must be assigned in custom CAN. These soft inputs and outputs can then be used in the schematic by choosing it as an input or output component.

7.3.4 Communication settings

Settings for communication can be made under »Cal«, »Custom CAN«.

Using custom CAN makes it possible to setup the speeds of the CAN bus (SCS3000) as well as all the custom CAN messages. There is also the possibility in the SCS3000 range to use the module as a gateway.

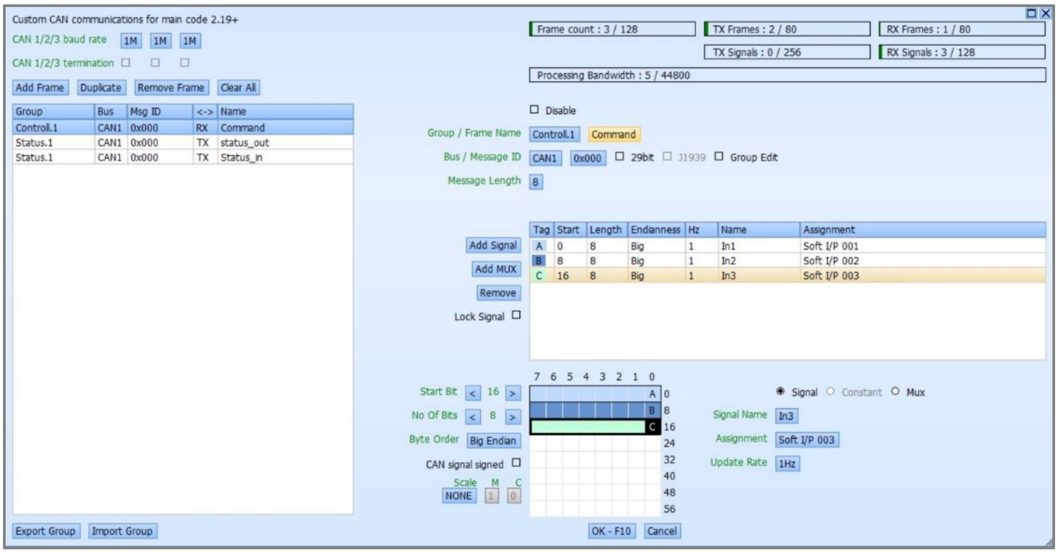


Figure 21: Communication settings

CAN baud rate

Changing the baud rate of the CAN bus. For the SCS1000 chosen baud rate must match the baud rate set via »Device«, »Set SCS1000 Comms«. For the SCS3000 it must match the baud rate defined in the Power Config file.

CAN termination

The SCS1000 and SCS3000 modules have no integral CAN termination. This checkbox is for internal use and therefore greyed out.

Add Frame

Add a new CAN frame.

TX: This CAN frame is transmitted by the unit

TXG: Gaited frame, will be sent at defined frequency

RX: CAN frames which shall be received and evaluated by the unit

TXC: Copied frame, will be sent immediately after receival

TXT: CAN frames will only be transmitted if triggered from the schematic

Duplicate

Duplicate marked CAN frame.

Remove Frame

Remove marked CAN frame.

Clear All

Remove all CAN frames.

Export Group

Export the group of CAN frames as a. LRCCG file.

Import Group

Import a group of CAN frames from a. LRCCG file.

Disable

Disable the selected CAN frame.

Group / Frame Name

Assign a group and a name to the CAN frame.

Bus / Message ID

Assign the CAN frame to a CAN bus and assign a message ID.

Message Length

Define the message length. The maximum message length for standard CAN messages is 8 bytes.

Initial Skipped frames / Tx Freq

Define how many frames will be skipped after start up and the frequency of transmission.

Add Signal

Add signal to the selected CAN frame.

Add MUX (only RX)

Add Mux value to CAN frame.

Add Constant (only Tx)

Add constant value to CAN frame.

Remove

Remove marked signal.

Lock Signal

Disable editing of the signal.

Start Bit

Define start bit of marked signal.

No of Bits

Define length of marked signal.

Start bit and length of the signal can also be graphically defined.

Byte Order

Choose between big endian or little endian.

CAN signal signed

Define whether signal is signed or not.

Scale

Add offset or calculation for signal value.

Signal name

Name the marked signal.

Assignment

Assign input, output, or predefined values to the signal.

Update Rate

Choose the update rate for the marked signal.

On the top right a summary of the available and used signals is provided.

7.3.4.1 Predefined variables

PDUsetup provides several predefined variables for outputs.

Variable	Recommended Size	Comment
Board temperature	1 byte	For better resolution multiply with 10 (increases size of variable accordingly)
Debug/ debug		Internal use only
Device Main Code Branch	2 bytes	
Device Main Code Revision	2 bytes	
Device Main Code Version	1 byte	
Device Serial Number	2 bytes	
Device Type Code	1 byte	0x15 SCS1000-16HS 0x10 SCS3000-34 0x11 SCS3000-48 0x12 SCS3000-64 0x13 SCS3000-16 0x16 SCS3000-16-v2.1

		0x17 SCS3000-34-v2.1 0x18 SCS3000-48-v2.1 0x19 SCS3000-64-v2.1
Filename Character	1 byte	
Hard Input States x-y	1 byte	
Hard Output States x-y	1 byte	
Input x – Value	1 byte	
Input x – Volts	1 byte	For better resolution multiply with 10 (increases size of variable accordingly)
Keypad Dimmer Selection value %		Legacy functionality, no longer in use
Logic Supply Volts	1 byte	For better resolution multiply with 10 (increases size of variable accordingly)
(LS) Output x – Current	1 byte	For better resolution multiply with 10 (increases size of variable accordingly)
(LS) Output x – State	1 byte	
(LS) Output x – Value		Legacy functionality, no longer in use
Main Power State		Legacy functionality, no longer in use
On Time	3 bytes	Max resolution: 100^{th} of a second
Power Supply Volts	2 bytes	
Soft Input x – Value	Depends on soft input	
Soft Input States x – y	1 byte	

Soft Output x – Value	Depends on soft output	
Soft Output States x – y	1 byte	
Total Current (filtered – A)	2 bytes	
Total Current (instantaneous – A)	2 bytes	
X/Y/Z – axis accelerometer (g)	2 bytes	Only available for SCS3000-XX v2.1
X/Y/Z – axis gyroscope (deg/s)	2 bytes	Only available for SCS3000-XX v2.1

7.4 Sleep/ Snooze mode

The SCS1000 and SCS3000 have a so-called sleep mode. This is a low-power consumption state that allows a vehicle to be switched on and off without draining the battery.

Several options are available to configure the behaviour of this sleep function.

Sleep mode on the SCS1000 is only available with boot code v1.21 or newer and and firmware v 2.20.10 or newer.

7.4.1 Power Config

When a module is to go into sleep mode or wake up again is defined in the power configuration. The configurable sleep options include:

- Dedicated wake pin (SCS3000 only)
- Selectable analogue input for wake up
- Wake-up on general CAN activity (SCS3000 only)
- Wake-up on defined specific CAN activity with defined data content (SCS3000 only)

Wake-up on CAN activity results in increased quiescent current in sleep mode.

To access the Power Config and make settings for sleep mode, select »Device«, »Power Config«. A live connection with a module, is not possible during this time.

The Power Config is saved as a text file that can be saved on the PC and loaded into devices.

The »Save« and »Load« buttons in the lower part of the window are used to open and save offline configurations that are saved on the PC. The »Get« and »Set« buttons are used to upload a configuration from a connected device and to save the Power Config on a connected device, respectively.

To edit the sleep configuration, make sure that »read only« is unchecked and enter text in the text area. To set, change only the numbers behind the square brackets [ ]. The required format is described in the configuration itself.

A comment can be added preceded by »//«. However, comments are only saved offline and are not retained in the device. The Power Config file can also be edited with any text editor, e. g. Notepad.

Figure 22 shows an extract of a Power Config of an SCS3000 module.

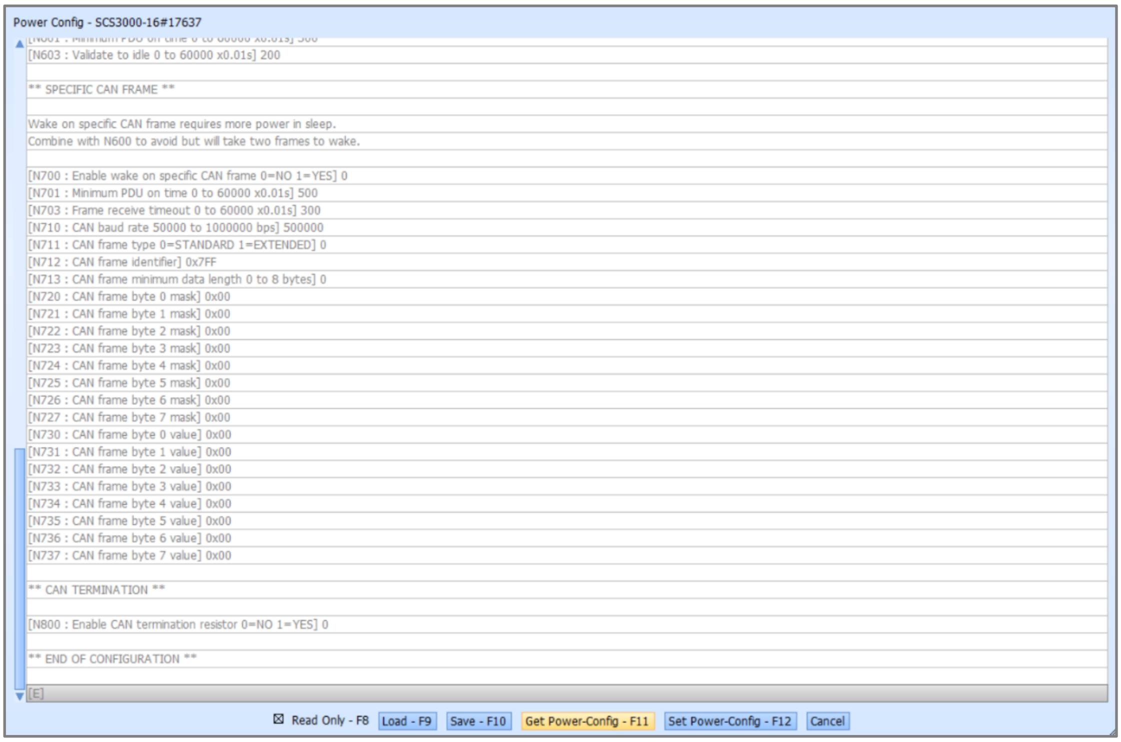


Figure 22: Power Config

7.4.2 Sleep Symbols

Two EVENT components allow sleep functions to be integrated in the configuration schematic diagram. The wake component reflects the state of the PDU's dedicated wake pin. The PWR HLD component, when active, keeps the module awake, allowing controlled shutdown of vehicle systems.

7.5 SCS1000 Comms

With PDU setup 2.15.2113 or newer all settings previously done via etaSetEcuComms_V1-0_2021-11-12.exe can now be found under »Device«, »Set SCS1000 Comms«.

Set SCS1000 Comms (and etaSetEcuComms) requires boot code 1.15 or newer.

The following node address settings are possible:

- Set the CAN baud rate (250 kbit/s, 500 kbit/s, 1000 kbit/s)

- Define the module's standard node address (Supported range: 128d to 247d)
- Enable J1939 address claiming
- Fix the module's node address (no address claiming allowed)
- Define input pins (inputs 5 to 12) to override specific bits of the module's source address, depending on the potential of these pins (PMA)

7.6 Tools

7.6.1 Simulation

A complete or parts of a configuration can be simulated to check if the calibration behaves as intended. All input nodes must be assigned before simulation, output nodes can be left free.

The simulation includes the state of all internal components so that each step and state can be monitored.

Switch the simulation mode on or off by selecting »Cal«, »Start/Stop Simulation«. The connection status in the top right corner of the window should flash green and indicate 'SIMULATING'. In simulation mode, all components are locked so they cannot be moved or edited. Inputs can be switched on and off by selecting them. An error can be simulated by clicking on an output. Symbols are coloured when they are active, errors are displayed in red (see Figure 23).

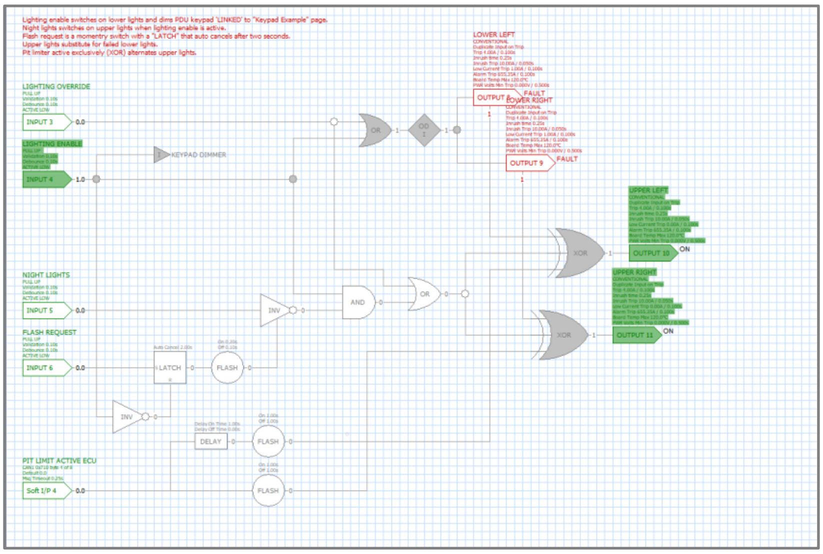


Figure 23: Simulation

7.6.2 Monitoring

Select »Device«, »Connect« to establish a live connection with a PDU. This automatically retrieves the saved calibration and starts monitoring all inputs and outputs as well as the supply voltage and board temperature and generates general messages that are shown on the right side of the main display (see Figure 24).

The contents of the message box can be saved in a text file in the working directory by selecting »Device«, »eXport messages«. Information in the message field can be cleared by selecting »Device«, »clear Messages«.

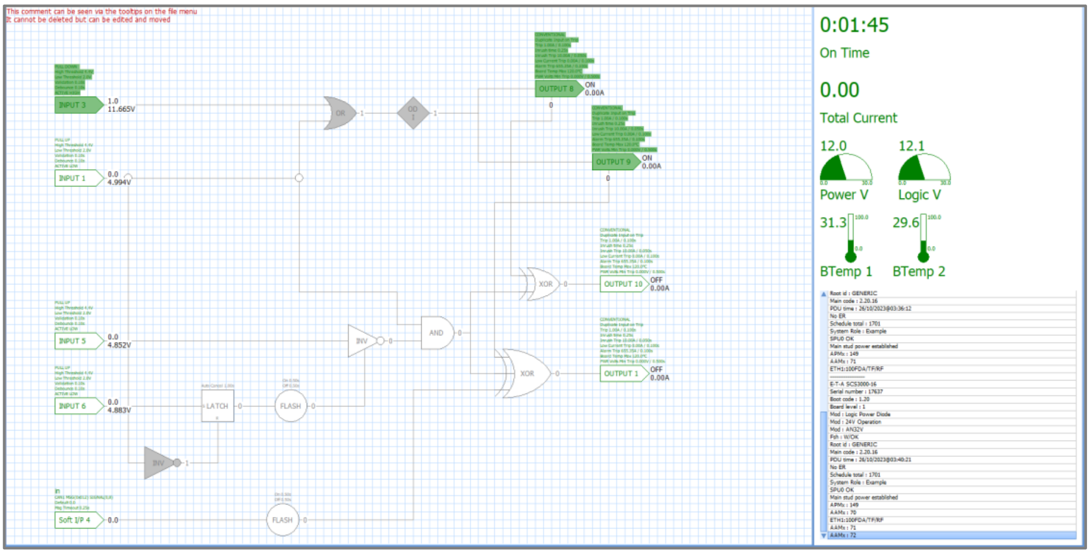


Figure 24: Live monitoring

7.6.3 Expert Frequency Mode

PDUsetup 2.15.1966 introduces variable schematic evaluation rates to both the SCS1000 and SCS3000 configurations. This allows choices to be made for reduced latency for particular control paths, potentially balancing the increased processing load of those choices against increased latency for other paths. This affects hard input processing rates, logic component processing rates, and hard output processing rates.

Hard inputs, logic components, and hard outputs may all now have processing frequencies adjusted. PDUsetup allows ‘Expert Frequency Mode' to be set to enable this, on a per-configuration basis, it can be activated under »Cal«, »Enable eXpert frequency mode«.

If the mode is not set for any particular configuration, the entire schematic will be processed at 100 Hz, as was the case in previous releases.

For minimum latency from input (whether hard input or soft input) through to output (whether hard output or soft output), the entire path should be at the same frequency. Anywhere that a value in the schematic moves between components at different frequencies, this will introduce additional latency. Such instances are therefore colour-highlighted (yellow / red instead of green).

The latency introduced at any particular crossing between different frequency paths will be consistent at run time and no greater than that implied by the frequency of the receiving component but may be lower or even zero.

The actual latencies in such cases have complex dependencies and may be significantly altered by changes elsewhere in the calibration. A simple facility has therefore been included to click on a component and set the entire preceding net to the same update frequency.

As with the custom CAN processing, a processing budget has been defined so very complex calibrations may have to trade off lower-frequency paths to 'pay for' high frequency ones.

Minimal theoretical latency for a complete 1000Hz path is 1-2ms, and this is very nearly achieved for soft inputs. For hard inputs however, an additional ~2ms occurs at present.

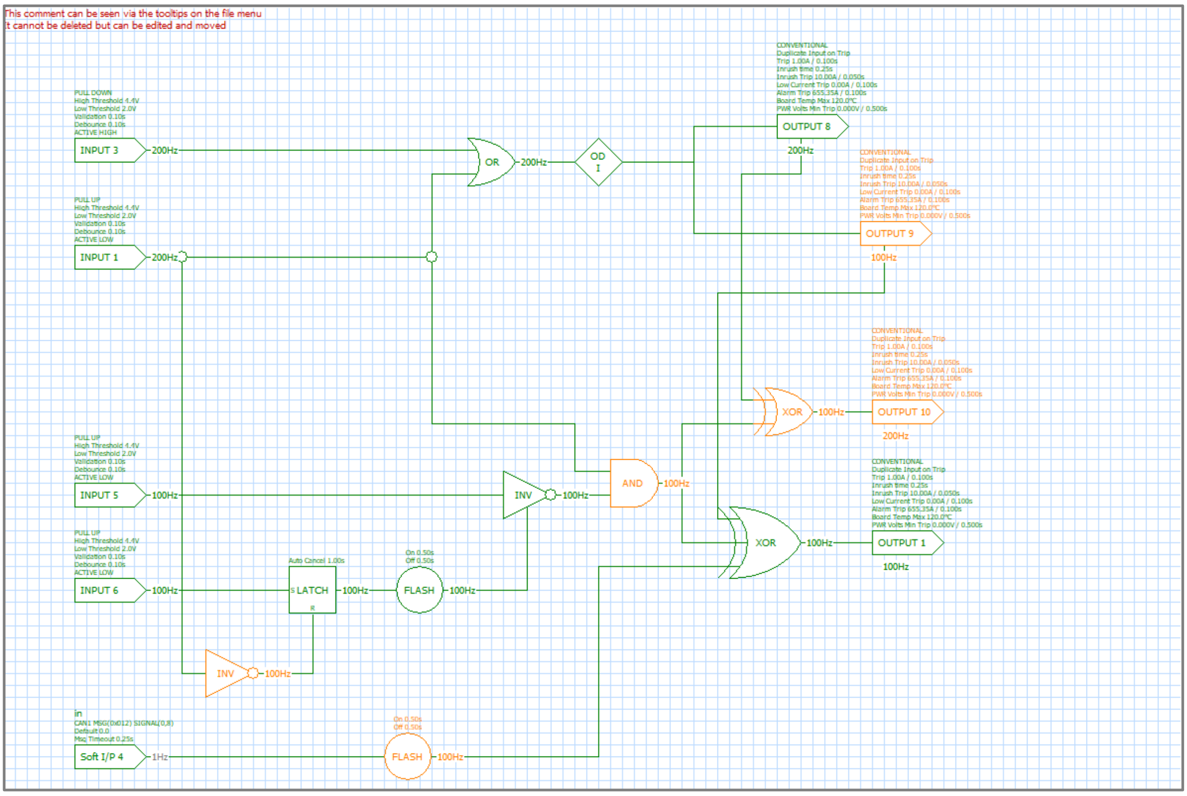


Figure 25: Expert frequency mode

8. UPDATE INSTRUCTIONS

Boot code updates should only be performed upon advice from E-T-A. Files will be provided upon request.

8.1 General Update Sequence for SCS1000 / SCS3000 modules

When updating SCS1000 or SCS3000 modules the general update sequence should be as

follows:

- Boot Code Update
- Main Code Update

In-between builds of boot code or main code can be skipped, e.g. it is possible to directly update a unit that runs on boot code v1.10 to boot code v1.15.

8.2 SCS1000 Boot Code Update

The SCS1000 boot code update is carried out via the CAN interface of the module. The boot code is upgraded using a command line utility.

Prerequisites

- A Peak PCAN USB CAN adapter

- The required boot code update file (for example SCS1000-16HSBootV1-21.exe)

SCS1000 Boot Code Update via command line

Place the .exe file in a convenient location and open a command window in that location, e.g. c:\temp.

To do this, press the windows Home button:

Type “cmd” and press enter to open a command window.

Change directory to the location of the .exe file.

To do so use the cd command as shown in Figure 26.

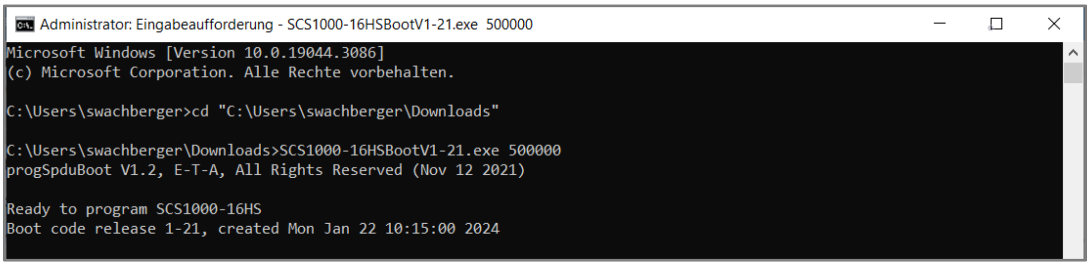


Figure 26: Boot code update SCS1000

Execute the boot code .exe utility (for example SCS1000-16HSBootV1-21.exe) and mention the CAN baud rate in bps as argument. The default CAN baud rate of SCS1000 is 500 kbps.

Example: SCS1000-16HSBootV1-21.exe 500000

When you see the message “Turn device on now”, switch on the SCS1000 (or switch it off and on again if already powered up). Then wait for the programming to complete.

8.3 SCS3000 Boot Code Update

The SCS3000 boot code update is carried out via the RS232 interface of the module. The boot code is upgraded using a command line utility.

Prerequisites

- A USB to RS232 adapter

  The physical connection between the adapter and the unit must be established as follows:

  Tx (PC) ↔ Rx (SCS)

  Rx (PC) ↔ Tx (SCS)

  GND (PC) ↔ GND (SCS)

- The latest boot code update file (for example SCS3000-34Bootv1-25.exe)

SCS3000 Boot Code Update via command line

Place the .exe file in a convenient location and open a command window in that location, e.g. c:\temp

To do this, press the windows Home button:

Type “cmd” and press enter to open a command window.

Change directory to the location of the .exe file.

To do so use the cd command as shown below.

Execute the boot code .exe utility (for example SCS3000-48Bootv1-25.exe) and mention the respective COM port as argument. The used COM port of your USB to RS232 adapter can be found in the device manager of your PC.

Example:

SCS3000-48Bootv1-25.exe 5

When you see the message “Turn ECU on now”, switch on the SCS3000 (or switch it off and on again if already powered up). Then wait for the programming to complete.

8.4 SCS1000 & SCS3000 Main Code Update

The main code update on SCS1000 is carried out via the CAN interface of the module, whereas the main code update on SCS3000 is done via the Ethernet interface of the unit.

Prerequisites SCS1000

- A Peak PCAN USB CAN adapter
- The latest firmware update file (for example SCS1000-16HSv2-19-12.exe)

Prerequisites SCS3000

- Ethernet connection between Ethernet Port 1 of the SCS3000 module and the PC
- The latest firmware update file (for example SCS3000-34v2-19-10.exe)

SCS1000 / SCS3000 Main Code Update via executable

Start the update process by executing the firmware update file directly out of the explorer (double-click onto the .exe file).

The executable will then automatically open a command line window and ask the user to indicate the serial number of the device that should be flashed. Enter the respective device serial number and start the update process, then wait for the programming to complete.

9. LIST OF ABBREVIATIONS

CAN	Controller Area Network
ECU	Electronic Controller Unit
HSD	High Side Driver
ID	Identifier
IP	International Protection
ISO	International Organization for Standardization
LED	Light Emitting Diode
LSB	Least Significant Byte
MSB	Most Significant Byte
PC	Personal Computer
PDU	Power Distribution Unit
PGN	Parameter Group Number
SAE	Society of Automotive Engineers
SCS	Smart Control Systems
USB	Universal Serial Bus

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