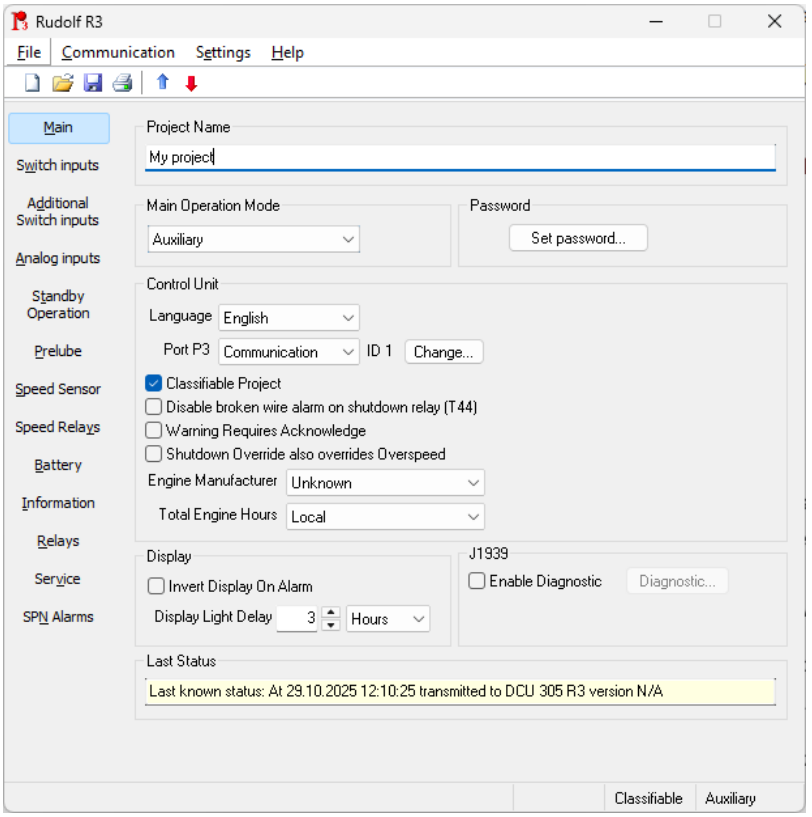
Publication P/N 1501537

Rudolf R3 User Manual

DCU 305 R3 configuration software



auto MASKIN

Table of contents

1 Introduction

This document describes the **Rudolf R3** configuration software for PC.

Rudolf R3 is the PC configuration software used to fully customise the DCU 305 R3 range of diesel engine control units; hereafter referred to as the control unit.

1.1 Important information

Rudolf is a powerful configuration tool that can completely change the engine control unit's current behaviour.

Ensure you thoroughly understand your system and exercise caution when modifying critical parameters in an installed system.

1.2 System requirements

Rudolf runs on Windows® 95 through Windows 11.

1.3 Installation

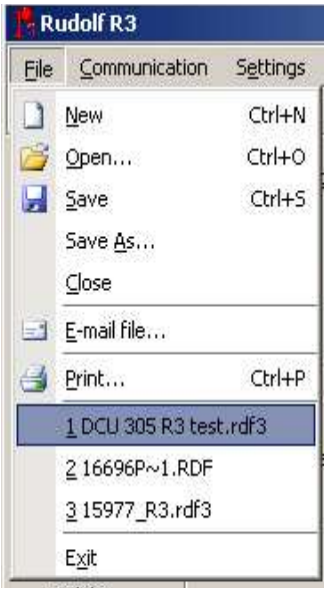
The latest available version is available from auto-maskin.com

Follow the guidelines as given by the Setup program.

2 Menu Overview

2.1 File

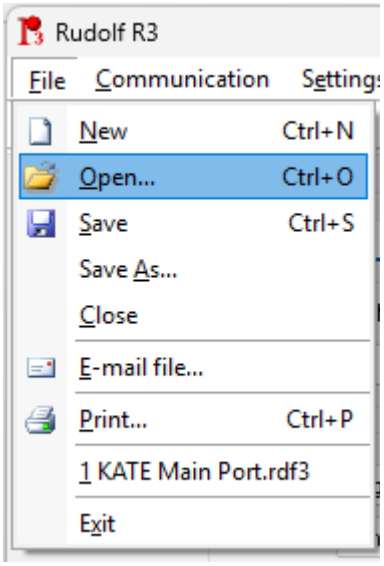
The File menu is used to create new project files, open existing project files, and save current files.



The project files are small (2-3k bytes) and have the .rdf3 extension; for instance, myproject.rdf3.

2.1.1 New

Select this to create a new project. The new project file has default values for most parameters.



Often, it is faster to open an earlier, similar project, modify it, and save it with a new name.

2.1.2 Open

Select this to open a previous project.

Select a file with the .rdf3 extension, and click Open.

2.1.3 Save

Select this to save the open file or project.

If this is the first time the project is saved, Rudolf will prompt for a file name. Type a file name. The .rdf3 extension is added automatically.

2.1.4 Save As

This menu is used when saving a project with a new filename.

Type the new name and press Save.

2.1.5 Close

This closes the open file. If it is not saved, Rudolf R3 will prompt to save it.

2.1.6 E-mail file

E-mail the currently open Rudolf file.

2.1.7 Print

Select this option to get a printout for overview or backup purposes.

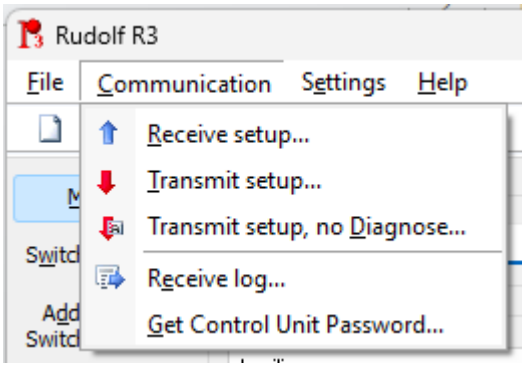
2.1.8 Exit

Select this to quit Rudolf.

2.2 Communication

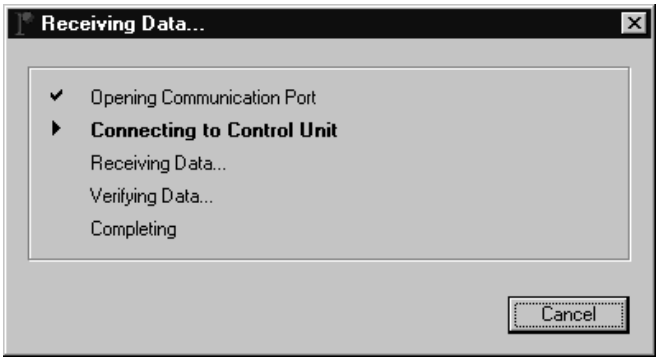
This menu is for uploading and downloading project files between the PC with Rudolf and the control unit.

Connect the Rudolf Cable between the control unit and the PC.



2.2.1 Receive setup

Receive the project currently in a control unit from Rudolf. This takes ~30 seconds. The following dialogue will appear:



Opening Communication Port

Rudolf opens the PC communication port, Com1 - Com10. If the selected port is in use by another program or service, this operation fails.

Connecting to Control Unit

Rudolf makes sure that a control System is connected to the PC.

If it fails, ensure the correct cable is connected and that the control unit is powered. Always use an original Rudolf cable.

Receiving Data

Rudolf receives the project currently in the control unit. If it fails, there is a bad cable connection between the PC and the control unit.

Verifying Data

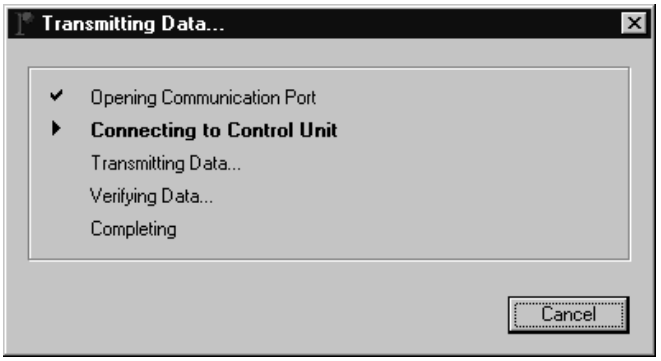
After receiving all the data, Rudolf re-reads the control unit to ensure that all data is correct. If it fails, there is a bad cable connection between the PC and the control unit.

Completing

Rudolf informs the control unit that the upload is finished and closes the PC communication port.

2.2.2 Transmit setup

Transmit the open project to the control unit. This takes approx. ~30 seconds. The following dialogue will appear:



Opening Communication Port

Rudolf opens the PC communication port, Com1 - Com10.

If the selected port is in use by another service, this operation fails. If no port is selected, Rudolf displays a dialogue box that prompts the user to select a port.

Connecting to Control Unit

Rudolf ensures that a control System is connected to the PC and prepares the control unit for receiving a new Project.

If it fails:

- Ensure the correct cable is connected and that the control unit is powered.
- Ensure the unit is in the READY state before transmitting.

For security reasons, it is not possible to transmit a new project if the engine is running. Connection will fail.

Transmitting Data

Rudolf sends the project to the control unit. If it fails, there is a bad cable connection between the PC and the control unit.

Verifying Data

After sending all the data, Rudolf read the control unit and ensured that all the data was correct.

Completing

Rudolf tells the control unit that the download is finished and closes the PC communication port.

Note! The control unit will automatically power off and then turn back on. The control unit is now ready to use with the new configuration.

2.2.3 Receive log…

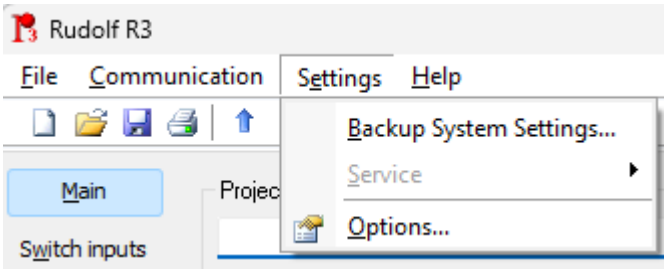
The control unit stores all events in a built-in log. This command will read the entire log as a text file.

Connect the Rudolf Cable between your PC and the control unit.

The log includes the engine start counter and engine hours.

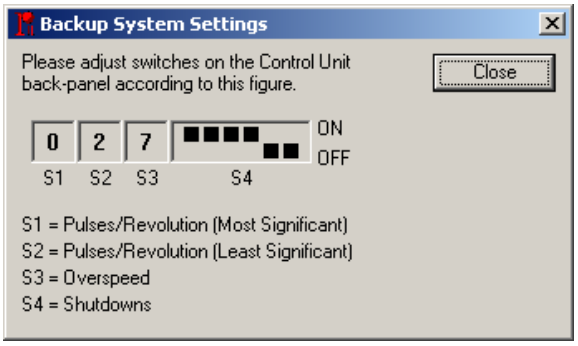
2.3 Settings

This menu has a collection of useful submenus that configure the control unit.



2.3.1 Backup System Settings

Set the backup parameters using the HEX- and DIP switches on the control unit. Use this menu option to verify that the settings are correct.



***Note!** Example dialogue. Always set the HEX-switches (S1-S3) and DIP-switches (S4) on the DCU 305 R3 as advised by Rudolf R3.*

2.3.2 Service

Unless Rudolf R3 is set to Expert Mode, the **Service** menu option is unavailable (displayed in grey text). To access this menu option:

- Press and hold the **Shift**+**Ctrl** keys
- Click **Settings**
- Click **Service**

Under the menu option Service, two options appear:

Delete Log

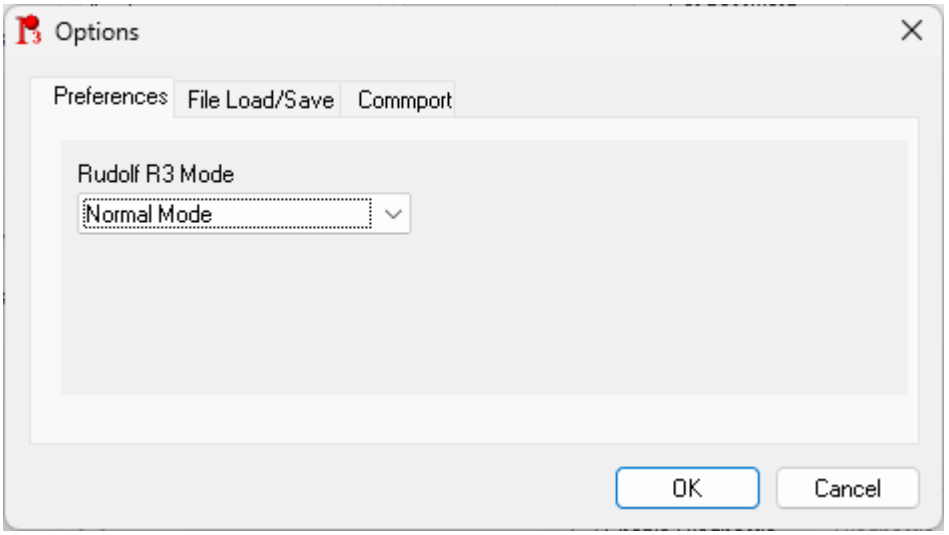
This option clears the event log in the control unit.

Counters

This option allows adjustment of the engine running hours, which is particularly useful if the engine panel has been replaced.

Note! A password is required to make any changes. Contact your distributor for the password.

2.3.3 Options



Preferences – Rudolf R3 Mode

Choose between **Normal Mode** (recommended) and **Expert Mode**.

In Expert Mode, only a minimum of dialogue boxes and warnings are displayed to speed up the configuration, but this may increase the risk of mistakes.

File Load/Save

The default file load/save folders are set here.

Commport

Select the PC communication port to be used by Rudolf R3.

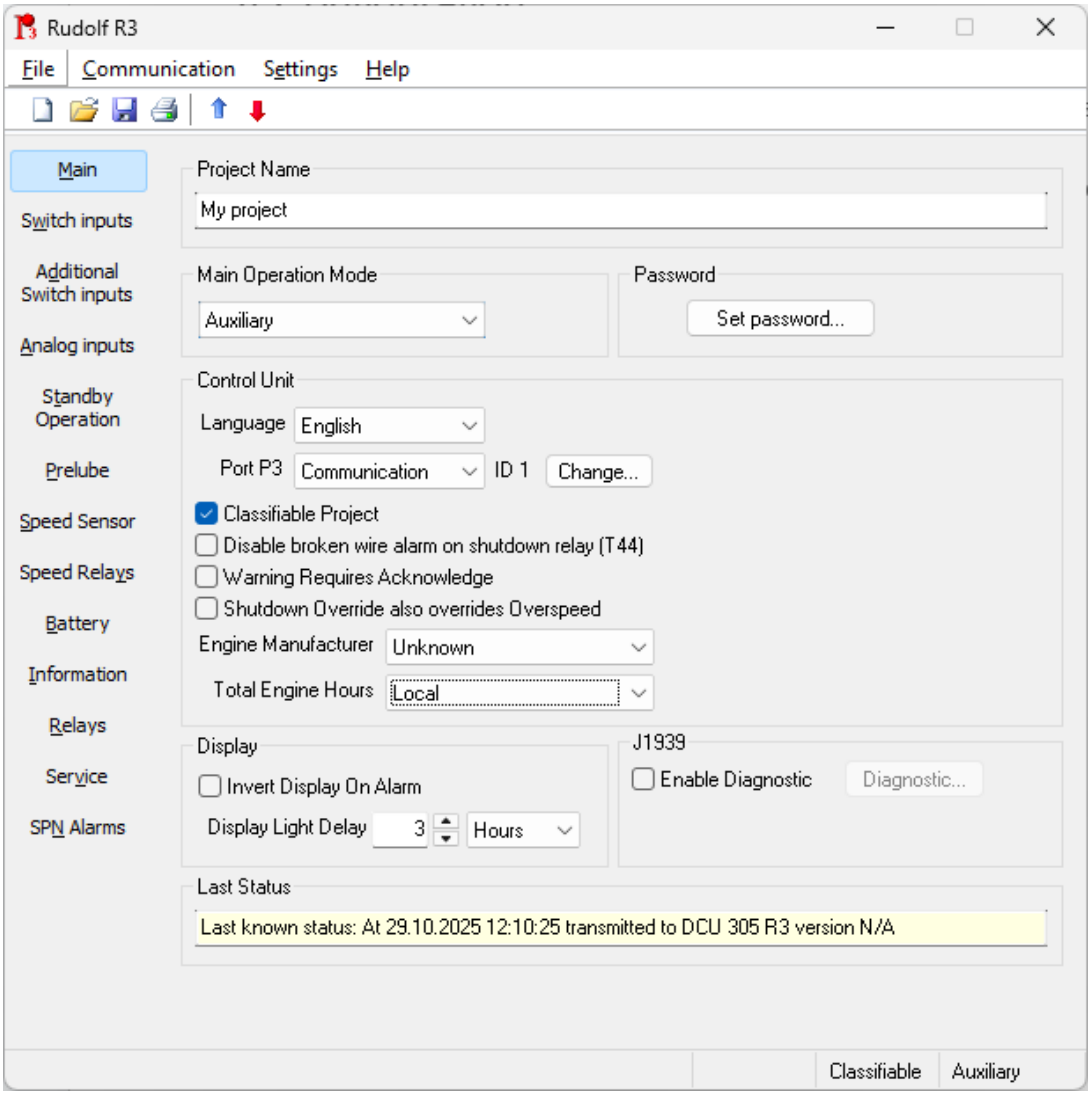
3 Configuration

The configuration is divided into logical sections, which are indicated in the left margin.

The sections can be configured in any order; however, some sections contain signals that are configured in other sections.

Therefore, we recommend starting at the topmost section and proceeding downwards.

3.1 Main



3.1.1 Project Name

The text in this field is visible in the control unit.

3.1.2 Main Operation Mode

Choose one of the four available operation modes.

Main Operation Mode – Summarised

The operation modes and how they affect shutdown channels:

Configured Mode	Control Unit in Manual	Control Unit in Standby
Emergency	Alarm	Alarm
Auxiliary	**Shutdown**	**Shutdown**
Combined	**Shutdown**	Alarm
Propulsion[1]	**Shutdown**	**Shutdown**

Emergency

Select this for a typical emergency genset operation. Shutdown for overspeed only; all other channels are disabled.

Auxiliary

The control unit is prepared for Auxiliary operation mode. Shutdown is enabled for all channels configured for shutdown, including overspeed.

Combined

This is useful when the genset is used as a combined Emergency and Auxiliary genset.

The control unit switches between Emergency and Auxiliary operation mode depending on the state of the Standby button as follows:

- Standby: Emergency operation mode. Shutdowns disabled.
- Manual: Auxiliary operation mode. Shutdowns enabled.

Propulsion

This mode is available only in the P-type series of the control unit.

The control unit is prepared for the Propulsion operation mode. Shutdown is enabled for the Auxiliary operation mode.

[1] There is no Standby/Manual button the the P-variant of theonly in the P-type series of the control unit control unthe i

3.1.3 Password

Set a password for this configuration file.

3.1.4 Control Unit

Language

The control unit features several built-in alarms and messages. These are displayed in one of the available languages.

Port P3

Choose the functionality of port P3 on the control unit.

- Select **'Communication'** if the port is to be used for communicating with a remote system. Also, set the Modbus ID number.
- Select **Log to Printer** if a printer is connected. This prints all the events to the printer. The printer must have a serial port configured to 9600 baud, 8 data bits, 1 stop bit, and odd parity.

Display Backlight Delay

The time before the LCD-backlight shuts off is set here.

Classifiable Project

Check this option (default checked) to make Rudolf verify that only options allowed by the classification societies are made:

- In the **Switch** section, it is not possible to select Shutdown on switches 7-12 (as the built-in backup system does not cover these).
- In the **Switch** section, if a Shutdown is selected for channels 1-6, the “Broken Wire Detection” option must also be selected.
- In the **Analogue In** section, it is not possible to select Shutdown on a falling signal (as a broken wire will give shutdown).

Disable Broken Wire Alarm on Terminal 44

The control unit alarms if the coil on the relay connected to terminal 44 (shutdown) is broken.

Tick this option to disable the alarm that appears if no relay is connected to terminal 44.

Warning Requires Acknowledge

Select this option to have events configured as Warning events that need an acknowledgement to disappear.

Uncheck to have Warnings disappear by itself.

Disable Overspeed Shutdown

Select this option to disable overspeed shutdown.

Engine Manufacturer

This selection is essential only when reading engine parameters over the J1939 CAN bus protocol. Selecting the correct engine manufacturer ensures the DCU 305 R3 displays the parameters correctly.

Total Engine Hours

It is possible to display engine hours accumulated locally by the DCU 305 or engine hours from the engine's electronic CAN bus system.

- Local – display hours accumulated locally in the DCU 305
- J1939 – displays engine hours accumulated in the engine's electronic system.

3.1.5 Display

Invert LCD on Alarm

Checking this option causes the LCD to invert (flash) during alarm events.

Also, set the time before the backlight turns off automatically.

3.1.6 J1939

Enable Diagnostic

Selecting this option gives access to the supported messages in the J1939 CAN bus protocol.

Specific diagnostic messages can be ignored (suppressed). The DM Interval is set to 2 by default.

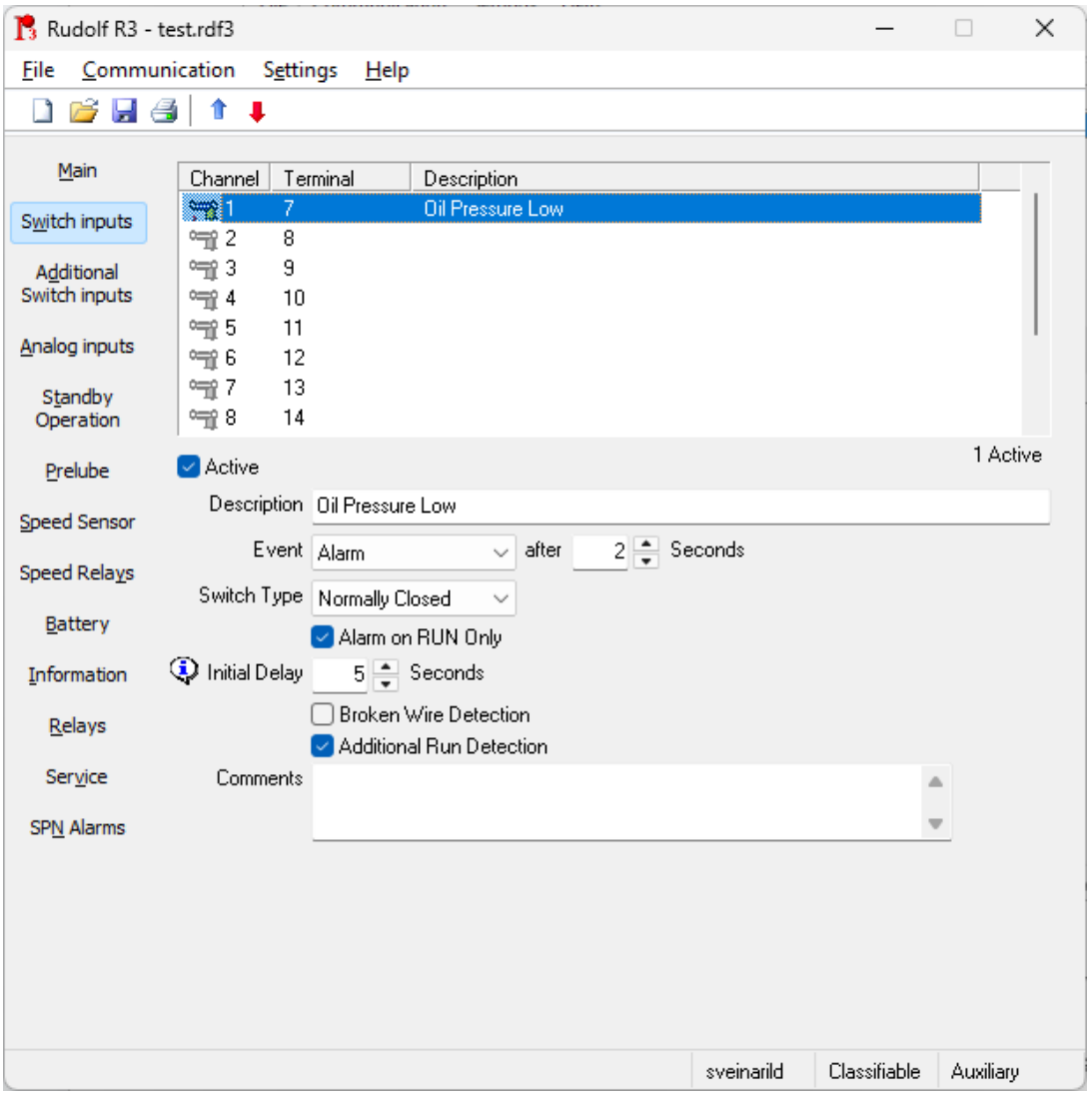
3.1.7 Last Status

Displays the last-known status of the configuration file.

3.2 Switch inputs

The switch tab is shown below, along with all possible settings for switch channels.

There are 12 switch input channels. Channels 1-6 support an optional wire-break detection function, typically used for shutdown channels.



Here, channel 1 is selected and active. Channel 1 uses terminal 7 on the wire terminal card RK-66.

Description

Type the text that shall appear in the alarm list if the sensor triggers.

Event

Select the severity of the event for this sensor and the delay time before the event occurs.

Switch Type

Note that for shutdown switches, the best practice is to use Normally Open.

Check the **Alarm on RUN Only** option for all pressure sensors. The **Initial Delay** is the time from when a detected running engine state is detected to when this channel is enabled.

Broken Wire Detection

This option is available on channels 1-6, and is typically checked for shutdown channels with a normally open switch configuration.

Additional Run Detection

This option can be checked if the sensor is a pressure sensor. If so, the control unit uses the pressure to indicate that the engine is running.

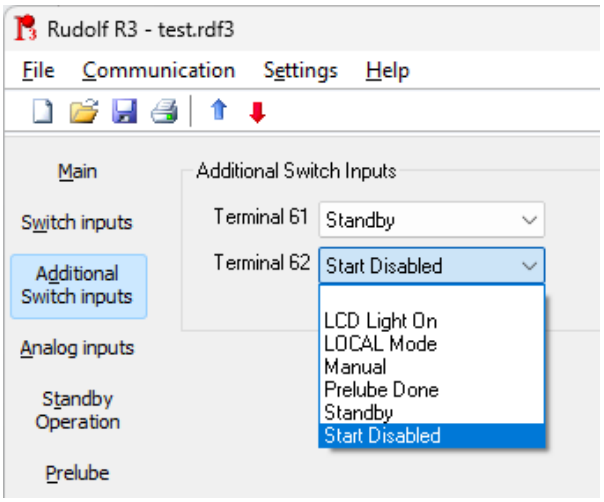
Typically, select this for the Oil Pressure Low sensor.

Comments

Type any comment that will aid as documentation for this sensor. This information is visible only in the configuration software and the configuration printout.

3.3 Additional Switch inputs

Terminals 61 and 62 on the RK-66 wire terminal card are configurable.

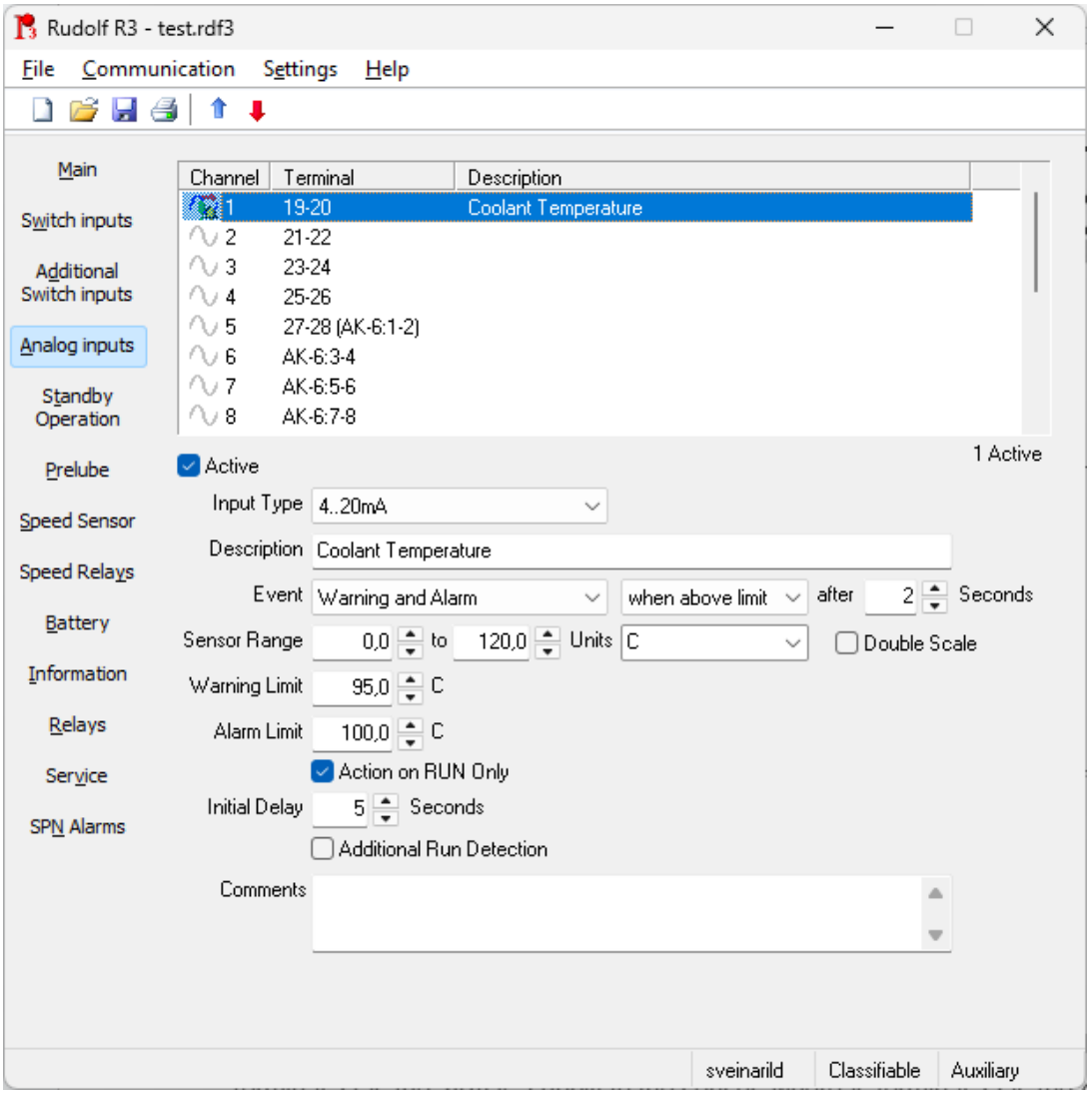


- LCD Light On: Activates the LCD backlight when it is automatically switched off.
- LOCAL Mode: Set the control unit to Local Mode.
- Manual: Set the control unit to Manual mode.
- Prelube Done: Signal to the control unit that the prelube session is finished.
- Standby: Set the control unit to Standby mode.
- Start Disabled: Set the control unit to Start Disabled.

3.4 Analog inputs

There are five analogue channels as standard, plus an optional six channels with the AK-6 Analogue Expansion module, and an optional six channels for the J1939 CAN bus.

Channels 12-17 are exclusively for the CAN bus[2]. All 17 channels can be used for CAN bus signals.



In the above example, channel 1 is in use, indicating a warning and an alarm with two different setpoints.

[2] The CAN bus is available on the DCU 305 R3, but not on , and the sensor range is 0 to 15 bar, the bargraph the DCU 305 R3 LT

The **'Action on RUN only'** option is selected, so the channel will not display a warning/alarm when the engine is not running.

Double Scale

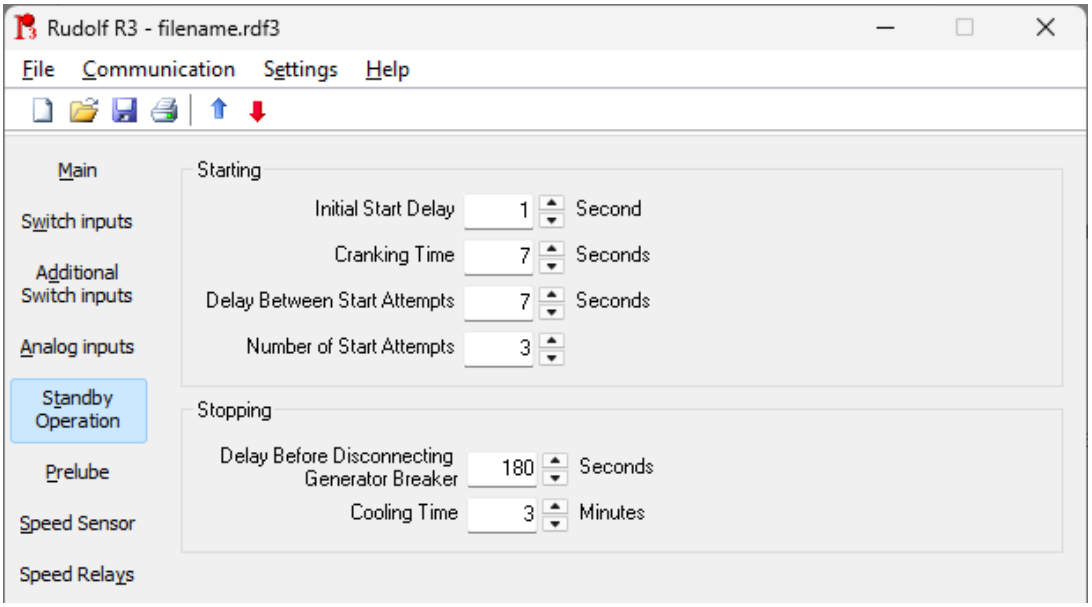
Ticking this option doubles the bargraph size.

For instance, if the engine oil pressure ranges from 0 to 6 bar only, and the sensor range is 0 to 15 bar, the bargraph size will be (much) smaller than the full-size bargraph. At most, it would be 6/15 of the range.

By ticking this option, the bargraph size doubles, and it would now be a maximum 12/15th of the range, which is better.

3.5 Standby operation

This tab controls parameters for the automatic start and stop of the genset when the control unit is set to Standby.



3.5.1 Starting

Initial Start Delay

This is typically used as a preheat timer. When the control unit receives the automatic-start “blackout-signal”, it delays this amount of time before the first start attempt.

Note! If the **Preheat** function (located in the Relays section) is used, this timer is used for preheating. The preheat relay is activated in this time period.

Note! If the **Prelube** function is used, the prelube timer will complete first, followed by the start sequence.

Cranking Time

The time the starter motor spends cranking the engine in Standby mode.

Note! Excessive start attempts may damage the starter motor or discharge the starting battery.

Delay between Start Attempts

This is the amount of time between each start attempt in Standby mode.

Number of Start Attempts

After the final unsuccessful start attempt, the control unit gives a start failure alarm.

Note! Too many start attempts may discharge the starter battery.

3.5.2 Stopping

Delay before disconnecting Gen. Breaker

When the control unit receives the Delayed Stop signal, it will wait for this amount of time before disconnecting the load, i.e., the generator breaker.

The genset is now running with no load, and the control unit will keep it running for the cooling period.

Cooling time

The genset runs at no load until the control unit sets the stop signal.

3.6 Prelube

There are two types of prelube functionality in the panel

- Oscillating, and
- Pre-Start

Both can be used simultaneously.

3.6.1 Oscillating

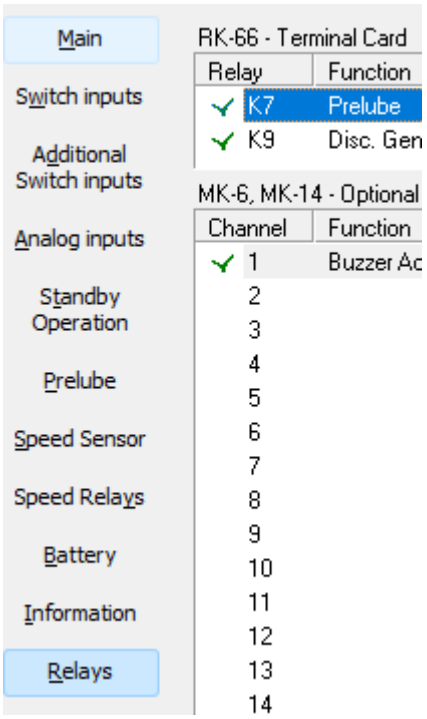
The oscillating prelube preludes the engine at fixed time intervals.

Note! The oscillating prelube function is disabled when the engine is running.

3.6.2 Pre-Start

This option prelubes the engine before an automatic engine start. A manual start from the panel overrides this setting and immediately cranks the engine.

If any of the prelube functions are in use, ensure that the **Prelube** function is configured on one of the configurable relay channels. See below.

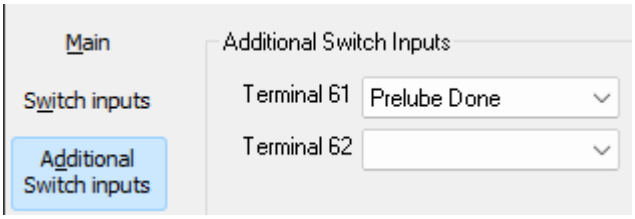


Prelube

Set the desired prelube time before cranking.

Until Prelube Done

Select this option to ensure a certain lube oil pressure is achieved before cranking the engine. Also, configure a channel under Additional Switch Inputs to receive the appropriate lube oil pressure signal on terminal 61 or 62. See below.

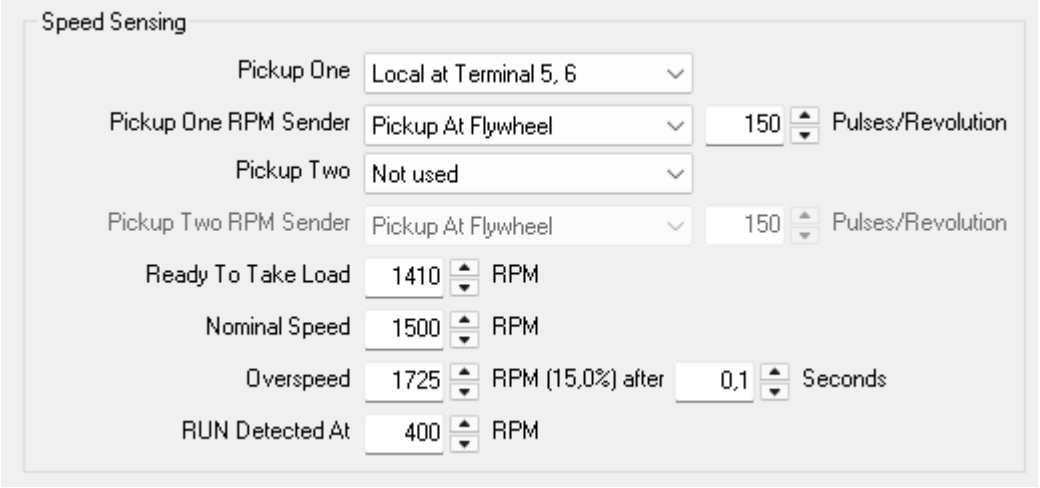


If the lube oil pressure is not achieved within the specified time limit, the prelube and start process is aborted and a start failure alarm is issued.

Note! If, however, the **Override Allowed** is checked, then cranking will commence after the elapsed time, also without the feedback signal to terminal 61 or 62.

3.7 Speed sensor

This section handles pickups and indicates when the engine is running.



3.7.1 Speed Sensing

One or two magnetic pickup units (MPUs) can be configured.

There is also an option to have no MPUs. This is not recommended. In that case, an oil pressure sensor can be used to indicate that the engine is running, and the actual engine speed cannot be indicated.

Pickup One / Pickup Two

Select whether the pickup channel is in use. Rudolf R3 advises the terminal connections for the selected pickup.

Pickup One / Pickup Two – RPM Sender

Select if the pickup is at the flywheel or the timing gear.

- At the flywheel, set the number of pulses/revolution.
- At the timing gear, set the teeth count.

Ready To Take Load

The control unit has a function that can be directed to K7 or K9 on the RK-66 card, or to the optional relay cards, which activate when the engine reaches this RPM.

It will not deactivate again until the control unit is in the Stopping mode.

This can be used for any RPM detection purpose. Also see the chapter Speed Relays.

Nominal Speed

This is the nominal. For Propulsion engines, indicate the maximum speed.

Overspeed

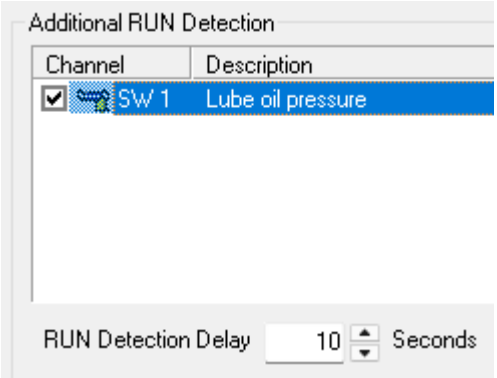
Set the setpoint for overspeed shutdown.

RUN Detected At

Set the setpoint for indicating a running engine. The cranking motor is also disabled above this setpoint.

3.7.2 Additional RUN Detection

In addition to the Speed Sensor, the control unit can detect that the engine is running by using any of the other connected sensors. It is common practice to use oil pressure as an additional means of detection.



Note! Ensure reasonable signals, such as Oil Pressure, are used for run detection.

If two pickups are in use, there is good redundancy, and this section can be left blank.

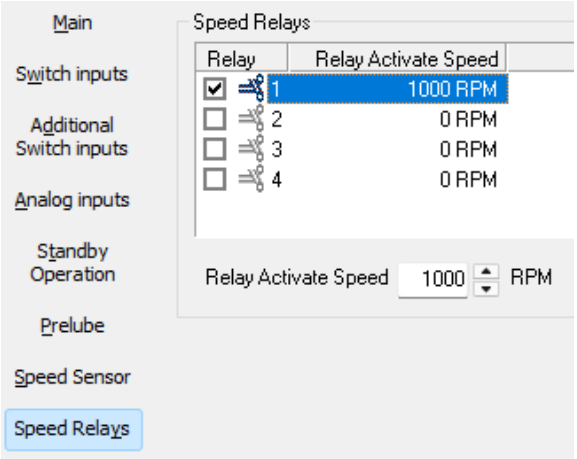
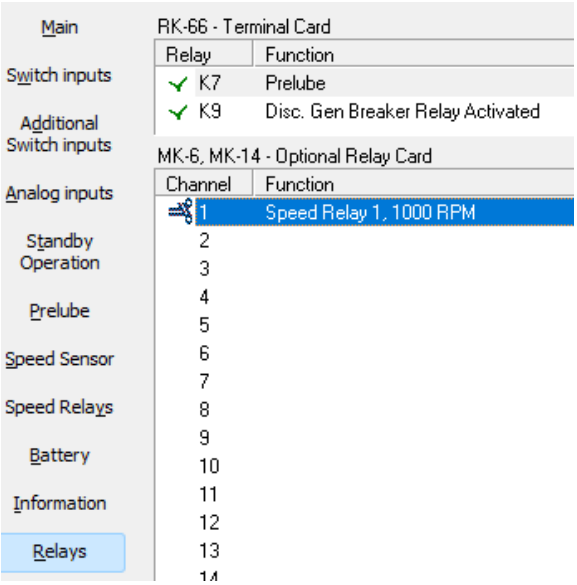
Run Detection Delay

The delay time from when the additional RUN detection signal (eg. an oil pressure switch) indicates, to when this actually indicates a running engine.

3.8 Speed Relays

Speed relays are relays that activate and deactivate at a given RPM. Up to four speed relays can be defined and used simultaneously.

The signals are routed to the MK-6 or MK-14 optional relay cards.

Enable a speed relay and set a setpoint	Then, assign the speed relay to any of the available relay channels
	

In the above example, Speed Relay 1 is enabled. It activates at 1000 RPM and operates on relay channel 1 on the MK-6 or MK-14 relay expansion units.

3.9 Battery

The control unit will alarm if the start-battery voltage is too low.

Note! It will not alarm during Start (Cranking state) or during Stop (Stopping state).

Start Battery Voltage

Select a 12V or 24V supply. The control unit is a 24V system; however, if a 12V/24V DC/DC converter is used on the power supply, select 12V here. Otherwise, always choose 24 volts.

Low Battery Voltage Alarm

This field specifies the voltage for which the control unit will issue an alarm for low start-battery voltage.

Delay before Alarm

When the battery voltage is below the limit, it must remain low for this period before the alarm is given.

3.10 Information

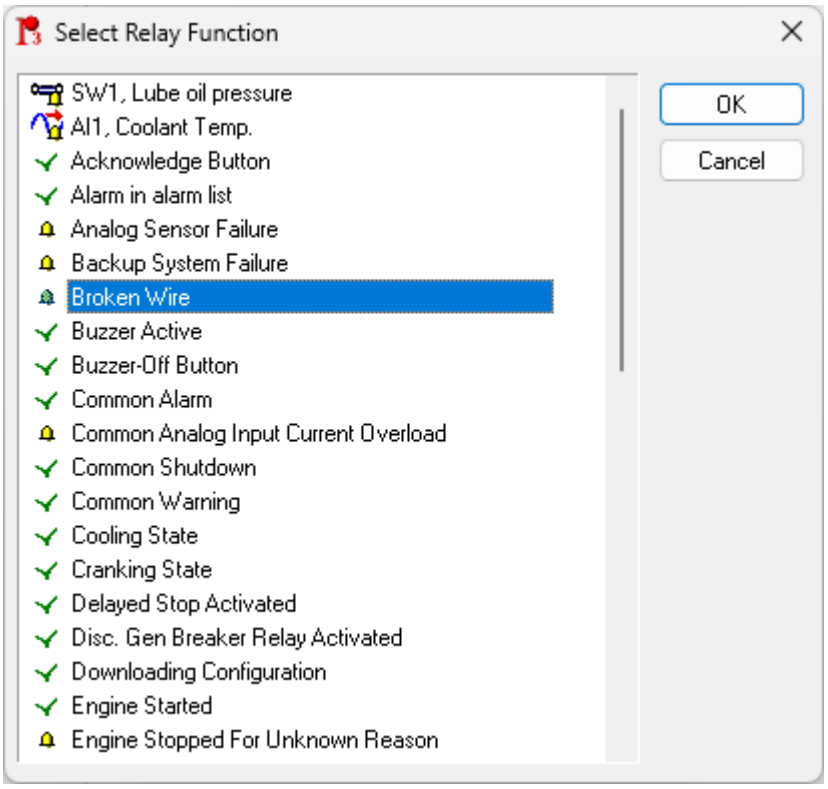
All text written in this section is displayed in the control unit at power-on, and again from the menu item **Information**.

3.11 Relays

Several functions can be assigned to any available relay.

The standard RK-66 wire terminal unit features two configurable relays, and expansion units are available to further expand the system.

Note! All defined switch channels and all analogue channels with defined setpoints will also appear in the list of available functions.



RK-66 Wire Terminal Unit

On the RK-66 wire terminal unit, the two relays K7 and K9 are configurable.

MK-6 and MK-14 Relay Expansion Unit

The optional MK-6 and MK-14 relay expansion units can be connected to the control panel. Each relay can be assigned any available function.

3.12 Service

This section enables notifications to the panel operator on regular timed intervals.

A **Pre-Warning** notifies of the upcoming service some time before the deadline.

3.13 SPN Alarms

If the panel is connected to the J1939 CAN bus, message lookups can be configured.