USER'S MANUAL

Interbus-S Fieldbus Option Board

VACON CX / CXL Frequency Converter

Subject to changes without notice

INDEX

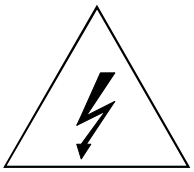
1. GENERAL

Vacon frequency converters can be connected to Interbus-S fieldbus by using fieldbus board. The converter can be then controlled, monitored and programmed from the Host system. Fieldbus board follows connection profile 21 for frequency converters defined by DRIVECOM user's group. This guarantees that interfacing of the Vacon frequency converter to the Interbus-S fieldbus happens according to the standardized parameters and functions. Then the commissioning of the frequency converter speed up and control of the frequency converter facilitated. Vacon Fieldbus board is a remote bus device.

The used I/O can be also extended by the Fieldbus board:
- 4 digital inputs (standard signals)
- 4 digital outputs (standard signals)
- Termistor input (can be directly connected into the motor termistors for over temperature trip)
- Encoder input

Fieldbus board can be installed into the existing option board place inside the frequency converter.

The control connections are isolated from the mains potential and I/O ground is connected to the frame of the device via an 1 MΩ resistor and 4.7 nF capacitor*. The control I/O ground can be connected also directly to the frame by changing the position of the jumper X9 (GND ON/OFF) to ON-position. Digital inputs are also isolated from the I/O ground.



Internal components and circuit boards (except the isolated I/O terminals) are at mains potential when the Vacon CX/CXL is connected to the mains. This voltage is extremely dangerous and may cause death or severe injury if you come in contact with it.

The control I/O terminals are isolated from the mains potential, but the I/O:s (if jumper X9 is in OFF position) may have dangerous voltage connected even if the power is off on the Vacon CX/CXL.

* Default value (X9 is GND OFF- position)

1. SPECIFICATIONS

IBS - connections	Interface	Remote bus, 9-pin DSUB connector
	Transfer method	RS-485
	Transfer cable	Twisted pair (2 pair and ground)
	Electrical isolation	
	- Remote bus in	500 V DC
I/O -control connections	Digital input (4 pcs)	24 V (± 15 %), R_i = 5 kΩ
	Digital output (4 pcs)	Open collector output, 50 mA/48 V
	Termistor input (1 pcs)	R_{trip} = 4.7 kΩ
	Encoder input (3 pcs)	24 V (± 30 V): "0" ≤10 V, "1" ≥18 V, R_i = 3.3 kΩ 5 V (± 10 V): "0" ≤2 V, "1" ≥3 V, R_i = 330 Ω
	Aux. voltage	24 V (±20%), max 50 mA
Safety		Fulfils EN50178 standard

Table 1. Specifications

ID - Code	227	Remote bus station with PCP
Profile	21	DRIVECOM
Process Data	2 words	
PCP communication	1 word	
Communication Reference List - max. PDU length for Sending -high - max. PDU length for Sending.-low - max. PDU length for Receive -high - max. PDU length for Receive -low - supported services Client - supported services Server	 0 bytes 64 bytes 0 bytes 64 bytes 00 00 00 00 30 80	 Read, Write, Information Report

Table 2. Interbus-S communication data

1. INTERBUS-S

Interbus-S is fast sensore/actuator fieldbus. Through Interbus-S fieldbus both individual I/O-device and intelligent actuator can be controlled, such as frequency converter. Due to topology Interbus-S is able to fast, under 10 ms, response times.

Interbus-S is from it's topology a ring, where is one Host system. As a Host system can function for example a programmable logic, industrial design PC or process station of the automation system. Remote bus cable which begins from Host System combines the Bus terminals of the field. The long displacements in the field are implemented by using Remote bus. If Bus terminal in the field does not include repeat function, it will be connected to Interbus-S fieldbus by using Local bus. Local bus situated in the field is local, switch cabinet's internal bus, which is however a part of the Interbus-S circle. Vacon equipped with Fieldbus board is Remote bus device.

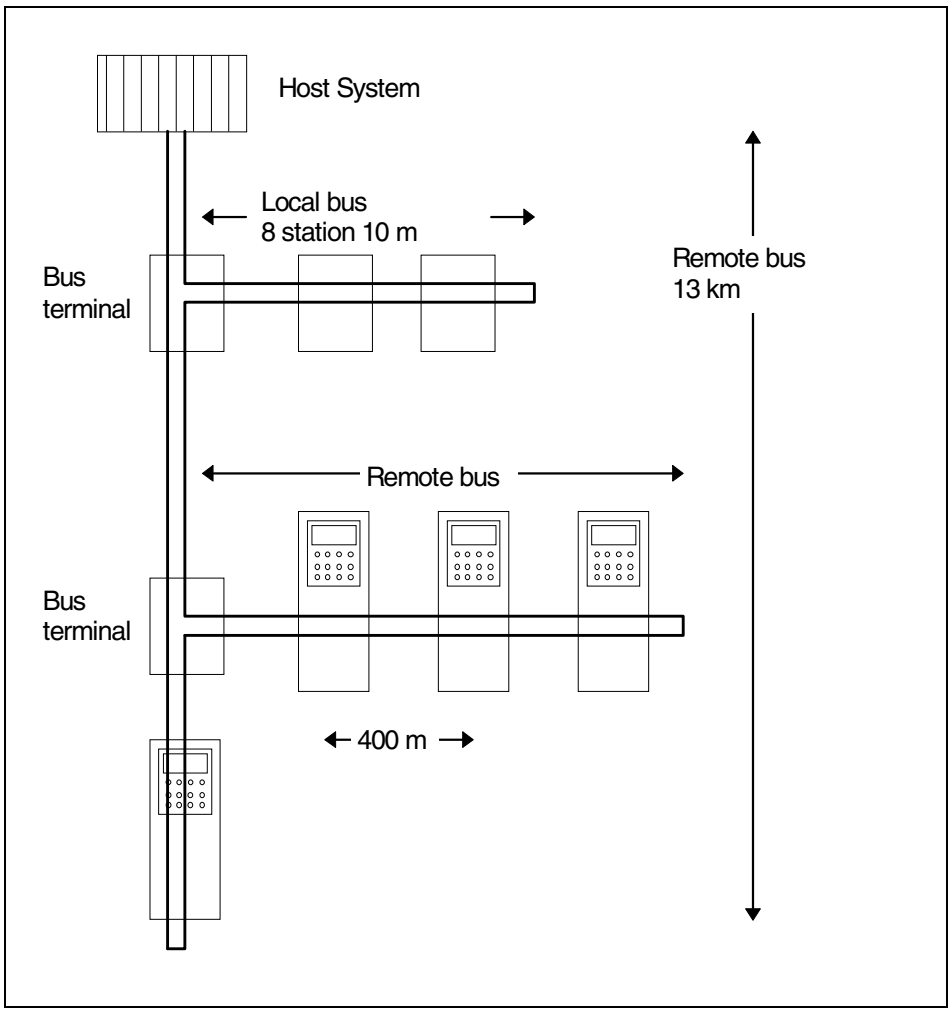


Figure 1. Interbus-S topology

Information can be deliver two ways to the device, which is in the Interbus-S field. The Process channel is used for the fast information delivery. With the support of this channel can be for example speed reference of the frequency converter placed and get back the actual speed information. Slower, but more information included parameter information delivery PCP channel is used (Peripheral Communication Protocol), when message construction according to DRIVECOM Profile 21 is used.

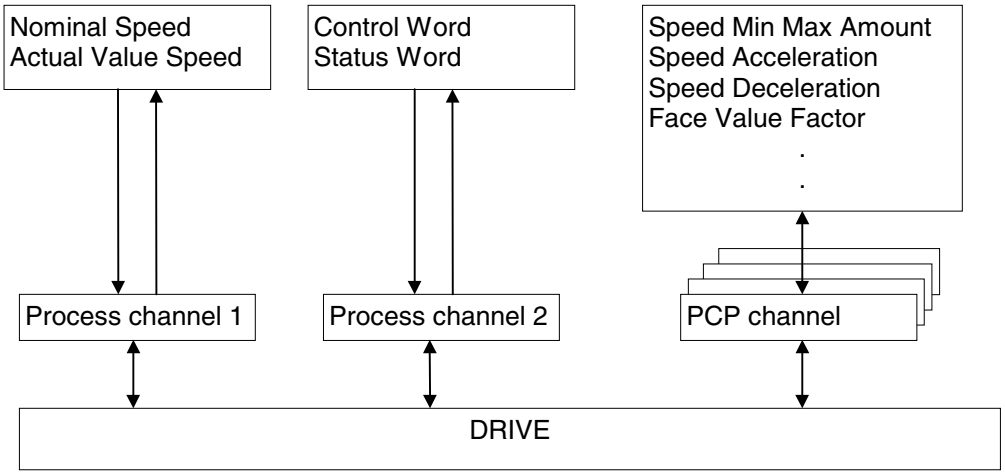


Figure 2. Process channel/PCP channel

Connection of Vacon frequency converter to the Interbus-S field is described in the interface figure below:

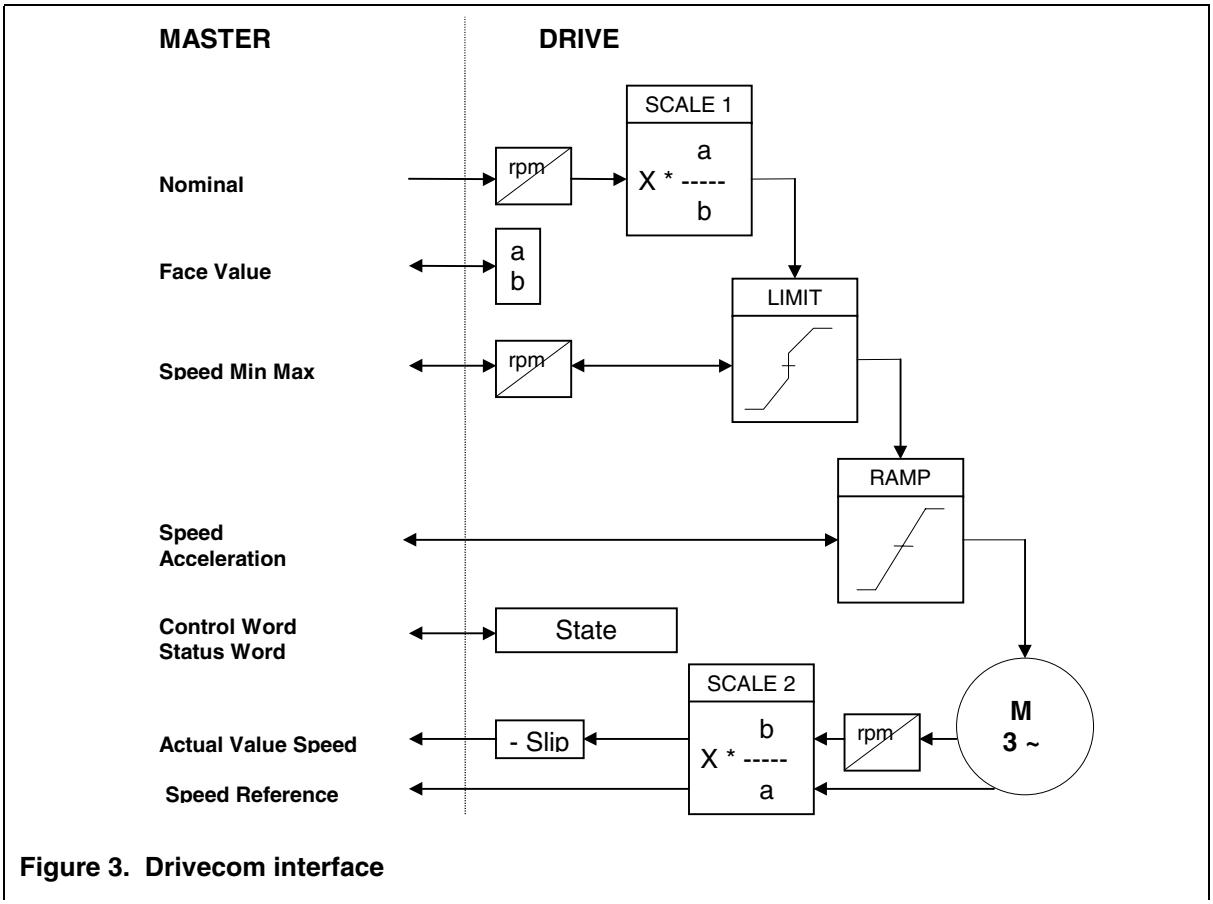


Figure 3. Drivecom interface

4. INSTALLATION

Before doing any commissioning actions read carefully safety instructions from the "User's manual CX/CXL/CXS frequency converter"- manual chapter 2. Check that you have got all the Fieldbus board parts: Fieldbus board, plastic board, power cable (black terminal), data cable (blue terminal) and earthing screw.
Fieldbus board can be installed into the existing option board place inside the frequency converter (see figure 4-1).

A	Remove the control panel and the jumper X4 from the control board (**1**).
B	Install the power cable into the control board X5 -terminal (**2**) and data cable to the X14 -terminal (**3**). Power cable can also be installed into the X6 -terminal, if the power cable from the power board is connected into the X5 -terminal.
C	Bend the data cable to the "S-curve" as far as possible from the power board transformer (**4**) before you install the plastic board into the control board.
D	Remove the protection foil of the plastic board and install the plastic board into the control board, remember the right position of the plastic board (**5**).
E	Install the Fieldbus board into the plastic board from the larger holes and "push" it into the right position in the narrow position of the screws . Check that the Fieldbus board is installed stable. If you have difficulties to place the plastic board and Fieldbus board, bend slightly the regulator A4 (**6**) and capasitor C59 (**7**) of the control board.
F	Install the power cable to the X6 -terminal of the Fieldbus board (**8**)and data cable to the X14 -terminal (**9**).
G	Install the jumper which you remove from the X4 -terminal of the control board, into the X9 -terminal of the Fieldbus board (**10**) ON or OFF position.
H	If the packet includes the cable cover (**11**), install that into position shown in figure 1.
I	Install the earthing screw (**12**).
J	After this install the control panel and connect the needed control signals.
K	If use 5 V encoder input, install the jumper to the X7-terminal (see Chapter 5, figure 1) of the Fieldbus board.

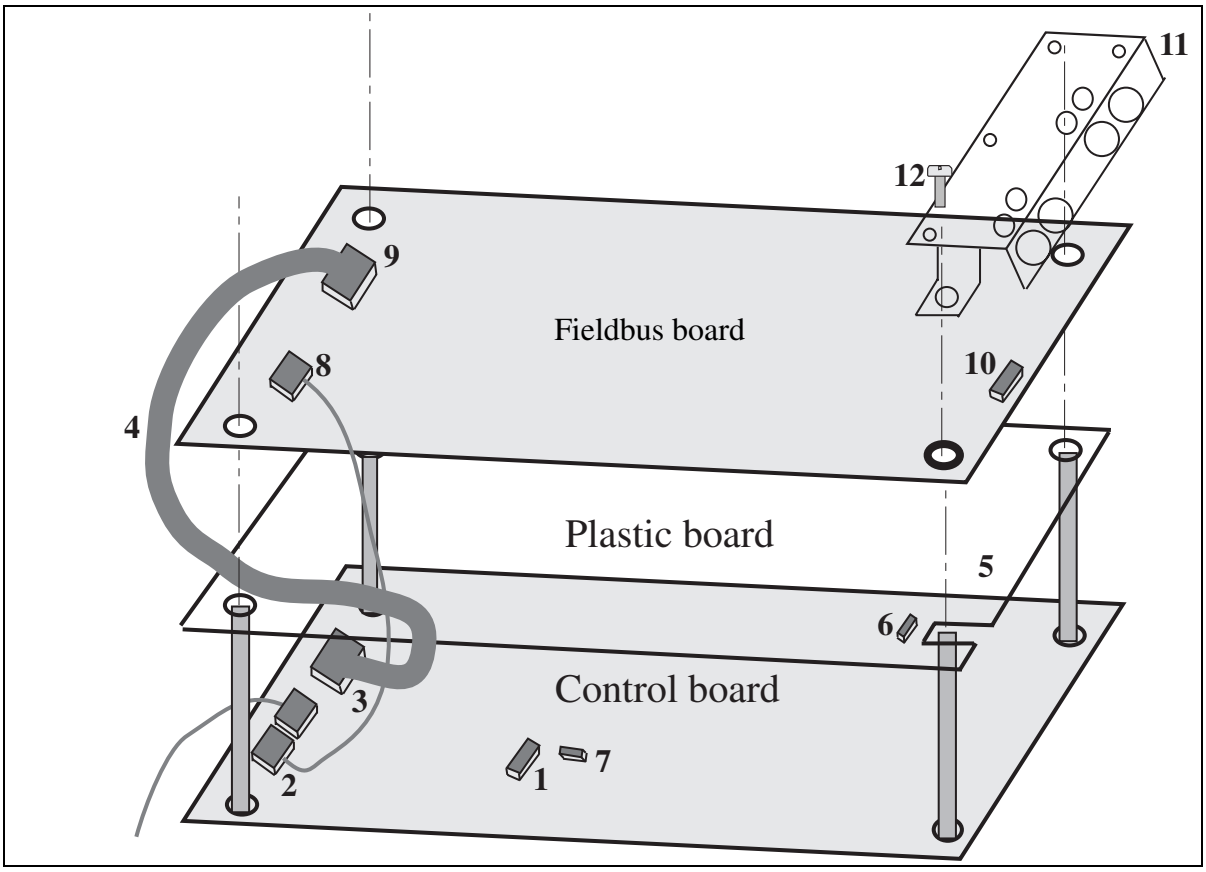
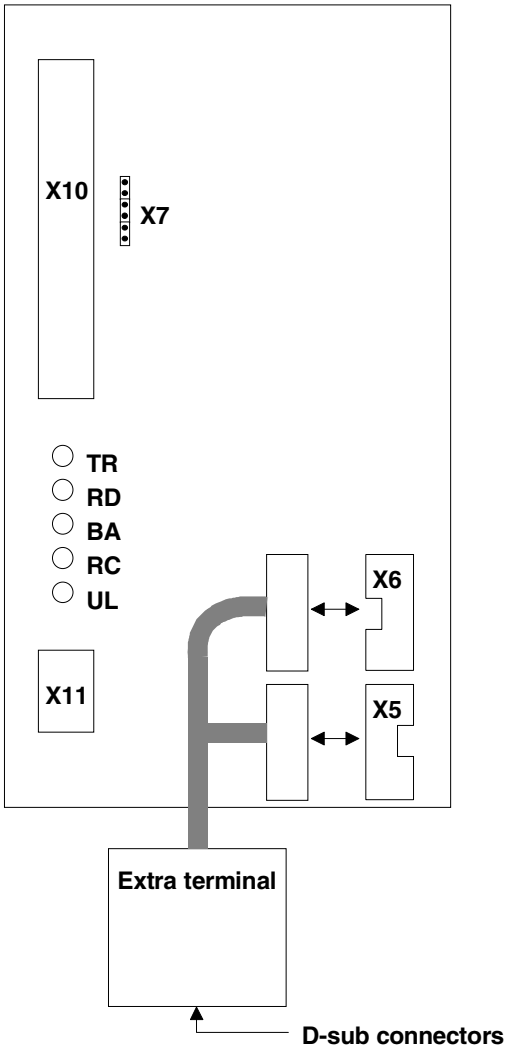


Figure 1. Fieldbus board installed into the control board

5. CONNECTIONS

5.1 Board layout



Terminals:

X10	I/O - terminals
X11	Termistor input
X7	Encoder terminal
X5	Interbus-S Input
X6	Interbus-S Output

Figure 1. Fieldbus board

UL Supply Voltage, Green.
UL led is active if the interface board has supply voltage.

RC Remote bus Check, Green.
RC led is active if the cable connection is good and the Interbus-S master is not reset.

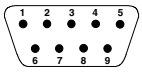
BA Bus Active, Green.

RD Remote bus Disabled, Red.
The red RD led is active if the outgoing remote bus is disabled.

TR Transmit/Receive, Green.
PCP communication is active.

5.2 Interbus-S connections

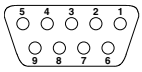
Input (male):



Signal	Connector D SUB 9-pin	Board Connector X5 - terminal	Description
DO	1	X5 - 1	Data Out
DI	2	X5 - 3	Data In
COM	3	X5 - 5	Common
/DO	6	X5 - 2	Data Out, Inverse
/DI	7	X5 - 4	Data In, Inverse
Shield		X5 - 10	Cable shield

Table 1. Input D-sub connector

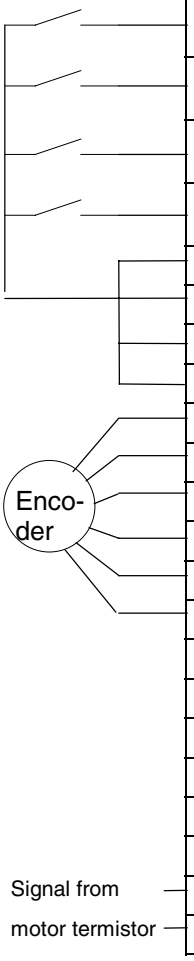
Output (female):



Signal	Connector D SUB 9-pin	Board Connector X6 - terminal	Description
DO	1	X6 - 1	Data Out
DI	2	X6 - 3	Data In
COM	3	X6 - 5	Common
+ 5V	5	X6 - 9	
/DO	6	X6 - 2	Data Out, Inverse
/DI	7	X6 - 4	Data In, Inverse
RBST	9	X6 - 8	Remote Bus Connector
Shield		X6 - 10	Cable shield

Table 2. Output D-sub connector

5.3 /O-control connections



Terminal		Signal	Description
301	DID1	External fault (closing contact)	Contact open = no fault Contact closed = fault
302	DID2	Run disable	Contact open = start of motor enabled Contact closed = start of motor disabled
303	DID3	Acceler. / Decel. time selection	Contact open = time 1 selected Contact closed = time 2 selected
304	DID4	Jogging speed selection	Contact open = no action Contact closed = jogging speed
305	COMD	Common for DID1-DID2	Connect to GND or +24 V
306	+24 V	Control voltage output	Voltage for switches, etc. max. 0.1 A
307	COME	Common for DIE3-DIE4	Connect to GND or +24 V
308	GND	I/O ground	Ground for reference and controls
309	DID5A+	Pulse input A	
310	DID5A-	(differential input)	
311	DID6B+	Pulse input B	90 degrees phase shift compared
312	DID6B-	(differential input)	to pulse input A
313	DID7Z+	Pulse input Z	one pulse per one revolution
314	DID7Z-	(differential input)	
315	GND	I/O ground	Ground for reference and controls
316	DOD1	Open collector output 1	READY
317	DOD2	Open collector output 2	RUN
318	DOD3	Open collector output 3	FAULT
319	DOD4	Open collector output 4	FIELDBUS CONTROL
320	GND	I/O ground	Ground for reference and controls
327	TI+	Termistor input	
328	TI-		

Figure 2. Control connections

6. COMMISSIONING

Check first commissioning of the frequency converter from User's manual CX/CXL frequency converter (Chapter 8.)

Commissioning of the Fieldbus board:

1. Check that Multi-purpose Control Application II (or e.g. Fieldbus Application) is selected. (Parameter P0.1 = 0)
2. Initial connection between Master - Drive using PCP-service, Initial.
3. Wait until Initial confirmation is received.

Start-up test:

DRIVE APPLICATION

1. Check that the active control place is I/O terminals (not control panel)
2. Set parameter "Fieldbus control select" to value 1(On).

MASTER SOFTWARE

1. ProcessDataInput 1 is now value xx60hex, SWITCH ON DISABLED
   (if ProcessDataInput 1 = xx40hex)
   - Parameters can be read and write
2. Write to ProcessDataOutput 1 value xxx6hex.
3. Wait until status ProcessDataInput 1 value is xx21hex, READY TO SWITCH ON
4. Write to ProcessDataOutput 1 value xxx7hex.
5. Wait until status ProcessDataInput 1 value is xx23hex, SWITCHED ON
6. Write to ProcessDataOutput 1 value xxxFhex.
7. Wait until status ProcessDataInput 1 value is xx27hex, OPERATION ENABLE
   - Drive control is now enable (Run State = ON)
8. Set Nominal Speed Value using variable ProcessDataOutput 2 variable.
   Read Actual Speed using variable ProcessDataInput 2.

If ProcessDataInput 1 = xx08hex or xx28hex Device status is MALFUNCTION

7. DRIVECOM

The DRIVECOM user group is standardizing the most important functions and parameters of the drive:

- Device control state machine
- Profile parameters
- PCP-communication services

7.1 Device control State machine

The state machine describes the device status and the possible control sequence of the drive. The state transitions can be generated by using "control word" parameter. The "status word" parameter indicates the current status of state machine. The modes ***INIT***, ***STOP***, ***RUN*** and ***FAULT*** (see figure 7-1) correspond to the actual mode of the Drive.

SWITCHED ON (=xx23 hex) is one value of the "status word".
Shutdown (=xxxx x110 bin) is one value of the "control word".

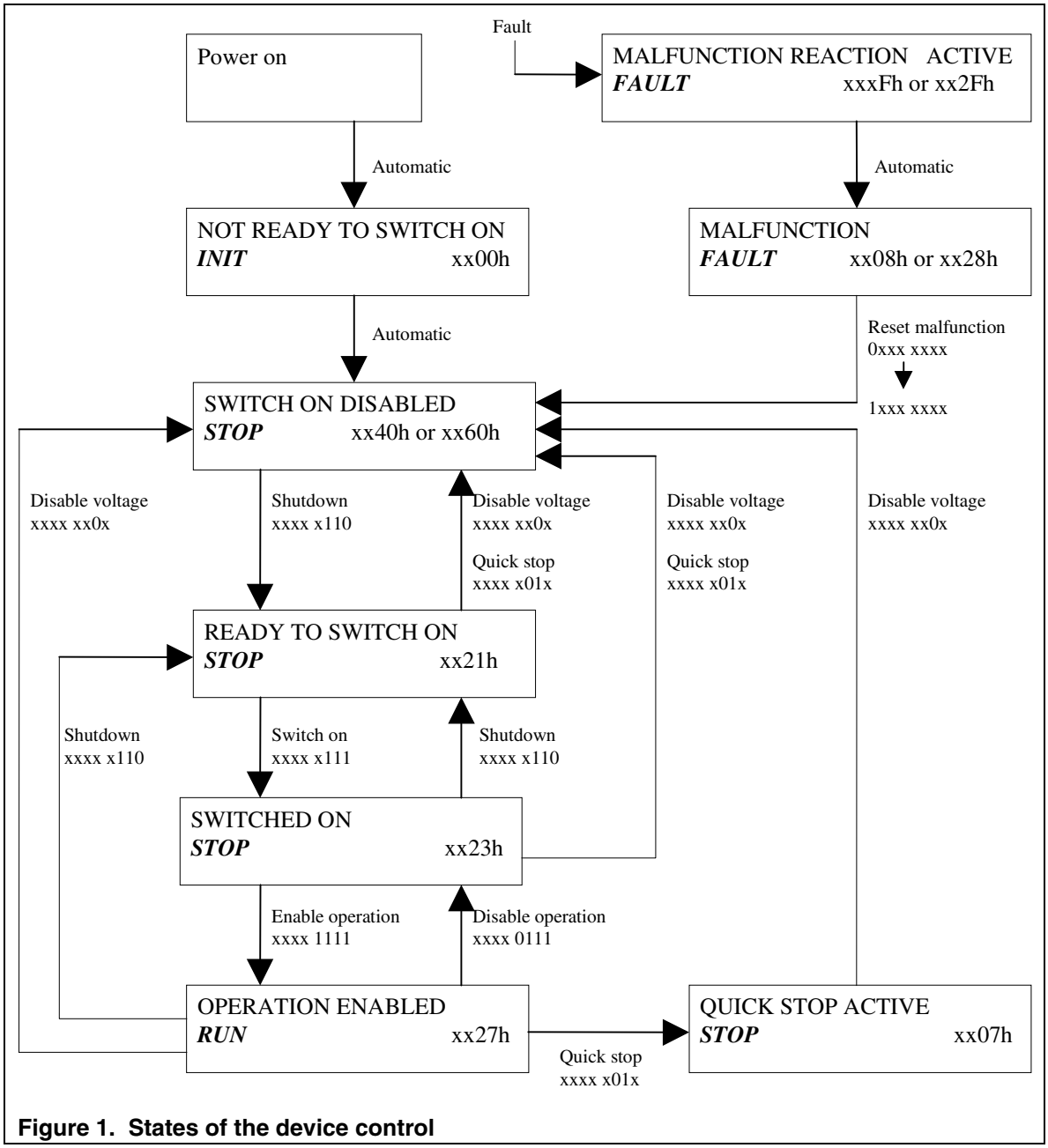


Figure 1. States of the device control

STATE	STATUS OF THE DRIVE
NOT READY TO SWITCH ON -The interface board initialization is running. -The drive function is disabled.	***INIT***
SWITCH ON DISABLED -Initialization was completed. -The parameters can read and write. -The drive function is disabled.	***STOP***
READY TO SWITCH ON -The parameters can read and write. -The drive function is disabled.	***STOP***
SWITCHED ON -The parameters can read and write. -The drive function is disabled.	***STOP***
OPERATION ENABLED -The parameters can read and write. -The drive function is enabled.	***RUN***
MALFUNCTION REACTION ACTIVE -The drive function is disabled. -The fault trip occur	***FAULT***
MALFUNCTION -The drive function is disabled. -The drive is fault state. -The interface board waits for falling edge of reset malfunction bit.	***FAULT***
QUICK STOP ACTIVE -The parameters can read and write. -The drive function is enabled.	***STOP***

Table 1. Descriptions of the states

7.2 Profile Parameters

Index		Name	Type	Object	Data length	Access rights
hex	dec					
6000	24576	Process Input Data Description	PDD-structure	Record	13	R
6001	24577	Process Output Data Description	PDD-structure	Record	13	R
6002	24578	Process Output Data Enable	Boolean	Var	1	R/W
6007	24583	Connection Abort Option Code	Interger 16	Var	2	R/W
603F	24639	Malfunction Code	Octet String	Var	2	R
6040	24640	Control Word	Octet String	Var	2	R/W
6041	24641	Status Word	Octet String	Var	2	R
6042	24642	Nominal Speed		Var	2	R/W
6043	24643	Speed Reference Variable	Interger 16	Var	2	R
6044	24644	Actual Speed	Interger 16	Var	2	R
6046	24646	Speed Min Max Amount	Unsigned 32	Array	8	R/W
6048	24648	Speed Acceleration	Ramp	Record	6	R/W
6049	24649	Speed Deceleration	Ramp	Record	6	R/W
604B	24651	Face Value Factor	Integer 16	Array	4	R/W

Table 2. List of the profile parameters

Type	Value range			
Boolean	FALSE = 00hex , TRUE = FFhex			
Octet String	8 bit / byte binary coded			
Integer 8	-128	...	127	
Unsigned 8	0	...	255	
Interger 16	-32768	...	32767	
Unsigned 16	0	...	65535	
Integer 32	-2147483648	...	2147483647	
Unsigned 32	0	...	4294967295	
PDD-structure	Subindex 1: Process data length			Unsigned 8
	Subindex 2: 1-index process input/output data			Unsigned 16
	Subindex 3: 1-subindex process input/output data			Unsigned 8
	Subindex 4: 2-index process input/output data			Unsigned 16
	Subindex 5: 2-subindex process input/output data			Unsigned 8
Ramp	Subindex 1: Delta speed			Unsigned 32
	Subindex 2: Delta time			Unsigned 16
R	Read only			
W	Write			

7.2.1 Process Input Data Description (6000HEX)

This parameter contains the data defining which process input data is mapped to which communication objects. Input data is data from the drive to the master.

Object description	
Index	6000 hex
Object code	Record
Data type	PDD structure
Access rights	Read-all
Value description	
Subindex 1	Process data length
Value range	Unsigned 8
Default value	**4**
Subindex 2	1-index process input data
Value range	Unsigned 16
Default value	**6041 hex**
Subindex 3	1-subindex process input data
Value range	Unsigned 8
Default value	**00 hex**
Subindex 4	2-index process input data
Value range	Unsigned 16
Default value	**6044 hex**
Subindex 5	2-subindex process input data
Value range	Unsigned 8
Default value	**00 hex**

7.2.2 Process Output Data Description (6001HEX)

This parameter contains the data defining which process output data is mapped to which communication objects. Output data is data from the master to the drive.

Object description	
Index	6001 hex
Object code	Record
Data type	PDD structure
Access rights	Read-all
Value description	
Subindex 1	Process data length
Value range	Unsigned 8
Default value	**4**
Subindex 2	1-index process output data
Value range	Unsigned 16
Default value	**6040 hex**
Subindex 3	1-subindex process output data
Value range	Unsigned 8
Default value	**00 hex**
Subindex 4	2-index process output data
Value range	Unsigned 16
Default value	**6042 hex**
Subindex 5	2-subindex process input data
Value range	Unsigned 8
Default value	**00 hex**

7.2.3 Process Output Data Enable (6002HEX)

This parameter enables/disables the process data channel.

Object description	
Index	6002 hex
Object code	Simple variable
Data type	Boolean
Length	1 byte
Access rights	Read-all, Write-all
Value description	
Value range	TRUE, FALSE
Default value	**TRUE**

7.2.4 Connection Abort Option Code (6007HEX)

The parameter "Connection Abort Option Code" defines which function is executed when connection is aborted.

Object description	
Index	6007 hex
Object code	Simple variable
Data type	Integer 16
Length	2 bytes
Access rights	Read-all, Write-all
Value description	
Value range	Integer 16
Default value	**0**

Abort values:

Value	Description
-32768 ... -1	No action
0	No action
1	Malfunction
2	"Voltage Disabled" device control command
3	"Quick Stop" device control command
4 ... 32767	No action

7.2.5 Malfunction code (603Fhex)

When a fault trip occurs, device status is Malfunction and parameter "Malfunction code" indicates the current fault code.

Object description	
Index	603F hex
Object code	Simple variable
Data type	Octet string
Length	2 bytes
Access rights	Read-all
Value description	
Value range	Unsigned 16
Default value	**0**

Malfunction codes:

	VACON Fault Code	**DRIVECOM fault Code** hex	**Meaning**
1	Overcurrent	2300	General overcurrent
2	Overvoltage	3210	Overvoltage inside the device
3	Earth Fault	2330	Short to earth
4	Inverter Fault	5420	Gate drivers or IGBT bridge
5	Charging Switch	5120	DC link power supply
9	Under Voltage	3220	Undervoltage inside the device
10	Input Phase Supervision	3130	Phase failure
11	Output Phase Supervision	3130	Phase failure
12	Brake Chopper Supervision	7111	Brake chopper failure
13	Vacon Under Temperature	4210	Excess device temperature
14	Vacon Over Temperature	4220	Inadequete device temperature
15	Motor Stalled	7120	Motor
16	Motor Over Temperature	7120	Motor
17	Motor Underload	7120	Motor
18	Analog Input HW fault	5200	Control
19	OptionBoard Identification	7000	Additional modules
20	10 V Voltage Reference	5110	Low voltage power supply
21	24 V Supply	5112	+24 V power supply
22	EEPROM Checksum Fault	7600	Data memory
23	EEPROM Checksum Fault	7600	Data memory
24	EEPROM Checksum Fault	7600	Data memory
25	Microprocessor Watch Dog	6010	Software reset (Watchdog)
26	Panel Communication Error	7510	Communication
27	Fieldbus Communication Error	7510	Communication
28	Application Change	6200	Internal software
29	Termistor Fault	7200	Measurement circuits(Additional modules)
36	Analog Input Iin<4mA	5200	Control
37	Ap Fault Code 37	6200	Internal software
38	Ap Fault Code 38	6200	Internal software
39	Ap Fault Code 39	6200	Internal software
40	Ap Fault Code 40	6200	Internal software
41	External Fault	9000	External malfunction

7.2.6 Control Word (6040hex)

The Control command for the state machine (see figure 7.1). The state machine describes the device status and the possible control sequence of the drive.

Object description	
Index	6040 hex
Object code	Simple variable
Data type	Octet string
Length	2 bytes
Access rights	Read-all, Write-all
Value description	
Value range	Unsigned 16
Default value	**-**

The control word is composed of 16 bits that have the following meanings:

Bit	Name
0	Switch on
1	Disable voltage
2	Quick stop
3	Enable operation
4	Not used
5	Not used
6	Not used
7	Reset malfunction
8	Reserved
9	Reserved
10	Reserved
11	Special (*
12	Special (*
13	Special (*
14	Special (*
15	Special (*

(* See Appendix A

The device control commands are triggered by following bit combinations in the control word:

Command	Bit 7 Reset malfunction	Bit 3 Enable Operation	Bit 2 Quick Stop	Bit 1 Disable voltage	Bit 0 Switch on
Shutdown	X	X	1	1	0
Switch on	X	X	1	1	1
Disable voltage	X	X	X	0	X
Quick stop	X	X	0	1	X
Disable operation	X	0	1	1	1
Enable operation	X	1	1	1	1
Reset malfunction	0>1	X	X	X	X

0>1: Change from bit=0 to bit=1
X: Bit is irrelevant
Status Word (6041hex)

Information about the status of the device and messages is indicated in the status word.

Object description	
Index	6041 hex
Object code	Simple variable
Data type	Octet string
Length	2 bytes
Access rights	Read-all
Value description	
Value range	Unsigned 16
Default value	**-**

The status word is composed of 16 bits that have the following meanings:

Bit	Name
0	Ready to switch on
1	Switched on
2	Operation enabled
3	Malfunction
4	Voltage disabled
5	Quick stop
6	Switch on disabled
7	Warning active
8	Drive RUN/STOP
9	Remote
10	Face value reached
11	Limit value
12	Not used
13	Not used
14	Not used
15	Not used

The device status is indicated by the following bit combinations in the status word:

State	Bit 6 Switch on disabled	Bit 5 Quick Stop	Bit 3 Malfunction	Bit 2 Operation enabled	Bit 1 Switched on	Bit 0 Ready to switch on
Not ready to switch on	0	X	0	0	0	0
Switch on disabled	1	X	0	0	0	0
Ready to switch on	0	1	0	0	0	1
Switched on	0	1	0	0	1	1
Operation enabled	0	1	1	1	1	1
Malfunction	0	X	0	0	0	0
Malfunc reaction active	0	X	1	1	1	1
Quick stop active	0	0	0	0	0	1

X: Bit is irrelevant

7.2.7 Nominal Speed (6042hex)

Speed reference of the drive. The unit of the "Nominal Speed" is rpm. It is multiplied by the "Face Value Factor".

Object description	
Index	6042 hex
Object code	Simple variable
Data type	Integer 16
Length	2 bytes
Access rights	Read-all, Write-all
Value description	
Value range	Integer 16
Default value	**0**

7.2.8 Speed Reference Variable (6043hex)

Speed reference after ramp function, scaled to same unit as the "Nominal speed" (rpm). It is multiplied by the inverse of the "Face Value Factor".

Object description	
Index	6043 hex
Object code	Simple variable
Data type	Integer 16
Length	2 bytes
Access rights	Read-all
Value description	
Value range	Integer 16
Default value	**0**

7.2.9 Actual Speed (6044hex)

Actual speed of the motor, scaled to same unit as the "Nominal speed value" (rpm). It is multiplied by the inverse of the "Face Value Factor".

Object description	
Index	6044 hex
Object code	Simple variable
Data type	Integer 16
Length	2 bytes
Access rights	Read-all
Value description	
Value range	Integer 16
Default value	**0**

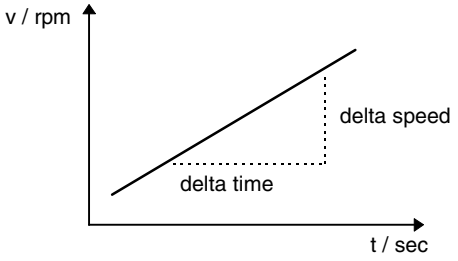
7.2.10 Speed Min Max Amount (6046hex)

Defines speed limits of the drive in rpm. The parameter consist of a minimum and a maximum speed.

Object description	
Index	6046 hex
Object code	Array
Data type	Octet string
Length	2 bytes
Access rights	Read-all, Write-all
Value description	
Subindex 1	Speed min amount
Value range	Unsigned 32
Default value	**0**
Subindex 2	Speed max amount
Value range	Unsigned 32
Default value	**1500 rpm**

7.2.11 Speed Acceleration (6048hex)

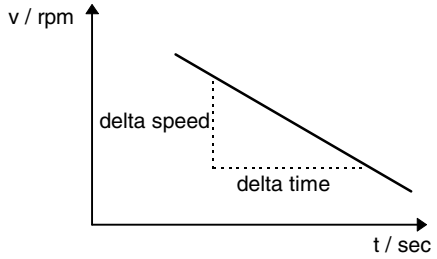
This parameter specifies the slope of the acceleration ramp. The parameter consist of two parts: the delta speed and the delta time.



Object description	
Index	6048 hex
Object code	Record
Number of elements	2 elements
Data type	Ramp
Access rights	Read-all, Write-all
Value description	
Subindex 1	Delta speed
Value range	Unsigned 32
Default value	**1500 rpm**
Subindex 2	Delta time
Value range	Unsigned 16
Default value	**3 s**

7.2.12 Speed Deceleration (6049hex)

This parameter specifies the slope of the deceleration ramp. The parameter consist of two parts: the delta speed and the delta time.



Object description	
Index	6049 hex
Object code	Record
Number of elements	2 elements
Data type	Ramp
Access rights	Read-all, Write-all
Value description	
Subindex 1	Delta speed
Value range	Unsigned 32
Default value	**1500 rpm**
Subindex 2	Delta time
Value range	Unsigned 16
Default value	**3 s**

7.2.13 Face Value Factor (604Bhex)

The "Face Value Factor" serves to modify the resolution or directing range of the specified face value. It is included in calculation of the specified face value and the output variables of the speed function only.

$$\text{Speed Reference} = \text{Nominal Speed} * \frac{\text{Numerator}}{\text{Denominator}}$$

$$\text{Actual Speed} = \text{Actual Speed} * \frac{\text{Denominator}}{\text{Numerator}}$$

Object description	
Index	604B hex
Object code	Array
Number of elements	2 elements
Data type	Integer 16
Length	2 bytes
Access rights	Read-all, Write-all
Value description	
Subindex 1	Numerator
Value range	1 ... 100
Default value	**1**
Subindex 2	Denominator
Value range	1 ... 100
Default value	**1**

8. VACON PARAMETERS

The Vacon variables and parameters can be read and write using following indexes:

Index		Name	Type	Object	Data Length	Access rights
hex	dec					
5FFF	24575	Monitoring variable 1	Interger 16	Array	4	R/W
5FFE	24574	Monitoring variable 2	Interger 16	Array	4	R/W
5FFD	24573	Monitoring variable 3	Interger 16	Array	4	R/W
5FFC	24572	Parameter Write	Interger 16	Array	6	R/W
5FFB	24571	Parameter Read	Interger 16	Array	6	R/W

8.1 Monitoring variables

Monitored item is chosen by writing the number (nX) of monitored item to the wanted index (see Table below). After this the chosen monitored item can be read from the wanted index. Separate monitored items can be chosen to every index "channel" (5FFD ... 5FFF).

Object description	
Index	5FFF ... 5FFD hex
Object code	Array
Number of elements	2 elements
Data type	Integer 16
Length	2 bytes
Access rights	Read-all, Write-all
Value description	
Subindex 1	Number of monitored data
Value range	Integer 16
Default value	**-**
Subindex 2	Number of monitored data
Value range	Integer 16
Default value	**-**

Number	Data name	Step	Unit	Description
n1	Output frequency	0,01	Hz	Frequency to the motor
n2	Motor speed	1	rpm	Calculated motor speed
n3	Motor current	0,1	A	Measured motor current
n4	Motor torque	1	%	Calculated actual torque/nominal torque of the unit
n5	Motor power	1	%	Calculated actual power/nominal power of the unit
n6	Motor voltage	1	V	Calculated motor voltage
n7	DC-link voltage	1	V	Measured DC-link voltage
n8	Temperature	1	°C	Temperature of the heat sink
n9	Operating day counter		DD.dd	Operating days 1), not resetable
n10	Operating hours, "trip counter"		HH.hh	Operating hours 2), can be reset with program-button #3
n11	MW-hours	0,001	MWh	Total MW-hours, not resetable
n12	MW-hours, "trip counter"	0,001	MWh	MW-hours, can be reset with programmable button #4
n13	Voltage/analogue input	0,01	V	Voltage of the terminal $U_{in}+$ (control board)
n14	Current/analogue input	0,01	mA	Current of terminals $I_{in}+$ and $I_{in}-$ (control board)

n15	Digital input status, gr. A			0 = Open Input, 1 = Closed Input (Active)
n16	Digital input status, gr. B			0 = Open Input, 1 = Closed Input (Active)
n17	Digital and relay output status			0 = Open Input, 1 = Closed Input (Active)
n18	Control program			Version number of the control software
n19	Unit nominal power	0,1	kW	Shows the power size of the unit
n20	Motor temperature rise	1	%	100%= temperature of motor has risen to nominal value

1) DD = full days, dd = decimal part of a day
2) HH = full hours, hh = decimal part of an hour

Table. Monitored Items

8.2 Parameter Write

By using index 5FFC can be written in to Vacon parameter. The group number of parameter, parameter number and parameter value will be written in to index. Numbering of the parameter as well as parameter ranges and steps can be found in the application manual in question. The parameter value should be given without decimals.

Object description	
Index	5FFC hex
Object code	Array
Number of elements	3 elements
Data type	Integer 16
Length	2 bytes
Access rights	Read-all, Write-all
Value description	
Subindex 1	Parameter group number
Value range	Integer 16
Default value	**-**
Subindex 2	Parameter number
Value range	Integer 16
Default value	**-**
Subindex 3	Parameter value
Value range	Integer 16
Default value	**-**

Example: Write value 25 to Vacon parameter 1.2

command	WRITE
subindex 1	0001 hex
subindex 2	0002 hex
subindex 3	0019 hex

8.3 Parameter read

Reading of the Vacon parameter is accomplished in two stages. At the first stage the read group number of the parameter and parameter value is written in to 5FFB, parameter value is not important. At the second stage the parameter value will be read from the same index, when the parameter value without desimals is received.

Object description	
Index	5FFB hex
Object code	Array
Number of elements	3 elements
Data type	Integer 16
Length	2 bytes
Access rights	Read-all, Write-all
Value description	
Subindex 1	Parameter group number
Value range	Integer 16
Default value	**-**
Subindex 2	Parameter number
Value range	Integer 16
Default value	**-**
Subindex 3	Parameter value
Value range	Integer 16
Default value	**-**

9. PCP-COMMUNICATION SERVICES

Following services are supported:

- Initiate Establish connection
- Abort Abort connection
- Status Read drive status
- Identify Read manufacturer's name, type and version
- Get OV Read the object description
- Read Read communication objects
- Write Write communication objects

9.1 Initiate

Establish a communication connection between master and slave. The drive controller returns the following service parameters when answering the initiate service:

Access Protection Supported: **TRUE**

Version OV: **0001hex**

Profile Number: **0021hex**

Password: **00hex**

9.2 Abort

Abort communication connection between two communication partners. The parameter "Connection Abort Option Code" defines which function is executed when connection is aborted.

9.3 Status

Request device and user status from the drive. The drive controller returns the following values:

Logical status

	Logical status	Device status
0	Ready to communicate	Remote
1	Limited number of services	Local

Physical status

	Physical status	Status of the device control
0	Ready for operation	OPERATION ENABLE
1	Partly ready for operation	All other states
2	Not ready for operation	Device not ready
3		

Local Detail

= Status word (index 6041hex)

9.4 Identify

Request identification data from the communication partner. The drive controller returns the following values:

Device manufacturer name: VACON

Model Name: VACON IBS-BOARD

Device version: Revision 1.0

9.5 Get OV

Read object dictionary of the communication partner.

9.6 Read

This service is read out of the parameters. The result is parameter value if service was processed successfully. The result is fault indication if service was not processed successfully. The fault indications:

Error Class	Error Code	Additional Code	Meaning
6	3	00	No access rights
6	5	00	Subindex is invalid
6	5	10	A service parameter has assumed an invalid value
6	6	00	The object is not a parameter
6	7	00	The object does not exist
8	0	00	Service cannot be executed
8	0	20	Service can currently not be executed

9.7 Write

This service is read out of the parameters. The result is acknowledgment if service was processed successfully. The result is fault indication if service was not processed successfully. The fault indications:

Error Class	Error Code	Additional Code	Meaning
6	3	00	No access rights
6	5	00	Subindex is invalid
6	5	10	A service parameter has assumed an invalid value
6	6	00	The object is not a parameter
6	7	00	No object exists under this index
6	8	00	The data does not correspond to the data type of the object
8	0	00	Service cannot be executed
8	0	20	Service can currently not be executed
8	0	21	Cannot be executed because of local control

10. Extra information

More information about Interbus-S system, Host Systems and DriveCom profile:

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APPENDIX A

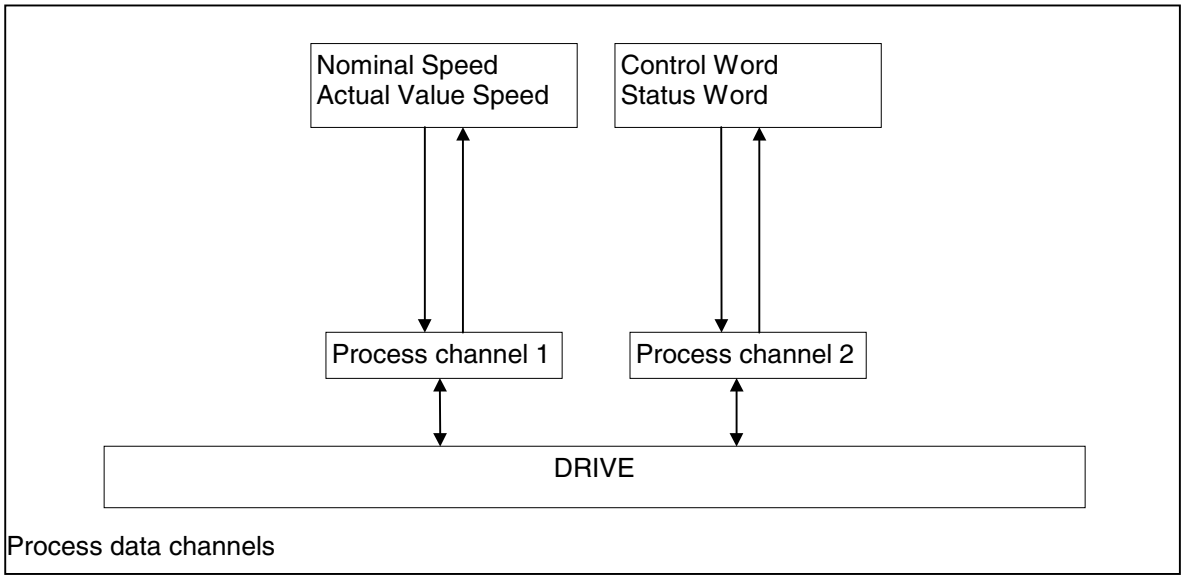
Special Actual Values

Default value of Index 6044hex (Process channel 1) is Actual Speed (RPM).

The user can also read the frequency converter's actual values via a Process Channel 1. Meaning of Process channel 1 can be selected by setting a Control Word (6040hex) bits 15...11. The user can select to show one of the monitoring page variables or active fault code.

Control Word (bit 15...11) is binary code as follows:

Control Word					Description
bit 15	bit 14	bit 13	bit 12	bit 11	
0	0	0	0	0	Default, Actual Speed (RPM)
0	0	0	0	1	n1 (see table 8-1)
0	0	0	1	0	n2 (see table 8-1)
0	0	0	1	1	n3 (see table 8-1)
					.
					.
1	1	1	0	1	n29 (see table 8-1)
1	1	1	1	0	Active Fault Code
1	1	1	1	1	Actual Speed (RPM)



Process data channels

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