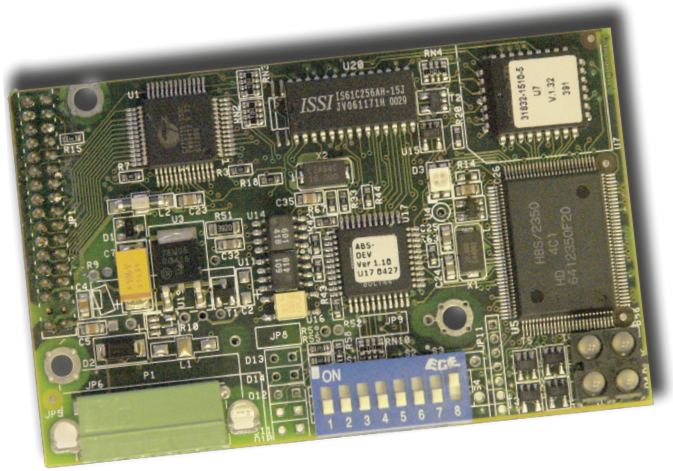
DeviceNet Drive Profile

MVW-01

Installation, Configuration and Operation Guide

Language: English



DEVICENET DRIVE PROFILE MVW-01 GUIDE

1 DEVICENET DRIVE PROFILE

It was developed with the purpose of making available in the product a DeviceNet communication interface with the following characteristics:

- Enabling the inverter parameter setting through the network and giving direct access to the parameters with messages sent by the master.
- Following the standard for the Device Profile for AC and DC Drives, specified by the ODVA (Open DeviceNet Vendor Association), which defines a common object set for drives that operate in DeviceNet network.

This guide gives a general overview about the DeviceNet operation, showing mainly the parameter setting and the inverter operation on this network. Detailed protocol description can be gotten from ODVA.

1.1 DEVICENET DRIVE PROFILE PARAMETER LIST

Parameter	Description	Adjustable Range	Factory Setting
P309	Fieldbus	0 to 10 10 = DeviceNet Drive Profile	0 = Inactive
P340	I/O Instances	0 = 20 / 70 1 = 21 / 71 2 = 100 / 101 3 = 102 / 103	0 = 20 / 70
P348	Write Parameter #1	0 to 999	370
P349	Write Parameter #2	0 to 999	371
P350	Write Parameter #3	0 to 999	372
P351	Write Parameter #4	0 to 999	0
P352	Read Parameter #1	0 to 999	373
P353	Read Parameter #2	0 to 999	374
P354	Read Parameter #3	0 to 999	375
P355	Read Parameter #4	0 to 999	0
P356	Write Parameter #5	0 to 999	0
P357	Write Parameter #6	0 to 999	0
P358	Write Parameter #7	0 to 999	0
P359	Write Parameter #8	0 to 999	0
P360	Write Parameter #9	0 to 999	0
P361	Read Parameter #5	0 to 999	0
P362	Read Parameter #6	0 to 999	0
P363	Read Parameter #7	0 to 999	0
P364	Read Parameter #8	0 to 999	0
P365	Read Parameter #9	0 to 999	0
P366	Number of IO words	1 to 9	2

1.2 INSTALLATION OF THE FIELDBUS KIT

For DeviceNet communication, a KFB-DD kit containing:
- DeviceNet Drive Profile communication board;
- Cable with connector for line connection;
- EDS network configuration file;
- DeviceNet Drive Profile guide.

For kit installation (when the kit is supplied separately), refer to the item 8.4.1 in the MVW-01 Frequency Inverter Manual – Installation of the Fieldbus kit, where you can find all installation procedures.

1.3 INTRODUCTION TO THE DEVICENET

The DeviceNet communication is used for industrial automation, mainly for the control of valves, sensors, input/output units and automation equipment. The DeviceNet communication link is base on a CAN communication protocol (Controller Area Network). figure 1.1 gives a general view of a DeviceNet.

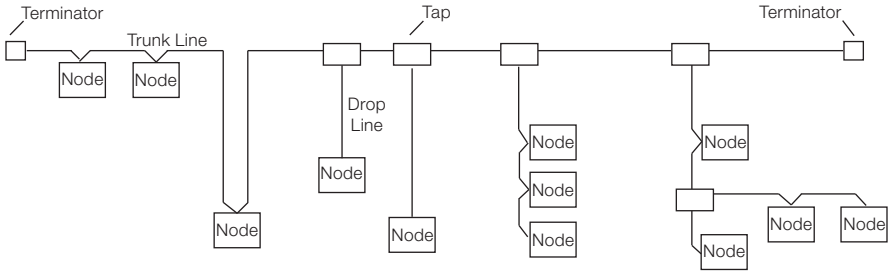
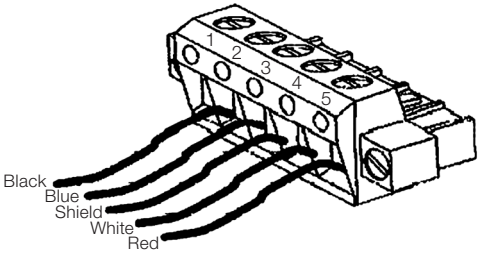


Figure 1.1: *DeviceNet Network*

1.3.1 Cable and Connector

The DeviceNet network uses a shielded twisted pair copper cable. One pair makes the 24 Vdc power supply to the different nodes and the other pair is used for the communication signal. An example of connector for the MVW-01, together with the wire color outline used for the connection, is presented in the figure 1.2:



1	Black	V-
2	Blue	CANL
3	Shield	SHIELD
4	White	CANH
5	Red	V+

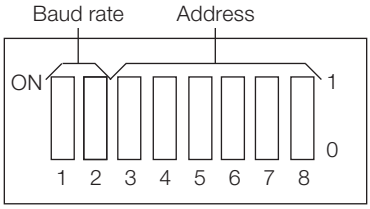
Figure 1.2: *Connector for the DeviceNet network*

1.3.2 Line Termination

To avoid signal reflection, the initial and the end points of the network must be terminated with the characteristic impedance. Thus a 120 ohms/0,5 W resistor must be connected between the pins 2 and 4 of the Fieldbus connector.

1.3.3 Baud rate and Node Address

There are three different baud rates for the DeviceNet: 125 k, 250 k or 500 kbits/s. Choose one of these baud rates by setting the DIP switch on the communication board. The node address is selected by means of the six DIP switches on the electronic board, permitting the addressing from 0 to 63.



Baud rate [bits/s]	DIPs 1 and 2
125 k	00
250 k	01
500 k	10
Reserved	11

Address	DIP3 to DIP8
0	000000
1	000001
2	000010
...	....
61	111101
62	111110
63	111111

Figure 1.3: *Address Configuration and Baud rate*

NOTE!
The Baud rate and the address of the inverter on the network are only updated when inverter is powered up.

1.3.4 Signaling LEDs

The communication board has four signaling LEDs with following functions for the network diagnostics:

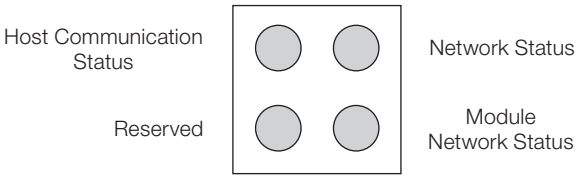


Figure 1.4: *LEDs for status indication of the Communication board*

Table 1.1: Signaling of the communication board status LEDs

LED	Color	Description
Host Communication Status	Green	Data transfer between board - inverter OK
	Red	Data transfer fault between board - inverter OK (permanent)
	Red flashing	Data transfer fault between board - inverter (temporary)
Network Status	Off	Without supply/off line
	Green	Link operating, connected
	Red	Critical fault at link
	Green flashing	On line not connected
	Red flashing	Time out of the connection
Module Network Status	Off	Without supply
	Red	Fault not correctable
	Green	Operational board
	Red flashing	Small fault

1.3.5 Configuration File (EDS File)

Each element of a DeviceNet network is associated to an EDS file which has all information about the element. This file is used by the configuration program during network configuration. Use the file with the extension .EDS supplied with the Fieldbus kit.

NOTE!
For this firmware version, together with the communication board you can program the master communication with two different connection types:
- Polled; or
- Change of State & Cyclic.

1.4 INVERTER PARAMETER SETTING

There is a set of parameters which enables and configures then inverter operation on the DeviceNet network. Before starting the network operation you must configure these parameters to ensure proper inverter operation.

- **P220... P228:** These parameters define the command source for the inverter in Local and Remote modes. For the commands you want to operate via network, you must program these parameters to "Fieldbus" option. For more detail about theses parameters, refer to the user manual.
- **P309:** When the Fieldbus kit is installed, the parameter P309 enables the operation via communication board. To operate the inverter via DeviceNet Drive Profile board, you must configure P309 = 10.
- **P313:** If the inverter is being controlled by the network master, but some communication fault is detected, the inverter will display E29 (refer to the item 1.7.1 for more details). In this case you can program the inverter to adopt some actions (such as, motor disabling). This action is controlled by the parameter P313.

- **P340*:** This parameter defines how the data in the I/O area of the network master will be available. There are four options: two options follow the Drive Profile model defined by the ODVA, and the other two are specific WEG options.
- **P348... P365*:** When you make the selection P340 = 3 (102 / 103), you can select, through the parameters P348 to P365, the parameters which should occupy the master I/O area. There is also another group of special parameters (P370 to P375), available only via Fieldbus, for controlling and monitoring the inverter status.
- **P366*:** When P340 = 3, this parameter defines the number of words (1 word = 2 bytes) mapped for the I/O area (each word corresponds to a parameter). The content of each word is selected through the Parameters P348 to P365. Up to 9 read parameters (input) and up to 9 write parameters (output) can be mapped.

***** The changes of these parameters will be accepted only when inverter is switched off/on. Please find below a detailed description of these parameters.

1.5 I/O DATA

The MVW-01 medium voltage frequency inverter together with communication board for the DeviceNet Drive Profile has four different data format to be mapped for the inverter I/O area (assembly instances). These instances are defined at P340. The first two options follow the Drive Profile model defined by the ODVA, and the other two are specific WEG options.

Instances (P340)	Number of Input / Output words	Data of the Output are	Data of the Input area	Drive Profile
20 / 70	2	word 1 = control word 2 = speed reference	word 1 = status word 2 = current speed	ODVA
21 / 71	2	word 1 = control word 2 = speed reference	word 1 = status word 2 = current speed	ODVA
100 / 101	2	word 1 = control (WEG) word 2 = speed reference (WEG)	word 1 = status (WEG) word 2 = current speed (WEG)	WEG
102 / 103	1 ... 9 Defined by the Parameter P366	Defined by the Parameters P348, P349, P350, P351, P356, P357, P358, P359, P360	Defined by the Parameters P352, P353, P354, P355, P361, P362, P363, P364, P365	WEG

1.5.1 Data Content for Instances 20 / 70

When P340 = 0 (20 / 70), the inverter makes available automatically two write words (output) and two read words (input) for the I/O area with the content described in the following itens.

1.5.1.1 Write Words (instance 20)

Word 1 = Control word

Control word formed by 16 bits, and each bit having following function:

Bit Number	Bit = 0	Bit = 1
0	Stop	Run
1	Reserved	
2	Not used	Error reset
3 ... 15	Reserved	

- **Bit 0: Run**

  Bit 0 = 0: sends the ramp stop command via ramp to the inverter.
  Bit 0 = 1: sends the ramp enable command to the inverter (motor run).
  Note: this command will be only active when the inverter has been programmed for the command via Fieldbus (see parameters P224 and P227).

- **Bit 2: Error Reset**

  Bit 2 = 0: errors will not be reset.
  Bit 2 = 1: sends the reset command to the inverter.

Word 2 = Speed reference

Refer to the item 1.5.2.3 – Speed Reference for Instances 20 and 21.

1.5.1.2 Read Words (instance 70)

Word 1 = Status word

Status word formed by 16 bits, and each bit having following function:

Nº do Bit	Bit = 0	Bit = 1
0	No fault	With fault
1	Reserved	
2	Stopped	Running
3 ... 15	Reserved	

- **Bit 0: Error**

  Bit 0 = 0: inverter is not in error status.
  Bit 0 = 1: inverter has some activated error.

- **Bit 2: Running**

  Bit 2 = 0: inverter is stopped.
  Bit 2 = 1: inverter is driving the motor.

Word 2 = Motor Speed

Refer to the item 1.5.2.4 – Motor Speed for Instances 70 and 71.

1.5.2 Data Content for Instances 21 / 71

When P340 = 1 (21 / 71), the inverter makes available automatically for the I/O area two write words (output) and two read words (input), with following content:

1.5.2.1 Write Words (instance 21)

Word 1 = Control word
Control word, formed by 16 bits, where each bit has following function:

Bit Number	Bit = 0	Bit = 1
0	Stop	Run CW
1	Stop	Run CWW
2	Not used	Error Reset
3	Reserved	
4	Reserved	
5	Local Control	Control via network
6	Local Reference	Reference via network
7 ... 15	Reserved	

- **Bit 0: Run CW (clockwise)**
  Bit 0 = 0: it sends a ramp stop command to the inverter. At the end of the stop by ramp, inverter is general disabled.
  Bit 0 = 1: it sends a general enable command and a CW ramp acceleration command.
  Note: this command will be only active when inverter has been programmed for command via Fieldbus (refer to the parameters P224 and P227). At the end of the stop by ramp, the inverter is general disabled.

- **Bit 1: Run CCW (counterclockwise)**
  Bit 1 = 0: it sends a ramp stop command to the inverter. At the end of the stop by ramp, inverter is general disabled.
  Bit 1 = 1: it sends a general enable command and a CCW ramp acceleration command.
  Note: this command will be only active when inverter has been programmed for command via Fieldbus (refer to the parameters P224 and P227).

- **Bit 2: Error Reset**
  Bit 2 = 0: error reset is not executed.
  Bit 2 = 1: it sends a reset command to the inverter.
  Note: after the error reset, the inverter losses the control and the reference via network (bits 5 and 6). In this case you must reset these bits to be able to write again the desired values.

- **Bit 5: Control via network**
  Bit 5 = 0: it sends a command to the inverter to be controlled locally.
  Bit 5 = 1: it sends a command to the inverter to be controlled remotely.
  Note: this command acts directly on the local/remote operation mode.
  To validate this command you must enable the local/remote command via Fieldbus (P220 = 7 or 8), and also configure the commands of the remote mode to Fieldbus (P226, P227 and P228).

- **Bit 6: Reference via network**
  Bit 6 = 0: it send a command to the inverter to use the local reference.
  Bit 6 = 1: it sends a command to the inverter for using the received reference via network.
  Note: This command changes the values programmed in the parameters P221 e P222. When the reference is via network, both P221 and P222 are programmed to 10 (Fieldbus). When the reference is via local mode, the inverter restores the firstly programmed values and which have been saved during the inverter start-up.

Word 2 = Speed Reference
Refer to the item 1.5.2.3 – Speed Reference for Instances 20 and 21.

1.5.2.2 Read Words (instance 71)

Word 1 = Status word
The Status Word is formed by 16 bits and each bit has following function:

Bit Number	Bit = 0	Bit = 1
0	No error	With error
1	Not used	Warning
2	Stopped	Running CW
3	Stopped	Running CCW
4	Not used	Ready
5	Local Control	Control via network
6	Local reference	Reference via network
7	Reference not reached	Running at reference value
8 ... 15	Inverter Status	

- **Bit 0: Error**
  Bit 0 = 0: inverter is not in error status.
  Bit 0 = 1: inverter has some acting error.

- **Bit 1: Warning**
  The MVW-01 no has warning message.

- **Bit 2: Running CW (clockwise)**
  Bit 2 = 0: inverter is stopped.
  Bit 2 = 1: inverter is running clockwise.

- **Bit 3: Running CCW (counterclockwise)**
  Bit 3 = 0: inverter is stopped.
  Bit 3 = 1: inverter is running counterclockwise.

- **Bit 4: Ready**
  Bit 4 = 0: inverter is initializing or is in error status.
  Bit 4 = 1: inverter is initializing without fault.

- **Bit 5: Control via network**
  Bit 5 = 0: inverter is in local mode.
  Bit 5 = 1: inverter is in remote mode.
  Note: program P220, P226, P227 and P228 to Fieldbus for ensuring that this bit really shows that the control is being made via Fieldbus.

- **Bit 6: Reference via network**
  Bit 6 = 0: inverter is not using the reference received via network.
  Bit 6 = 1: inverter is using the reference received via network.

- **Bit 7: Running at reference value**
  Bit 7 = 0: inverter is not driving the motor at the indicated reference value.
  Bit 7 = 1: inverter is driving the motor at the indicated reference value.
  Note: inverter considers an error when synchronous motor speed deviates by more than 0.5 % from the reference value.

Inverter status: byte which can assume following values:

Byte value	Meaning	Note
0	Specific from Manufact	Not used
1	Initializing	
2	Not ready	
3	Ready	
4	Enabled	
5	Stopping	It detects only when the command is given via Fieldbus
6	Stopping due to error	Inverter does not have this status
7	With error	

Word 2 = Motor speed
See item 1.5.2.4 – Motor Speed for Instances 70 and 71.

1.5.2.3 Speed Reference for Instances 20 and 21

In the instances 20 and 21 (output), the speed reference is received by the inverter as a whole number with signal (as complement of 2). Each unit represents 1 rpm. The negative values are interpreted by the inverter as reference to run the motor CCW. Thus we will have two examples:

1200 = $04B0_{hex}$ = reference of 1200 rpm with CW direction of rotation
-1200 = $FB50_{hex}$ = reference of 1200 rpm with CCW direction of rotation

NOTE!
- The reference value will be used only by the inverter when it is programmed for receiving the reference via Fieldbus (refer to the parameter P221 and P222).
- Negative values will only change the direction of rotation when the inverter is programmed to be commanded via Fieldbus (refer to the parameters P223 e P226).
- It is required that the sent values are within the min. and max. adjustable range allowed for the references that are programmed at the parameters P133 and P134. Otherwise inverter will not consider the received value.
- To ensure that the rpm reference corresponds to the motor reference, you must set the speed scale value at P208.
- When a negative reference value is sent jointly with a CCW run command, the inverter will run the motor in CW direction of rotation.

1.5.2.4 Motor Speed for Instances 70 and 71

The effective motor speed in transmitted by the inverter as a whole number with signal (as complement of 2). Each unit represents 1 rpm. Positive values mean that the motor is running in CW direction of rotation and negative values mean that the motor is running in CCW direction of rotation. For example:

1800 = 0708_{hex} = motor is running at 1800 rpm at CW direction of rotation
-1800 = $F8F8_{hex}$ = motor is running at 1800 rpm at CCW direction of rotation

NOTE!
To ensure that the speed in rpm corresponds exactly to the motor speed, you must set the speed scale value at P208.

1.5.3 Data Content for Instances 100 / 101

When P340 = 2 (100 / 101) has been programmed, the inverter will operate in a specific WEG mode. Two write words (output) and two read words (input) with following content will be available at the I/O area:

1.5.3.1 Write Words (instance 100)

Word 1 = WEG Logic Command
It is the Logic command word through which are sent the commands to the inverter via network.
For knowing the structure of this word, refer to the item 1.5.4.3.1 - P370: WEG Logic Command.

Word 2 = Speed reference
The word through which are sent the speed reference to the inverter via Fieldbus.
For knowing the structure of this word, refer to the Item 1.5.4.3.2 - P371: Speed Reference.

1.5.3.2 Read Words (instance 101)

Word 1 = WEG Logic Status
It is the logic status word through which the inverter shows the network status. For more details about the structure of this word, refer to the item 1.5.4.3.4 - P373: WEG Logic Status.

Word 2 = Motor Speed
This word contains the current motor speed. . For more details about the structure of this word, refer to the item 1.5.4.3.5 - P374: Motor Speed.

1.5.4 Data Content for Instances 102 / 103

The number of words and the data content in the I/O area for the instances 102 (output) and 103 (input) can be configured by the user through the parameters 348 to 366.

1.5.4.1 Selection of the Number of Words for the I/O area

For the instances 102 / 103, you can select the number of I/O words at P366. Each word represents one parameter and the parameters that are available at the I/O area are selected at P348 to P365. You can map 1 up to 9 parameters. The number of read parameters (input) will be always equal to the number of the write parameters (output).

1.5.4.2 Parameter Selection for the I/O area

Once selected the number of words which should be mapped for the I/O, you must select the information that these words represent. For this you must configure the parameters P348 to P365. Here you can configure 9 parameters for the read area and 9 parameters for the write area.

For instance, if you want to achieve information about the current (P003) and the torque (P009), and to write information about the acceleration ramp (P100) and the deceleration ramp (P101), you must to program the inverter as follows:

P366 = 2: indicating that 2 read parameters and 2 write parameters will be mapped.
P348 = 100: indicating that the first write word will be the content for P100.
P349 = 101: indicating the second write word will be the content for P101.
P352 = 3: indicating that the first read word represents the content of P003.
P353 = 9: indicating that the second read word represents the content of P009.

As only two read words and two write words are used, the other parameters used for mapping the remaining words will not be considered.

The content of each parameter is transmitted as being one word and for interpreting the sent and received values correctly, you must consider the decimal places used in the parameters. For example, for an acceleration time (P100) of 5,0 seconds, as we have a decimal place for resolution, the effective value to be transmitted in the word is 50 (0032_{hex}). For the parameter list existing in the inverter, refer to the MVW-01 user manual.

NOTE!

- Almost all inverter parameters described in this manual are available for mapping the I/O area, excepting the parameters P000, P001, P215 and P408.
- The parameters mapped for read word are updated constantly by the network, but they are not stored in the EEPROM memory In the case of an inverter reset, the values are restored to the previous values.

1.5.4.3 Specific Parameters for the I/O area

In addition to the inverter parameters described in the Parameter List of the user manual, there are other parameters that can be accessed only through the I/O area. The parameters have been created in order to enable which inverter commands and status may be accessed. These parameters can not be viewed in the inverter HMI, but they can be indicated in the parameters P348 to P365, and accessed through the I/O areas. These parameters are:

1.5.4.3.1 P370: WEG Logic Command

This is a read/write parameter that can be accessed only via Fieldbus. Through this parameter are sent commands to the inverter via network. This parameter is formed by16 bits and each bit has following function:

Bit Number	Bit = 0	Bit = 1
0	Disables ramp	Enables ramp
1	General Disable	General enable
2	Counterclockwise direction of rotation	Clockwise direction of rotation
3	Disable JOG	Enable JOG
4	Local	Remote
5	Reserved	
6	Reserved	
7	Reset is not executed	Error reset is executed
8	Command inactive	Ramp enable mask
9	Command inactive	General enable mask
10	Command inactive	Direction of rotation mask
11	Command inactive	JOG command mask
12	Command inactive	Local/remote command mask
13	Reserved	
14	Reserved	
15	Command inactive	Reset command mask

The logic command is divided in 8 high order bits which are responsible for enabling each command sent in the 8 low order bits. If the mask (in the high order bits) is enabled, the inverter will execute the command indicated in the corresponding low order bit. If the mask is enabled, the inverter will disregard the value sent in the corresponding low order bit.

For controlling the functions of the Logic Command, you must set the respective inverter parameters with the "Fieldbus" option:
- Local/remote selection - P220;
- Direction of rotation - P223 and/or P226;
- General enable, Run/Stop - P224 and/or P227;
- Jog selection - P225 and/or P228.

1.5.4.3.2 P371: Speed Reference

Read/write parameter through which is sent via network the speed reference value to the inverter. This variable é represented by a 13 bit resolution. Thus a reference value equal to 8191 ($1FFF_{hex}$) corresponds to the synchronous motor speed (which is 1800 rpm for an IV-pole motor and a 60 Hz line). It is possible to sent higher values than the synchronous speed (values higher than 13 bits), provided the value sent to the inverter, converted to rpm, is within the reference range programmed in the inverter (P133 and P134).

The reference value is always positive. For inverting the direction of rotation, use the 2 and 10 of the Logic Command. To ensure that the reference value is accepted by the inverter, you must program the parameter P221 and/or P222 to the “Fieldbus" option.

1.5.4.3.3 P372: Command for the Digital Output

Read/write parameter for driving the digital outputs of the inverter via network. A 16 bits word divided into 8 high order bits and 8 low order bits with the following structure:

Bit Number	Bit = 0	Bit = 1
0	DO1 Output inactive	DO1 Output active
1	DO2 Output inactive	DO1 Output active
2	RL1 Output inactive	RL1 Output active
3	RL2 Output inactive	RL2 Output active
4	RL3 Output inactive	RL3 Output active
5	RL4 Output inactive	RL4 Output active
6	RL5 Output inactive	RL5 Output active
7	Reserved	
8	Command inactive	DO1 Command Mask
9	Command inactive	DO2 Command Mask
10	Command inactive	RL1 Command Mask
11	Command inactive	RL2 Command Mask
12	Command inactive	RL3 Command Mask
13	Command inactive	RL4 Command Mask
14	Command inactive	RL5 Command Mask
15	Reserved	

As for the logic commands, also the driving of the digital outputs is divided in masks (high order bits) and output values (low order bits). The output value will be updated only when the corresponding mask in the high order bits is active, otherwise the value will be disregarded.

To drive the output via network you must program the parameters relating to these outputs (P275 ... P280) to the "Fieldbus" option.

1.5.4.3.4 P373: WEG Logic Status

Read parameter where is indicated the inverter status, and which can be accessed only via Fieldbus. This parameter is formed by 16 bits, divided into 8 low order bits, indicating the error code, and 8 high order bits, indicating the inverter status:

Bit Number	Bit = 0	Bit = 1
0 ... 7	Error Code	
8	Ramp disabled	Ramp enabled
9	General Disable	General Enable
10	CWW direction of rotation	CW direction of rotation
11	JOG disabled	JOG enabled
12	Local	Remote
13	No undervoltage	With undervoltage
14	PID regulator- Manual	PID regulator- Automatic
15	No error	With error

When the bit 15 of the logic status is active (indicating inverter error), the eight low order bits of the logic status will indicate the error code, which can be a Hardware error (refer to the item 7.1 in the user manual - Errors and Possible Causes), or a Software error (refer to the item 1.5.4.4 – Software Error).

1.5.4.3.5 P374: Motor Speed

Read parameter, through which the inverter allows reading the motor speed. This variable is shown by using a 13 bits resolution + signal (as complement of 2) Thus the rated value will be equal to 8191 ($1FFF_{hex}$) (CW direction of rotation) or
-8191 ($E001_{hex}$) (CCW direction of rotation), when the motor is running at synchronous speed (or basic speed, for example 1800 rpm for IV-pole motor – 60 Hz). The value of the 13 bits is used only as base for the representation, speed values higher than 13 bits can also be indicated.

1.5.4.3.6 P375: Status of the digital inputs

Read parameter that allows monitoring of the inverter digital inputs via network. A 16 bits word which has exactly the same structure as the parameter P012. Each bit has following meaning:

Bit Number	Bit = 0	Bit = 1
0	Input DI8 inactive	Input DI8 active
1	Input DI7 inactive	Input DI7 active
2	Input DI6 inactive	Input DI6 active
3	Input DI5 inactive	Input DI5 active
4	Input DI4 inactive	Input DI4 active
5	Input DI3 inactive	Input DI3 active
6	Input DI2 inactive	Input DI2 active
7	Input DI1 inactive	Input DI1 active
8 ... 15	Reserved	

1.5.4.4 Software Error

When the inverter receives any undue command via network, it indicates some specific errors to the master, informing which the cause of this error is. These indications will be made only in the logic status word (refer to the item 1.5.4.3.4 - P373: WEG Logic Status), however these indications are not displayed on the inverter HMI. Following fault messages are displayed:

A124 - Parameter changing permitted only with disabled inverter.
- Parameter setting error.

A125 - caused by:
- Reading of no-existing parameter, or
- Writing of non-existing parameter.

A126 - The desired content value is out of range.

A127 - caused by:
- The function selected in the Logic Command is not enabled for Fieldbus, or
- Digital Output Command is not enabled for Fieldbus, or
- writing in Read-Only Parameter.

1.6 VARIABLES SCAN TIME

The variables scan time through DeviceNet network can be divided into two parts:
- Data sending and data receiving time via network: this time depends on several factors related to the application. Among these factors are the baud rate of the DeviceNet network, the number of elements in the network and the number of data transferred with each element.

- Time for updating the received data: for the data updating time, the inverter access and updates at every 20 ms the information on the communication board. The data mapped at the I/O area are updated according to this scan time that must be included in the total calculation time for updating these variables.

1.7 COMMUNICATION ERROR

Two errors can occur during the communication of the inverter with the network: E29 or E30.

1.7.1 E29: Fieldbus Communication is Inactive

The fault message E29 indicates that there is some communication problem between the network master and the communication board. The main causes for these errors are:

- Problems with the communication cable: the connection cable between the network master and slave can be interrupted, some point may have contact problem, or the cable connection may be wrong.
- Network without power supply: the DeviceNet network has a twisted pair cable that supplies 24 Vdc to the slaves and this power supply must be On.
- Master configuration problems: the network master must be ON and configured correctly for the inverter communication.
- The number of I/O word is not correct: the master must be configured for the communication with the inverter and the number of the master I/O words must be according to the inverter programming. For more details about the number of words used for the communication, refer to item 1.5 – Data Content.
- Master in IDLE status: one of the conditions for indicating the E29 fault is when the network master enters in the IDLE status. In this case, in spite the communication board remains indicating that it is on-line, the fault message will be indicated.

1.7.2 E30: Fieldbus Board Inactive

The fault Message E30 indicates that there s some problem in the data transfer between the communication board and the inverter control board. This error will be indicated mainly during the inverter start-up. However, if after the start-up an interval longer that 1 second is detected without data exchange between the board and the inverter (which is executed cyclically, independent of the communication with the master) this error will also be indicated. The main causes for this error are:

- Inverter configuration problem: P309 must be configured correctly for the desired Fieldbus option. For DeviceNet Drive Profile, you must program P309 = 10.
- Board position problem: If the communication board is not connected or it has grounding connection problems (bad contact, bent pin), the inverter can display this error.

NOTE!

- When the error E29 or E30 is detected and the inverter is controlled by the Fieldbus network, the action that has been programmed at P313 will be executed - Type of disabling by E29/E30.
- For executing the self-tuning procedure for the vector mode, the communication must be disabled, otherwise problems can occur during the communication.

1.8 OBJECT CLASSES FOR THE DEVICENET NETWORK

One DeviceNet network node has several attributes which are grouped into instances and classes, through which you can access many information about the equipment. Find below the list of classes and attributes that can be accessed via network for the MVW-01 with the DeviceNet Drive Profile communication board.

1.8.1 Identity Object, Class 01_{hex}

Attributes of the Instance 1

Attribute	Access	Name	Description	Standard	Type
1	Get	Vendor ID	Vendor identification - WEG	853	UINT16
2	Get	Device Type	AC/DC Motor	2	UINT16
3	Get	Product Code	Code assigned by the vendor	1	UINT16
4	Get	Revision	Revision of the communication card	101	Struct of UINT8 UINT8
5	Get	Status			UINT16
6	Get	Serial Number	Serial number of the device		UINT32
7	Get	Product Name		MVW-01	SHORT_STRING
9	Get	Configuration Consist. Value	Contents identify configuration of device		UINT6

1.8.2 Message Router Object, Class 02_{hex}

Class Attributes

Attribute	Access	Name	Description	Standard	Type
1	Get	Revision			Array of UINT8

1.8.3 DeviceNet Object, Class 03_{hex}

Attributes of the Instance 1

Attribute	Access	Name	Description	Standard	Type
1	Get	MAC ID	Node address		UINT8
2	Get	Baud Rate	Baud Rate of the device		UINT8
5	Get	Allocation Information	Allocation Choice Master's Mac ID		Struct of UINT8 UINT8

1.8.4 Assembly Object, Class 04_{hex}

Supported Instances

Instance	Type	Name
20	Output	Basic Speed Control Output
70	Input	Basic Speed Control Input
21	Output	Extended Speed Control Output
71	Input	Extended Speed Control Input
100	Output	WEG Basic Speed Control Output
101	Input	WEG Basic Speed Control Input
102	Output	User Specific Output
103	Input	User Specific Input

1.8.5 DeviceNet Connection Object, Class 05_{hex}

Attributes of the Instance 1: Explicit Connection Instance

Attribute	Access	Name	Description	Standard	Type
1	Get	State	State of the object	1	UINT8
2	Get	Instance Type	Indicates either I/O or Messages Connection	0	UINT8
3	Get	Transport Class Trigger	Defines behavior of the Connection	83_{hex}	UINT8
4	Get	Produced Connection ID	Placed in CAN Identifier Field when the Connection transmits		UINT16
5	Get	Consumed Connection ID	CAN Identifier Field value that denotes message to be received		UINT16
6	Get	Initial Communication Characteristics	Defines the message group(s) across which productions and consumptions associated with this Connection occur		UINT8
7	Get	Produced Connection size	Maximum number of bytes transmitted across this Connection	512	UINT16
8	Get	Consumed Connection size	Maximum number of bytes received across this Connection	512	UINT16
9	Get/ Set	Expected Package Rate	Defines timing associated with this Connection		UINT16
12	Get/ Set	Watchdog timeout action	Defines how to handle Inactivity/ Watchdog timeout		UINT8
13	Get	Produced Connection Path Length	Number of Bytes in the produced connection path attribute	256	UINT16
14	Get	Produced Connection Path	Specifies the Application Object(s) whose data is to be produced by these Connection Objects		Array of UINT8
15	Get	Consumed Connection Path Length	Number of bytes in the consumed connection path attribute	256	UINT16
16	Get	Consumed Connection Path	Specifies the Application object(s) that are to receive the data consumed by this Connection object		Array of UINT8
17	Get	Production Inhibit Time	Defines minimum time between new data production.	0	UINT16

Attributes of the Instance 2: Polled I/O Connection Instance

Attribute	Access	Name	Description	Standard	Type
1	Get	State	State of the object	1	UINT8
2	Get	Instance Type	Indicates either I/O or Messages Connection	0	UINT8
3	Get	Transport Class Trigger	Defines behavior of the Connection		UINT8
4	Get	Produced Connection ID	Placed in CAN Identifier Field when the Connection transmits		UINT16
5	Get	Consumed Connection ID	CAN Identifier Field value that denotes message to be received		UINT16
6	Get	Initial Communication Characteristics	Defines the message group(s) across which productions and consumptions associated with this Connection occur		UINT8
7	Get	Produced Connection size	Maximum number of bytes transmitted across this Connection		UINT16
8	Get	Consumed Connection size	Maximum number of bytes received across this Connection		UINT16
9	Get/ Set	Expected Package Rate	Defines timing associated with this Connection		UINT16
12	Get	Watchdog timeout action	Defines how to handle Inactivity/ Watchdog timeout		UINT8
13	Get	Produced Connection Path Length	Number of Bytes in the produced connection path attribute	3	UINT16
14	Get	Produced Connection Path	Specifies the Application Object(s) whose data is to be produced by these Connection Objects		Array of UINT8
15	Get	Consumed Connection Path Length	Number of bytes in the consumed connection path attribute	3	UINT16
16	Get	Consumed Connection Path	Specifies the Application object(s) that are to receive the data consumed by this Connection object		Array of UINT8
17	Get	Production Inhibit Time	Defines minimum time between new data production. This attribute is required for I/O Client connection	0	UINT16

Attributes of the Instance 2: Change of state/Cyclic Connection Instance

Attribute	Access	Name	Description	Standard	Type
1	Get	State	State of the object	1	UINT8
2	Get	Instance Type	Indicates either I/O or Messages Connection	1	UINT8
3	Get	Transport Class Trigger	Defines behavior of the Connection		UINT8
4	Get	Produced Connection ID	Placed in CAN Identifier Field when the Connection transmits		UINT16
5	Get	Consumed Connection ID	CAN Identifier Field value that denotes message to be received		UINT16
6	Get	Initial Communication Characteristics	Defines the message group(s) across which productions and consumptions associated with this Connection occur		UINT8
7	Get	Produced Connection size	Maximum number of bytes transmitted across this Connection	0	UINT16
8	Get	Consumed Connection size	Maximum number of bytes received across this Connection	0	UINT16
9	Get/ Set	Expected Package Rate	Defines timing associated with this Connection	0	UINT16
12	Get	Watchdog timeout action	Defines how to handle Inactivity/ Watchdog timeout		UINT8
13	Get	Produced Connection Path Length	Number of Bytes in the produced connection path attribute	3	UINT16
14	Get	Produced Connection Path	Specifies the Application Object(s) whose data is to be produced by these Connection Objects		Array of UINT8
15	Get	Consumed Connection Path Length	Number of bytes in the consumed connection path attribute	5	UINT16
16	Get	Consumed Connection Path	Specifies the Application object(s) that are to receive the data consumed by this Connection object		Array of UINT8
17	Get	Production Inhibit Time	Defines minimum time between new data production. This attribute is required for I/O Client connection	0	UINT16

1.8.6 Acknowledge Handler Object, Class $2B_{hex}$

Attributes of the Instance 1

Attribute	Access	Name	Description	Standard	Type
1	Get/ Set	Acknowledge Timer	Time to wait for acknowledge before resending	16	UINT16
2	Get/ Set	Retry Limit	Number of Ack Timeouts to wait before informing the producing application of a Retry_Limit_ Reached event	1	UINT8
3	Get	COS Producing Connection Instance	Connection Instance which contains the path of the producing I/O application object a which will be notified of Ack Handler events		UINT16

1.8.7 Motor Data Object, Class 28_{hex}

Attributes of the Instance 1

Attribute	Access	Name	Description	Standard	Type
3	Get/ Set	MotorType	0 = Non Standard Motor 1 = PM DC Motor 2 = FC DC Motor 3 = PM Synchronous Motor 4 = FC Synchronous Motor 5 = Switched Reluctance Motor 6 = Wound Rotor Induction Motor 7 = Squirrel Cage Induction Motor 8 = Stepper Motor 9 = Sinusoidal PM BL Motor 10 = Trapezoidal PM BL Motor	7	UINT8
6	Get/ Set	Rated Current	Rates Stator Current from Motor nameplate		UINT16
7	Get/ Set	Rated Voltage	Rated Base Voltage from Motor nameplate		UINT16
9	Get/ Set	Rated Frequency	Rated Electrical Frequency		UINT16
15	Get/ Set	Base Speed	Nominal speed at rated frequency from Motor nameplate		UINT16

1.8.8 Control Supervisor Object, Class 29_{hex}

Attributes of the Instance 1

Attribute	Access	Name	Description	Standard	Type
3	Get/Set	Run 1	Run forward		BOOL
4	Get/Set	Run 2	Run reverse		BOOL
5	Get/Set	NetCtrl	0 = Local Control 1 = Control from Network		BOOL
6	Get	State	0 = Vendor Specific 1 = Startup 2 = Not ready 3 = Ready 4 = Enabled 5 = Stopping 6 = Fault Stop 7 = Fault		UINT8
7	Get	Running 1	Running forward		BOOL
8	Get	Running 2	Running reverse		BOOL
9	Get	Ready	0 = Other State 1 = Ready or Enabled or Stopping		BOOL
10	Get	Fault	0 = No Faults Present 1 = Fault Occurred		BOOL
12	Get/Set	Fault Reset	0 = No Action 0 → 1 = Reset Fault		BOOL
13	Get	Fault Code	If fault is active, this attribute indicates the code for the fault. If fault is not active, it indicates the last error code.		UINT16
15	Get	Crt From Net	0 = Control is local 1 = Control is from Network		BOOL

1.8.9 AC/DC Drive Object, Class $2A_{hex}$

Attributes of the Instance 1

Attribute	Access	Name	Description	Standard	Type
3	Get	At Reference	Frequency arrival		BOOL
4	Get/Set	Net Ref	0 = Set reference not DN Control 1 = Set Reference at DN Control		BOOL
6	Get/Set	Drive Mode	0 = Vendor specific mode 1 = Open loop speed (Frequency) 2 = Closed loop speed control 3 = Torque control 4 = Process control (e.g. PI) 5 = Position control	1	UINT8
7	Get	Speed Actual	Actual drive speed		SINT16
8	Get/Set	Speed Ref	Speed Reference		SINT16
9	Get	Current Actual	Actual current		UINT16
15	Get	Power actual	Actual power		UINT16
16	Get	Input voltage	Input voltage		UINT16
17	Get	Output voltage	Output voltage		UINT16
18	Get/Set	Acceleration time	Acceleration time		UINT16
19	Get/Set	Deceleration time	Deceleration time		UINT16
22	Get/Set	Speed Scale	Speed scaling factor		UINT8
23	Get/Set	Current Scale	Current scaling factor		UINT8
26	Get/Set	Power Scale	Power scaling factor		UINT8
27	Get/Set	Voltage Scale	Voltage scaling factor		UINT8
28	Get/Set	Time Scale	Time scaling factor		UINT8
29	Get	Ref from Net	0 = Local speed reference 1 = DeviceNet speed reference		BOOL

1.8.10 Vendor Specific Object, Class 90_{hex}

In this class are available practically the whole MVW-01 parameter list. This class is divided into several instances, and in each instance you can access a group of parameters as shown in table below:

Parameters	Instance Number
P002 ... P099	Instance 1
P100 ... P199	Instance 2
P200 ... P299	Instance 3
P300 ... P399	Instance 4
P400 ... P499	Instance 5
P500 ... P599	Instance 6

You can access each inverter parameter though the instance attributes.

Parameter Number	Number of the corresponding attribute	Instance Number to which the attribute belongs
P002	102	Instância 1
P003	103	Instância 1
...	...	...
P100	100	Instância 2
P101	101	Instância 2
P102	102	Instância 2
...	...	...
P535	135	Instância 6
P536	136	Instância 6

The read or write access depends on the accessed parameter number. These attributes are mapped in the configuration EDS file supplied with this communication board. Through this file you can inform to the configuration software the addresses for the parameter access and thus execute the inverter parameter setting.

NOTE!
Remember that the parameters P000, P001, P215 and P408 are not available for the access via network.

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