

8903/CB

CANopen

Communications Option

Technical Manual

HA469262U001 Issue 4

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Safety Information



Requirements

IMPORTANT: Please read this information BEFORE installing the equipment.

Intended Users

This manual is to be made available to all persons who are required to install, configure or service equipment described herein, or any other associated operation.

The information given is intended to highlight safety issues, EMC considerations, and to enable the user to obtain maximum benefit from the equipment.

Complete the following table for future reference detailing how the unit is to be installed and used.

INSTALLATION DETAILS	
Model Number <i>(see product label)</i>	
Where installed <i>(for your own information)</i>	
Unit used as a: <i>(refer to Certification for the Inverter)</i>	<input type="radio"/> Component <input type="radio"/> Relevant Apparatus
Unit fitted:	<input type="radio"/> Wall-mounted <input type="radio"/> Enclosure




Application Area

The equipment described is intended for industrial motor speed control utilising DC motors, AC induction or AC synchronous machines

Personnel

Installation, operation and maintenance of the equipment should be carried out by qualified personnel. A qualified person is someone who is technically competent and familiar with all safety information and established safety practices; with the installation process, operation and maintenance of this equipment; and with all the hazards involved.

Product Warnings

	Caution Risk of electric shock		Caution Refer to documentation		Earth/Ground Protective Conductor Terminal
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Safety Information



Hazards

DANGER! - Ignoring the following may result in injury

1. This equipment can endanger life by exposure to rotating machinery and high voltages.
2. The equipment must be permanently earthed due to the high earth leakage current, and the drive motor must be connected to an appropriate safety earth.
3. Ensure all incoming supplies are isolated before working on the equipment. Be aware that there may be more than one supply connection to the drive.
4. There may still be dangerous voltages present at power terminals (motor output, supply input phases, DC bus and the brake, where fitted) when the motor is at standstill or is stopped.
5. For measurements use only a meter to IEC 61010 (CAT III or higher). Always begin using the highest range. CAT I and CAT II meters must not be used on this product.
6. Allow at least 5 minutes for the drive's capacitors to discharge to safe voltage levels (<50V). Use the specified meter capable of measuring up to 1000V dc & ac rms to confirm that less than 50V is present between all power terminals and earth.
7. Unless otherwise stated, this product must NOT be dismantled. In the event of a fault the drive must be returned. Refer to "Routine Maintenance and Repair".

WARNING! - Ignoring the following may result in injury or damage to equipment

SAFETY

Where there is conflict between EMC and Safety requirements, personnel safety shall always take precedence.

- Never perform high voltage resistance checks on the wiring without first disconnecting the drive from the circuit being tested.
- Whilst ensuring ventilation is sufficient, provide guarding and /or additional safety systems to prevent injury or damage to equipment.
- When replacing a drive in an application and before returning to use, it is essential that all user defined parameters for the product's operation are correctly installed.
- All control and signal terminals are SELV, i.e. protected by double insulation. Ensure all external wiring is rated for the highest system voltage.
- Thermal sensors contained within the motor must have at least basic insulation.
- All exposed metalwork in the Inverter is protected by basic insulation and bonded to a safety earth.
- RCDs are not recommended for use with this product but, where their use is mandatory, only Type B RCDs should be used.

EMC

- In a domestic environment this product may cause radio interference in which case supplementary mitigation measures may be required.
- This equipment contains electrostatic discharge (ESD) sensitive parts. Observe static control precautions when handling, installing and servicing this product.
- This is a product of the restricted sales distribution class according to IEC 61800-3. It is designated as "professional equipment" as defined in EN61000-3-2. Permission of the supply authority shall be obtained before connection to the low voltage supply.

CAUTION!

APPLICATION RISK

- The specifications, processes and circuitry described herein are for guidance only and may need to be adapted to the user's specific application. We can not guarantee the suitability of the equipment described in this Manual for individual applications.

RISK ASSESSMENT

Under fault conditions, power loss or unintended operating conditions, the drive may not operate as intended.

In particular:

- Stored energy might not discharge to safe levels as quickly as suggested, and can still be present even though the drive appears to be switched off
- The motor's direction of rotation might not be controlled
- The motor speed might not be controlled
- The motor might be energised

A drive is a component within a drive system that may influence its operation or effects under a fault condition.

Consideration must be given to:

- Stored energy
- Supply disconnects
- Sequencing logic
- Unintended operation

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8903/CB CANopen OPTION

Introduction

This manual describes the Parker SSD Drives' CANopen Option.

Product Features

- Suitable for use with 890CD Common Bus Drive, 890SD Standalone Drive and 890PX Drive
- CANopen Port
- LEDs to indicate board and communications status
- Hardware/software selectable Slave Address and Baudrate
- Up to 256 DSE input registers and 256 DSE output registers

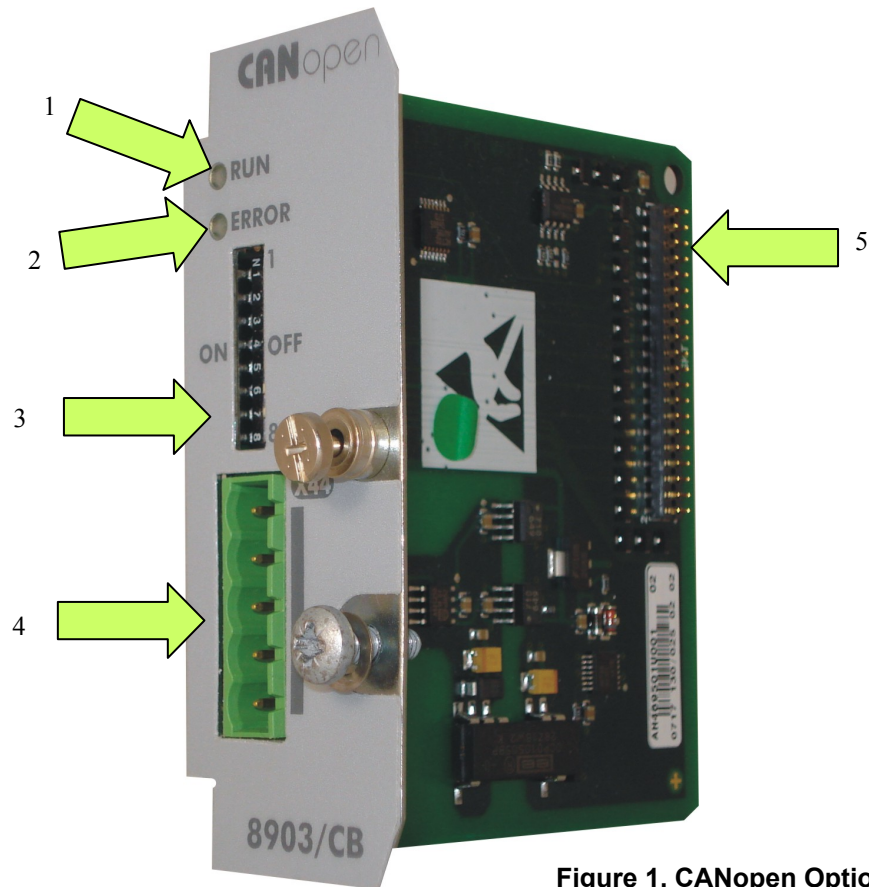


Figure 1. CANopen Option

1	Run LED	4	X44 CANopen port
2	Error LED	5	Connector to Control Board
3	Node Address and Baudrate Switches		

Product Order Code

Not fitted order code: 8903-CB-00

Factory fitted order code: 890xx-xxxxxxxx-xxx-xxxNx

Compatible Firmware

This option will work with the following version of 890 firmware:

Version 1.3 onwards

Version 2.1 onwards

Version 3.1 onwards

Version 4.1 onwards

Restrictions

Option must be fitted in Slot A.

When 8903/CB is fitted, the options 8903/SP and 8903/DN cannot be used

2

Installation

WARNING!

Before installing, ensure that the drive wiring is electrically isolated and cannot be made "live" unintentionally by other personnel. Wait 5 minutes after disconnecting power before working on any part of the system or removing the covers from the drives.

To Remove the Control Board

1. Remove the blanking plates, each secured by a single screw, that fits over the option slots(1).
2. Loosen the top and bottom screws from the handles on the Control Board (2).
3. Pull gently on the handles and slide the Control Board (2) out of the drive.

Note: Save the blanking plate and screw for future use. The drive should not be operated without either an option or a blanking plate fitted. When fitted, these maintain the drive's IP20 rating.

Caution

This Option contains ESD (Electrostatic Discharge) sensitive parts. Observe static control precautions when handling, installing and servicing this Option.



Figure 2. 890 showing Control Board withdrawn with Options fitted

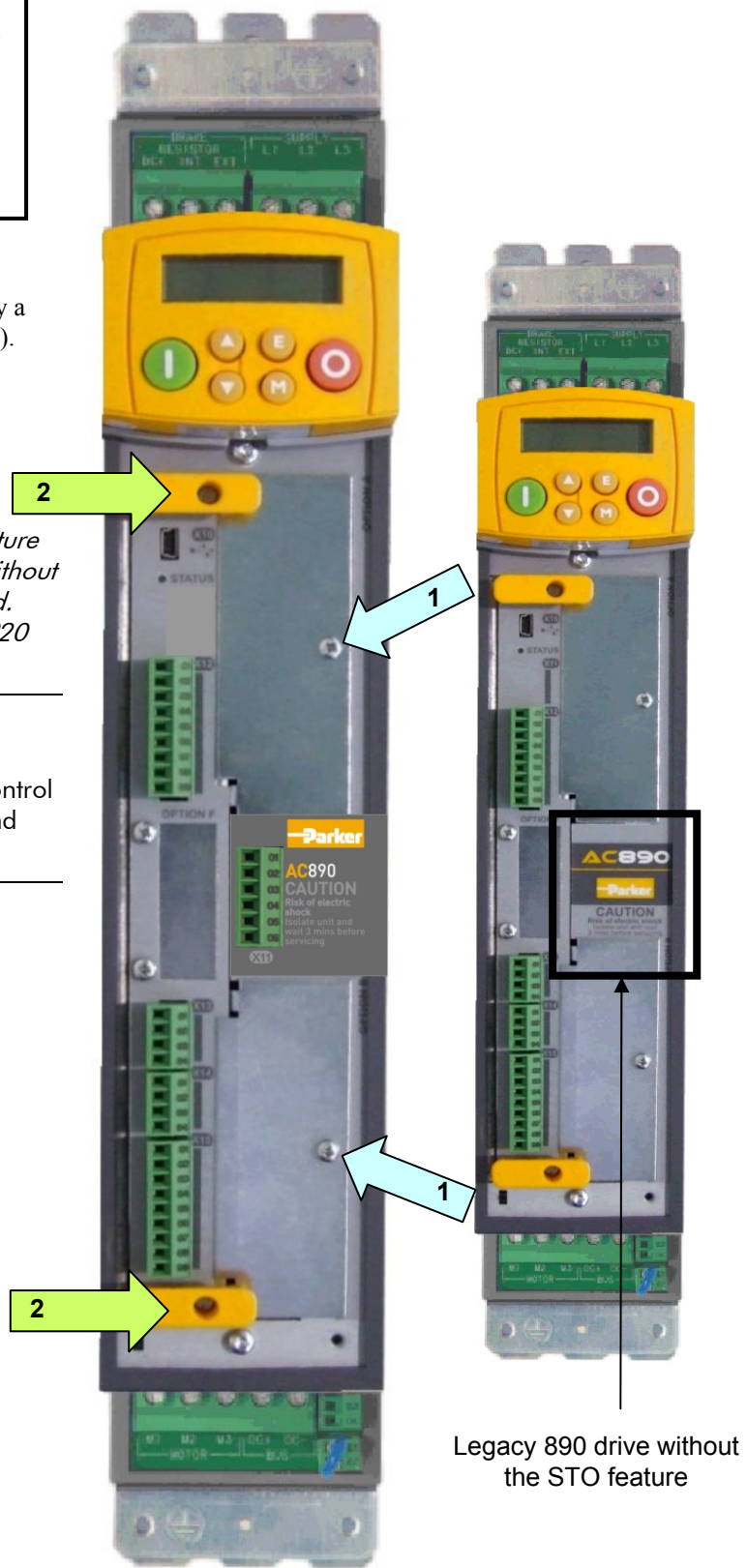


Figure 3. Front of 890 drive showing Control Board fitted

Fitting the Option

The Option fits onto the Control Board.

1. Insert the connector into the Option as shown. The legs of the connector will protrude through into the connector on the other side of the Option.
2. Press the assembly into the **TOP** connector (adjacent to terminals X10, X11 and X12) on the Control Board. Ensure that the front panel of the Option overlaps the front of the Control Board.

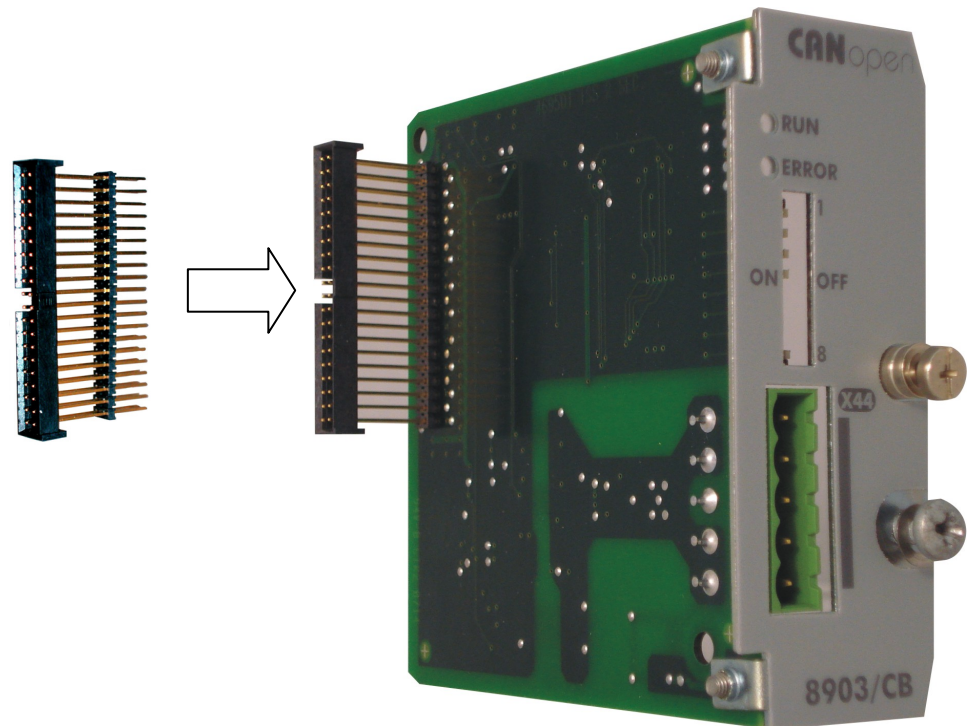


Figure 4. Fitting the connector to the Option

Re-fitting the Control Board

1. Slide the board into the drive, engaging the edges of the boards into the slots. Push until the back edge of the Control Board PCB locates with the connectors in the drive.
2. Tighten in position using the top and bottom screws in the handles of the Control Board.
3. Screw the Option in position using the captive screw on the front of the Option.

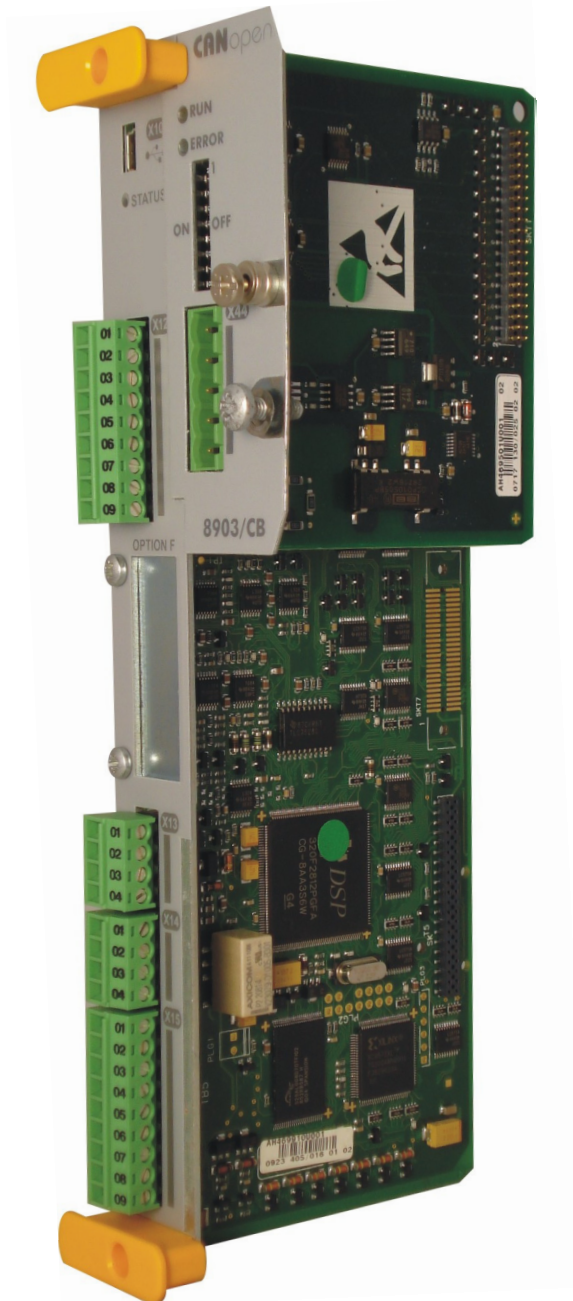


Figure 5. 890 Control Board with Option fitted

Wiring the System

Terminal X44

Pin	Connection
1	GND
2	CAN-
3	Screen (N/C)
4	CAN+
5	V+ (N/C)

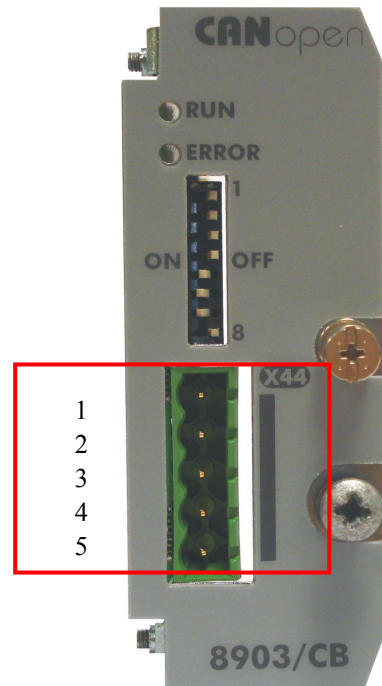


Figure 6. Terminal X44

Note: *It is possible to make serial communications operate without adhering to the following recommendations, however, the recommendations will promote greater reliability.*

Cable Specification

The media for CANopen is a shielded copper cable consisting of one twisted pair and two optional cables for an external power supply. As standard, the CANopen option does not use the external power supply. The user organisation (CiA) has specified ISO/DIS 11898 as the standard bus cable.

Maximum Cable Lengths

The maximum cable length depends on the baud rate selected:

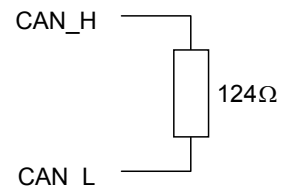
Data Rate	Maximum Distance
125 kBit/s	500 metres
250 kBit/s	250 metres
500 kBit/s	100 metres
1 Mbit/s	25 metres

Terminators

- If the drive is at the end of the trunk it must have a terminating resistor.
- All other drives in the system should not have a terminator.

Connect terminating resistors to the last drive as shown opposite. (resistor is $\pm 1\%$, minimum $\frac{1}{4}$ Watt).

The CANopen specification recommends 124Ω , but it should be chosen to equal as closely as possible the characteristic impedance of the cable.



IMPORTANT: Failing to fit terminating resistors correctly may result in unreliable operation.

Initial Power-on Checks

Understanding the Status LED Indications

Table 1: CANopen RUN LED - Green

RUN LED	State	Description
Flickering	AutoBaud/LSS	Auto Baudrate detection in progress or LSS services in progress.
Single Flash	STOPPED	The Device is in STOPPED state
Blinking	PRE-OPERATIONAL	The Device is in PRE-OPERATIONAL state
On	OPERATIONAL	The Device is in OPERATIONAL state

Table 2: CANopen ERROR LED - Red

ERROR LED	State	Description
Off	No error	The Device is in working condition
Single Flash	Warning limit reached	At least one of the error counters of CAN controller has reached or exceeded the warning level (too many error frames)
Flickering	Autobaud/LSS	Auto Baudrate detection in progress or LSS services in progress.
Double Flash	Error Control Event	A guard event or heartbeat event has occurred
Triple Flash	Sync Error	The SYNC message has not been received within the configured communication cycle period time out
On	Bus Off	The CAN controller bus is off

The LED states and flash rates are as defined in the CiA DR-303-3 Indicator Specification.

Setting the Node Address and Baudrate

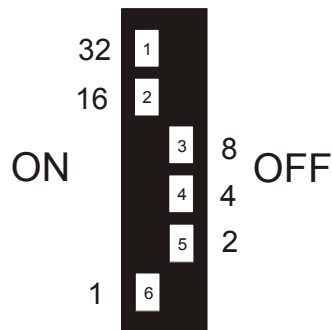
The 890CD, 890SD and 890PX are configured identically.

Node Address

The node address is set using switches 1 to 6.

Set a value between 1 and 63.

For example, 49 in binary is:



Baudrate

The CANopen baudrate is set using switches 7 and 8.

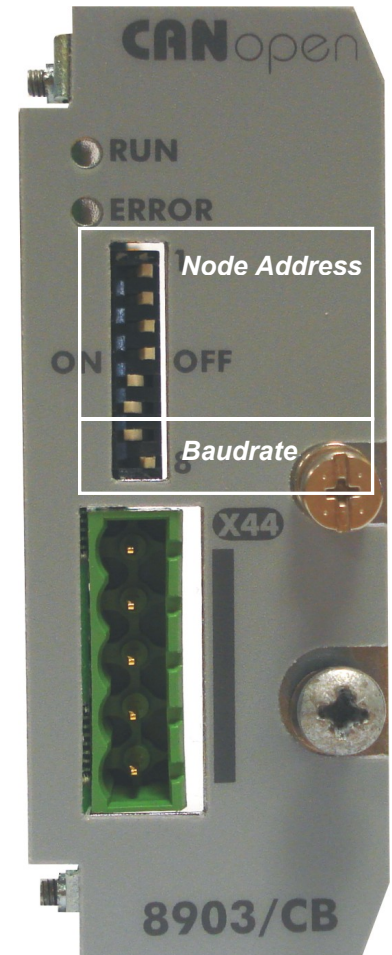
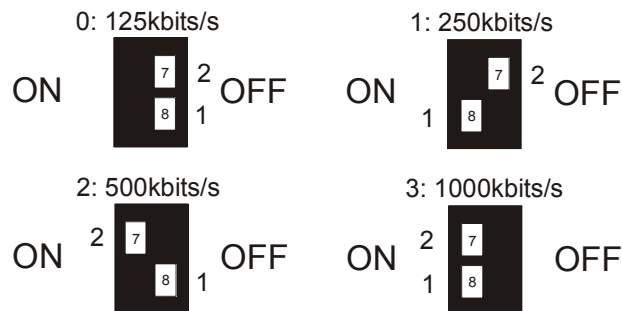


Figure 7. Setting the Node Address and Baudrate

Note: If all switches are set to ON, the node address and baudrate are set by the MMI or the DSE Configuration Tool. If the DSE CANopen function block is instantiated then this has precedence over the MMI.

Configuring the Drive

The CANopen MMI View

The CANopen Option correctly installed, the CANOPEN function block will contain the following parameter names when viewed using the MMI. These are read-only parameters.

Parameter Descriptions

BAUDRATE	<i>Read Only</i>	<i>Range: Enumerated – see below</i>
The CANopen baudrate being used.		
<i>Enumerated Value : BAUDRATE</i>		
0: 125K		
1: 250K		
2: 500K		
3: 1000K		
NODE ADDRESS	<i>Read Only</i>	<i>Range: 1 to 63</i>
The CANopen node address being used.		
STATUS RUN	<i>Read Only</i>	<i>Range: Enumerated - see below</i>
Displays the CANopen running state.		
<i>Enumerated Value : STATUS RUN</i>		
0 : STOPPED		
1 : PRE-OPERATIONAL		
2 : OPERATIONAL		
STATUS ERROR	<i>Read Only</i>	<i>Range: Enumerated - see below</i>
Displays the CANopen error state.		
<i>Enumerated Value : STATUS ERROR</i>		
0 : NO ERROR		
1 : WARNING LIMIT		
2 : AUTOBAUD OR LSS		
3 : CONTROL EVENT		
4 : SYNC ERROR		
5 : BUS OFF		
HARDWARE	<i>Read Only</i>	<i>Range: FALSE / TRUE</i>
The method being used to set the node address and baudrate. If all the Node Address and Baudrate Switches are set to ON, then the method is set by MMI or the DSE Configuration Tool, otherwise it is by hardware i.e. by the switches.		
<i>Enumerated Value : HARDWARE</i>		
0 : FALSE Baudrate set by MMI or the DSE Configuration Tool		
1 : TRUE Baudrate set by hardware		
BAUDRATE SOFT	<i>Read/Write</i>	<i>Range: Enumerated – see below</i>
The Baudrate set by software, either by the MMI or by the DSE Configuration Tool. (Functional when all the Node Address and Baudrate Switches are set to ON).		
<i>Enumerated Value : BAUDRATE SOFT</i>		
0: 125K		
1: 250K		
2: 500K		
3: 1000K		
ADDRESS SOFT	<i>Read/Write</i>	<i>Range: 1 to 63</i>
Sets the address set by software, either by the MMI or by the DSE Configuration Tool. (Functional when all the Node Address and Baudrate Switches are set to ON).		

Configuring the CANopen System

To configure the CANopen system, complete the steps below. Our example is shown using a PLC configured using SyCon® System Configurator by Hilscher GmbH (<http://www.hilscher.com/>) For other systems, refer to the manufacturer's instructions.

Step 1: Configuring the CANopen Option using DSE

You can configure your CANopen Option using DSE. Follow the instructions below.

Step 1.1: Inserting a CANOPEN Function Block

Display your configuration page. Click on the Block menu at the top of the screen.

1. Move the cursor down to select "890 Comms" and select "CANopen".
2. Click to select the CANopen block. Move this to where you want on the screen then click again to place the block.

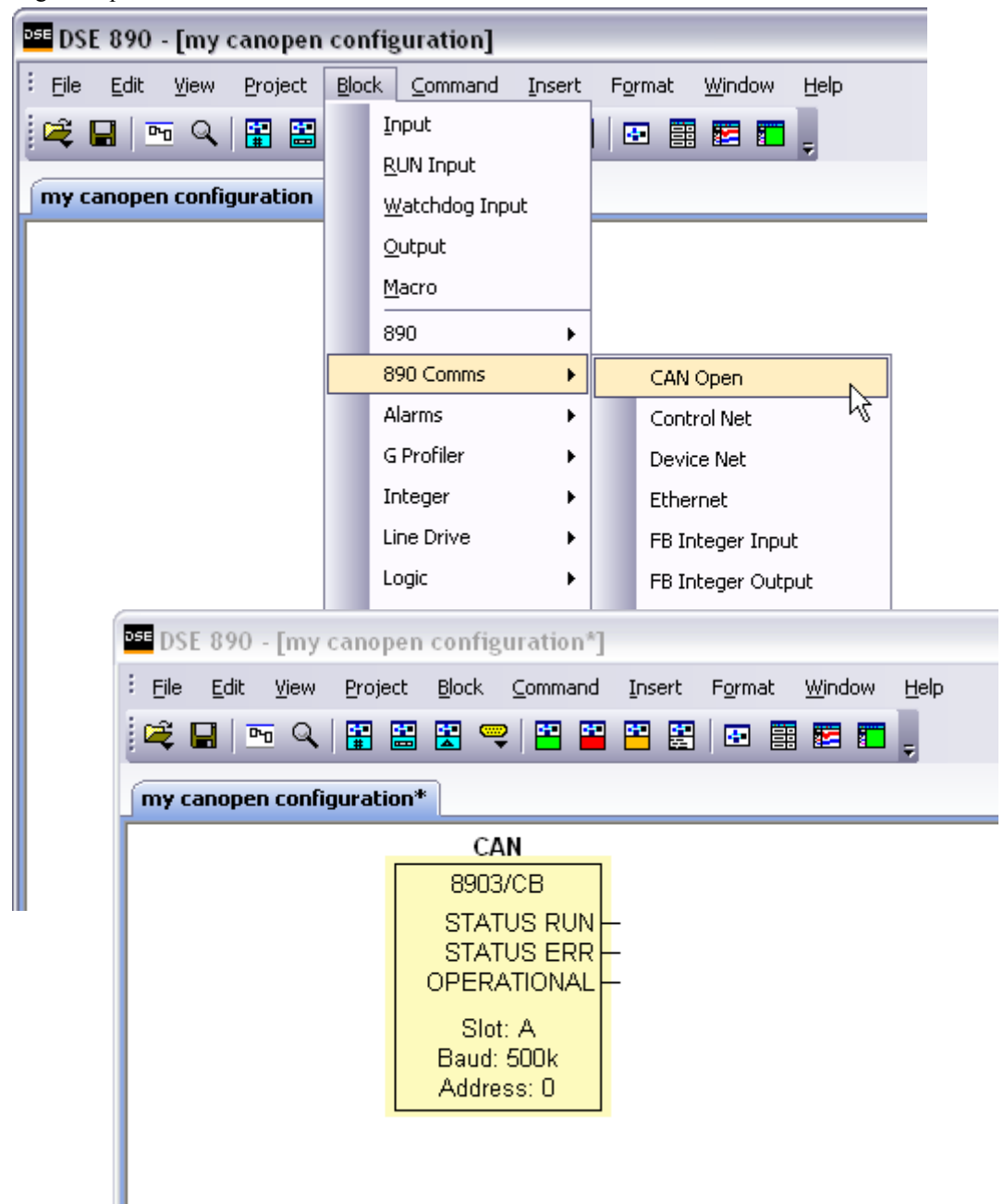


Figure 8. Configuration showing CANopen function block

Step 1.2: Attaching Fieldbus Connectors

Seven fieldbus connector types are available:

- FB Logic Input FB Integer Input FB Value Input
- FB Logic Output FB Integer Output FB Value Output FB Val to Int Output

Input connector : the data is sent from PLC → 890

Output connector : the data is sent from 890 → PLC

The fieldbus connectors must be added before they will appear in the CANOpen function block.

Note: The function block and connectors can be renamed by using the right mouse button and selecting **Rename Block**.

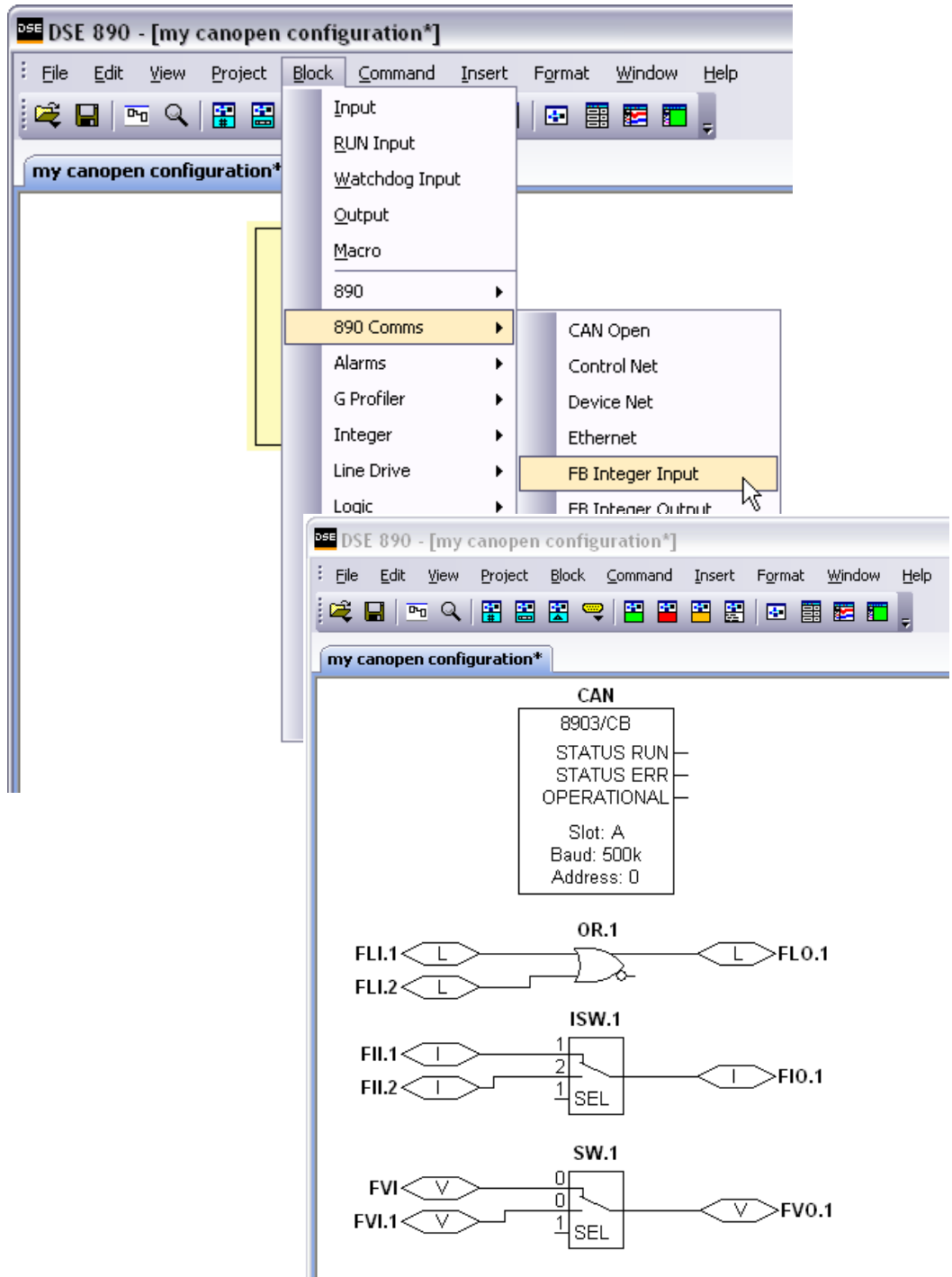
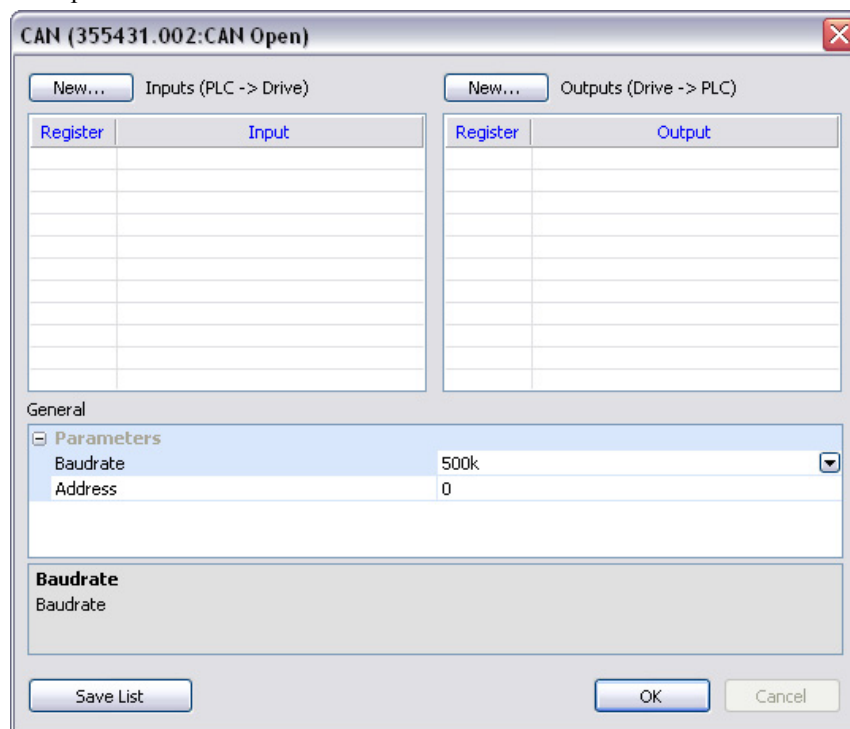


Figure 9. Configuration showing CANOpen function block and Fieldbus Connectors

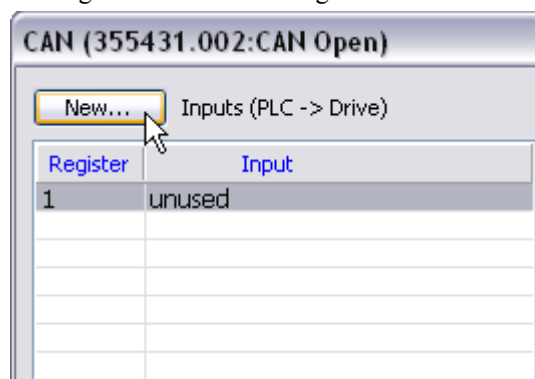
Step 1.3: Configuring the Fieldbus Connectors

Double-click on the function block to display the dialog below. The fieldbus connectors (inputs and outputs) are assignable in the function block along with their data type to/from the PLC. The option slot and Address can also be selected.

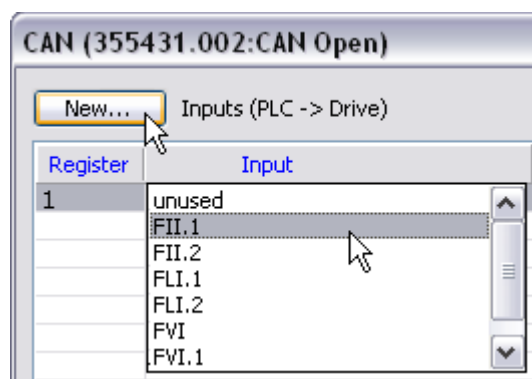


To configure the input and output connectors you have placed in the configuration:

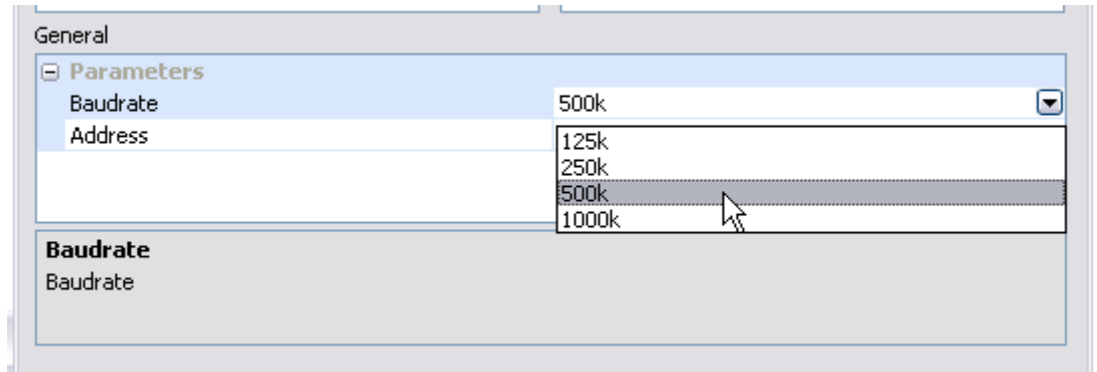
1. Expand the **Inputs** and **Outputs** trees to reveal the registers. By default the trees each have one register. To add more registers click on **New...**



2. Select the drop-down menu adjacent to **Input** to choose the required input/output connector on the Register. For example below, Register 1 "Input" is shown with the possible fieldbus selections that have been placed in the configuration: FII.1 (Fieldbus Integer Input 1), FLI.1 (Fieldbus Logic Input 1), FVI.1 (Fieldbus Value Input 1) etc.

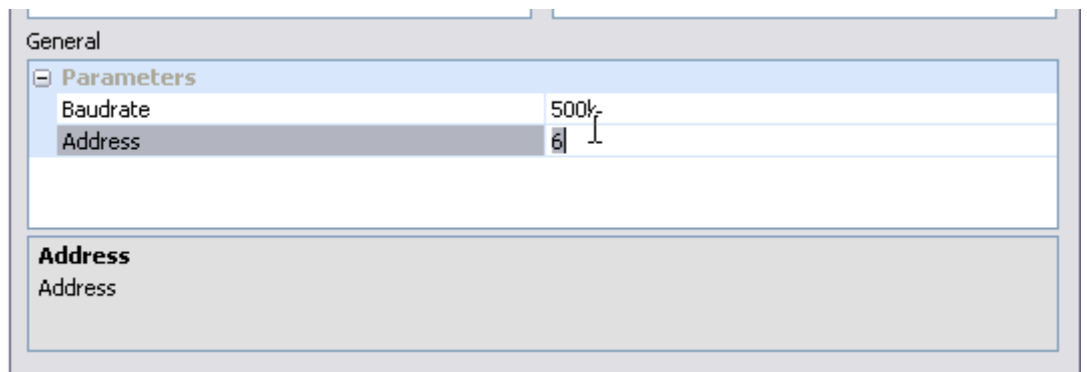


3. Set up all the input/output registers in a similar way.
4. The Baudrate can be selected to be either 125k, 250k, 500k or 1000k.



Note: The Baudrate set in DSE will only be used if all switches on the Option are set to ON.

5. The Address can be selected in the range 0 – 127.



Note: The Address set in DSE will only be used if all switches on the Option are set to ON. If the Address is set to zero and the switches on the CANopen Option are all set to ON, the option is disabled and will not appear on the network.

FB Input and Output Data Types

Data Type	Description	Range
LOGIC	Logic	False (F) and True (T)
INTEGER	32-bit signed integer	-2,147,483,648 to 2,147,483,647
VALUE	32-bit fixed point value	-32768.0 to 32767.9999

CANopen Data Types

Data Type	Description	Range
Boolean	8-bit boolean	False (0x00) and True (0x01)
Integer8	8-bit signed integer	-128 to 127
Integer16	16-bit signed integer	-32,768 to 32,767
Integer32	32-bit signed integer	-2,147,438,648 to 2,147,483,647
Unsigned8	8-bit unsigned integer	0 to 255
Unsigned16	16-bit unsigned integer	0 to 65,535
Unsigned32	32-bit unsigned integer	0 to 4,294,967,295
Real32	32-bit IEEE-754 floating-point value	1.19209290e-38 to 3.4028235e+38

Conversion of DSE Type < > CANopen Type

Each FB Input, regardless of type, can be written to over CANopen using any of the CANopen data types. FB Outputs can be similarly both read and written. The selection of the CANopen data type is not part of the DSE configuration, as it is with other Fieldbusses, but depends on which Sub-Index is used for access.

Sub-Index	CANopen Data Type
1	Boolean
2	Integer8
3	Integer16
4	Integer32
5	Unsigned8
6	Unsigned16
7	Unsigned32
8	Real32

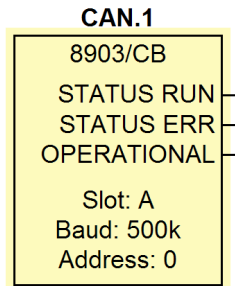
The conversion between the DSE type and the CANopen type is performed automatically (refer to DSE/CANopen Conversion Rules, page 30).

Some recommended PLC type assignments to fieldbus connectors are given in the table below:

Fieldbus Connector	CANopen Type
LOGIC	Boolean
INTEGER	Integer32
VALUE	Real32

CANopen Status Information

The CANopen function block in DSE provides status information about the CANopen network interface.



When online, the *actual* Baudrate or Address in use can be found by clicking the right mouse button over the "Baud" or "Address" text and selecting **Get**. This may be different to that set in the function block configuration if the switches on the Option are not all set in the ON position.

The function block also provides three status outputs that can be wired to: STATUS RUN, STATUS ERR and OPERATIONAL.

For example, the OPERATIONAL output could be ANDed with the motor START causing the drive to stop if the PLC connection is lost.

OPERATIONAL

Logic value: True (T) indicates that the CANopen interface is in the Data Exchange state.

The STATUS RUN and STATUS ERR outputs could be used with the LOGIC::LOOKUP function block to determine a particular state.

STATUS RUN

Enumerated value: Status Run
0: STOPPED
1: PRE-OPERATIONAL
2: OPERATIONAL

STATUS ERR

Enumerated value: Status Run
0: NO ERROR
1: WARNING LI MIT
2 : AUTOBAUD OR LSS
3 : CONTROL EVENT
4 : SYNC ERROR
5 : BUS OFF

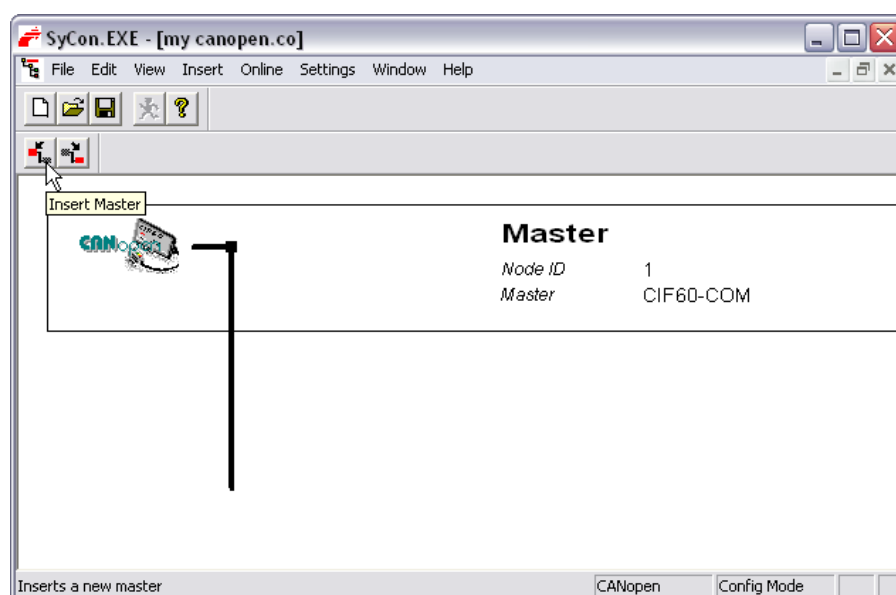
Step 2: Configuring the PLC/SCADA Supervisor

Note: EDS and bitmap files may be downloaded from <http://www.ssd drives.com>

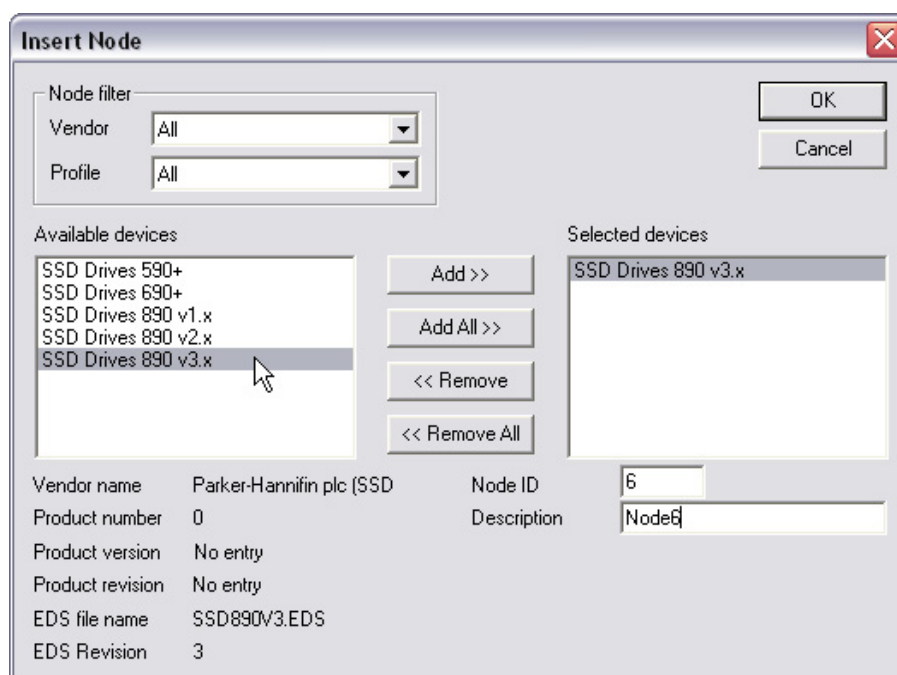
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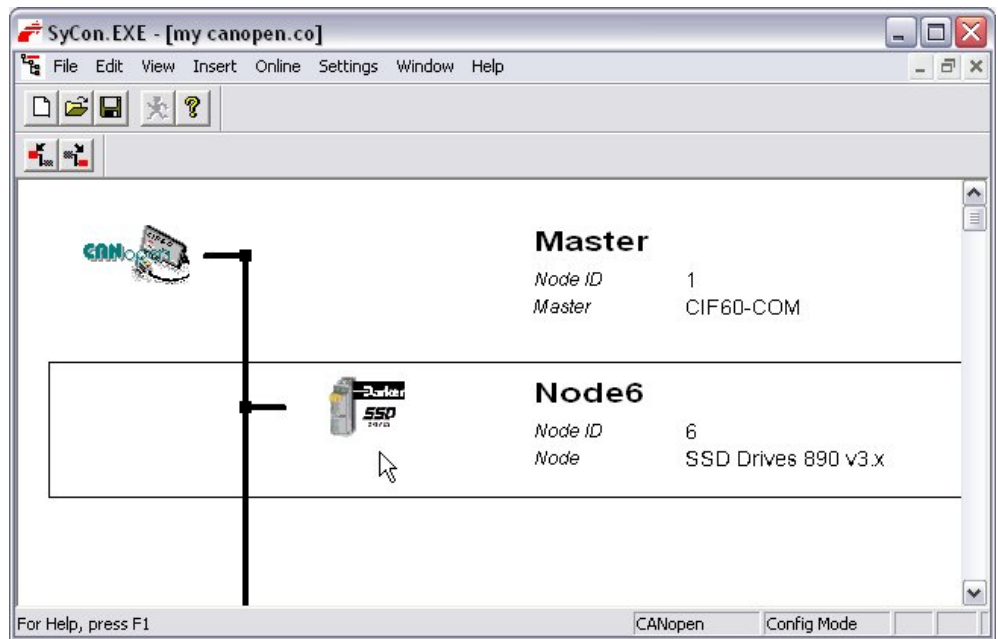
Step 2.1: Creating a Project

1. For 890 version 3.x copy the EDS file called "ssd890v3.eds" into the directory called "C:\Program Files\Hilscher\SyCon\Fieldbus\CANopen\EDS".
Copy the files called "ssd890v3_d.dib", "ssd890_r.dib" and "ssd890v3_s.dib" into the directory called "C:\Program Files\Hilscher\SyCon\Fieldbus\CANopen\BMP".
2. Create a project selecting the CANopen. Click on "Insert Master" to add the required master.

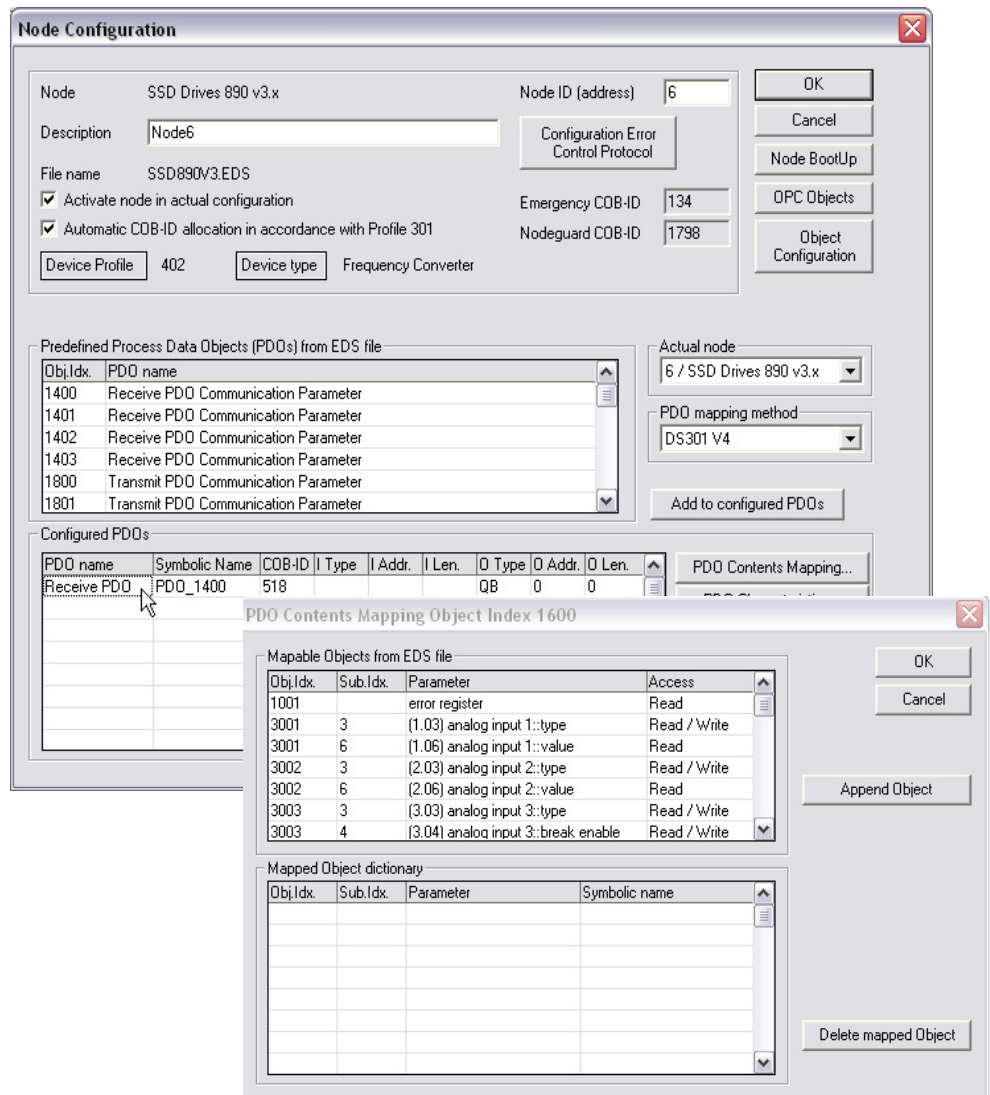


3. Click on the Insert Node to add the 890 Drives and assign a Node ID.





4. Double-click on the created node to allow configuration of the Receive PDOs and Transmit PDOs.

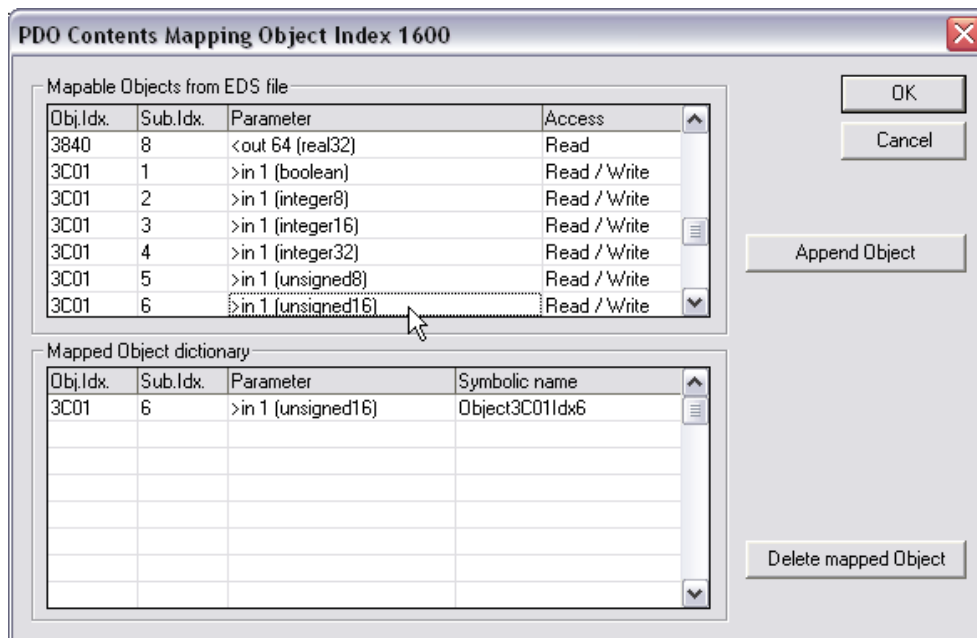


5. Two kinds of parameter may be selected:

A : User-defined Input and Output Registers

These are the registers as declared in the DSE configuration.

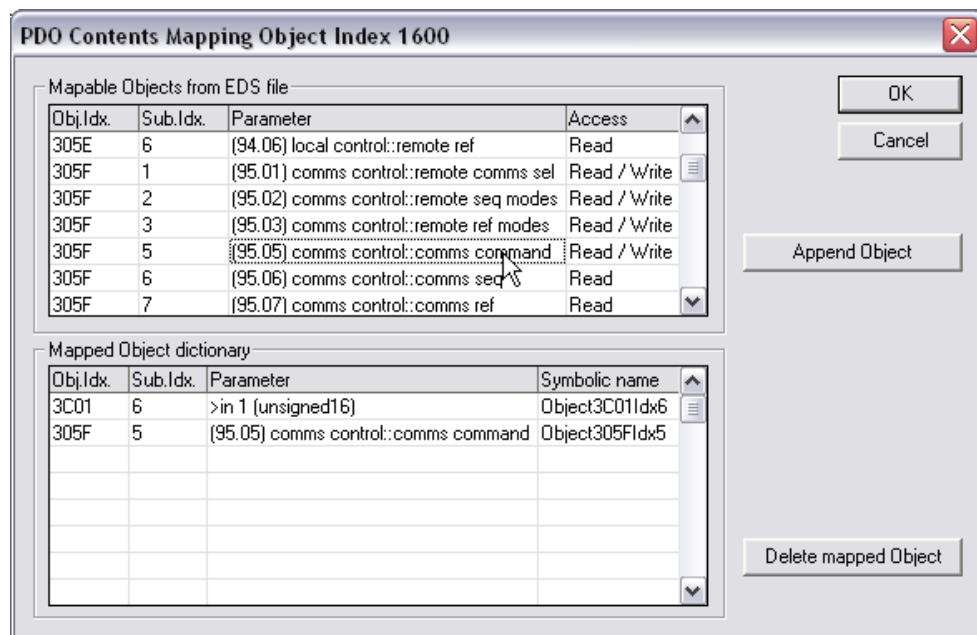
Note: Input Registers have Index 3c00h + input register number. Output Registers have Index 3800h + output register number.



As described previously, each register can be accessed using any of the CANopen data types by selecting the correct Sub-Index. The example above shows FB Input Register being added to the RxPDO to be sent as Unsigned16 data.

B : Fixed Parameters

These are Drive Parameters that are always present in the 890. They can be found in the Motor Control macro block in the DSE Configuration.



The example above shows the Comms Command parameter (reference 95.5) being added to the RxPDO. The data type is fixed depending on the selected parameter.

Introduction

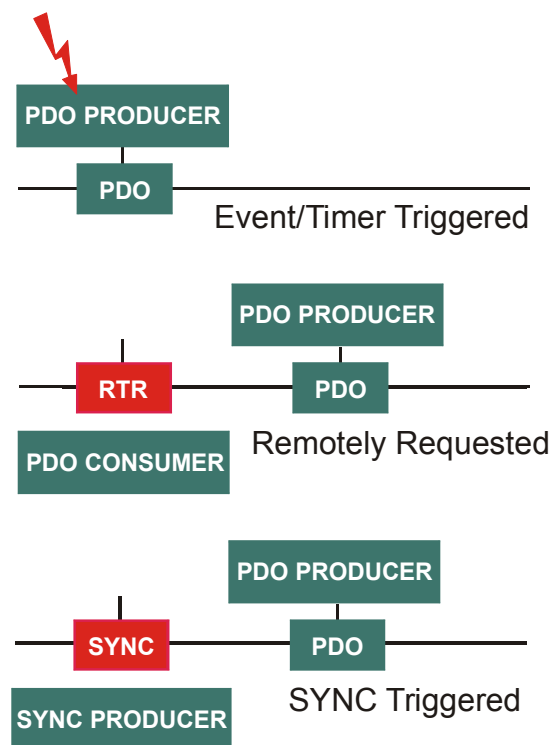
CANopen is a CAN-based higher layer protocol. It was developed as a standardised embedded network with highly flexible configuration capabilities. CANopen was designed for motion-oriented machine control networks, such as handling systems. By now it is used in many various fields, such as medical equipment, off-road vehicles, maritime electronics, public transportation, building automation, etc.

The CANopen application layer and communication profile (EN 50325-4; CiA 301) supports direct access to device parameters and transmission of time-critical process data. The CANopen network management services simplify project design, system integration, and diagnostics. In each decentralised control application, different communication services and protocols are required. CANopen defines all these services and protocols as well as the necessary communication objects.

Process Data Object (PDO)

Process Data Objects (PDOs) are mapped to a single CAN frame using up to 8 bytes of the data field to transmit application objects. Each PDO has a unique identifier and is transmitted by only one node, but it can be received by more than one (producer/consumer communication).

PDO Transmissions



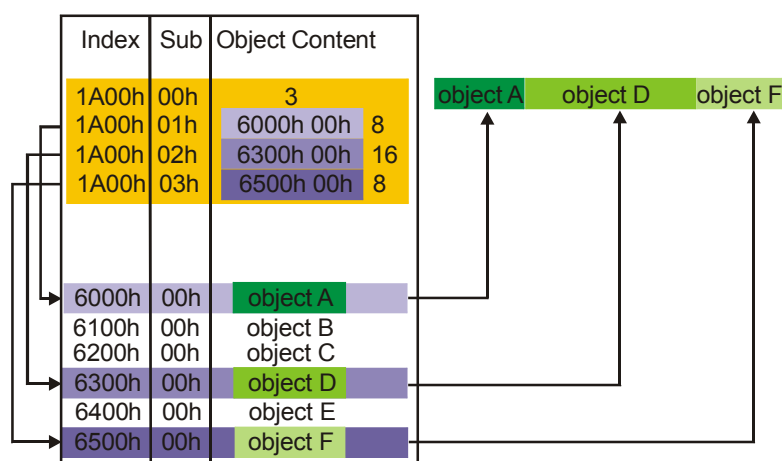
PDO transmissions may be driven by an internal event, by an internal timer, by remote requests and by the Sync message received:

- Event- or timer-driven: An event (specified in the device profile) triggers message transmission. An elapsed timer additionally triggers the periodically transmitting nodes.
- Remotely requested: Another device may initiate the transmission of an asynchronous PDO by sending a remote transmission request (remote frame).
- Synchronous transmission: In order to initiate simultaneous sampling of input values of all nodes, a periodically transmitted Sync message is required. Synchronous transmission of PDOs

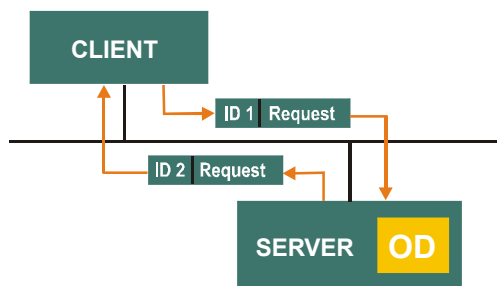
takes place in cyclic and acyclic transmission mode. Cyclic transmission means that the node waits for the Sync message, after which it sends its measured values. Its PDO transmission type number (1 to 240) indicates the Sync rate it listens to (how many Sync messages the node waits before the next transmission of its values). Acyclically transmitted synchronous PDOs are triggered by a defined application-specific event. The node transmits its values with the next Sync message but will not transmit again until another application-specific event has occurred.

PDO Mapping

The default mapping of application objects as well as the supported transmission mode are described in the Object Dictionary for each PDO. PDO identifiers should have high priority to guarantee a short response time. PDO transmission is not confirmed. The PDO mapping defines which application objects are transmitted within a PDO. It describes the sequence and length of the mapped application objects. A device that supports variable mapping of PDOs must support this during the pre-operational state.



Service Data Object (SDO)

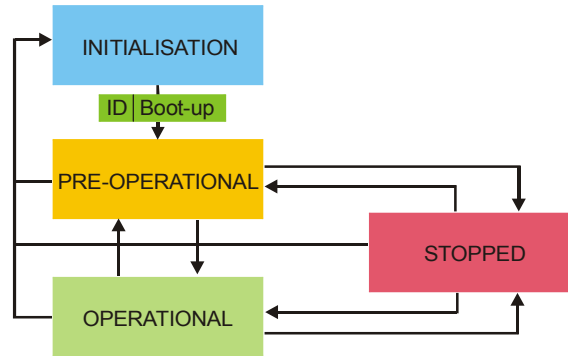


A Service Data Object (SDO) reads from entries or writes to entries of the Object Dictionary. The SDO transport protocol allows transmitting objects of any size. The first byte of the first segment contains the necessary flow control information including a toggle bit to overcome the well-known problem of doubly received CAN frames. The next three byte of the first segment contain index and sub-index of the Object Dictionary entry to be read or written. The last four byte of the first segment are available for user data. The second and the following segments (using the very same CAN identifier) contain the control byte and up to seven byte of user data. The receiver confirms each segment or a block of segments, so that a peer-to-peer communication (client/server) takes place.

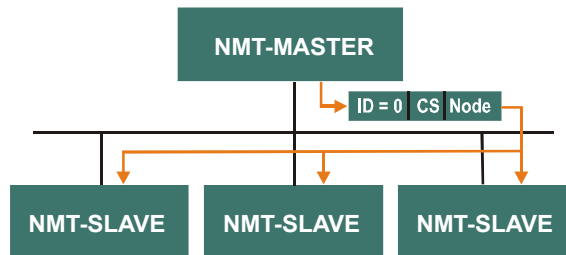
Network Management (NMT)

The Network Management objects include Boot-up message, Heartbeat protocol, and NMT message.

Boot-up message, and Heartbeat protocol are implemented as single CAN frames with 1-byte data field.



NMT Message

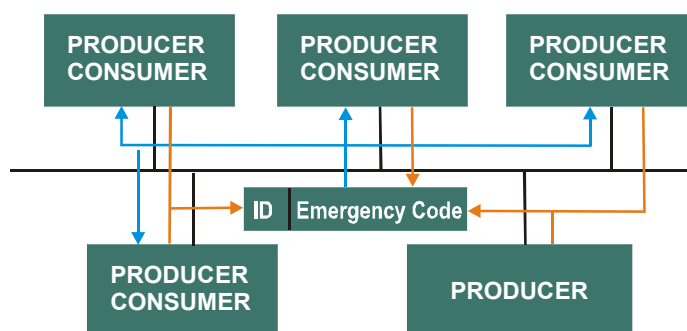


The NMT message is mapped to a single CAN frame with a data length of 2 byte. Its identifier is 0. The first byte contains the command specifier and the second contains the Node-ID of the device that must perform the command (in the case of Node-ID 0 all nodes have to perform the command). The NMT message transmitted by the NMT master forces the nodes to transit to another NMT state. The CANopen state machine specifies the states Initialisation, Pre-Operational, Operational and Stopped. After power-on, each CANopen device is in the state Initialisation and automatically transits to the state Pre-operational. In this state, transmission of SDOs is allowed. If the NMT master has set one or more nodes into the state Operational, they are allowed to transmit and to receive PDOs. In the state Stopped no communication is allowed except that of NMT objects.

Boot-up Message

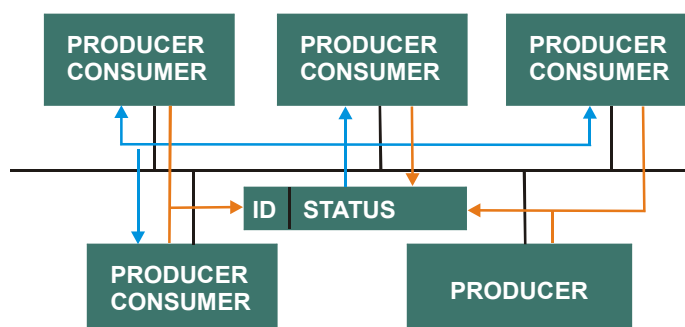
A device sends the Boot-up message to indicate to the NMT master that it has reached the state Pre-operational. This occurs whenever the device initially boots-up but also after a power-out during operation. The Boot-up message has the same identifier as the Heartbeat object, however, its data content is zero.

Synchronisation Object (Sync)



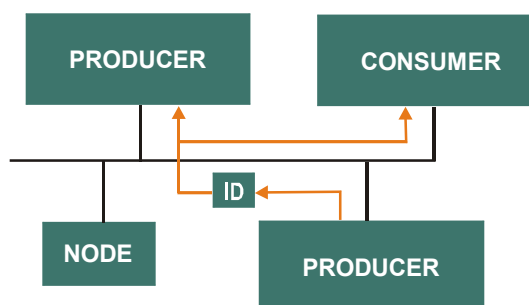
The Sync Object is broadcast periodically by the Sync Producer. The time period between Sync messages is defined by the Communication Cycle Period, which may be reset by a configuration tool to the application devices during the boot-up process. There can be a time jitter in transmission by the Sync Producer due to some other objects with higher prior identifiers or by one frame being transmitted just before the Sync message. The Sync message is mapped to a single CAN frame with the identifier 128 by default. The Sync message does not carry any data.

Emergency Object (Emcy)



The Emergency message is triggered by the occurrence of a device internal error situation and are transmitted from an Emergency producer on the concerned application device. This makes them suitable for interrupt type error alerts. An Emergency message is transmitted only once per 'error event'. As long as no new errors occurs on a device, no further Emergency message can be transmitted. Zero or more Emergency consumers may receive these. The reaction of the Emergency consumer is application-specific. CANopen defines several Emergency Error Codes to be transmitted in the Emergency message, which is a single CAN frame with 8 data byte.

Error Control: Heartbeat Protocol



The Heartbeat protocol is for error control purposes and signals the presence of a node and its state. The Heartbeat message is a periodic message of the node to one or several other nodes. It indicates that the sending node is still working properly.

Besides Heartbeat protocol there exists an old and out-dated error control services, which is called Node and Life Guarding protocol. It is not recommend to use Life Guarding.

Electronic Data Sheet (EDS)

An EDS file is available with every CANOpen device. It contains all relevant information required by a configuration tool to allow the device to be integrated into a network.

Object Dictionary

The object dictionary represents the complete access to the application program of the device in terms of application data as well as in term of configuration parameters. The object dictionary gains access:

- to all data types used in the device,
- to the communication parameters (to configure the device in terms of communication), and
- to the application data and configuration parameters.

Index	Description
0000h	reserved
0001h - 025Fh	Data types
0260h - 0FFFh	reserved
1000h - 1FFFh	Communication object area
2000h - 5FFFh	Manufacturer specific area
6000h - 9FFFh	Device profile specific area
A000h - BFFFh	Interface profile specific area
C000h - FFFh	reserved

The object dictionary is divided into two parts:

- Communication Profile Area (Index 1000h to 1BFFh)
- Manufacturer Specific Profile Area (Index 2000h to 5FFFh)

Communication Profile Area

*PDO Mapping allowed. ¹ Saved in non-volatile memory using Index 1010h.

Index	Sub Index	Name	Type	Attr.	Default	Notes
1000h	00h	device type	Unsigned32	const	00010192h	Frequency converter
1001h*	00h	error register	Unsigned8	ro	00h	
1004h	00h	number of PDOs supported	Unsigned32	ro	00040004h	4 transmit and 4 receive
	01h	number of synch. PDOs	Unsigned32	ro	00040004h	All can be synchronous
	02h	number of asynch. PDOs	Unsigned32	ro	00040004h	All can be asynchronous
1005h	00h	COB-ID SYNC	Unsigned32	rw		¹ SYNC Consumer
1006h	00h	communications cycle period	Unsigned32	rw	00000000h	¹ Used by SYNC watchdog
1008h	00h	manufacturer device name	Vis-String	const	“SSD Drives 890”	Depends on host Drive
1009h	00h	manufacturer hardware version	Vis-String	const	“1.0”	
100Ah	00h	manufacturer software version	Vis-String	const	“1.7”	Main Firmware Version
100Ch	00h	guard time	Unsigned16	rw	0000h	¹
100Dh	00h	lifetime factor	Unsigned8	rw	00h	¹
100Fh	00h	Number of SDOs supported	Unsigned32	ro	4	
1014h	00h	COB-ID EMCY	Unsigned32	rw	00h	¹
1015h	00h	Inhibit Time EMCY	Unsigned32	rw	00h	¹
1018h		Identity Object	Identity			

Communication Profile Area

*PDO Mapping allowed. ¹ Saved in non-volatile memory using Index 1010h.

Index	Sub Index	Name	Type	Attr.	Default	Notes
	00h	Number of entries	Unsigned8	ro	4	
	01h	Vendor ID	Unsigned32	ro	00000098h	SSD Drives
	02h	Product Code	Unsigned32	ro	00000890h	
	03h	Revision Number	Unsigned32	ro		
	04h	Serial Number	Unsigned32	ro		
1201h		Server SDO Parameter	SDO Parameter			
	00h	Number of Entries	Unsigned8	ro	3	
	01h	COB-ID Client -> Server	Unsigned32	rw		¹
	02h	COB-ID Client -> Server	Unsigned32	rw		¹
	03h	Node iD of the SDO Client	Unsigned8	rw		¹
1202h		Server SDO Parameter	SDO Parameter			
	00h	Number of Entries	Unsigned8	ro	3	
	01h	COB-ID Client -> Server	Unsigned32	rw		¹
	02h	COB-ID Client -> Server	Unsigned32	rw		¹
	03h	Node iD of the SDO Client	Unsigned8	rw		¹
1203h		Server SDO Parameter	SDO Parameter			
	00h	Number of Entries	Unsigned8	ro	3	
	01h	COB-ID Client -> Server	Unsigned32	rw		¹
	02h	COB-ID Client -> Server	Unsigned32	rw		¹
	03h	Node iD of the SDO Client	Unsigned8	rw		¹
1400h		receive PDO1 parameter	PDO Parameter			
	00h	largest sub-index supported	Unsigned8	ro	5	
	01h	COB-ID	Unsigned32	rw	200h + nodeID	¹
	02h	transmission type	Unsigned8	rw	254	¹
	05h	event timer	Unsigned16	rw	0000h	¹
1401h		receive PDO2 parameter	PDO Parameter			
	00h	largest sub-index supported	Unsigned8	ro	5	
	01h	COB-ID	Unsigned32	rw	300h + nodeID	¹
	02h	transmission type	Unsigned8	rw	254	¹
	05h	event timer	Unsigned16	rw	0000h	¹
1402h		receive PDO3 parameter	PDO Parameter			
	00h	largest sub-index supported	Unsigned8	ro	5	
	01h	COB-ID	Unsigned32	rw	400h + nodeID	¹
	02h	transmission type	Unsigned8	rw	254	¹
	05h	event timer	Unsigned16	rw	0000h	¹
1403h		receive PDO4 parameter	PDO Parameter			
	00h	largest sub-index supported	Unsigned8	ro	5	
	01h	COB-ID	Unsigned32	rw	500h + nodeID	¹
	02h	transmission type	Unsigned8	rw	254	¹
	05h	event timer	Unsigned16	rw	0000h	¹
1600h		receive PDO1 mapping parameter	PDO Mapping			
	00h	number of mapped objects	Unsigned8	rw	0	¹ Maximum 4
	01h	1 st mapped object	Unsigned32	rw	00000000h	¹
	02h	2 nd mapped object	Unsigned32	rw	00000000h	¹
	03h	3 rd mapped object	Unsigned32	rw	00000000h	¹
	04h	4 th mapped object	Unsigned32	rw	00000000h	¹

Communication Profile Area

*PDO Mapping allowed. ¹ Saved in non-volatile memory using Index 1010h.

Index	Sub Index	Name	Type	Attr.	Default	Notes
1601h		receive PDO2 parameter	PDO Parameter			
	00h	number of mapped objects	Unsigned8	rw	0	¹ Maximum 4
	01h	1 st mapped object	Unsigned32	rw	00000000h	¹
	02h	2 nd mapped object	Unsigned32	rw	00000000h	¹
	03h	3 rd mapped object	Unsigned32	rw	00000000h	¹
	04h	4 th mapped object	Unsigned32	rw	00000000h	¹
1602h		receive PDO3 parameter	PDO Parameter			
	00h	number of mapped objects	Unsigned8	rw	0	¹ Maximum 4
	01h	1 st mapped object	Unsigned32	rw	00000000h	¹
	02h	2 nd mapped object	Unsigned32	rw	00000000h	¹
	03h	3 rd mapped object	Unsigned32	rw	00000000h	¹
	04h	4 th mapped object	Unsigned32	rw	00000000h	¹
1603h		receive PDO4 parameter	PDO Parameter			
	00h	number of mapped objects	Unsigned8	rw	0	¹ Maximum 4
	01h	1 st mapped object	Unsigned32	rw	00000000h	¹
	02h	2 nd mapped object	Unsigned32	rw	00000000h	¹
	03h	3 rd mapped object	Unsigned32	rw	00000000h	¹
	04h	4 th mapped object	Unsigned32	rw	00000000h	¹
1800h		transmit PDO1 parameter	PDO Parameter			
	00h	largest sub-index supported	Unsigned8	ro	5	
	01h	COB-ID	Unsigned32	rw	180h + nodeID	¹
	02h	transmission type	Unsigned8	rw	253	¹
	03h	inhibit time	Unsigned16	rw	0000h	¹
	05h	event timer	Unsigned16	rw	0000h	¹
1801h		transmit PDO2 parameter	PDO Parameter			
	00h	largest sub-index supported	Unsigned8	ro	5	
	01h	COB-ID	Unsigned32	rw	280h + nodeID	¹
	02h	transmission type	Unsigned8	rw	253	¹
	03h	inhibit time	Unsigned16	rw	0000h	¹
	05h	event timer	Unsigned16	rw	0000h	¹
1802h		transmit PDO3 parameter	PDO Parameter			
	00h	largest sub-index supported	Unsigned8	ro	5	
	01h	COB-ID	Unsigned32	rw	380h + nodeID	¹
	02h	transmission type	Unsigned8	rw	253	¹
	03h	inhibit time	Unsigned16	rw	0000h	¹
	05h	event timer	Unsigned16	rw	0000h	¹
1803h		transmit PDO4 parameter	PDO Parameter			
	00h	largest sub-index supported	Unsigned8	ro	5	
	01h	COB-ID	Unsigned32	rw	480h + nodeID	¹
	02h	transmission type	Unsigned8	rw	253	¹
	03h	inhibit time	Unsigned16	rw	0000h	¹
	05h	event timer	Unsigned16	rw	0000h	¹

Communication Profile Area

*PDO Mapping allowed. ¹ Saved in non-volatile memory using Index 1010h.

Index	Sub Index	Name	Type	Attr.	Default	Notes
1A00h		transmit PDO1 mapping parameter	PDO Mapping			
	00h	number of mapped objects	Unsigned8	rw	0	¹ Maximum 4
	01h	1 st mapped object	Unsigned32	rw	00000000h	¹
	02h	2 nd mapped object	Unsigned32	rw	00000000h	¹
	03h	3 rd mapped object	Unsigned32	rw	00000000h	¹
1A01h	04h	4 th mapped object	Unsigned32	rw	00000000h	¹
		transmit PDO2 parameter	PDO Parameter			
	00h	number of mapped objects	Unsigned8	rw	0	¹ Maximum 4
	01h	1 st mapped object	Unsigned32	rw	00000000h	¹
	02h	2 nd mapped object	Unsigned32	rw	00000000h	¹
1A02h	03h	3 rd mapped object	Unsigned32	rw	00000000h	¹
	04h	4 th mapped object	Unsigned32	rw	00000000h	¹
		transmit PDO3 parameter	PDO Parameter			
	00h	number of mapped objects	Unsigned8	rw	0	¹ Maximum 4
	01h	1 st mapped object	Unsigned32	rw	00000000h	¹
1A03h	02h	2 nd mapped object	Unsigned32	rw	00000000h	¹
	03h	3 rd mapped object	Unsigned32	rw	00000000h	¹
	04h	4 th mapped object	Unsigned32	rw	00000000h	¹
		transmit PDO4 parameter	PDO Parameter			
	00h	number of mapped objects	Unsigned8	rw	0	¹ Maximum 4

Manufacturer Specific Profile Area

Index	Sub Index	Name	Type	Attr.	Default	Notes
2014h		PDO1 transmit mask				
	00h	number of entries	Unsigned8	ro	2	
	01h	mask low	Unsigned32	rw	FFFFFFFFh	¹
	02h	mask low	Unsigned32	rw	FFFFFFFFh	¹
2015h		PDO2 transmit mask				
	00h	number of entries	Unsigned8	ro	2	
	01h	mask low	Unsigned32	rw	FFFFFFFFh	¹
2016h	02h	mask low	Unsigned32	rw	FFFFFFFFh	¹
		PDO3 transmit mask				
	00	number of entries	Unsigned8	ro	2	
2017h	01h	mask low	Unsigned32	rw	FFFFFFFFh	¹
	02h	mask low	Unsigned32	rw	FFFFFFFFh	¹
		PDO4 transmit mask				
2017h	00h	number of entries	Unsigned8	ro	2	
	01h	mask low	Unsigned32	rw	FFFFFFFFh	
	02h	mask low	Unsigned32	rw	FFFFFFFFh	

Manufacturer Specific Profile Area

Area 3000h-37FFh corresponds to the fixed parameter area of 890

Index	Sub Index	Name	Data type	Access	Default	Notes
3001h		Analog input 1				
	06h	(1.6) Analog input 1::Value	Integer16	rw	0	
...	00000000	...
3015h		Fluxing				
	0Ah	(21.10) Fluxing::User freq. 1	Unsigned32	rw	41200000	
	0Bh	(21.11) Fluxing::User voltage 1	Unsigned32	rw	41200000	
	0Ch	(21.12) Fluxing::User freq. 2	Unsigned32	rw	41A00000	
	0Dh	(21.13) Fluxing::User voltage 2	Unsigned32	rw	41A00000	
	0Eh	(21.14) Fluxing::User freq. 3	Unsigned32	rw	41F00000	
	0Fh	(21.15) Fluxing::User voltage 3	Unsigned32	rw	41F00000	
...

Area 3800h-3BFFh corresponds to user-configurable Output Registers

Index	Sub Index	Name	Data type	Access	Default	Notes
3801h		< out 1				
	01h	< out 1 (boolean)	Unsigned8	ro	no default	0 = FALSE, 1 = TRUE
	02h	< out 1 (integer8)	Integer8	ro	no default	
	03h	< out 1 (integer16)	Integer16	ro	no default	
	04h	< out 1 (integer32)	Integer32	ro	no default	
	05h	< out 1 (unsigned8)	Unsigned8	ro	no default	
	06h	< out 1 (unsigned16)	Unsigned16	ro	no default	
	07h	< out 1 (unsigned32)	Unsigned32	ro	no default	
	08h	< out 1 (real32)	Real32	ro	no default	
...
3802h		< out 2				
	01h	< out 2 (boolean)	Unsigned8	ro	no default	0 = FALSE, 1 = TRUE
...

Area 3C00h-3FFFh corresponds to user-configurable Input Registers

Index	Sub Index	Name	Data type	Access	Default	Notes
3C01h		> in 1				
	01h	> in 1 (boolean)	Unsigned8	rw	no default	0 = FALSE, 1 = TRUE
	02h	> in 1 (integer8)	Integer8	rw	no default	
	03h	> in 1 (integer16)	Integer16	rw	no default	
	04h	> in 1 (integer32)	Integer32	rw	no default	
	05h	> in 1 (unsigned8)	Unsigned8	rw	no default	
	06h	> in 1 (unsigned16)	Unsigned16	rw	no default	
	07h	> in 1 (unsigned32)	Unsigned32	rw	no default	
	08h	> in 1 (real32)	Real32	rw	no default	
...
3C02h		> in 2				
	01h	> in 2 (boolean)	Unsigned8	rw	no default	0 = FALSE, 1 = TRUE
...

External Control of the Drive

Communications Command

When sequencing is in the Remote Comms mode, the sequencing of the Drive is controlled by writing to the COMMS COMMAND (PREF 95.05).

The COMMS COMMAND parameter is a 16-bit word based on standard fieldbus drive profiles. Some bits are not implemented in this release (see “Supported” column of the table below).

Bit	Name	Description	Supported	Required Value
0	Switch On	OFF1 Operational	✓	
1	(Not) Disable Voltage	OFF2 Coast Stop	✓	
2	(Not) Quick Stop	OFF3 Fast Stop	✓	
3	Enable Operation		✓	
4	Enable Ramp Output	=0 to set ramp output to zero		1
5	Enable Ramp	=0 to hold ramp		1
6	Enable Ramp Input	=0 to set ramp input to zero		1
7	Reset Fault	Reset on 0 to 1 transition	✓	
8				0
9				0
10	Remote	=1 to control remotely		1
11				0
12				0
13				0
14				0
15				0

Switch On

Replaces the RUN FWD, RUN REV and NOT STOP parameters of the SEQUENCING LOGIC function block. When Set (=1) is the same as :

RUN FWD = TRUE
 RUN REV = FALSE
 NOT STOP = FALSE

When Cleared (= 0) is the same as :

RUN FWD = FALSE
 RUN REV = FALSE
 NOT STOP = FALSE

(Not) Disable Voltage

ANDed with the NOT COAST STOP parameter of the SEQUENCING LOGIC function block.
When both Set (=1) is the same as:

NOT COAST STOP = TRUE

When either or both Cleared (= 0) is the same as :

NOT COAST STOP = FALSE

(Not) Quick Stop

ANDed with the NOT FAST STOP parameter on the SEQUENCING LOGIC function block.
When both Set (=1) is the same as:

NOT FAST STOP = TRUE

When either or both Cleared (= 0) is the same as :

NOT FAST STOP = FALSE

Enable Operation

ANDed with the DRIVE ENABLE parameter on the SEQUENCING LOGIC function block.
When both Set (=1) is the same as:

DRIVE ENABLE = TRUE

When either or both Cleared (= 0) is the same as :

DRIVE ENABLE = FALSE

Enable Ramp Output, Enable Ramp, Enable Ramp Input

Not implemented. The state of these bits must be set (=1) to allow this feature to be added in the future.

Reset Fault

Replaces the REM TRIP RESET parameter on the SEQUENCING LOGIC function block.
When Set (=1) is the same as:

REM TRIP RESET = TRUE

When Cleared (= 0) is the same as :

REM TRIP RESET = FALSE

Remote

Not implemented. It is intended to allow the PLC to toggle between local and remote. The state of this must be set (=1) to allow this feature to be added in the future.

Example Commands

047F hexadecimal to RUN

047E hexadecimal to STOP

Communications Status

The COMMS STATUS parameter (PREF 95.08) in the COMMS CONTROL function block monitors the sequencing of the Drive. It is a 16-bit word based on standard fieldbus drive profiles. Some bits are not implemented in the initial release and are set to 0 (see “Supported” column of the table below).

Bit	Name	Description	Supported
0	Ready To Switch On		✓
1	Switched On	Ready for operation (refer control bit 0)	✓
2	Operation Enabled	(refer control bit 3)	✓
3	Fault	Tripped	✓
4	(Not) Voltage Disabled	OFF 2 Command pending	✓
5	(Not) Quick Stop	OFF 3 Command pending	✓
6	Switch On Disable	Switch On Inhibited	✓
7	Warning		
8	SP / PV in Range		
9	Remote	= 1 if Drive will accept Command Word	✓
10	Setpoint Reached	= 1 if not ramping	✓
11	Internal Limit Active	= 1 if current limit active or speed loop is in torque limit	✓
12			
13			
14			
15			

Ready To Switch On

Same as the SWITCH ON ENABLE output parameter of the SEQUENCING LOGIC function block.

Switched On

Same as the SWITCHED ON output parameter of the SEQUENCING LOGIC function block.

Operation Enabled

Same as the RUNNING output parameter of the SEQUENCING LOGIC function block.

Fault

Same as the TRIPPED output parameter of the SEQUENCING LOGIC function block.

(Not) Voltage Disabled

If in Remote Comms mode, this is the same as Bit 1 of the COMMS COMMAND parameter. Otherwise it is the same as the NOT COAST STOP input parameter of the SEQUENCING LOGIC function block.

(Not) Quick Stop

If in Remote Comms mode, this is the same as Bit 2 of the COMMS COMMAND parameter. Otherwise it is the same as the NOT FAST STOP input parameter of the SEQUENCING LOGIC function block.

Switch On Disable

Set (=1) only when in START DISABLED state.

Remote

This bit is set (= 1) if the Drive is in Remote mode **AND** the parameter REMOTE COMMS SEL of the COMMS CONTROL function block is Set (= 1).

Setpoint Reached

This bit is set (=1) if the Reference Ramp is not ramping.

Internal Limit Active

This bit is set (=1) if, while in vector control mode, the speed limit has reached the torque limit; or, while in Volts/Hz mode, the open loop current limit is active.

DSE/CANopen Conversion Rules

The rules governing the conversion between 890 data types and CANopen data types are given below. Note carefully that some conversions will result in rounding, limiting and truncation of the original value.

LOGIC Type Connector

	Data from CANopen	Data to 890
From BOOLEAN to LOGIC	False True	False True
From REAL 32 to LOGIC	Zero Non-zero	False True
From INTEGER 8 to LOGIC	Zero Non-zero	False True
From INTEGER 16 to LOGIC	Zero Non-zero	False True
From INTEGER 32 to LOGIC	Zero Non-zero	False True
From UNSIGNED 8 to LOGIC	Zero Non-zero	False True
From UNSIGNED 16 to LOGIC	Zero Non-zero	False True
From UNSIGNED 32 to LOGIC	Zero Non-zero	False True

	Data from 890	Data to CANopen
From LOGIC to BOOLEAN	False True	False True
From LOGIC to REAL 32	False True	0.0 1.0
From LOGIC to INTEGER 8	False True	0 1
From LOGIC to INTEGER 16	False True	0 1
From LOGIC to INTEGER 32	False True	0 1
From LOGIC to UNSIGNED 8	False True	0 1
From LOGIC to UNSIGNED 16	False True	0 1
From LOGIC to UNSIGNED 32	False True	0 1

INTEGER Type Connector

	Data from CANopen	Data to 890
From BOOLEAN to INTEGER	False True	0x0000 0000 0x0000 0001
From INTEGER 8 to INTEGER	-128 to 127	-128 to 127
From INTEGER 16 to INTEGER	-32,768 to 32,767	-32,768 to 32,767
From INTEGER 32 to INTEGER	-2,147,483,648 to 2,147,483,547	-2,147,483,648 to 2,147,483,547
From UNSIGNED 8 to INTEGER	0 to 255	0 to 255
From UNSIGNED 16 to INTEGER	0 to 65,535	0 to 65,535
From UNSIGNED 32 to INTEGER	0 to 4,294,967,295	0 to 2,147,483,647 limits apply
From REAL 32 to INTEGER	32-bit IEEE floating- point	-2,147,483,648 to 2,147,483,547 Fractional part rounded

	Data from 890	Data to CANopen
From INTEGER to BOOLEAN	Zero Non-zero	True False
From INTEGER to REAL 32	-2,147,483,648 to 2,147,483,647	32-bit IEEE floating- point
From INTEGER to INTEGER 8	-2,147,483,648 to 2,147,483,647	-128 to 127 limits apply
From INTEGER to INTEGER 16	-2,147,483,648 to 2,147,483,647	-32768 to 32767 limits apply
From INTEGER to INTEGER 32	-2,147,483,648 to 2,147,483,647	-2,147,483,648 to 2,147,483,647
From INTEGER to UNSIGNED 8	-2,147,483,648 to 2,147,483,647	0 to 255 limits apply
From INTEGER to UNSIGNED 16	-2,147,483,648 to 2,147,483,647	0 to 65,535 limits apply
From INTEGER to UNSIGNED 32	-2,147,483,648 to 2,147,483,647	0 to 2,147,483,647 limits apply

VALUE Type Connector

	Data from CANopen	Data to 890
From BOOLEAN to VALUE	False True	0.0 1.0
From REAL 32 to VALUE	32-bit IEEE floating-point	-32,768.0 to 32,767.9999
From INTEGER 8 to VALUE	-128 to 127	-128.0 to 127.0
From INTEGER 16 to VALUE	-32,768 to 32,767	-32,768.0 to 32,767.0
From INTEGER 32 to VALUE	-2,147,483,648 to 2,147,483,547	-32,768.0 to 32,767.0 limits apply
From UNSIGNED 8 to VALUE	0 to 255	0.0 to 255.0
From UNSIGNED 16 to VALUE	0 to 65,535	0.0 to 32,767.0 limits apply
From UNSIGNED 32 to VALUE	0 to 4,294,967,295	0.0 to 32,767.0 limits apply

	Data from 890	Data to CANopen
From VALUE to BOOLEAN	Zero Non-zero	False True
From VALUE to REAL 32	-32,768.0 to 32,767.9999	32-bit IEEE floating-point
From VALUE to INTEGER 8	-32,768.0 to 32,767.9999	-128 to 127 limits apply/ rounding applies
From VALUE to INTEGER 16	-32,768.0 to 32,767.9999	-32,768 to 32,767 limits apply/ rounding applies
From VALUE to INTEGER 32	-32,768.0 to 32,767.9999	-32768 to 32,767 limits apply/ rounding applies
From VALUE to UNSIGNED 8	-32,768.0 to 32,767.9999	0 to 255 limits apply/ rounding applies
From VALUE to UNSIGNED 16	-32,768.0 to 32,767.9999	0 to 32767 limits apply/ rounding applies
From VALUE to UNSIGNED 32	-32,768.0 to 32,767.9999	0 to 32767 limits apply/ rounding applies

Disposal

This product contains materials which are consignable waste under the Special Waste Regulations 1996 which complies with the EC Hazardous Waste Directive - Directive 91/689/EEC.

We recommend you dispose of the appropriate materials in accordance with the valid environmental control laws. The following table shows which materials can be recycled and which have to be disposed of in a special way.


Material	Recycle	Disposal
metal	yes	no
plastics material	yes	no
printed circuit board	no	yes

The printed circuit board should be disposed of in one of two ways:

1. High temperature incineration (minimum temperature 1200°C) by an incinerator authorised under parts A or B of the Environmental Protection Act
2. Disposal in an engineered land fill site that is licensed to take aluminium electrolytic capacitors. Do not dispose of in a land fill site set aside for domestic waste.

Packaging

During transport our products are protected by suitable packaging. This is entirely environmentally compatible and should be taken for central disposal as secondary raw material.

ISS.	MODIFICATION	ECN No.	DATE	DRAWN	CHK'D
1	Initial Issue (HA469262U001)	17320	13/03/06	CM	KJ
2	Small amendments. Company name change.	19768	09/01/07	CM	KJ
3	Page 29 removed "refer to Error! Reference source not found". Updated photos, logos, and screen shots. Page 15 added the first "Note".	20796	15 Jun 09	FEP	KJ
4	Updated screen shots and photos. Page 10 Replaced six with seven and added FB Val to Int Output Standardised Safety pages over 3 pages. Replaced TechCard with Option and Replaced DSE 890 with DSE. Other minor corrections and amendments	20814	11 Feb 10	FEP	MF
FIRST USED ON		MODIFICATION RECORD			
		CANopen Communications Interface			
		DRAWING NUMBER			SHT. 1
		ZZ469262C001			OF 1