

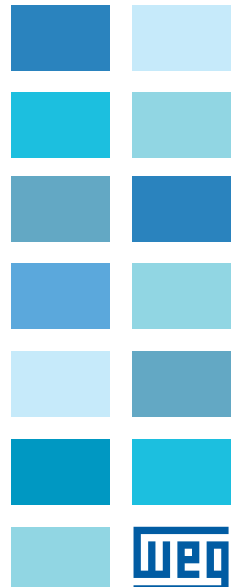
Graphic HMI Interface

MVV-01 V1.7X

Installation, Operation and Configuration Guide

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1 INTRODUCTION

The Graphic HMI Interface (HMI - Human Machine Interface) provides a series of new resources to the medium voltage frequency inverter MVW-01. They are:

- Visualization: text and graphic visualization modes.
- Monitoring: up to 6 parameters can be monitored simultaneously on the screen.
- Navigation: navigation system via menus, with the addition of scroll bars and new keys.
- On-line help function: help in the own HMI (only for parameters at the software version 1.7).
- Editing: new keys to speed up the parameter edition.

The Graphic HMI design, improvements and new functions present an operation, navigation and programming similar to the HMI used with the CFW-11 line, making its use even easier to those familiar with that WEG product line (refer to the figure 1.1).



Figure 1.1: MVW-01 inverter Graphic HMI

1.1 INSTALLATION OF THE GRAPHIC HMI IN THE CABINET

The installation of the HMI in the cabinet is done without the need of using the frame, and the fastening is done directly through the screws placed on the movable fins positioned at the HMI back cover, according to the figure 1.2.

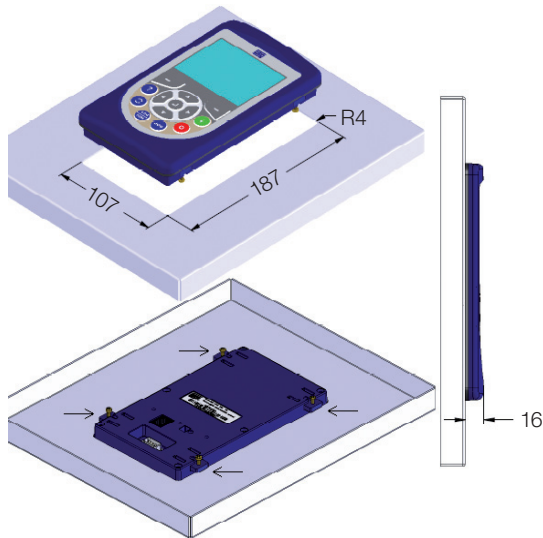


Figure 1.2: Size of the panel cut-out for fixing the Graphic HMI

The connection of the Graphic HMI to the MVC2 board is done with the same cable used for the conventional HMI, and the connection point on the MVC2 board is also the XC8 connector.



NOTE!

No additional hardware configuration has to be done on the MVC2 board, because it recognizes the type of connected HMI automatically.



ATTENTION!

The MVC2 board software version must be 1.7X or newer, so that the Graphic HMI be able to operate.



NOTE!

The MVC2 board and the Graphic HMI software versions must be compatible. For instance, if the Graphic HMI software is 1.7X and the MVC2 board version is 1.8X or newer, the HMI will not work properly and a warning of incompatible software version will occur.



ATTENTION!

It is not recommended to connect the Graphic HMI to the MVC2 board with power applied to the control rack.

2 STARTING THE USE OF THE GRAPHIC HMI

The communication between the Graphic HMI and the inverter is established with the Modbus RTU protocol (38400 bps, no parity, with 2 stop bits), using as the physical layer the RS485 channel. The Graphic HMI works as the communication master.

When the panel is powered up the Graphic HMI does an initialization of the MVC2 parameters with the MVC2 board. During this process the software versions of the Graphic HMI and of the MVW-01 control boards are presented. The information of the parameters being transferred and a progress bar are also exhibited during the initialization process (refer to the figure 2.1).

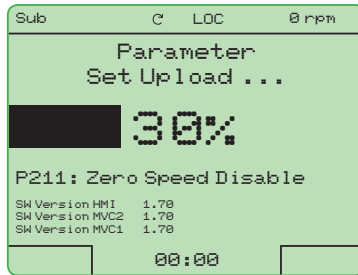


Figure 2.1: Graphic HMI initialization



NOTE!

In order to be able to start using the Graphic HMI (navigation and parameter edition) it is only necessary that the initialization be successfully concluded and no additional programming is necessary.



NOTE!

In order that the MVC2 board responds properly to the commands sent by the Graphic HMI (Start/Stop, Speed Direction, JOG, etc.), it is necessary to program the commands of the LOC or REM modes for serial (refer to the section 4.2).



NOTE!

The values of the parameters remain stored in the MVC2 board. If a communication problem occurs and the initialization is not successfully concluded, the Graphic HMI notifies an initialization failure and releases the keypad use, however, any modification in the parameter programming becomes useless because data will not be sent to the MVC2 board.

**NOTE!**

If the Graphic HMI is disconnected while the panel is with power, when reconnecting it a new initialization procedure occurs.

2.1 GRAPHIC HMI BASIC VISUALIZATION MODES

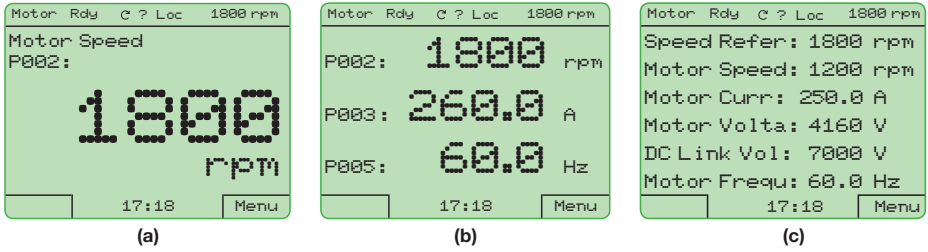
In any HMI use situation (visualization mode or active screen) there are standard indications that always will be presented (refer to the figure 1.1):

- Header:
 - Inverter Status
 - Speed Direction
 - Help Availability
 - Local or Remote Mode
 - Motor Speed (rpm)
- Footer:
 - Time
 - Function of the 2 Softkeys

The various modes or visualization screens of the Graphic HMI can be classified into 6 distinct basic types:

- Read-only parameters:
 - 1 parameter
 - 2 or 3 parameters
 - 4 to 6 parameters
- Navigation:
 - Parameter Groups
 - Parameters
 - Error Log
- Parameter edition:
 - Numerical Parameters
 - Alphanumerical Parameters
- Indication of occurred fault, alarm or notification.
- Help Function (only for parameters in this software version).
- Graphic functions:
 - Watch Function
 - Trace Function (function not implemented in this software version)

When the initialization is finished the display enters the parameter monitoring mode. The number of presented parameters can be programmed through the read-only parameter selection parameters (P500 to P505, refer to the section 4.3 for more details), and the font size varies according to the number of parameters programmed for monitoring, according to the figure 2.2.



- (a) Monitoring 1 parameter.
- (b) Monitoring 2 or 3 parameter.
- (c) Monitoring 4 to 6 parameter.

Figure 2.2: Parameter monitoring modes

In the read-only parameter monitoring mode the main HMI navigation menu can be accessed through the quick access Softkey [Menu] (SK2) or through the [ENTER] key.

2.2 STRUCTURE OF THE PARAMETER GROUPS

When in the monitoring mode the [Menu] option is selected, the parameter group navigation menu appears (table 2.1).

In order to select a group either the Prog/Enter key or the SK2 softkey [Select] can be used.

The Menu is composed by several access levels (refer to the table 2.2). The navigation through these levels is done by means of the softkeys SK1 [return] and SK2 [Select].

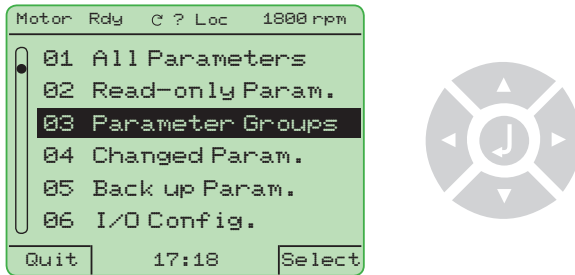


Figure 2.3: Main menu (level 1 group)

Table 2.1: Groups accessed through the main menu

	Group	Parameters or groups to which access is given
01	All the Parameters	All the parameters with access in a sequential mode
02	Read-only Parameters	Access just to the read-only parameters
03	Parameter Groups	Parameters accessed by menus according to their functions
04	Changed Parameters	Parameters whose contents are different from the factory settings
05	Backup Parameters	Parameters related to parameter copy functions

Table 2.1 (cont.): Groups accessed through the main menu

	Group	Parameters or groups to which access is given
06	I/O Configuration	Parameters for the configuration of digital and analog inputs and outputs
07	Fault History	Access to the error log (P067)
08	Basic Application	Access to basic parameters
09	Oriented Start-up	Easy access to configuration parameters
10	Auto-Setup	Access to automatic configurations

The selection of the parameters works with the cursor navigating through the sub-groups or through the parameters of the group to which they are associated.

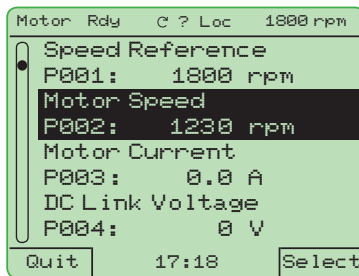
In the navigation modes a scrollbar appears at the HMI left side, with the purpose of helping the navigation by signaling the relative position of the cursor regarding the total of possible groups/parameters.

The inverter parameters can be accessed through the classic sequential structure, or disposed in menu groups according to their functions.

2.2.1 Sequential Access Mode

In order to enter this parameter access mode it is just necessary to press the [Menu] softkey (available in the monitoring mode) and select <01 All the Parameters>.

In this mode all the active parameters are presented in an uninterrupted sequence from the first up to the last parameter (provided that the respective parameter is active).


Figure 2.4: Sequential parameter list

2.2.2 Parameter Groups Access Mode

In order to enter this parameter access mode it is necessary to press the [Menu] softkey (available in the monitoring mode) and select <03 Parameter Groups>.

In this mode the parameters are accessed according to their group or to the function to which they belong. Refer to the group structure in table 2.2.

Table 2.2: Group, subgroup and parameter structures according to the various navigation levels

Groups							
Level 1		Level 2		Level 3			
01	All the Parameters						
02	Read-only Parameters						
03	Parameter Groups	20	Ramps				
		21	Speed References				
		22	Speed Limits				
		23	V/F Control				
		24	Adjustable V/F Curve				
		25	V/F Current Limitation				
		26	V/F DC Voltage Limitation				
		27	Dynamic Braking				
		28	Vector Control	90	Speed Regulator		
				91	Current Regulator		
				92	Flux Regulator		
				93	Torque Current Limitation		
				94	DC Link Regulator		
				95	Self-Tuning		
		29	HMI				
		30	Local Command				
		31	Remote Command				
		32	3-Wire Command				
		33	FWD/REV Run Command				
		34	Zero Speed Logic				
		35	Multispeed				
		36	Electronic Potentiometer				
		37	Analog Inputs				
		38	Analog Inputs				
		39	Digital Inputs				
		40	Digital/Relay Outputs				
		41	Inverter Data				
		42	Motor Data				
43	Flying Start/Ride-Through						
44	Protections						
45	PID Regulator						
46	DC Braking						
47	Skip Speed						
48	Communication	110	Local/Remote Configuration				
		111	Status/Commands				
		112	DeviceNet				
		113	Serial RS232/485				
		114	Anybus				
04	Changed Parameters						
05	Backup Parameters						
06	I/O Configuration	37	Analog Inputs				
		38	Analog Inputs				
		39	Digital Inputs				
		40	Digital/Relay Outputs				
07	Fault History						
08	Basic Application						
09	Oriented Start-up						
10	Auto-Setup						

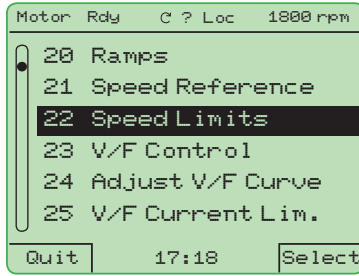


Figure 2.5: Navigation through the group 03 [Parameter Groups]

3 PARAMETER EDITION

The activation of the edition or parameter changing mode is executed by pressing the Enter/Prog key or the softkey associated to the parameter navigation.

Once in the edition mode, if the softkey programmed to leave [Return] is used, the modifications are not stored in the parameter memory and the value prior to the edition is restored. In a similar way, by using the softkey programmed to confirm [Select], the new parameter content is stored in the inverter parameter memory.

3.1 NUMERICAL

The numerical parameters (refer to the figure 3.1) are changed with the ▲ and ▼ keys, in order to increment and decrement their contents. There is the possibility of changing the parameter contents with a ten times faster rate (x 10), therefore, the ◀ and ▶ keys are used in order to increment and decrement the tens.



Figure 3.1: Numerical edition

3.2 ALPHANUMERICAL

In the edition of message type parameters (refer to the figure 3.2), the cursor can be moved with the ▲ and ▼ keys.

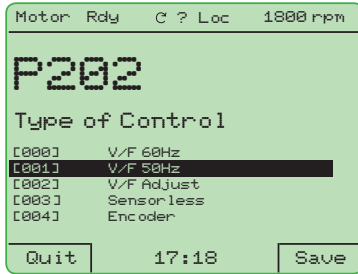


Figure 3.2: Alphanumerical edition

4 CONFIGURING THE GRAPHIC HMI

4.1 LCD CONTRAST

The Graphic HMI LCD contrast is adjusted by the parameter P490, which is accessible through the group <29 HMI> or the group <09 Oriented Start-up>. Typical contrast values are between 50 and 75.



NOTE!

After the power on, approximately 60 seconds are necessary for the stabilization of the contrast at the level adjusted in P490. In certain climatic conditions (temperature/humidity) contrast stabilization times longer than 60 may occur.

4.2 CONFIGURING THE HMI COMMANDS

In order that the Graphic HMI commands work properly, it is necessary to program the local or remote (LOC/REM) inverter commands to be of the 'Serial' type.

- Example of LOCAL configuration:
 - P220 = 5 (Serial LOCAL)
 - P221 = 0 (HMI keys) or 9 (Serial)
 - P223 = 5 (Serial FWD)
 - P224 = 2 (Serial)
 - P225 = 3 (Serial)
- Example of REMOTE configuration:
 - P220 = 6 (Serial REMOTE)
 - P222 = 0 (HMI keys) or 9 (Serial)
 - P226 = 5 (Serial FWD)
 - P227 = 2 (Serial)
 - P228 = 3 (Serial)

The automatic programming of the parameters described above can be done through the parameter P491 – Graphic HMI Configuration (menu <10 Auto-Setup> or <29 HMI>).

Table 4.1: *Graphic HMI commands selection*

Option	Description
000	Inactive
001	Modbus Local
002	Modbus Remote

In the [000 Inactive] mode the Graphic HMI is not enabled to send commands to the inverter and the parameters P220 to P228 are programmed with the factory settings.

In the [001 Modbus Local] and [002 Modbus Remote] modes the parameters P220 to P228 are programmed according to the configuration examples described previously.

4.3 CONFIGURING THE MONITORING MODE READ-ONLY PARAMETERS

In the monitoring mode the HMI is able to present from 1 to 6 read-only parameters simultaneously. The parameters P500 to P505 select which read-only parameters will be presented (refer to the table 4.2 in order to identify the possible programmable parameters).

In order not to present a read-only parameter the parameters P500 to P505 must be programmed with '0 = Inactive'. The number of read-only parameters presented depends on how many parameters from P500 to P505 are programmed different from '0 = Inactive'.

Table 4.2: *Possible monitoring mode read-only parameters*

Parameter	Description	Full Scale
P001	Speed Reference	P208
P002	Motor Speed	P208
P003	Motor Current	P295
P004	DC Link Voltage	1.35 x P296
P005	Motor Frequency	P403
P007	Motor Voltage	P296
P009	Motor Torque	(P295/P401) x 100 %
P010	Output Power	1.732 x (P295 x P296)
P040	PID	100 %

4.4 CONFIGURING THE ON-LINE GRAPHIC (WATCH) FUNCTION

In the on-line graphic visualization mode (watch function), the user is able to program up to two read-only parameters (refer to the table 4.2) for real time graphic monitoring on the HMI. This programming is done in a similar form to the programming of the monitoring mode (P512 to P519). The variable updating (sampling) is slow, and the objective is of monitoring in real time the inverter situation (refer to the figure 4.1). Data is not saved in any memory device, i.e., it is only for real time monitoring.

The graphic (watch) function is accessed through the [Graphic] softkey, from the parameter monitoring mode.

**NOTE!**

In order that the [Graphic] softkey be available it is necessary that there is at least one read-only parameter programmed for watch (P512 to P519).

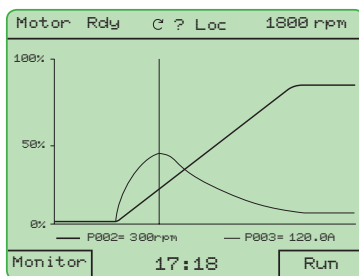


Figure 4.1: Graphic function visualization example

In the graphic mode (watch), it is possible to pause the sampling and navigate through the graphic with the help of a cursor (use the ◀ and ▶ keys). The parameter values corresponding to the cursor location are presented near the parameter numbers below the graphic, according to the figure 4.1.

By means of the parameter [P493 Sampling Time] it is also possible to adjust the horizontal graphic scale, by adjusting the sampling time between the points.

The default full scale of the graphic is always 100 % of the programmed parameter full scale. Through the parameters P516 and P517 it is possible to modify the full scale of the parameters programmed for the graphic function.

**NOTE!**

The table 4.2 presents the full scale for the read-only parameters that can be programmed for both, monitoring and graphic function.

5 ALARMS AND FAULTS

5.1 ALARM/FAULT SCREEN

When an MVW-01 error (fault or alarm) occurs, the Graphic HMI enters the error notification mode (refer to the figure 5.1). The HMI will remain in this error notification mode until the user selects [Return] or error [Reset], via the corresponding softkeys.

The [Return] option deactivates the notification and allows the user to continue using the HMI, however, the inverter stays in the fault status and it is not possible to enable it.

The [Reset] option causes a general inverter reset and, if the fault persists (the fault cause has not been solved), it is indicated again. If the fault cause has been eliminated, the inverter operates normally again and the fault is stored in the error record.

Alarms are showed in the inverter status field with the Axxx indication. In this case the HMI and the inverter remain operating normally and the alarm is stored in the error record. If one chooses the alarm reset, the procedure is similar to the fault reset (corresponding softkey).

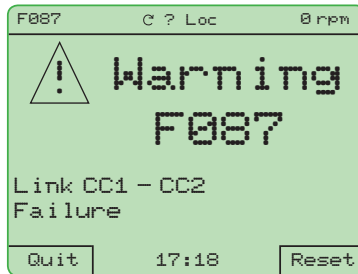


Figure 5.1: Inverter error visualization mode

5.2 NOTE SCREEN

Notes are warnings that only notify the user that any situation did not occur in the expected form, and therefore, are not considered errors neither stored in the error log.

Notes usually occur because of configuration errors of the Graphic HMI commands (generating Modbus errors) or because of attempts to command the inverter in not allowed situations (general enabling with the inverter in undervoltage or error).



NOTE!

Notes do not generate events as inverter stopping.

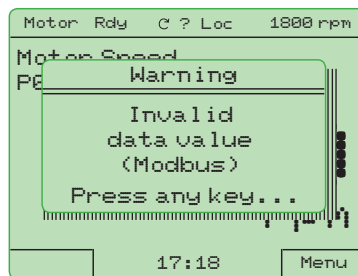


Figure 5.2: Inverter note screen

5.3 ERROR LOG

The parameter P067 keeps the information on the inverter last 100 occurred errors (in a similar manner to the conventional HMI), according to the figure 5.3 a).

In order to visualize more information regarding the error, as its description and the status of the inverter at the moment it occurred, it is necessary to select the [+Info] option through

the corresponding softkey (refer to the figure 5.3 b)).

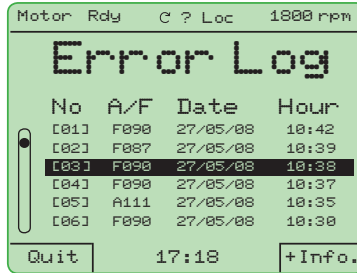


Figure 5.3 a): Error Log P067

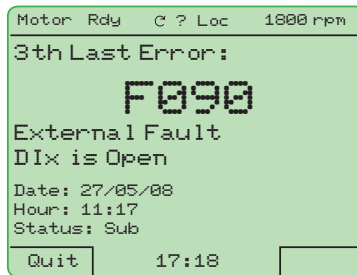


Figure 5.3 b): More information on the error

6 HELP FUNCTION

The Graphic HMI has an on-line help function. For the parameters and situations where the help is available, an indication in form of a question mark is presented at the top strip of the HMI display (refer to the figure 1.1). By means of the help key [?] the user gets access to the explanatory text of the corresponding parameter or function.



NOTE!

In this software version only the parameters have the on-line help function. Errors and other functions do not have help in this software version.

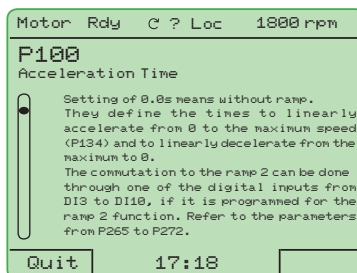


Figure 6.1: Help function visualization mode

7 GRAPHIC HMI PARAMETER DESCRIPTION

Parameter	Range [Factory Setting] Unit	Description / Notes								
P490 Graphic HMI LCD Contrast Adjustment	0...150 [65] %	<ul style="list-style-type: none"> ■ It adjusts the Graphic LCD contrast percentage. 								
P491 Graphic HMI Configuration	0...2 [-] -	<ul style="list-style-type: none"> ■ It configures the origin of the inverter Local or Remote (LOC/REM) commands for the 'Serial' type, so that the Graphic HMI be able to operate in an adequate manner (the Graphic HMI commands are of the Modbus RTU serial type). <p style="margin-top: 10px;"><i>Table 7.1: Graphic HMI commands selection</i></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">P491</th> <th style="text-align: center;">Function</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">Inactive</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">Modbus Local</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Modbus Remote</td> </tr> </tbody> </table>	P491	Function	0	Inactive	1	Modbus Local	2	Modbus Remote
P491	Function									
0	Inactive									
1	Modbus Local									
2	Modbus Remote									
P493 Sampling Time of the On-line Graphic Function	1...100 [-] 1 x 10 ms	<ul style="list-style-type: none"> ■ It adjusts the time between the points presented in the On-line Graphic Function. 								

Parameter	Range [Factory Setting] Unit	Description / Notes																						
P500 Read-only Parameter #1 Selection	0...9 [2] -	<ul style="list-style-type: none"> It selects one of the monitoring parameters. From 1 to 6 read-only parameters can be programmed for simultaneous exhibition among the 9 available ones. 																						
P501 Read-only Parameter #2 Selection	0...9 [0] -	<p><i>Table 7.2: Read-only parameters selection</i></p> <table border="1"> <thead> <tr> <th>P500 to P505</th> <th>Read-only Parameter</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Inactive</td> </tr> <tr> <td>1</td> <td>P001</td> </tr> <tr> <td>2</td> <td>P002</td> </tr> <tr> <td>3</td> <td>P003</td> </tr> <tr> <td>4</td> <td>P004</td> </tr> <tr> <td>5</td> <td>P005</td> </tr> <tr> <td>6</td> <td>P007</td> </tr> <tr> <td>7</td> <td>P009</td> </tr> <tr> <td>8</td> <td>P010</td> </tr> <tr> <td>9</td> <td>P040</td> </tr> </tbody> </table>	P500 to P505	Read-only Parameter	0	Inactive	1	P001	2	P002	3	P003	4	P004	5	P005	6	P007	7	P009	8	P010	9	P040
P500 to P505	Read-only Parameter																							
0	Inactive																							
1	P001																							
2	P002																							
3	P003																							
4	P004																							
5	P005																							
6	P007																							
7	P009																							
8	P010																							
9	P040																							
P502 Read-only Parameter #3 Selection	0...9 [0] -																							
P503 Read-only Parameter #4 Selection	0...9 [0] -																							
P504 Read-only Parameter #5 Selection	0...9 [0] -																							
P505 Read-only Parameter #6 Selection	0...9 [0] -																							

Parameter	Range [Factory Setting] Unit	Description / Notes																						
P512 On-line Graphic Function Parameter #1 Selection	0...9 [2] -	<ul style="list-style-type: none"> It selects one of the parameters to be monitored by the On-line Graphic Function (Watch Function). <p><i>Table 7.3: On-line graphic function parameters selection</i></p> <table border="1"> <thead> <tr> <th>P512 and P513</th> <th>Read-only Parameter</th> </tr> </thead> <tbody> <tr><td>0</td><td>Inactive</td></tr> <tr><td>1</td><td>P001</td></tr> <tr><td>2</td><td>P002</td></tr> <tr><td>3</td><td>P003</td></tr> <tr><td>4</td><td>P004</td></tr> <tr><td>5</td><td>P005</td></tr> <tr><td>6</td><td>P007</td></tr> <tr><td>7</td><td>P009</td></tr> <tr><td>8</td><td>P010</td></tr> <tr><td>9</td><td>P040</td></tr> </tbody> </table>	P512 and P513	Read-only Parameter	0	Inactive	1	P001	2	P002	3	P003	4	P004	5	P005	6	P007	7	P009	8	P010	9	P040
P512 and P513	Read-only Parameter																							
0	Inactive																							
1	P001																							
2	P002																							
3	P003																							
4	P004																							
5	P005																							
6	P007																							
7	P009																							
8	P010																							
9	P040																							
P513 On-line Graphic Function Parameter #2 Selection	0...9 [3] -																							
P516 Full Scale of the On-line Graphic Function Parameter #1	0...200 [100] %	<ul style="list-style-type: none"> It adjusts the full scale of the on-line graphic correspondent parameter. <p><i>Table 7.4: Adjust of the full scale of the on-line graphic function</i></p> <table border="1"> <thead> <tr> <th>P516 and P517</th> <th>Full Scale</th> </tr> </thead> <tbody> <tr><td>P001</td><td>P208</td></tr> <tr><td>P002</td><td>P208</td></tr> <tr><td>P003</td><td>P295</td></tr> <tr><td>P004</td><td>1,35 x P296</td></tr> <tr><td>P005</td><td>P403</td></tr> <tr><td>P007</td><td>P296</td></tr> <tr><td>P009</td><td>(P295 / P401) x 100 %</td></tr> <tr><td>P010</td><td>1,732 x (P295 x P296)</td></tr> <tr><td>P040</td><td>100 %</td></tr> </tbody> </table>	P516 and P517	Full Scale	P001	P208	P002	P208	P003	P295	P004	1,35 x P296	P005	P403	P007	P296	P009	(P295 / P401) x 100 %	P010	1,732 x (P295 x P296)	P040	100 %		
P516 and P517	Full Scale																							
P001	P208																							
P002	P208																							
P003	P295																							
P004	1,35 x P296																							
P005	P403																							
P007	P296																							
P009	(P295 / P401) x 100 %																							
P010	1,732 x (P295 x P296)																							
P040	100 %																							
P517 Full Scale of the On-line Graphic Function Parameter #1	0...200 [100] %																							



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