Rudolf R3

User's Manual

DCU 305 R3 Control Unit configuration tool

Contents

Document revisions

Date	Revision
December 2006	Release
November 2009	Updated config. relay signal list, vers: 3..5.10

Title:	*Rudolf R3 User's Manual*
Revision:	*August 2011*

All trademarks acknowledged.

Related documentation:

- *DCU 305 R3 User's Manual, Eng*
- *DCU 305 R3 Communication Manual, Eng*
- *DCU 305 R3 Installation Manual*

1 Introduction

This document describes the Rudolf R3 configuration software for PC.

Rudolf R3 is the PC parameter software used to completely customize the **DCU 305 R3** range of Diesel Engine control units; hereafter referred to as the *control unit* only.

Note: Rudolf R3 is backward compatible and new versions completely replace earlier releases and versions.

Rudolf R3 is hereafter referred to as *Rudolf* only.

1.1   Important information

Rudolf is a powerful configuration tool that can completely change the current behavior of the control unit.

Make sure you know your system well and use precaution whenever changing critical parameters in an installed system.

1.2   System requirements

Rudolf runs under Microsoft® Windows® 95/98/ME and Windows® NT/2000/XP/7, and occupies ~30MB of the hard disk space.

Note: Rudolf will *not* run on Windows 3.x.

The project files occupy 2-3k bytes only, and can easily be emailed between organizations.

1.2.1 Minimum PC requirements

A PC equipped with a Pentium processor running at 200MHz.

- Windows® 95/98/ME: 32MB RAM

- Windows® NT/2000/XP: 64MB RAM

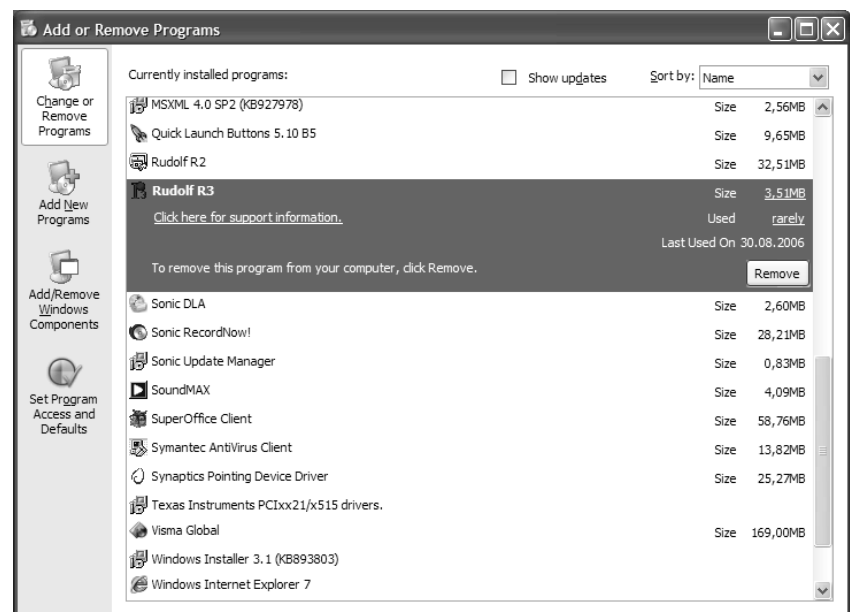- Windows 7:   1/2GB RAM (32/64 bit)

Use a color screen with 800 x 600 dpi resolution or better.

Rudolf is delivered on a CD, so make sure the PC is equipped with a CD-drive.

1.3   Installation of Rudolf R3

1.3.1 Uninstall previous installations

Before installation, be sure to uninstall any previous copies of Rudolf.

Select Remove and follow the guidelines.

1.3.2 Installation

Latest version is available on *www.auto-maskin.com*.
Alternatively if you have a CD-ROM with Rudolf R3, then insert the CD-ROM in the drive.

Close all other programs before installation.

Run the SETUP.EXE file.

Follow the guidelines on screen as given by the Setup program.

2 Menu Overview

2.1 <u>F</u>ile

The file menu is used for creating new project files, opening existing project files and saving current files.
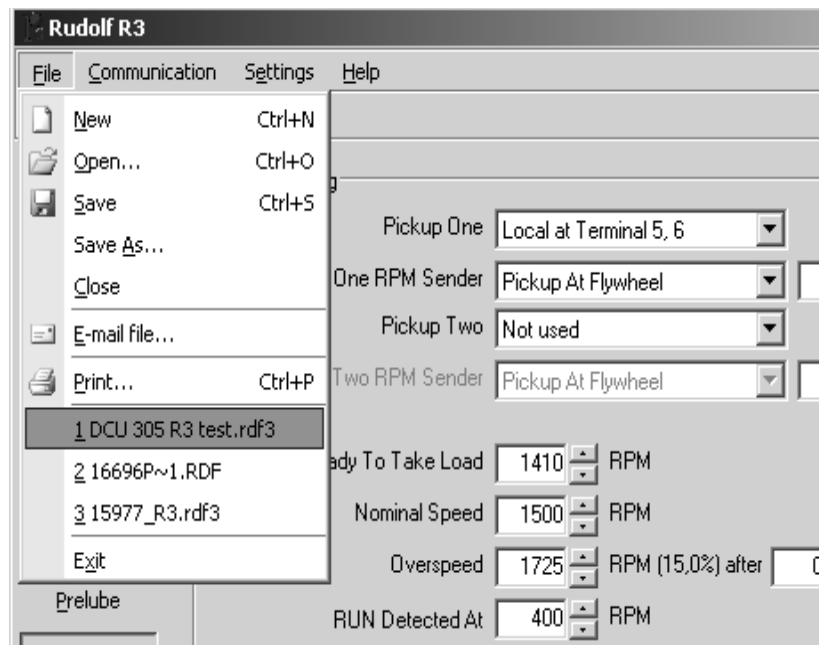
The project files are small (2-3k bytes) and their extension is .rdf3, for instance MYFILE.rdf3 or PROJECT 173.rdf3.

2.1.1 <u>New</u>

Alt+F+N

Select File-New to create a new project. The new project file has default values for most parameters.

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

2.1.2 <u>O</u>pen

Alt+F+O

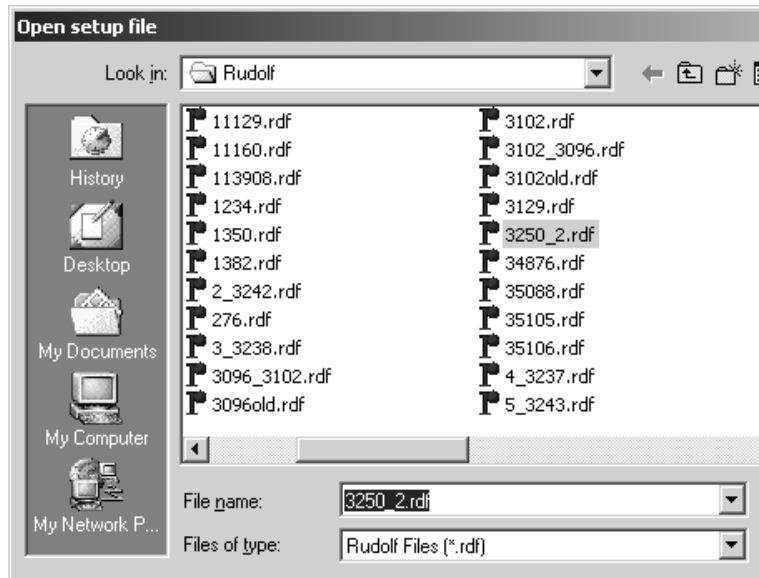Select File-Open to open a previous project. The following dialog appears:

Select a file with the .RDF extension, and click <u>O</u>pen.

2.1.3 <u>S</u>ave

Alt+F+S

Select File-Save. If this is the first time the project is saved, Rudolf will prompt for a file name.

Type a file name. The extension .RDF is added automatically.

2.1.4 Save <u>A</u>s…

Alt+F+A

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

Type the new name and press Save.

2.1.5 <u>C</u>lose

Alt+F+C

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

2.1.6 <u>E</u>xport as Text

Alt+F+E

The complete project setup can be exported to a text-file. The text-file can easily be included into a word-processor document.

2.1.7 E-mail…

Alt+F+M   Select this option to send the opened Rudolf file as e-mail. This requires an installed version of Microsoft Outlook®.

2.1.8 Print…

Alt+F+P   Select this option to get a paper printout. It is possible see a preview before printing.

Print	✕
Printer: \\AUTO_SERVER\HP5n	OK
	Cancel
☐ Print Preview	
Number of copies 1 ▲▼	Setup…

2.1.9 Exit

Alt+F+X   Select File-Exit to quit Rudolf. If the current project is not saved, you will be prompted to do so.

2.2   Communication

This menu handles *up- and download* of project files between the PC with Rudolf and the control unit.

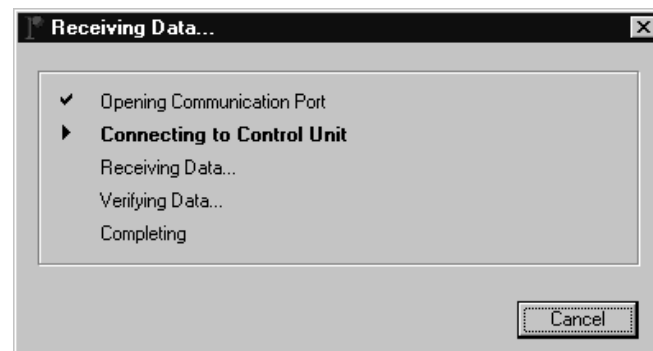Connect the Rudolf Cable between the control unit and the PC.

2.2.1 Load from control unit…

Alt+C+L   Receive the project currently in a control unit to Rudolf. This takes ~30 seconds.

The following dialog will appear:

Receiving Data…	✕
✔ Opening Communication Port	
▶ **Connecting to Control Unit**	
Receiving Data…	
Verifying Data…	
Completing	
	Cancel

When none settings are done under the SPN tab, you can choose to download setup without diagnostics. This will shorten the download time. This does only supress the customized texts decelerated in the SPN tab, all diagnostic messages will still be picked up on J1939 and shown in the diagnostic view in the DCU 305 R3.

Opening Communication port

Rudolf opens the PC communication port, Com1 – Com4.

If the selected port is in use by another program, this operation fails. If no port is selected, Rudolf brings up a dialog that makes you select a port.

Connecting to control unit

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

If it fails, make sure the right 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 data, Rudolf reads the control unit again to make sure all data is correct. If it fails, there is a bad cable connection between the PC and the control unit.
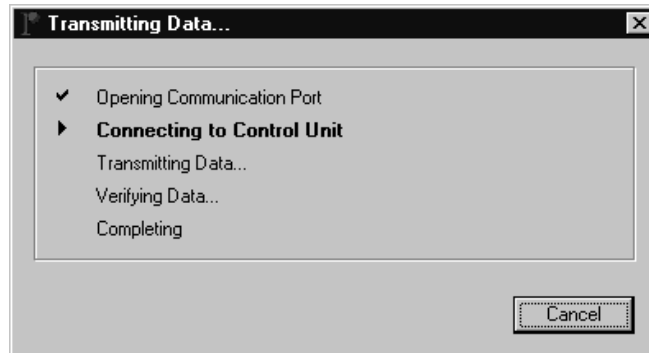
Completing

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

## 2.2.2 Transmit to control unit…

Alt+C+T

Transmit the open project to the control unit. This takes approx. ~15 seconds.

The following dialog will appear:

When none settings are done under the SPN tab, you can choose to download setup without diagnostics. This will shorten the download time. This does only supress the customized texts decelerated in the SPN tab, all diagnostic messages will still be picked up on J1939 and shown in the diagnostic view in the DCU 305 R3.
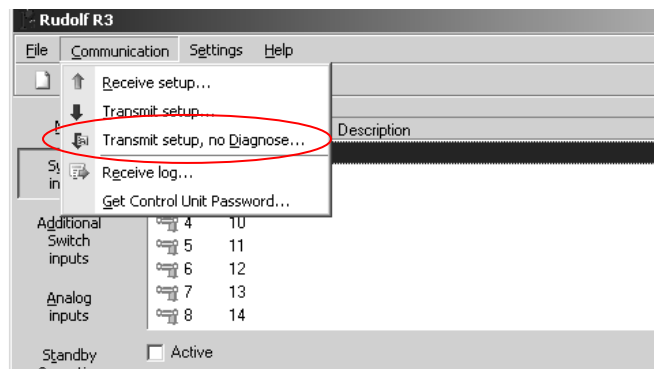
Opening Communication port

Rudolf opens the PC communication port, Com1 – Com4.

If the selected port is in use by another program, this operation fails. If no port is selected, Rudolf brings up a dialog that makes you select a port.

Connecting to control unit

Rudolf makes sure that a control System is connected to the PC and prepares the control unit for reception of a new Project.

If it fails, make sure the right cable is connected and that the control unit is powered.

Make sure the unit is in the READY state before transmitting.

For security reasons, it is not possible to send a new project if the engine is running. Connection will then 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 data, Rudolf read the control unit and makes sure all data is correct.

If this fails, there could be a bad cable connection between the PC and the control unit. Check the cable and try again.

Completing

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

The control unit will power off, and on again, automatically.

Note: The control unit will automatically power off, and on again. The control unit is now ready to use with the new configuration.

2.2.3 <u>R</u>etrieve log…

Alt+C+R

The control unit stores all events in a built-in log. This command will read the entire log and open it in Notepad on your PC.

Connect the Rudolf Cable between your PC and the control unit.
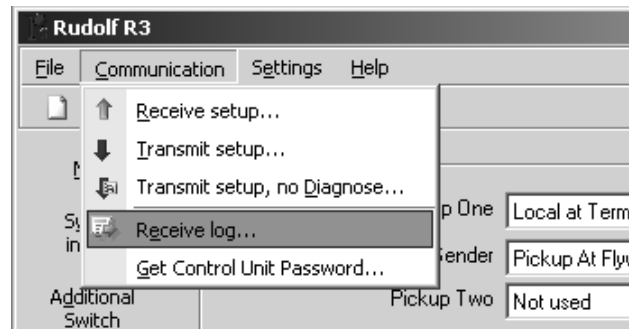
Included in the log are the project information and the counters.

2.3   S<u>e</u>ttings

This menu has a collection of useful submenus with settings that can be made in the control unit.
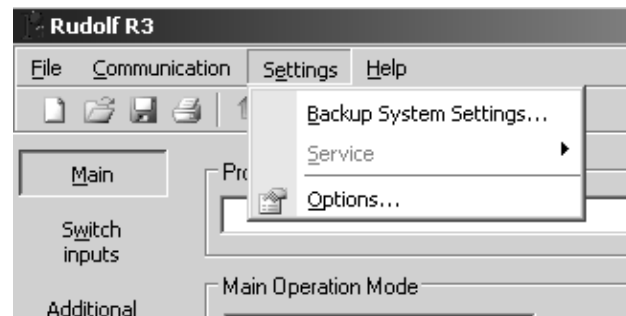
2.3.1 <u>B</u>ackup System Settings…

Alt+E+B

On the DCU 305 R3, you are prompted to set the backup parameters on the control unit after a new configuration is downloaded.

Selecting this menu brings up the configuration again.
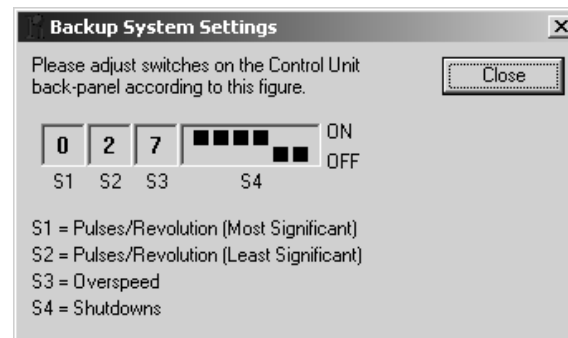
2.3.2 <u>S</u>ervice

Behind this hidden menu there are options for deleting the built-in log, and reset the built-in counters.

Follow the guidelines in the margin to access the menus.

Two choices appear:

- <u>D</u>elete Log
- Counters

A password is required to actually delete or reset anything.

For passwords, contact your distributor.

2.3.3 Options…

A number of installations are made here, for instance:

2.3.3.1 Rudolf R3 Mode

Choose between Normal Mode and Expert Mode.

In Expert Mode, only a minimum of dialog boxes and warnings are shown to speed up the configuration, for experts only.
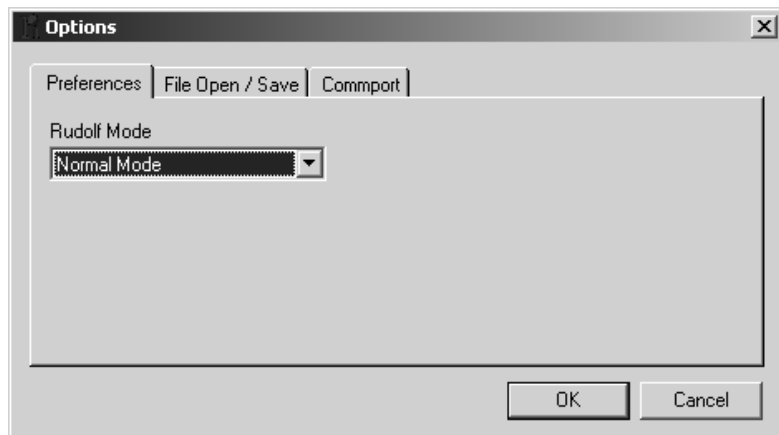
2.3.3.2 File Open/Save

The default file open/save folder can be set here.
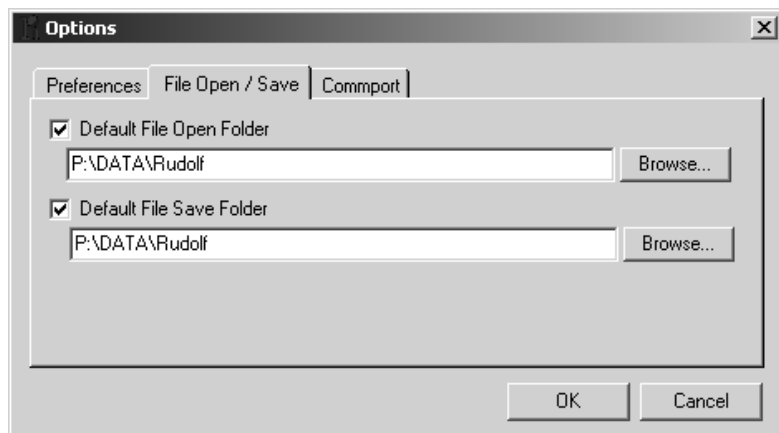
2.3.3.3 Rudolf R3 COM Port

Select the PC/laptop communication port to be used by Rudolf. Most often, this is COM1.
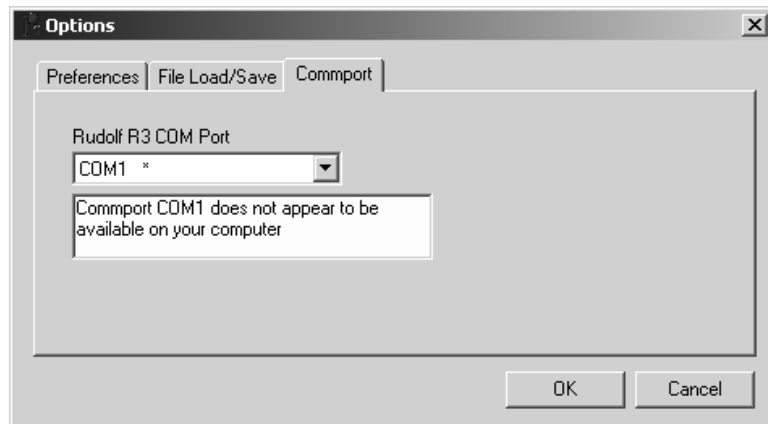
Note: On this particular PC, COM1 is not available. Select a different COM port.

Some PC's do not have serial COM port available. An USB to Serial converter can be used to obtain a serial COM port.

3 Buttons

A number of common tasks are quickly accessible using the buttons located under the menu string.

Upload
Read *from* control panel *to* Rudolf

Download
Transmit *from* Rudolf *to* control panel
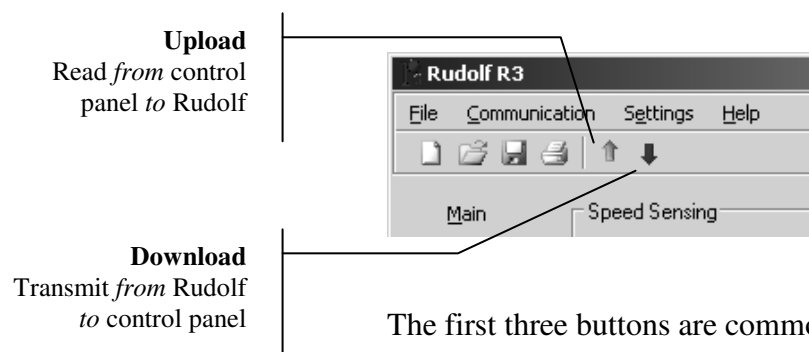
The first three buttons are common in the Windows environment and are **New** configuration, **Open** an existing configuration and **Save** the current configuration.

- Pressing the *green* arrow button will read the project currently in the control unit into Rudolf. The project may then be saved to a file.

- Pressing the *red* arrow button will transmit the project currently in Rudolf to the control unit.

- The printer button will print the documentation on your printer.

- The rightmost button is the Help button and brings up the Rudolf Help file.

4 Configuration Sections
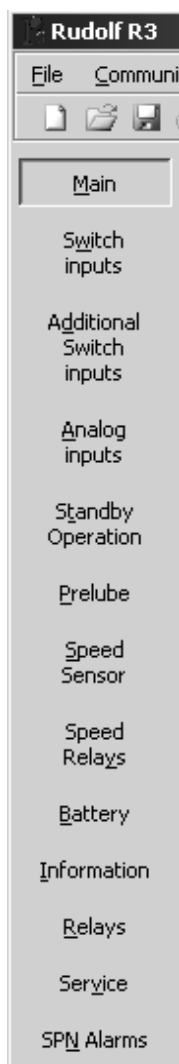
The configuration is sorted into *tab* sections as shown in the TAB selection figure:

The sections can be completed in any order, but it makes sense to start with Main and then Switch and Analog Inputs. The configurations made here will appear in the Relays section.

When a configuration is made and saved, it can be reused.

The TAB sections

![auto MASKIN logo]

4.1   Main

Alt+M

The main tab lets you select the main operation mode and the control unit language.
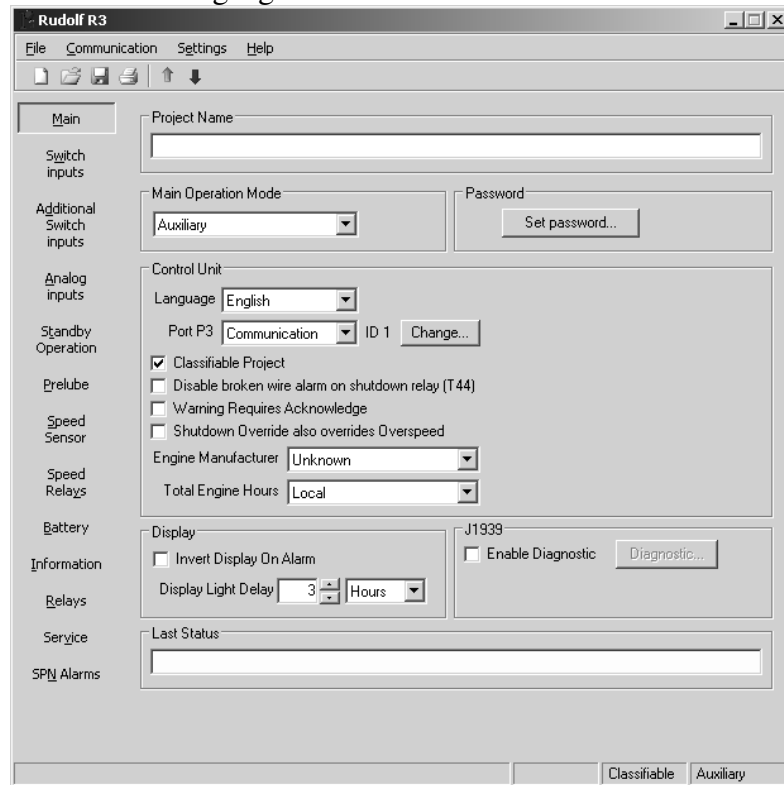
4.1.1 Main Operation Mode

Four main operation modes can be selected as follows:

- Emergency
- Auxiliary
- Combined
- Propulsion

1)   Emergency Mode

Shutdown for overspeed only, all others disabled

The control unit is prepared for Emergency operation mode. Shutdown is *disabled* for all inputs, regardless of the chosen action type.

Shutdown is *enabled* for Overspeed only.

2)   Auxiliary Mode

All shutdowns enabled

The control unit is prepared for Auxiliary operation mode. Shutdown is *enabled* for all inputs set up to set shutdown, including Overspeed.

3) Combined Emergency/Auxiliary Mode

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

Shutdowns are enabled in Manual mode

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*.

4) Propulsion mode (control unit type P)

All shutdowns enabled

The control unit is prepared for Propulsion operation mode. Shutdown is *enabled* as for Auxiliary mode of operation.

4.1.1.1 The Operation Modes in table format

The four possible modes of operation of the control unit is summarized in this table:

	Manual	Standby
Emergency		
Auxiliary	✓	✓
Combined	✓	
Propulsion	✓	✓

✓ *= Shutdowns enabled*

* *= Not applicable (no Standby/Manual button)*

4.1.2 Control Unit Language

The control unit has a number of built-in alarms and messages. These are displayed in one of 11 different available languages.
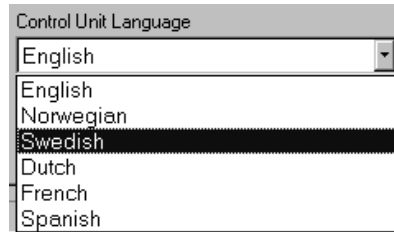
The currently supported languages are:

- Danish, Dutch, English, Finnish, French, German, Italian, Norwegian, Portuguese, Spanish and Swedish.

Additional languages may appear in the future.

Note: Only the built-in texts are changed when switching language. Any self-defined text for sensors and switches must be translated manually.

4.1.3 Port P3 Functionality

Choose between *Communication* and *Log to Printer*.

4.1.3.1 Communication

Select Communication if the port is to be used towards a slave panel. Also, set the ID-number.

4.1.3.2 Log to Printer

Select Log to Printer if a printer is connected. This prints all the log events to the printer.

Note: The printer must have a serial port set to 9600, 8, 1, odd parity.

4.1.4 Display Backlight Delay

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

Typical: *3 hours*

Range: *1 – 59 minutes, or*

             1 – 194 hours

Requires control unit firmware version >= 4.0. Otherwise, it is fixed to 1 hour.

4.1.5 Classifiable Project

Check this option (default checked) to make Rudolf verify that no options not allowed by the classification societies are made.

Here, these include:

- In the Switch section, it is not possible to select Shutdown on switches 7-12 (as these are not covered by the built-in backup system).

- In the Switch section, if a Shutdown is selected on channel 1-6, the option "Broken Wire Detection" must also be selected.

- In the Analog In section, it is not possible to select Shutdown on a falling signal (as a broken wire will give shutdown).

4.1.6 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.

4.1.7 Warning Requires Acknowledge

Select this option to have events configured as Warning needing an Acknowledge to disappear.

Uncheck to have Warnings disappear by itself.

4.1.8 Disable Overspeed Shutdown

Select this option to disable overspeed shutdown.

4.1.9 Engine Manufacturer

This selection is important when reading engine parameters over J1939. The DCU 305 R3 is adapted to work with most engines. Selecting the correct manufacturer will ensure that the DCU 305 R3 is displaying the parameters correctly.

4.1.10 Engine Hours

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

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

4.1.11 Inverting LCD on Alarm

Checking this option gives an inverting (flashing) LCD on Alarm.

4.1.12 J1939 – Enable diagnostic

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

If you don't know what this is, just leave it unchecked.

If you use CAN and want to use Diagnostic, then enable it.

The "Diagnostic" should normally not be configured:

If you have one single diagnostic you do not get rid of you may specify its SPN here. You will then get rid of the diagnostic alarm/warning when it's only that SPN being reported.

DM Interval is set to 2 as default. Setting this value lower can cause spurious diagnostics displayed on the DCU 305.

4.1.13 Last Status

Displays the last known status for configuration:

- Date and time for last download to a DCU 305
- DCU 305 version and firmware.

4.2   S<u>w</u>itch

Alt+W

The switch tab is displayed below, together with all the possible settings for switch channels.

In the picture below, channel 1 is selected. Channel 1 uses terminal 7 on the wire terminal card RK-66.

Clicking anywhere on that line will select channel 1. Then click *Active* to enable it and complete the fields.

The terminal number where the wires are connected

The channel number

Red text indicates the channel is not activated
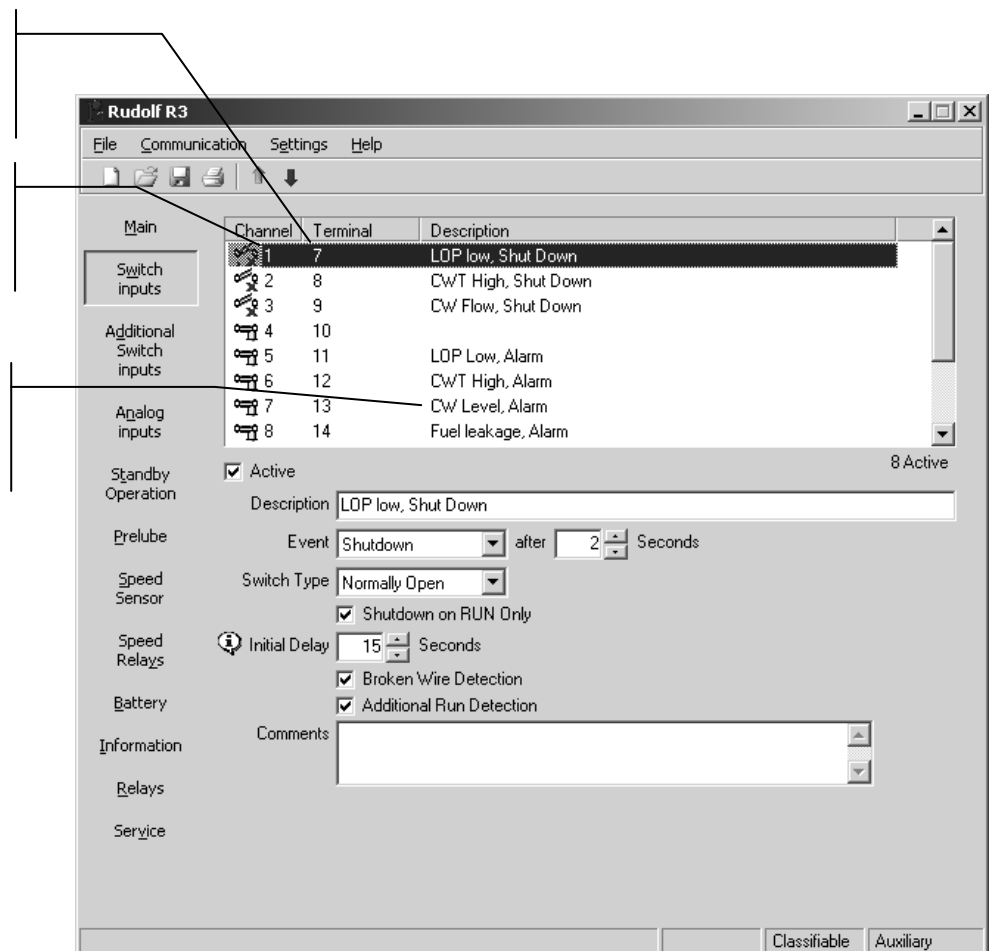
- Above, channel 1 is selected. The normally open switch is connected between terminal 7 and 0V.

- Here, the alarm text "LOP Low, Shut Down" will appear two seconds after the switch opens.

- This channel is excluded when the engine is at standstill, and comes into operation 15 seconds after the engine has started.

- Further, this channel indicates that the engine is running – together with the rpm.

4.2.1 Input Channel

The input channel number. There are 12 channels altogether.

Any sensor can be connected to any channel, but we recommend to connect shutdown switches on channel 1..6, as these have broken wire detection and backup if the main microcontroller fails. Warning and alarm switches are preferred on channels 7..12.

4.2.2 Terminal

The wire terminal number on the RK-66 wire terminal card, where the sensor wire is connected. It is listed for reference only.

4.2.3 Active

This enables the input channel for use. Any channel can be enabled (☑) or disabled (☐).

Disabled channels will never give alarms. Disabled channels with a text description are shown in red.

4.2.4 Description

User's text that describes the sensor, or its function. The text can be up to 30 characters long and may consist of numbers and, to some extent, national characters.

Rudolf will not allow typing of characters that the control unit is unable to display.

4.2.5 Action Type

Warning, Alarm or Shutdown

Select Shutdown if you want the gen. set. to stop when this sensor is outside limits. Select Alarm otherwise.

Warning is used for a pre-warning before the alarm is set. The warning lamp follows the sensor, and will illuminate when the sensor is outside limits.

When the sensor is back within limits, the warning will disappear, without pushing the acknowledgement button. The warning is also available on the MK-6 or MK-14 optional relay card.

All Warnings will trigger the Common Warning Relay, if defined. See the chapter about relay functions on page 41.

All alarms will trigger the Common Alarm relay, and all Shutdowns will trigger the Common Shutdown relay.

4.2.6 Switch type

▪ Warning and Alarm uses Normally Closed contacts (NC).

- Shutdown uses Normally Open contacts (NO).

It is possible to change that in this menu, although Rudolf suggests the most commonly used switch type for Warning, Alarm and Shutdown as above.

Switches for shutdowns shall be of type NO, as a broken wire should not initiate a shutdown.

4.2.7 Warning/Alarm/Shutdown on RUN only

If selected, the Warning/Alarm/Shutdown activates only if the engine is running.

4.2.8 Initial delay

An initial delay is possible only if "Warning/Alarm/Shutdown on RUN only" is selected.

- This is typically used on oil pressure sensors/switches.
- The amount of time after the engine has started (RUN is detected) until the channel is activated.

Typical value: 10-15 seconds

4.2.9 Broken Wire Detection

This feature can be applied on channels 1-6, if it is a shutdown channel.

- A **10k** ohm resistor must be connected in *parallel* with the actual switch.
- Refer to the control unit manual for further details.

4.2.10 Delay before alarm/shutdown

When the sensor is outside limit the control panel issues a warning, alarm or shutdown (depending on what is configured) after this amount of time.

Typical value: 2 seconds

4.3 Additional Switch inputs

4.3.1 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 has been automatically turned off.

LOCAL Mode: The control unit is set to Local Mode.

Standby: The control unit is set to Standby.

Start Disabled: The control unit is set to Start Disabled.

All functions are activated by connecting to 0V.

4.4   <u>A</u>nalog In

Alt+A

The analogue tab is displayed below, together with all the possible settings for analogue sensors.

The sensors must submit the industrial standard 4-20mA signal.

4.4.1 Add a new sensor

Select an available input channel by clicking in the window above it. In the figure below, channels 1-5 are in use.

Channel 6 is the next available sensor.
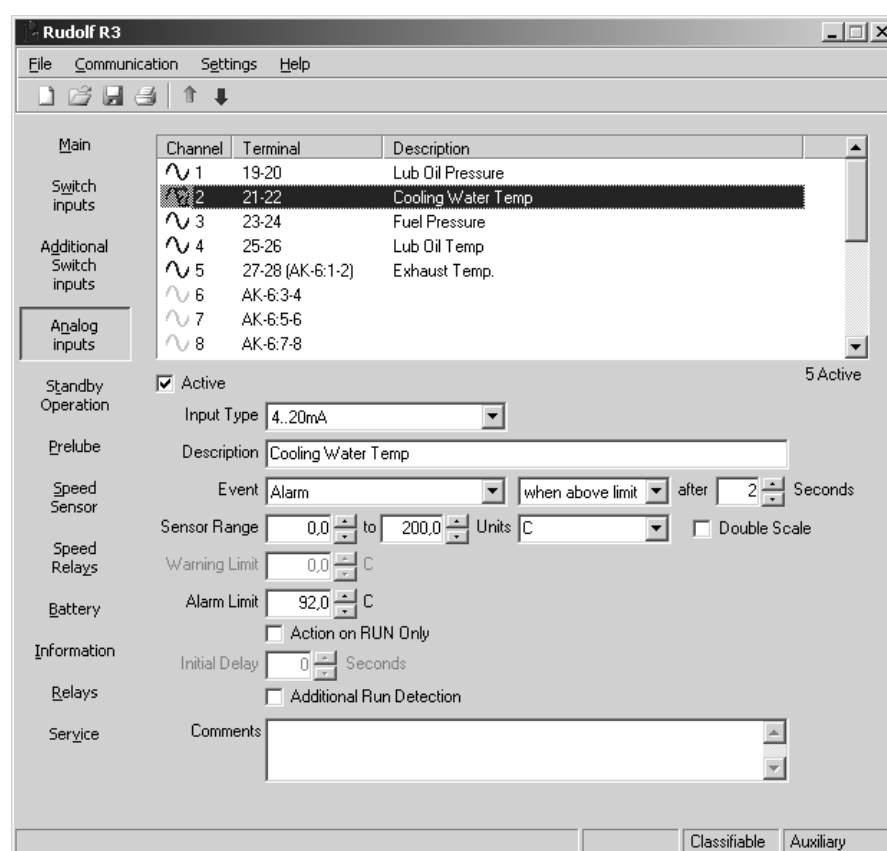
In the above example, channel two is highlighted and selected.

- A temperature sensor in the range 0 – 200C is connected between terminal 21 and 22.

- Terminal 21 is the 24VDC supply to the sensor, whereas terminal 22 is the 4-20mA input signal from the sensor.

- The alarm "Cooling Water Temp." appears two seconds after the temperature exceeds 92 degrees C.

4.4.2 Active

This enables the input channel for use. Any channel can be enabled (☑) or disabled (☐).

If the channel is disabled, the bargraph will not be displayed.

4.4.3 Input Type

This may be J1939, 0-20mA or 4-20mA.

On channel 1 only, 0-10V can be selected.

If J939 is selected, a list with of signals will be available in the right most menu.

4.4.4 Description

This is the text that describes the sensor, or its function. The text can be up to 30 characters long and may consist of numbers and, to some extent, national characters.

Note: Although you can type up to 30 characters, we recommend a maximum of 20 characters, as this gives a nicer view.

Rudolf will not allow typing of characters the control unit is unable to display.

4.4.5 Event

None: No setpoints are set. The analog value will be displayed only.

Warning: Does *not* need acknowledge. Activates the common warning relay.

Alarm: Needs acknowledge. Activates the common alarm relay.

Shutdown: Needs acknowledge. Stops the engine. Activates the common alarm *and* common shutdown relay.

RPM dependent…: The setpoint varies with the current rpm.

4.4.6 Above or Below Limit

This controls the sensor triggering on a rising or falling signal.

- ▪ If it is a *temperature sensor*, an action is normally required on a *rising* signal. Select *When Above Limit*.
- ▪ If it is an *oil pressure sensor*, an action is required on a *falling* signal. Select *When Below Limit*.

Note: *Shutdown when below limit* is not allowed in a classified installation, as a broken wire will initiate the shutdown. Rudolf warns about this.

4.4.7 Delay before Warning/Alarm/Shutdown

When the sensor is outside limit, it gives an alarm/shutdown after this amount of time.

Typical: *2 seconds*

Range: *0 – 255 seconds*

4.4.8 Sensor Range

The sensor range, as given on the sensor, must be completed for the meter to display correctly. The range can be set with one decimal.

The 4mA signal will equal the minimum (here 0 Bar) and 20mA will indicate the maximum (here 10 Bars) on the control unit meter.

▪ The range is –3000..3000.

4.4.9 Units

Select a predefined unit or type a new. Maximum four characters. This will be displayed at the end of the meter in the control unit.

4.4.10 Double Scale

Ticking this option *doubles* the *size* of the bargraph.

If for instance, the engine oil pressure ranges from 0-6 bar, and the sensor range is 0-18 bar, the bargraph value will be small compared with the full size bargraph (max 6/18bar or 1/3 of the full size).

Doubling the scale will enlarge the bargraph value to 2/3 of the full scale, giving a better view.

The number readout is not changed.

4.4.11 Alarm/Warning Limit

These options will be available when either Alarm or Warning is selected. The DCU 305 will give an alarm or warning (configured) when the sensor is outside this limit.

The limit can be set with one decimal.

4.4.12 Action on RUN only

If selected, the warning/alarm/shutdown activates only if the engine is running.

This tickbox is disabled (grey) if neither an alarm nor a shutdown has been enabled for this channel.

4.4.13 Initial delay

This is available only if "Action on RUN only" (see above) is selected.

It's the amount of time after the engine has started until this channel is monitored.

Typical: *15 seconds*
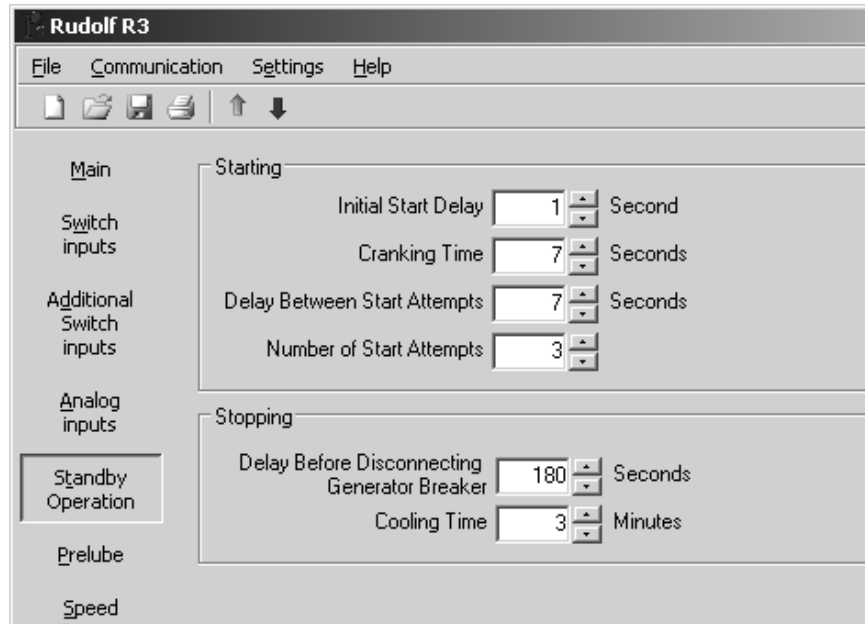
Range: *0 – 255 seconds*

4.4.14 Comments

Field for free text. Typical information is sensor type, range and part number.

4.5   S̲tandby operation

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

*The **Standby Operation** Tab displaying typical (default) values*

4.5.1 Initial Start Delay (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 using the Preheat function (found in Relays), this is also the preheating timer. The preheat relay then activates in this period.

Note: If using the Prelub functionality (adjusted in separate tab), the prelub timer will elapse before the stand by cycles starts.

Typical: *1 second (start delay), 10 seconds (preheat)*

Range: *1-255 seconds*

4.5.2 Cranking Time

The amount of time the starter motor is cranking the diesel engine in Standby mode of operation.

Typical: *7 seconds*

Range: *2 – 20 seconds*

Note: Too long start attempts may damage the starter motor or empty the start battery.

4.5.3 Delay between Start Attempts

This is the amount of time between each start attempt when set to Standby mode.

Typical: *7 seconds*

Range: *2 – 60 seconds*

4.5.4 Number of Start Attempts

The total start attempts before issuing the Start Failure alarm.

Typical: *3 attempts*

Range: *1 – 20 attempts*

Note: Too many (and/or too long) start attempts may discharge the starter-battery.

4.5.5 Delay before disconnecting Gen. Breaker

When the control unit has received the "delayed stop" signal, it will wait for this amount of time until it disconnects the load, i.e. the generator breaker.

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

Typical: *180 seconds (three minutes)*

Range: *1 – 255 seconds*
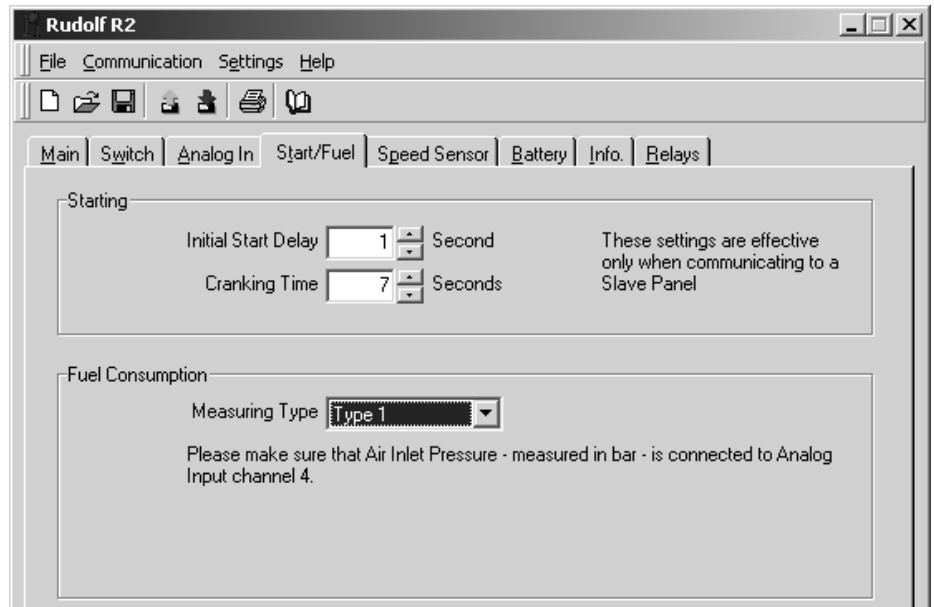
4.5.6 Cooling time

The amount of time the Gen Set is running at no load, until the control unit issues the stop-signal.

Typical: *3 minutes*

Range: *0 – 30 minutes*

4.6   S<u>t</u>art/Fuel

If selecting Propulsion in the Main Tab, the *Standby Operation* tab is replaced with the *Start/Fuel* tab.

4.6.1 Initial Start Delay

When receiving the Start command from a remote slave panel, the control unit delays this amount of time before starting.

Note: If using the Preheat function, this is also the preheating timer.

Typical: *1 second (start delay), 10 seconds (preheat)*

Range: *1-255 seconds*

4.6.2 Cranking Time

The amount of time the starter motor is cranking the diesel engine when received the remote start signal from a slave panel.

Typical: *7 seconds*

Range: *2 – 20 seconds*

4.7   Speed sensor

This tab handles pickups and when the engine is said to be running.
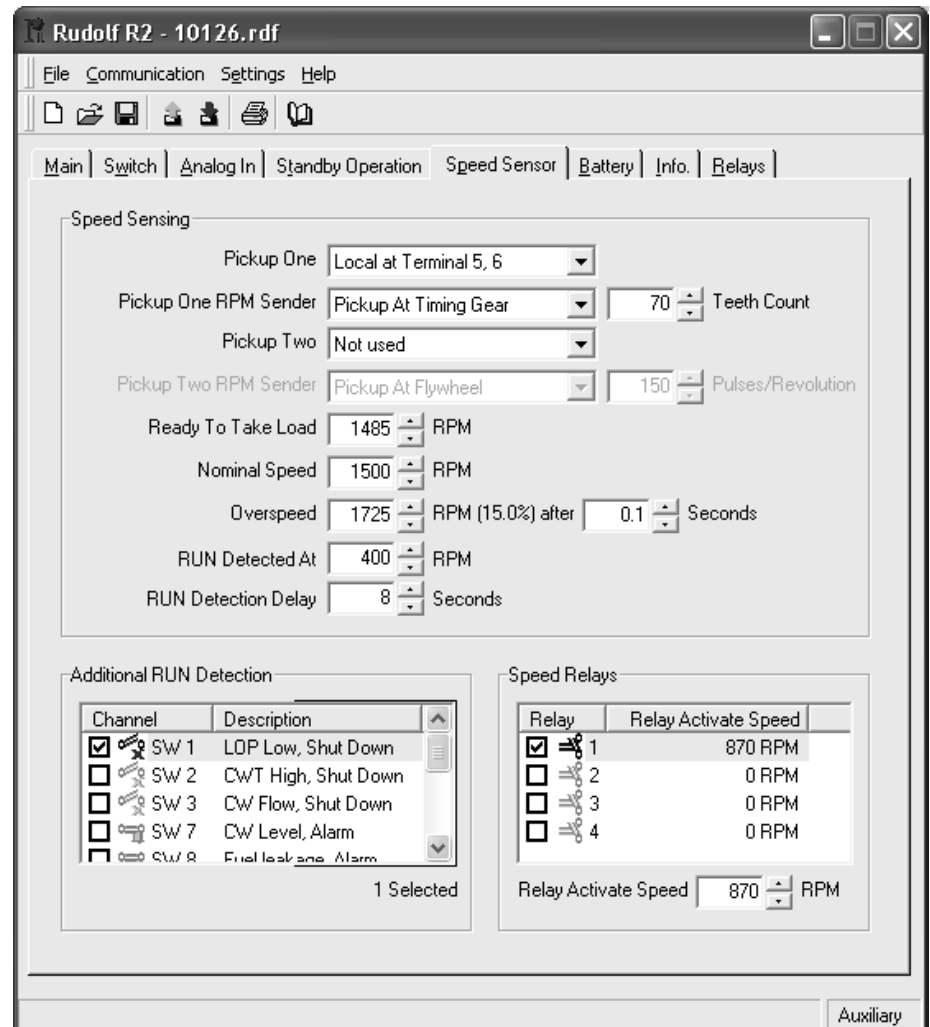
4.7.1 Pickup Information

Select zero, one or two pickups.

If zero pickups are selected, one or more signals must be selected under Additional RUN Detection.

4.7.2 Pickup One/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.

Range: 1 – 255 pulses/rev.

4.7.3 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 – that activates when the engine reaches this RPM.

It will not deactivate again until the control unit reaches the stopping mode.

This can be used for any RPM detection purpose. Also see the chapter *Speed Relays* on page 38.

Typical: *1% below nominal RPM*

Range: *100 – nominal RPM*

4.7.4 Nominal/Max Speed

This is the nominal or maximum operating speed of the engine. For Propulsion engines, indicate the maximum speed.

Typical: *1500/1800 RPM*

Range: *100 – 5000 RPM*

4.7.5 Overspeed

The control unit automatically shutdowns the engine if the RPM is higher than this setting.

Typical: *15% above Nominal RPM*

Range: *Nominal – 6500 RPM*

4.7.5.1 Overspeed Time

Typical: *0.1 seconds*

Range: *0.1 – 1.0 seconds*

4.7.6 RUN Detected At

When starting the gen. set., the control unit will sense that the engine is running when reached this RPM. This will also disable the cranking motor.

Typical: *400 RPM*

Range: *50 – 600 RPM*

4.7.7 Run Detection Delay

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

4.7.8 Additional RUN Detection

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

Note: Although any signal can be selected, be sure to select *reasonable* signals – for instance Oil Pressure – for run detection.

Press OK when finished.

4.7.9 Speed Relays

Speed relays are relays that activate and deactivate at a certain RPM.

Up to four such relays can be defined, and any RPM value can be set to any relay.

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

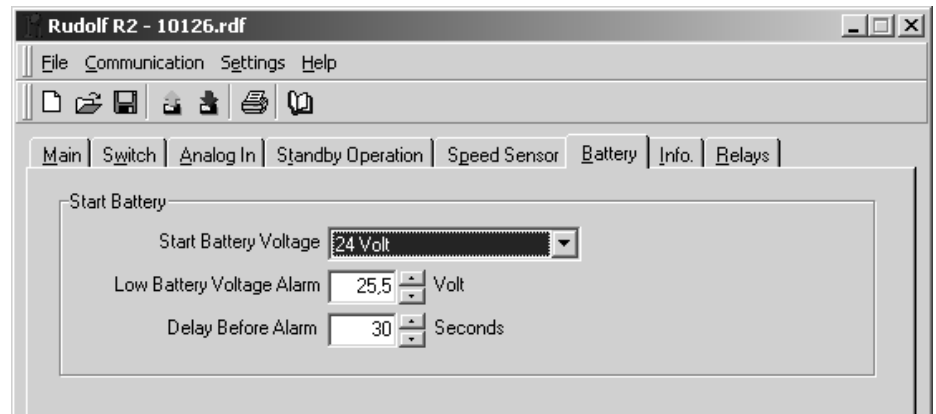In the above example, Speed Relay 1 is configured. It activates at 870 RPM.

The *activated* Speed Relays – and their settings – is now available in the Relays Tab, see page 41.

4.8 <u>B</u>attery

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

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

4.8.1 Start Battery Voltage

Select 12V or 24V supply. The control unit is a 24V system, but if a 12/24DC/DC converter is used, select 12V here.

Otherwise, always choose 24V.

4.8.2 Low Battery Voltage Alarm

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

Typical: 25.5 volt

24V Range: 18.0 – 30.0 volt

12V Range: 9.0 – 15.0 volt

4.8.3 Delay before Alarm

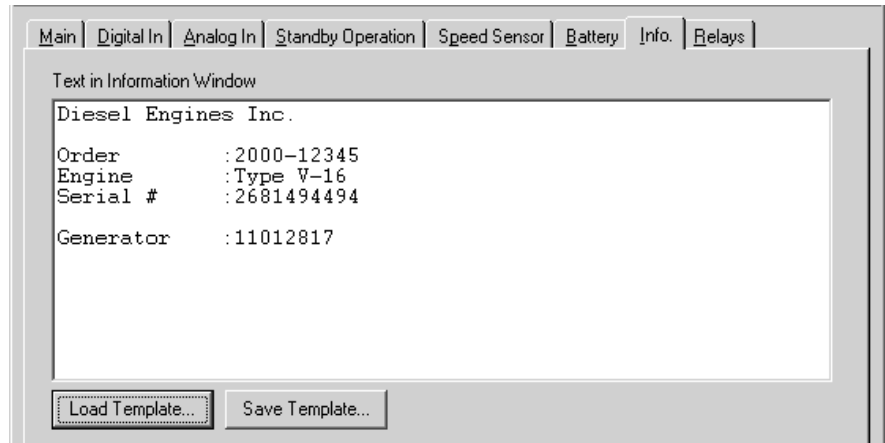When the battery voltage is below limit, it must remain low for this period, before the alarm is given.

Typical: 60 seconds

Range: 1 – 255 seconds

4.9 Info

All text written in the Information Tab is displayed in the control unit when pressing the INFO button on the frontpanel.

Typical information may include:

- Project Name and Number
- Order Number
- Engine Serial Number
- Generator Serial Number
- Service Telephone Number
- Etc.

Eight lines are available with up to 40 characters on each line. The text is stored in the control unit.

4.9.1 Fields

Fields are extremely useful, and often used instead of static text.

A field will be updated with the *field content* when the configuration is downloaded into the control unit.

The following fields exist:

Field	Field Content
{filename}	The Rudolf configuration filename, without the path.
{date}	Today's date in short-form, YYYY-MM-DD (2002-10-30)
{ldate}	Today's date in long-form, YYYY-MMM-DD (2002-Oct-02)
{time}	The current 24h time format HH:MM (14:28)
{author}	Your user name in the PC (The PC name if no user name is given).

4.10　Relays

On the terminal card, a number of functions are configurable to different relays as follows:

4.10.1 RK-60

There are no configurable relays available on this card. The card is used with the DCU 305 R1 system and is not configurable.

4.10.2 RK-66

On the RK-66 wire terminal card, the two relays K7 and K9 are configurable. See page 43 for available signals to these relays

4.10.3 MK-14

When necessary, optional extra relay-cards can be connected directly into the control unit with the MK-14 relay expansion module.
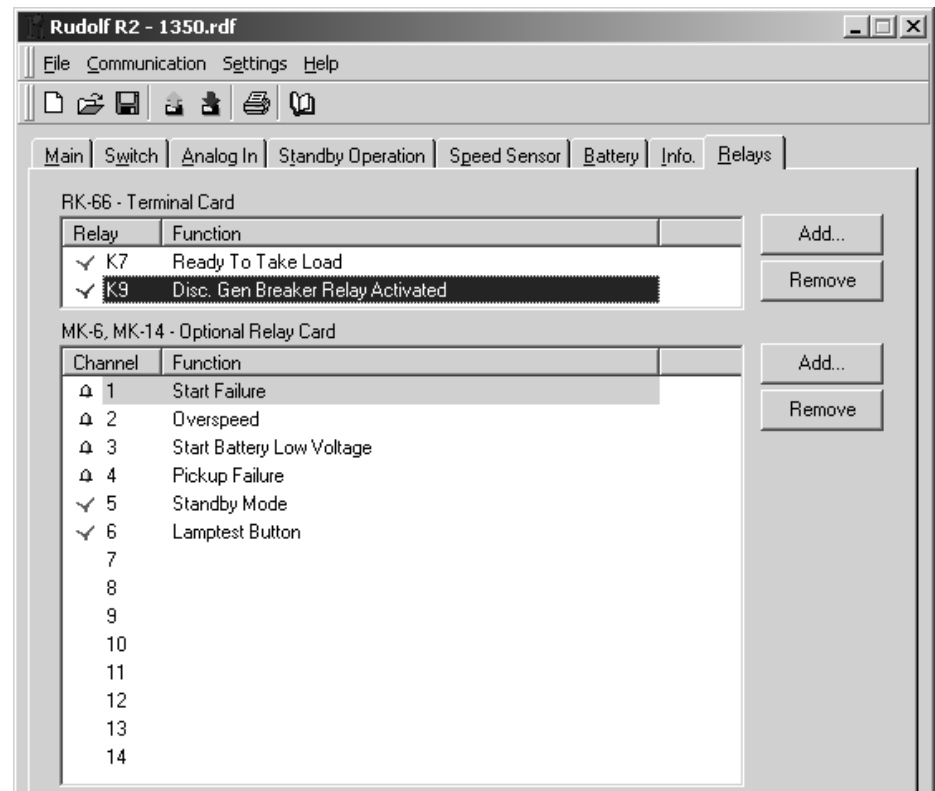
All the available signals in the control unit can be routed to the RK-66's K7 and K9 or the MK-14 cards for convenient use.
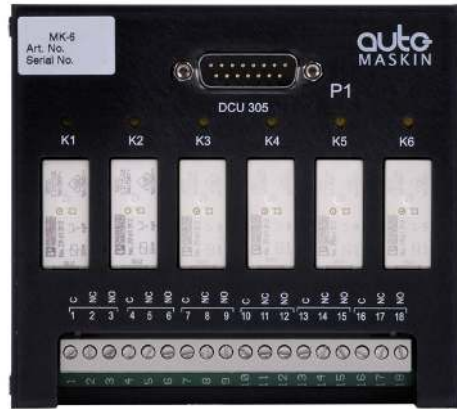
The MK-14 relay card

4.10.4 Signals to the optional Relay Cards

Relay	Signal
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	

MK-6
6 Relays

MK-14
14 Relays

Relay 1-6 on the MK-6 and relays 1-14 on the MK-14 can be given any signal from the following signal pool:

4.10.5 Available configurable signals

#	Signal	Comment
1	Acknowledge button	Manual press of the Acknowledge button.
2	Alarm In Alarm List	One or several Acknowledged OR unacknowledged alarms in alarm list.
3	Analogue Sensor failure	An analogue input (4-20mA) is defined but the signal is less than 2mA.
4	Backup System Failure	The built-in backup system has failed.
5	Broken Wire	Broken wire on Switch- OR analogue channels.
6	Buzzer Active	Active when the control units buzzer is active.
7	Buzzer off button	Manual press of the Buzzer Off button.
8	Common Alarm	Sum of all alarm channels, plus any internal alarm
9	Common Analogue Input Current Overload	The sensor fuse is blown. The fuse resets itself when the short circuit is removed.
10	Common Shutdown	Sum of all shutdown channels, plus any internal shutdown
11	Common Warning	Sum of all warning channels, plus any internal warning
12	Cooling State	The gen. set. is cooling and running at no load.
13	Cranking State	The control unit signals the start motor. The gen. set. is cranking. On also between start attempts.
14	Delayed Stop Activated	The control unit has received signal saying the gen. set may stop.
15	Disconnect Gen. Breaker	Disconnects the generator breaker when entering cooling or stopping mode.
16	Downloading Configuration	New parameters are being downloaded into the control unit.
17	Engine started	The control unit detects the engine is running but no start signal has been detected.
18	Engine stopped for Unknown reason	The engine stopped for no known reason.
19	First Start Attempt Failed	The *first* of several start attempts failed during automatic start.
20	LOCAL Mode	The control unit is set to Local mode (Automatic/Remote Start/Stop disabled)
21	Lamp test button	Lamp test button activated (relay on while button is operated)
22	Manual mode	The control unit is set to Manual mode.
23	Manual Stop	Manual Stop button, local or remote.
24	New Alarm Pulse	Relay activated for 2 sec on every new alarm.

#	Signal	Comment
25	Overspeed	Engine speed too high. Stays until Acknowledged.
26	Pickup 2 failure	Unable to detect a valid pickup signal. Dependent upon at least one defined *Additional RUN Detection*. Sum of pickup 1 and 2.
27	Pickup failure	Unable to detect a valid pickup signal. Dependent upon at least one defined *Additional RUN Detection*. Sum of pickup 1 and 2.
28	Power On	Activated when the control unit is powered.
29	Preheat	Preheating before and during start attempts. Stays on until engine has started or failed to start.
30	Prelube	Prelube activated. Behavior depends on prelube config.
31	Ready to start	The gen. set. is ready to start (Automatic start).
32	Ready to take load	Activates – and stays activated – when reached a certain rpm.
33	Running State	The gen. set is running. On as long as the engine is running. Same as green LED in the Start button.
34	Secondary battery failure (terminal 3-4)	The secondary battery is not connected or its voltage is below 12V.
35	Service Required	Activated when reached a service interval – depends on config.
36	Shutdown override	The control unit is disabling shutdowns, except overspeed.
37	Shutdown Override off	Shutdown override not activated – relay deactivates on shutdown override.
38	Standby mode	The control unit is set to Standby (Automatic) mode.
39	Start battery low voltage	The engines start battery has low voltage.
40	Start command Externally	Same as the input Blackout signal, e.g. from main switchboard. (Input terminal T34)
41	Start disabled	The control unit is disabling local and remote start attempts, also when set to Standby.
42	Start Failure	The engine failed to start after the configured amount of start attempts.
43	Stop failure	A stop signal was given but after 40 seconds, the engine is still running.
44	Stopped	The engine has stopped (Rpm < 10).
45	Stopping State	The control unit signals the stop solenoid and the engine is stopping.

Further, all channels configured to give a warning, alarm or shutdown, can be routed to any relay.

The relay activates when there is a warning, alarm or shutdown event.