Communication Manual

DCU 305 R3
DCU 305 R3 LT

Diesel Engine Control Unit

Auto-Maskin

Document Revisions

Revision	Update
November 2005	Created
July 2006	Added scaling factors
July 2014	DCU 305 R3 LT included

Title:	DCU 305 R3 & R3 LT Communication Manual
Revision:	July 2014

Content

Overview

Introduction

The DCU 305 R3 has the Modbus RTU communication protocol built in as standard.

Modbus is a master/slave protocol, meaning that there is one master and one or several slaves in a single communication network. All slaves are given a unique ID-number to distinguish them on the network.

The master always initiates communication by transmitting a message. All slaves receive the transmitted message, but will only answer if:

The message is recognised as valid, and

The message is addressed to this slave ID-number

As can be seen, only one slave will respond to any master request.

The DCU 305 R3 supports multidrop (several slaves on the same network) communication.

For more information around the Modbus protocol, please see http://www.modbus.org

The DCU 305 R3 LT is identical to the DCU 305 R3 with the exception that the LT version do not have the CAN capability.

Supported Messages

The DCU 305 R3 supports the following Modbus messages.

#	Modbus Message
1	Read Coil Status
2	Read Input Status
3	Read Holding Registers
4	Read Input Registers
5	Force Single Coil
6	Preset Single Register

#	Modbus Message
16	Preset Multiple Registers
43	Vendor ID

Communication Parameters

The DCU 305 R3 uses the following fixed communication parameters.

Parameter	Value
Baudrate	9600
Databits	8
Stopbits	1
Parity	Even
ID-number	1-247[1]

The Address Field

The **Address** fields below lists the Modbus Addresses minus one.

In equipment like for instance E-Panels, you should specify “zero offset” and use the “Address” values below.

If your product is working with Coil umbers, Input numbers, and Register numbers according to the Modbus standard, you must add 1 to the Addresses listed below before using them. This is called “one offset”.

[1] *ID-number 1 is standard from factory but can be changed using the configuration software utility. The ID-number is displayed in the Information page.*
Note! *If using the automatic remote panel RSP 305, make sure all ID-numbers are in the range 1-32.*

Commands

Overview

Commands are inputs to the DCU 305 R3 from a remote master unit.

The DCU 305 R3 will respond with an acknowledge message if the command is valid.

Command Addresses

The following signals are available.

Command	Address	Comment
Start	00001	Start command
Stop	00002	Stop command
Reset	00000	Reset all alarms
Standby	00004	Set to Standby mode of operation
Manual	00003	Set to Manual mode of operation
Delayed Stop	00005	Works as the Delayed Stop terminal input. A Reset command resets it.

Binary

Overview

Binary signals are 0 or 1.

Unless mentioned otherwise, the signal is active when the signal is a one (1).

Binary Addresses

General Alarm Status

Signal	Address	Comment
New alarm(s)	10019	Unacknowledged alarms. Flashing Alarm LED
Active alarm(s)	10011	Acknowledged alarms. Lit Alarm LED
New Warning(s)	10020	Unacknowledged warnings. Flashing Warning LED.
Active Warning(s)	10012	Acknowledged Warning(s). Lit Warning LED.
New/Active Shutdown(s)	10014	Lit Shutdown LED.
Primary Battery low voltage	10352	Voltage alarm on terminals 1-2
Secondary Battery low voltage	10368	Voltage alarm on terminals 3-4
Secondary battery failure	10069	Voltage on terminals 3-4 too low
Primary or secondary power low	10021	Power LED flashes. **Note!** Signal has no delay
Buzzer active	10025	Buzzer is cycling on/off. Signal is a steady one (1).
Sensor fuse overload	10068	Fuse located on RK-66. Repairs itself.

Signal	Address	Comment
Start Failure	10328	Failed to start after final attempt
Overspeed	10344	RPM > setpoint and time
Engine stopped	10336	Engine stopped for unknown reason
Failed to stop	10360	Engine is still running 60 seconds after stop command
Pickup 1 failure	10384	Requires one or more configured *Additional Run* signal
Pickup 2 failure	10472	
Analogue sensor failure	10399	Sum broken wire alarm for all analogue sensors

Switch Channel Alarm

Signal	Address	Comment
Switch channel 1 alarm[2] Broken Wire	10199 10198	
Switch channel 2 alarm Broken Wire	10207 10206	
Switch channel 3 alarm Broken Wire	10215 10214	
Switch channel 4 alarm Broken Wire	10223 10222	
Switch channel 5 alarm Broken Wire	10231 10230	
Switch channel 6 alarm Broken Wire	10239 10238	
Switch channel 7 alarm	10247	
Switch channel 8 alarm	10255	
Switch channel 9 alarm	10263	

[2] *An "Alarm", means an active Warning, Alarm or Shutdown.*

Signal	Address	Comment
Switch channel 10 alarm	10271	
Switch channel 11 alarm	10279	
Switch channel 12 alarm	10287	

Analogue Channel Alarm

Signal	Address	Comment
Analogue channel 1 alarm Broken Wire	10295 10294	
Analogue channel 2 alarm Broken Wire	10303 10302	
Analogue channel 3 alarm Broken Wire	10311 10310	
Analogue channel 4 alarm Broken Wire	10319 10318	
Analogue channel 5 alarm Broken Wire	10327 10326	
Analogue channel 6 alarm Broken Wire	10415 10414	Channels 6-11 are on optional AK-6 unit
Analogue channel 7 alarm Broken Wire	10423 10422	
Analogue channel 8 alarm Broken Wire	10431 10430	
Analogue channel 9 alarm Broken Wire	10439 10438	
Analogue channel 10 alarm Broken Wire	10447 10446	
Analogue channel 11 alarm Broken Wire	10455 10454	
Analogue channel 12 alarm	10495	Channels 12-17 are J1939 CAN only
Analogue channel 13 alarm	10503	
Analogue channel 14 alarm	10511	
Analogue channel 15 alarm	10519	

Signal	Address	Comment
Analogue channel 16 alarm	10527	
Analogue channel 17 alarm	10535	

DCU Operational Status

Signal	Address	Comment
Engine Running	10008	Engine is running
Standby mode	10009	In Standby mode
Stopping	10010	Same as red led in Stop button. Engine is stopping.
Local Mode	10024	DCU in Local mode
Cranking	10070	DCU is Cranking the engine
Shutdown override	10072	DCU has received a command to disable all shutdown channels
Ready to Start	10145	Ready state and Standby
Remote Reset	10088	DCU has received remote reset command
Delayed stop	10089	DCU has received Delayed Stop command.
Blackout (Automatic) Start	10090	DCU has received Blackout Start command
Remote Stop	10091	DCU has received Remote Stop command
Terminal 61 active	10065	Configurable function
Terminal 62 active	10064	Configurable function
Terminal 63 active	10063	N/A
Terminal 64 active	10062	No internal functionality
Relay K7	10144	Configurable
Relay K9	10146	Configurable
Broken wire sum alarm	10480	Switch, Analogue, T44, CAN/J1939.

Button Status

Signal	Address	Comment
Alarmlist button	10073	Pressed
Down button	10074	Pressed
Up button	10075	Pressed
Menu, Enter, Exit button	10076	Pressed
Acknowledge button	10077	Pressed
Stop button	10078	Pressed
Standby button	10079	Pressed

Optional MK-14 Relay Status

Signal	Address	Comment
MK-14 Relay 1	10159	Configurable
MK-14 Relay 2	10158	Configurable
MK-14 Relay 3	10157	Configurable
MK-14 Relay 4	10156	Configurable
MK-14 Relay 5	10155	Configurable
MK-14 Relay 6	10154	Configurable
MK-14 Relay 7	10153	Configurable
MK-14 Relay 8	10152	Configurable
MK-14 Relay 9	10167	Configurable
MK-14 Relay 10	10166	Configurable
MK-14 Relay 11	10165	Configurable
MK-14 Relay 12	10164	Configurable
MK-14 Relay 13	10163	Configurable
MK-14 Relay 14	10162	Configurable
Broken Wire Sum	10480	Sum alarm of all channels, including switch, analogue and J1939 CAN.
Service 1	10536	Reached service interval
Service 2	10552	Reached service interval
Service 3	10560	Reached service interval
Service 4	10568	Reached service interval

J1939 Diagnostics

According to SAE J1939-71, ref. www.sae.org.

This list is for DCU with firmware version before 6.53 (typically 6.46) :

Signal	Address	Comment
J1939 CAN Diagnostics	10463 10456+7	Active Diagnostic(s) available
DM1 Malfunction Indicator Lamp	11489	Malfunction Indicator Lamp
DM1 Red Stop Lamp	11491	Red Stop Lamp
DM1 Amber Warning Lamp	11493	Amber Warning Lamp
DM1 Protect Lamp	11495	Protect Lamp

This list is for DCU with firmware version 6.53 and onwards:

Signal	Address	Comment
J1939 CAN Diagnostics	10463 10456+7	Active Diagnostic(s) available
DM1 Malfunction Indicator Lamp	13025	Malfunction Indicator Lamp
DM1 Red Stop Lamp	13027	Red Stop Lamp
DM1 Amber Warning Lamp	13029	Amber Warning Lamp
DM1 Protect Lamp	13031	Protect Lamp

See J1939 Diagnostics page 12.

Note! The “Malfunction Indicator” is for emission related faults. The “Red Stop” is for faults that warrant stopping the engine. The “Amber” is for faults that do not warrant stopping the engine. The “Protect” is for faults that are not in the electronics/electrical, like for instance coolant temp outside acceptable range.

Please note that some engine vendors doesn’t use the Malfunction Indicator lamp, and always sends 1, which may make you think there’s a fault when there’s not.

Other Status

Signal	Address	Comment
LCD backlight On/Off	10140	LCD backlight is On
Backup Processor Active	10464	1Hz oscillating

Analogue

Overview

All addresses contain a 16-bit value.

Analogue Addresses

Scaling Factor on 4-20mA channels

In order to get the correct value reading, the analogue value as available in the DCU 305 R5 must be multiplied with a factor as described in the following table.

From	To	Multiply Factor
0	2.2	0.0001
0	2.3 – 50.9	0.001
0	51.0 – 509.6	0.01
0	509.7 –	0.1

Status, Counters and Meters

Signal	Address	Comment
Status	42816	0=Ready 1=Cranking (Manual) 2=Cranking(Automatic) 3=Running 4=Cooling 5=Stopping 6=Stopped Initial Pause Prelube Pause Blocked
Firmware version major	42825	DCU version **X**.y

Signal	Address	Comment
Firmware version minor	42826	DCU version x.**Y**
Total hours	42828	
Trip hours	42829	
Start counter	42830	
Start failure counter	42831	
Battery Voltage	42837	Terminals 1-2 (x10V)
RPM meter	42839	Engine rpm

Analogue Input channels

Signal	Address	Comment
Analogue channel 1	42832	4-20mA[3] or J1939
Analogue channel 2	42833	4-20mA or J1939
Analogue channel 3	42834	4-20mA or J1939
Analogue channel 4	42835	4-20mA or J1939
Analogue channel 5	42836	4-20mA or J1939
Analogue channel 6	42848	4-20mA from AK-6, or J1939
Analogue channel 7	42849	4-20mA from AK-6, or J1939
Analogue channel 8	42850	4-20mA from AK-6, or J1939
Analogue channel 9	42851	4-20mA from AK-6, or J1939
Analogue channel 10	42852	4-20mA from AK-6, or J1939
Analogue channel 11	42853	4-20mA from AK-6, or J1939
Analogue channel 12	42864	J1939 Only
Analogue channel 13	42865	J1939 Only
Analogue channel 14	42866	J1939 Only
Analogue channel 15	42867	J1939 Only
Analogue channel 16	42868	J1939 Only
Analogue channel 17	42869	J1939 Only

J1939 Diagnostics

According to SAE J1939-71. Please see www.sae.org

The 4-20mA channel can also be 0-20mA and 0-5V. In addition, channel 1 can be 0-10V. Please consult the DCU 305 R3 Installation Manual.

Signal	Address	Comment
J1939 SPN count	42880	0 = No diagnostic warning/alarm 1-16 = number of active diagnostics
J1939 SPN 1	42883	
J1939 FMI 1	42884	
J1939 SPN 2	42885	
J1939 FMI 2	42886	
J1939 SPN 3	42887	
J1939 FMI 3	42888	
J1939 SPN 4	42889	
J1939 FMI 4	42890	
J1939 SPN 5	42891	
J1939 FMI 5	42892	
J1939 SPN 6	42893	
J1939 FMI 6	42894	
J1939 SPN 7	42895	
J1939 FMI 7	42896	
J1939 SPN 8	42897	
J1939 FMI 8	42898	
J1939 SPN 9	42899	
J1939 FMI 9	42900	
J1939 SPN 10	42901	
J1939 FMI 10	42902	
J1939 SPN 11	42903	
J1939 FMI 11	42904	
J1939 SPN 12	42905	
J1939 FMI 12	42906	
J1939 SPN 13	42907	
J1939 FMI 13	42908	
J1939 SPN 14	42909	
J1939 FMI 14	42910	
J1939 SPN 15	42911	
J1939 FMI 15	42912	
J1939 SPN 16	42913	
J1939 FMI 16	42914	

See also J1939 *Diagnostics* page 9 for lamp status bits.

SPN: Suspect Parameter Number. Indicating – for instance – which sensor is faulty, eg. “Fuel level”. Will be zero when no valid data.

FMI: Failure Mode Identifier. This indicates the type of problem, eg. “shorted to 0V”. Will be zero when no valid data.

Note! The SPN and FMI number documentation should be obtained from the engine dealer.

If this is not available, see the Auto-Maskin document *DCU 305 R3 CAN/J1939 Manual*.