RCAN-01 and ACS800/ACS550 Quick Start-up Guide

Supported operation modes

- **CANopen DS-402** GENERIC in ACS800 parameter 98.7, explanation of the state machine in the RCAN-01 User's Manual

- **Transparent** ABB DRIVES in ACS800 parameter 98.7, explanation of the state machine in the drive manual

The ACS550 detects the operation mode automatically.

Supported PDOs (Process Data Objects)

RCAN-01 supports 5 receive PDOs (RPDO, from master to slave) and 5 transmit PDOs (TPDO, from slave to master). The supported PDOs are PDO1, PDO6, PDO21, PDO22 and PDO23. Each RPDO and TPDO can be separately enabled or disabled. The size of each PDO can range from 0 to 8 bytes (0 to 4 mapped objects).

The factory default settings are (in DS-402 mode):

- RPDO1 is enabled with COB ID 0x206 and has object 0x6040 (Control Word) mapped to it.

- TPDO1 is enabled with COB ID 0x186 and has object 0x6041 (Status Word) mapped to it.

- RPDO6 is disabled and has objects 0x6040 (Control Word) and 0x6042 (Target Velocity) mapped to it.

- TPDO6 is disabled and has objects 0x6041 (Status Word) and 0x6044 (Control Effort) mapped to it.

- Other PDOs are disabled and have no objects mapped to them.

Mappings and other PDO-related settings can be made via CANopen objects. Additionally, PDO21 can be configured by drive parameter group 51 (fieldbus adapter parameters). For more information, see RCAN-01 User's Manual.

ACS800/550 start-up sequence

1. **Set the rotary switches** S1…S3 on the RCAN-01 module. This should be done before mounting the module, as the switches are easier to reach.

   a. The **baud rate** setting is chosen by S1:
      1 = 10 kbit/s; 2 = 20 kbit/s; 3 = 50 kbit/s; 4 = 125 kbit/s;
      5 = 250 kbit/s; 6 = 500 kbit/s; 7 = 800 kbit/s; and 8 = 1 Mbit/s.
      To set the baud rate by drive parameter 51.03 instead, set S1 to 0.

   b. The **node ID** is set by S2 and S3. For example, to set the node ID to 16, set S2 to 6 and S1 to 1. To set the node ID by drive parameter 51.02 instead, set both S2 and S3 to 0.

2. **Mount the module** as instructed in the RCAN-01 User's Manual.
   Install RCAN-01 EDS file in the PLC

3. **Connect the fieldbus cable** to the X1 (NETWORK) connector of the module. Refer to the RCAN-01 User's Manual for more information.

4. Power up the drive. **Activate the fieldbus module** by setting parameter 98.2 to "FIELDBUS" (ACS800) or "EXT FBA" (ACS550).

5. Make the appropriate changes to the drive parameters, especially the **group 51 parameters** (fieldbus adapter parameters). Do one of the following (a…c):

   a. To use the CANopen DS-402 communication profile, set the module to profile mode by setting parameter 51.26 to 0 (Profile). If using ACS800, also set parameter 98.7 to GENERIC. The DS-402 control word can be accessed by CANopen object 0x6040 and the DS-402 status word by object 0x6041.

   b. To use the ABB Drives communication profile, set the operation mode of the module to transparent by setting parameter 51.26 to 1 (Transparent). If using ACS800, also set parameter 98.7 to ABB DRIVES. The transparent control word can be accessed by CANopen object 0x2005 and the transparent status word by object 0x2007.

   c. To allow selection of the communication profile by CANopen object 0x2004, set parameter 51.26 to 2. For ACS800, you still need to set parameter 98.7 as in a. and b. above.

   If software-configurable baud rate (0) or node ID (00) was selected by the rotary switches in step 1, do the appropriate settings in parameters 51.2 (node ID, 1…127) and/or 51.3 (baud rate, 1…8 as in the rotary switch; see the listing in step 1.).

   See the RCAN-01 User's Manual for other options configurable by the fieldbus parameter group 51.

   After changing the parameters in group 51, you will need to **refresh the parameters** to make them effective. This is done by setting parameter 51.27 to 1 (REFRESH). It will revert to 0 (DONE) once the refresh is complete.

   Make other changes to the drive parameters as needed.

6. **Install the RCAN-01 EDS file** to the master.

7. To allow controlling of the drive by the field bus, map the necessary **CANopen objects and/or drive parameters to the PDOs**. For more information, see the examples below.

8. Send a NMT 001 message to the node to **enter operational mode**. The drive can now be communicated with by sending and receiving PDOs on the field bus.

Parameter setting examples

Example 1: GENERIC DRIVES PROFILE (CANopen DS-402)

In this example, the RCAN-01 will be set to synchronously transmit and receive PDO6 with default mappings, with PDO1 disabled. The drive will be configured to be controlled via the field bus using the CANopen DS-402 communication profile.

1. Set the drive parameters as follows:

Par.	Name	Value (ACS800)	Value (ACS550)	Purpose and comments
10.01	EXT1 STRT/STP/DIR	COMM.CW	COMM	Allow the drive to be started and stopped from the field bus. This parameter is named "EXT1 COMMANDS" in ACS550.
11.03	EXT REF1 SELECT	COMM.REF	COMM	Allow the drive speed to be controlled from the field bus
16.01	RUN ENABLE	YES	NOT SEL	Make sure that no other controls prevent the starting of the drive.
16.04	FAULT RESET SEL	COMM.CW	COMM	Allow drive faults to be reset from the field bus.
98.02	COMM. MODULE LINK	FIELDBUS	EXT FBA	Enable the fieldbus module. This parameter is named "COMM PROT SEL" in ACS550.
98.07	COMM PROFILE	GENERIC	-	Specify the communication profile used by the ACS800 drive. Available in ACS800 only; automatically detected in ACS550.
51.01	MODULE TYPE	CANopen	CANopen	Read only – just verify that the module is detected correctly
51.02	NODE ADDRESS	6	6	Set module Node ID to 6.
51.03	BAUDRATE	8	8	The speed of the communication link. Value 8 means 1Mbit/s
51.27	FBA PAR REFRESH	REFRESH	REFRESH	This is the last parameter to be set so that the previous changes to group 51 parameters are taken into use.

NOTE: The names of the group 51 parameters (51.02 … 51.26) will not be shown on the ACS550 panel.

After setting parameter 51.27 (FBA PAR REFRESH), the fieldbus module should be in pre-operational mode ("CAN RUN" led in the front of the module blinks green). PDO mappings can be changed only in the pre-operational mode.

2. Disable PDO1 by setting bit 31 of COB-ID of both RPDO1 and TPDO1. Using the master, set CANopen objects as follows:

Index	Name	Value	Purpose
0x1400,1	Receive PDO 1 COB-ID	0x80000206	Disable RPDO1 by setting bit 31 of its COB-ID
0x1800,1	Transmit PDO 1 COB-ID	0x80000186	Disable TPDO1 by setting bit 31 of its COB-ID

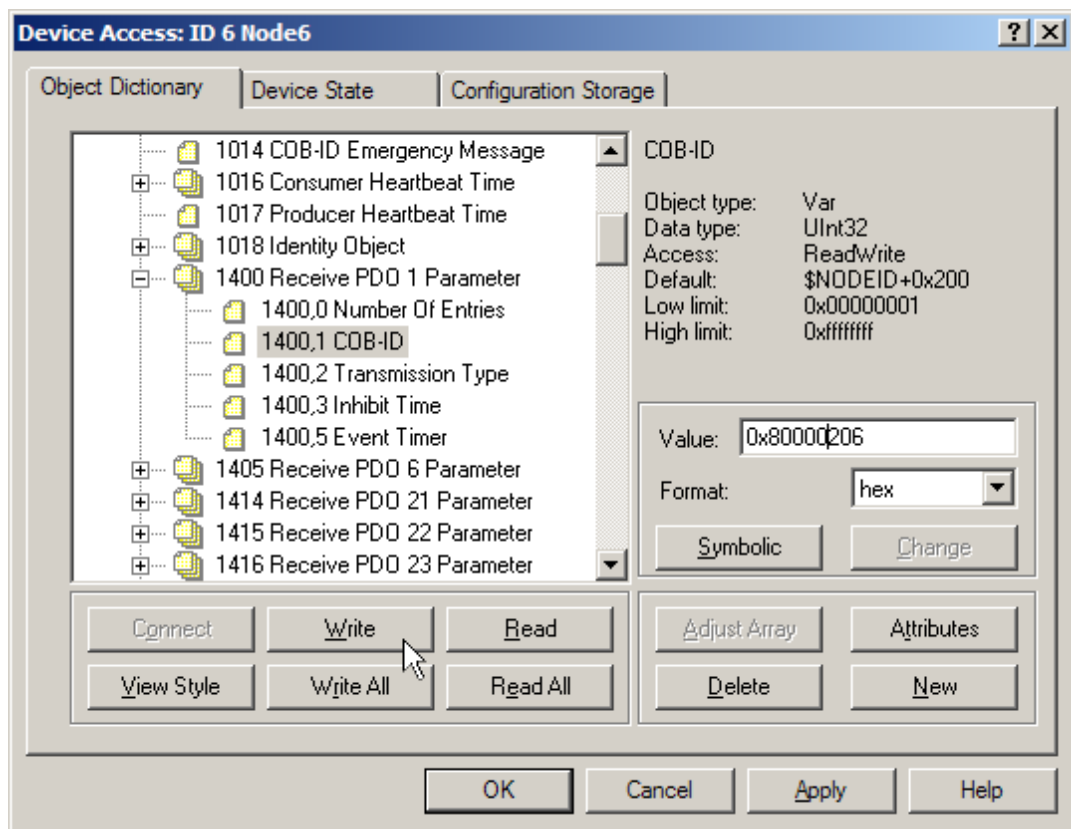Writing a CANopen object with Vector CANsetter v. 5.2 is illustrated in **Figure 1**.

Figure 1:   Writing a CANopen object with Vector CANsetter v. 5.2.

3. To enable PDO6, set CANopen objects as follows:

Index	Name	Value	Purpose
0x1805,1	Transmit PDO 6 COB-ID	0x286	Enable TPDO6 by setting a valid COB-ID for it.
0x1805,2	Transmit PDO 6 Transmission Type	0x0	Enable synchronous acyclic transmission of TPDO6 (the RCAN module will transmit PDO6 whenever it receives a SYNC message from the master)
0x1405,1	Receive PDO 6 COB-ID	0x306	Enable RPDO6 by setting a valid COB-ID for it.
0x1405,2	Receive PDO 6 Transmission Type	0x0	Enable synchronous acyclic reception of RPDO6 (the values written with RPDO6 will take effect only after the module receives a SYNC message)
0x1005,0	COB-ID Sync Message	0x80	Set the COB-ID of the SYNC message.

By default, RPDO6 has DS-402 control word and speed reference mapped to it, and TPDO6 has DS-402 status word and control effort mapped to it.

4. Finally, set the RCAN-01 to operational mode by sending a NMT 001 message. In CANsetter v.5.2, this is done by clicking the "Enter Operational" button on Device State tab of the Device Access dialog. In the operational mode, the RCAN-01 will send and receive the enabled PDOs. As a synchronous transmission type is used, the drive can be controlled by first sending PDO6 with the desired control word and speed reference, and then sending a SYNC message to make them effective. The drive can be monitored by sending a SYNC message and then receiving the PDO6 message sent by the module. The control and status words are described in RCAN-01 User's Manual.

Example 2: ABB DRIVES PROFILE (Transparent)

In this example, the RCAN-01 will be set to asynchronously transmit and receive PDO21. PDO21 mappings will be modified and the PDO will be enabled. Other PDOs will be disabled.

1. Set the drive parameters as follows:

Par.	Name	Value (ACS800)	Value (ACS550)	Purpose and comments
10.01	EXT1 STRT/STP/DIR	COMM.CW	COMM	Allow the drive to be started and stopped from the field bus. This parameter is named "EXT1 COMMANDS" in ACS550.
11.03	EXT REF1 SELECT	COMM.REF	COMM	Allow the drive speed to be controlled from the field bus
16.01	RUN ENABLE	COMM.CW	COMM	Set "Run enable" control to field bus.
16.04	FAULT RESET SEL	COMM.CW	COMM	Allow drive faults to be reset from the field bus.
98.02	COMM. MODULE LINK	FIELDBUS	EXT FBA	Enable the fieldbus module. This parameter is named "COMM PROT SEL" in ACS550.
98.07	COMM PROFILE	ABB DRIVES	-	Specify the communication profile used by the ACS800 drive. Available in ACS800 only; automatically detected in ACS550.
51.01	MODULE TYPE	CANopen	CANopen	Read only – just verify that the module is detected correctly
51.02	NODE ADDRESS	8	8	Set module Node ID to 8.
51.03	BAUDRATE	8	8	The speed of the communication link. Value 8 means 1Mbit/s
51.27	FBA PAR REFRESH	REFRESH	REFRESH	This is the last parameter to be set so that the previous changes to group 51 parameters are taken into use.

NOTE: **The names of the group 51 parameters (51.02 … 51.26) will not be shown on the ACS550 panel.**

The module should end up in pre-operational mode after writing the parameter 51.27.

2. Make sure that TPDO21 is disabled by setting bit 31 of TPDO21 COB-ID (CANopen object 0x1814,1). For this example, use the value 0x80000388. This must be done in order to change TPDO21 mappings. See **Figure 1** in Example 1 for an illustration on how to disable a PDO in Vector CANsetter v. 5.2.

3. Set the number of TPDO21 mapped objects (object 0x1a14,0) to 0. This is also required before setting TPDO21 mappings.

4. If you are using CANsetter, you will need to use the "Adjust Array" button in the Object Dictionary to bring up the objects which change the TPDO21 mappings, as they disappear after writing 0 in the previous step. This is done by typing the number of the objects to be mapped, 4 in this example, to the Value box of the object 0x1a14,0 (the same as in the previous step) and clicking on the "Adjust

Array" button and <u>not the "Write button"</u>. The object tree will then be updated with objects 0x1a14,1 … 0x1a14,4 visible. The objects can then be freely modified to set the PDO mappings. When finished with the mappings, the number of mapped objects will need to be actually written by returning to object 0x1a14,0 (the previously entered Value should be already filled in) and clicking Write.

5. Set the mappings by writing the following CANopen objects:

Index	Name	Value	Purpose
0x1a14,1	mappedObj1	0x20070010	Map "Transparent status word" to TPDO21 mapped object 1. The value 0x20070010 is formed by joining the hexadecimal object ID, subindex and length of the object to be mapped (here, object ID = 0x2007, subindex = 0x00, length = 0x10 = 16). In CANsetter, you can also click the "Symbolic" button below the Value box to construct the value based on the information in the EDS file.
0x1a14,2	mappedObj2	0x20080010	Map "Transparent actual speed" to TPDO21 mapped object 2.
0x1a14,3	mappedObj3	0x400c0310	Map par. 12.03 (constant speed 2) to TPDO21 mapped object 1.
0x1a14,4	mappedObj4	0x400c0410	Map par. 12.04 (constant speed 3) to TPDO21 mapped object 1.
0x1a14,0	Transmit PDO 21 Number Of Entries	0x4	Write the actual number of mapping entries to the module.
0x1814,1	Transmit PDO 21 COB-ID	0x388	Enable TPDO21 by setting a valid COB-ID for it.
0x1814,2	Transmit PDO 21 Transmission Type	0xff	Enable asynchronous cyclic transmission of TPDO21
0x1814,5	Transmit PDO 21 Event Timer	10	Set the TPDO21 to be sent with intervals of 10 ms.

6. Repeat the steps 2 … 4 for RPDO21; i.e., write the CANopen objects as follows:

Index	Name	Value	Purpose
0x1414,1	Receive PDO 21 COB-ID	0x80000408	Disable RPDO21 to enable setting of its mappings.
0x1614,1	mappedObj1	0x20050010	Map "Transparent control word" to RPDO21 mapped object 1. Note that in CANsetter, you need to use the "Adjust array" button in to bring up the objects 0x1614,1 … 0x1614,4 as described in step 4 above.
0x1614,2	mappedObj2	0x20060010	Map "Transparent reference speed" to RPDO21 mapped object 2.
0x1614,3	mappedObj3	0x400c0310	Map par. 12.03 (constant speed 2) to RPDO21 mapped object 1.
0x1614,4	mappedObj4	0x400c0410	Map par. 12.04 (constant speed 3) to RPDO21 mapped object 1.

Index	Name	Value	Purpose
0x1414,0	Receive PDO 21 Number Of Entries	0x4	Write the actual number of mapping entries to the module.
0x1414,1	Receive PDO 21 COB-ID	0x408	Enable RPDO21 by setting a valid COB-ID for it.
0x1414,2	Receive PDO 21 Transmission Type	0xff	Enable asynchronous cyclic transmission of TPDO21

7. Disable other PDOs (1, 6, 22 and 23) by setting their COB-IDs so that their bit 31 is set. You can use, for example, the value 0x800006e0.

8. Set the module to operational mode.

The module should now be sending and receiving the PDO21. To control the drive, send the RPDO21 with the desired control word and speed reference. The constant speeds 2 and 3 can also be set by RPDO21. To monitor the state of the drive, use the status word and actual speed sent by the drive in TPDO21. The status and control words are described in ACS800 and ACS550 Firmware manuals, under the ABB Drives Communication Profile. The speed reference is given as a signed 16-bit integer, where the sign specifies the direction and the speed is determined by the absolute value. ±20000 corresponds to the speed specified by drive parameter 11.05 (REF1 MAX).