

# SIEMENS

## COMBIMASTER 411 & MICROMASTER 411

Parameter List

Issue 08/02



## Available Documentation for the COMBIMASTER 411 & MICROMASTER 411

### Getting Started Guide

Provides for Quick Commissioning of the Inverter.



### Operating Instructions

Gives information about features of the MICROMASTER411, Installation, Commissioning, Control modes, System Parameter structure, Troubleshooting, Specifications and available options of the MICROMASTER411.



### Parameter List

The Parameterlist contains the description of all Parameters structured in functional order and a detailed description. The Parameter list also includes a series of function plans.



### Catalogues

In the catalogue you will find all needs to select a certain inverter, as well as filters chokes, operator panels or communications options.



# SIEMENS

## COMBIMASTER 411 & MICROMASTER 411

Parameter List  
User Documentation

**Valid for**

Issue 08/02

*Converter Type*

COMBIMASTER 411 & MICROMASTER 411

*Software Version*

V1.2

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Function Diagrams	2
Alarms and Warnings	3



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**Warning**

Please refer to all Definitions and Warnings contained in the Operating Instructions. You will find the Operating Instructions on the Docu CD delivered with your inverter. If the CD is lost, it can be ordered via your local Siemens department under the Order No. 6SE6400-5FC00-1AG0.

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Further information can be obtained from Internet website:

<http://www.siemens.de/micromaster>

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Other functions not described in this document may be available. However, this fact shall not constitute an obligation to supply such functions with a new control, or when servicing.

We have checked that the contents of this document correspond to the hardware and software described. There may be discrepancies nevertheless, and no guarantee can be given that they are completely identical. The information contained in this document is reviewed regularly and any necessary changes will be included in the next edition. We welcome suggestions for improvement.

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# Parameters MICROMASTER 411

This Parameter List must only be used together with the Operating Instructions of the MICROMASTER 411. Please pay special attention to the Warnings, Cautions, Notices and Notes contained in these manuals.

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# 1 Parameters

## 1.1 Introduction to MICROMASTER 411 System Parameters

The layout of the parameter description is as follows.

<b>1 Par number</b> [index]	<b>2 Parameter name</b>	<b>5 Datatype</b>	<b>7 Unit:</b>	<b>9 Min:</b>	<b>12 Level:</b> <b>2</b>
	<b>3 CStat:</b>	<b>6 active:</b>	<b>8 Quick Comm:</b>	<b>10 Def:</b>	
	<b>4 P-Group:</b>			<b>11 Max:</b>	

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13 Description:

### 1. Parameter number

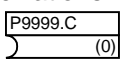
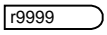
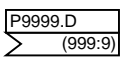
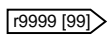
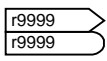
Indicates the relevant parameter number. The numbers used are 4-digit numbers in the range 0000 to 9999. Numbers prefixed with an “r” indicate that the parameter is a “read-only” parameter, which displays a particular value but cannot be changed directly by specifying a different value via this parameter number (in such cases, dashes “-“ are entered at the points “Unit”, “Min”, “Def” and “Max” in the header of the parameter description.

All other parameters are prefixed with a “P”. The values of these parameters can be changed directly in the range indicated by the “Min” and “Max” settings in the header.

[index] indicates that the parameter is an indexed parameter and specifies the number of indices available.

### 2. Parameter name

Indicates the name of the relevant parameter. Certain parameter names include the following abbreviated prefixes: BI, BO, CI, and CO followed by a colon. These abbreviations have the following meanings:

- BI =  Binector input, i.e. parameter selects the source of a binary signal
- BO =  Binector output, i.e. parameter connects as a binary signal
- CI =  Connector input, i.e. parameter selects the source of an analog signal
- CO =  Connector output, i.e. parameter connects as an analog signal
- CO/BO =  Connector/Binector output, i.e. parameter connects as an analog signal and/or as a binary signal

To make use of BiCo you will need access to the full parameter list. At this level many new parameter settings are possible, including BiCo functionality. BiCo functionality is a different, more flexible way of setting and combining input and output functions. It can be used in most cases in conjunction with the simple, level 2 settings.

The BiCo system allows complex functions to be programmed. Boolean and mathematical relationships can be set up between inputs (digital, analog, serial etc.) and outputs (inverter current, frequency, analog output, relays, etc.).

### 3. CStat

Commissioning status of the parameter. Three states are possible:

- Commissioning C
- Run U
- Ready to run T

This indicates when the parameter can be changed. One, two or all three states may be specified. If all three states are specified, this means that it is possible to change this parameter setting in all three inverter states

**4. P-Group**

Indicates the functional group of the particular.

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**Note**

Parameter P0004 (parameter filter) acts as a filter and focuses access to parameters according to the functional group selected.

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**5. Datatype**

The data types available are shown in the table below.

Notation	Meaning
U16	16-bit unsigned
U32	32-bit unsigned
I16	16-bit integer
I32	32-bit integer
Float	Floating point

**6. Active**

Indicates whether

- ◆ Immediately changes to the parameter values take effective immediately after they have been entered, or
- ◆ Confirm the “P” button on the operator panel (BOP or AOP) must be pressed before the changes take effect.

**7. Unit**

Indicates the unit of measure applicable to the parameter values

**8. QuickComm**

Indicates whether or not (Yes or No) a parameter can only be changed during quick commissioning, i.e. when P0010 (parameter groups for commissioning) is set to 1 (quick commissioning).

**9. Min**

Indicates the minimum value to which the parameter can be set.

**10. Def**

Indicates the default value, i.e. the value which applies if the user does not specify a particular value for the parameter.

**11. Max**

Indicates the maximum value to which the parameter can be set.

**12. Level**

Indicates the level of user access. There are four access levels: Standard, Extended, Expert and Service. The number of parameters that appear in each functional group depends on the access level set in P0003 (user access level).



### 13. Description

The parameter description consists of the sections and contents listed below. Some of these sections and contents are optional and will be omitted on a case-to-case basis if not applicable.

<b>Description:</b>	Brief explanation of the parameter function.
<b>Diagram:</b>	Where applicable, diagram to illustrate the effects of parameters on a characteristic curve, for example
<b>Settings:</b>	List of applicable settings. These include Possible settings, Most common settings, Index and Bitfields
<b>Example:</b>	Optional example of the effects of a particular parameter setting.
<b>Dependency:</b>	Any conditions that must be satisfied in connection with this parameter. Also any particular effects, which this parameter has on other parameter(s) or which other parameters have on this one.
<b>Warning / Caution / Notice / Note:</b>	Important information which must be heeded to prevent personal injury or damage to equipment / specific information which should be heeded in order to avoid problems / information which may be helpful to the user
<b>More details:</b>	Any sources of more detailed information concerning the particular parameter.

## 1.2 Quick commissioning (P0010=1)

The following parameters are necessary for quick commissioning (P0010=1).

No	Name	Access level	Cstat
P0100	Europe / North America	1	C
P0300	Select motor type	2	C
P0304	Rated motor voltage	1	C
P0305	Rated motor current	1	C
P0307	Rated motor power	1	C
P0308	Rated motor cosPhi	2	C
P0309	Rated motor efficiency	2	C
P0310	Rated motor frequency	1	C
P0311	Rated motor speed	1	C
P0320	Motor magnetizing current	3	CT
P0335	Motor cooling	2	CT
P0640	Motor overload factor [%]	2	CUT
P0700	Selection of command source	1	CT
P1000	Selection of frequency setpoint	1	CT
P1080	Min. frequency	1	CUT
P1082	Max. frequency	1	CT
P1120	Ramp-up time	1	CUT
P1121	Ramp-down time	1	CUT
P1135	OFF3 ramp-down time	2	CUT
P1300	Control mode	2	CT
P1910	Select motor data identification	2	CT
P3900	End of quick commissioning	1	C

When P0010=1 is chosen, P0003 (user access level) can be used to select the parameters to be accessed. This parameter also allows selection of a user-defined parameter list for quick commissioning.

At the end of the quick commissioning sequence, set P3900 = 1 to carry out the necessary motor calculations and clear all other parameters (not included in P0010=1) to their default settings.

### Note

This applies only in Quick Commissioning mode.

## Reset to Factory default

To reset all parameters to the factory default settings; the following parameters should be set as follows:

Set P0010=30

Set P0970=1

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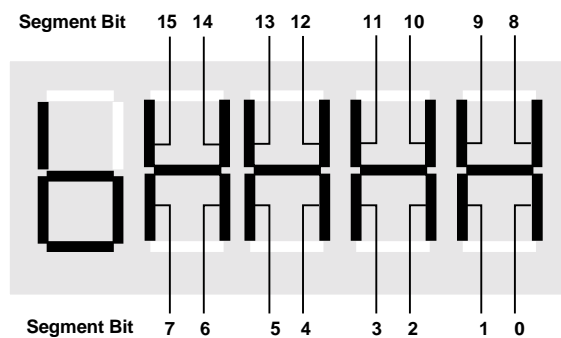
### Note

The reset process takes approximately 10 seconds to complete. Reset to Factory default

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## Seven-segment display

The seven-segment display is structured as follows:



The significance of the relevant bits in the display is described in the status and control word parameters.

### 1.3 Parameter Description

**Note:**

Level 4 Parameters are not visible with BOP or AOP.

<b>r0000</b>	<b>Drive display</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	<b>Def:</b> -	<b>Level:</b> <b>1</b>
	<b>P-Group:</b> ALWAYS			<b>Max:</b> -		
	Displays the user selected output as defined in P0005.					

**Note:**

Pressing the "Fn" button for 2 seconds allows the user to view the values of DC link voltage, output frequency, output voltage, output current, and chosen r0000 setting (defined in P0005).

<b>r0002</b>	<b>Drive state</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	<b>Def:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> COMMANDS			<b>Max:</b> -		
	Displays actual drive state.					

**Possible Settings:**

- 0 Commissioning mode (P0010 != 0)
- 1 Drive ready
- 2 Drive fault active
- 3 Drive starting (DC-link precharging)
- 4 Drive running
- 5 Stopping (ramping down)

**Dependency:**

State 3 visible only while precharging DC link, and when externally powered communications board is fitted.

<b>P0003</b>	<b>User access level</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> 0	<b>Def:</b> 1	<b>Level:</b> <b>1</b>
	<b>CStat:</b> CUT			<b>Max:</b> 4		
	<b>P-Group:</b> ALWAYS	<b>Active:</b> first confirm	<b>QuickComm. No</b>			
	Defines user access level to parameter sets. The default setting (standard) is sufficient for most simple applications.					

**Possible Settings:**

- 0 User defined parameter list - see P0013 for details on use
- 1 Standard: Allows access into most frequently used parameters.
- 2 Extended: Allows extended access e.g. to inverter I/O functions.
- 3 Expert: For expert use only.
- 4 Service: Only for use by authorized service personal - password protected.

<b>P0004</b>	<b>Parameter filter</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> 0	<b>Def:</b> 0	<b>Level:</b> <b>1</b>
	<b>CStat:</b> CUT			<b>Max:</b> 22		
	<b>P-Group:</b> ALWAYS	<b>Active:</b> first confirm	<b>QuickComm. No</b>			
	Filters available parameters according to functionality to enable a more focussed approach to commissioning.					

**Possible Settings:**

- 0 All parameters
- 2 Inverter
- 3 Motor
- 7 Commands, binary I/O
- 8 ADC
- 10 Setpoint channel / RFG
- 12 Drive features
- 13 Motor control
- 20 Communication
- 21 Alarms / warnings / monitoring
- 22 Technology controller (e.g. PID)

**Example:**

P0004 = 22 specifies that only PID parameters will be visible.

**Dependency:**

Parameters marked "Quick Comm: Yes" in the parameter header can only be set when P0010 = 1 (Quick Commissioning).

<b>P0005</b>	<b>Display selection</b>	<b>Min:</b> 2	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT <b>P-Group:</b> FUNC	<b>Datatype:</b> U16 <b>Active:</b> first confirm	
	Selects display for parameter r0000 (drive display).		
	<b>Common Settings:</b>		
	21 Actual frequency		
	25 Output voltage		
	26 DC link voltage		
	27 Output current		
	<b>Notice:</b>		
	These settings refer to read only parameter numbers ("rxxxx").		
	<b>Details:</b>		
	See relevant "rxxxx" parameter descriptions.		
<b>P0006</b>	<b>Display mode</b>	<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT <b>P-Group:</b> FUNC	<b>Datatype:</b> U16 <b>Active:</b> first confirm	
	Defines mode of display for r0000 (drive display).		
	<b>Possible Settings:</b>		
	0 In Ready state alternate between setpoint and output frequency. In run display output frequency		
	1 In Ready state display setpoint. In run display output frequency.		
	2 In Ready state alternate between P0005 value and r0020 value. In run display P0005 value		
	3 In Ready state alternate between r0002 value and r0020 value. In run display r0002 value		
	4 In all states just display P0005		
	<b>Note:</b>		
	When inverter is not running, the display alternates between the values for "Not Running" and "Running".		
	Per default, the setpoint and actual frequency values are displayed alternately.		
<b>P0007</b>	<b>Backlight delay time</b>	<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT <b>P-Group:</b> FUNC	<b>Datatype:</b> U16 <b>Active:</b> first confirm	
	Defines time period after which the backlight display turns off if no operator keys have been pressed.		
	<b>Value:</b>		
	P0007 = 0: Backlight always on (default state).		
	P0007 = 1 - 2000: Number of seconds after which the backlight will turn off.		
<b>P0010</b>	<b>Commissioning parameter</b>	<b>Min:</b> 0	<b>Level:</b> <b>1</b>
	<b>CStat:</b> CT <b>P-Group:</b> ALWAYS	<b>Datatype:</b> U16 <b>Active:</b> first confirm	
	Filters parameters so that only those related to a particular functional group are selected.		
	<b>Possible Settings:</b>		
	0 Ready		
	1 Quick commissioning		
	2 Inverter		
	29 Download		
	30 Factory setting		
	<b>Dependency:</b>		
	Reset to 0 for inverter to run.		
	P0003 (user access level) also determines access to parameters.		
	<b>Note:</b>		
	P0010 = 1 The inverter can be commissioned very quickly and easily by setting P0010 = 1. After that only the important parameters (e.g.: P0304, P0305, etc.) are visible. The value of these parameters must be entered one after the other. The end of quick commissioning and the start of internal calculation will be done by setting P3900 = 1 - 3. Afterward parameter P0010 will be reset to zero automatically.		
	P0010 = 2 For service purposes only.		
	P0010 = 29 To transfer a parameter file via PC tool (e.g.: DriveMonitor, STARTER) parameter P0010 will be set to 29 by the PC tool. When download has been finished PC tool resets parameter P0010 to zero.		
	P0010 = 30 When resetting the parameters of inverter P0010 must be set to 30. Resetting of the parameters will be started by setting parameter P0970 = 1. The inverter will automatically reset all its parameters to their default settings. This can prove beneficial if you experience problems during parameter setup and wish to start again. Duration of factory setting will take about 60 s.		
	If P3900 is not 0 (0 is the default value), this parameter is automatically reset to 0.		

<b>P0011</b>	<b>Lock for user defined parameter</b>				<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0		
	<b>P-Group:</b> FUNC	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 65535		

**Details:**

See parameter P0013 (user defined parameter)

<b>P0012</b>	<b>Key for user defined parameter</b>				<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0		
	<b>P-Group:</b> FUNC	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 65535		

**Details:**

See parameter P0013 (user defined parameter).

<b>P0013[20]</b>	<b>User defined parameter</b>				<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0		
	<b>P-Group:</b> FUNC	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 65535		

Defines a limited set of parameters to which the end user will have access.

Instructions for use:

Step 1: Set P0003 = 3 (expert user)

Step 2: Go to P0013 indices 0 to 16 (user list)

Step 3: Enter into P0013 index 0 to 16 the parameters required to be visible in the user-defined list.

The following values are fixed and cannot be changed:

- P0013 index 19 = 12 (key for user defined parameter)

- P0013 index 18 = 10 (commissioning parameter filter)

- P0013 index 17 = 3 (user access level)

Step 4: Set P0003 = 0 to activate the user defined parameter.

**Index:**

- P0013[0] : 1st user parameter
- P0013[1] : 2nd user parameter
- P0013[2] : 3rd user parameter
- P0013[3] : 4th user parameter
- P0013[4] : 5th user parameter
- P0013[5] : 6th user parameter
- P0013[6] : 7th user parameter
- P0013[7] : 8th user parameter
- P0013[8] : 9th user parameter
- P0013[9] : 10th user parameter
- P0013[10] : 11th user parameter
- P0013[11] : 12th user parameter
- P0013[12] : 13th user parameter
- P0013[13] : 14th user parameter
- P0013[14] : 15th user parameter
- P0013[15] : 16th user parameter
- P0013[16] : 17th user parameter
- P0013[17] : 18th user parameter
- P0013[18] : 19th user parameter
- P0013[19] : 20th user parameter

**Dependency:**

First, set P0011 ("lock") to a different value than P0012 ("key") to prevent changes to user-defined parameter. Then, set P0003 to 0 to activate the user-defined list.

When locked and the user-defined parameter is activated, the only way to exit the user-defined parameter (and view other parameters) is to set P0012 ("key") to the value in P0011 ("lock").

**Note:**

Alternatively, set P0010 = 30 (commissioning parameter filter = factory setting) and P0970 = 1 (factory reset) to perform a complete factory reset.

The default values of P0011 ("lock") and P0012 ("key") are the same.

<b>P0014[3]</b>	<b>Store mode</b>			<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> UT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> -	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 1	

Sets the store mode for parameters ("volatile" (RAM) or "nonvolatile" (EEPROM)).

**Possible Settings:**

0 volatile (RAM)  
1 nonvolatile (EEPROM)

**Index:**

P0014[0] : Serial interface COM link  
P0014[1] : Serial interface BOP link  
P0014[2] : PROFIBUS / CB

**Note:**

1. With the BOP the parameter will always be stored in the EEPROM.
2. P0014 itself will always be stored in the EEPROM.
3. P0014 will not be changed by performing a factory reset (P0010 = 30 and P0971 = 1).
4. P0014 can be transferred during a DOWNLOAD (P0010 = 29).
5. If "Store request via USS/CB = volatile (RAM)" and "P0014[x] = volatile (RAM)", you can make a transfer of all parameter values into the nonvolatile memory via P0971.
6. If "Store request via USS/CB" and P0014[x] are not consistent, the setting of P14[x] = "store nonvolatile (EEPROM)" has always higher priority.

Store request via USS/CB	Value of P0014[x]	Result
EEPROM	RAM	EEPROM
EEPROM	EEPROM	EEPROM
RAM	RAM	RAM
RAM	EEPROM	EEPROM

<b>r0018</b>	<b>Firmware version</b>			<b>Min:</b> -	<b>Level:</b> <b>1</b>
	<b>P-Group:</b> INVERTER	<b>Datatype:</b> Float	<b>Unit:</b> -	<b>Def:</b> -	
				<b>Max:</b> -	

Displays version number of installed firmware.

<b>r0019</b>	<b>CO/BO: BOP control word</b>			<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMMANDS	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> -	
				<b>Max:</b> -	

Displays status of operator panel commands.

The settings below are used as the "source" codes for keypad control when connecting to BICO input parameters.

**Bitfields:**

Bit00	ON/OFF1	0	NO
		1	YES
Bit01	OFF2: Electrical stop	0	YES
		1	NO
Bit08	JOG right	0	NO
		1	YES
Bit11	Reverse (setpoint inversion)	0	NO
		1	YES
Bit13	Motor potentiometer MOP up	0	NO
		1	YES
Bit14	Motor potentiometer MOP down	0	NO
		1	YES

**Note:**

When BICO technology is used to allocate functions to panel buttons, this parameter displays the actual status of the relevant command.

The following functions can be "connected" to individual buttons:

- ON/OFF1,
- OFF2,
- JOG,
- REVERSE,
- INCREASE,
- DECREASE

<b>r0020</b>	<b>CO: Freq. setpoint before RFG</b>			<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> CONTROL	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> -	
				<b>Max:</b> -	

Displays actual frequency setpoint (output from ramp function generator).

<b>r0021</b>	<b>CO: Act. frequency</b>	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> CONTROL				
	Displays actual inverter output frequency (r0024) excluding slip compensation, resonance damping and frequency limitation.				
<b>r0022</b>	<b>Act. filtered rotor speed</b>	<b>Datatype:</b> Float	<b>Unit:</b> 1/min	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> CONTROL				
	Displays calculated rotor speed based on inverter output frequency [Hz] x 120 / number of poles.				
	<b>Note:</b> This calculation makes no allowance for load-dependent slip.				
<b>r0024</b>	<b>CO: Act. output frequency</b>	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> CONTROL				
	Displays actual output frequency (slip compensation, resonance damping and frequency limitation are included).				
<b>r0025</b>	<b>CO: Act. output voltage</b>	<b>Datatype:</b> Float	<b>Unit:</b> V	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> CONTROL				
	Displays [rms] voltage applied to motor.				
<b>r0026</b>	<b>CO: Act. filtered DC-link volt.</b>	<b>Datatype:</b> Float	<b>Unit:</b> V	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> INVERTER				
	Displays DC-link voltage.				
<b>r0027</b>	<b>CO: Act. output current</b>	<b>Datatype:</b> Float	<b>Unit:</b> A	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> CONTROL				
	Displays [rms] value of motor current [A].				
<b>r0034</b>	<b>CO: Motor temperature (i2t)</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> MOTOR				
	Displays calculated motor temperature (I2t model) as [%] of the maximum permissible value.				
	<b>Note:</b> A value of 100 % means that the motor has reached its maximum permissible operating temperature. In this case, the motor will attempt to reduce the motor loading as defined in P0610 (motor I2t temperature reaction).				
<b>r0036</b>	<b>CO: Inverter overload utilization</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>4</b>
	<b>P-Group:</b> INVERTER				
	Displays inverter overload utilization calculated via I2t model.				
	The actual I2t value relative to the max. possible I2t value supplies utilization in [%].				
	If the nominal current of the inverter is not exceeded, 0 % utilization will be displayed.				
	If the current exceeds the threshold for P0294 (inverter I2t overload warning), alarm A0504 (inverter overtemperature) is generated and the output current of the inverter reduced via P0290 (inverter overload reaction).				
	If 100 % utilization is exceeded, alarm F0005 (inverter I2T) is tripped.				
<b>r0037</b>	<b>CO: Inverter temperature [°C]</b>	<b>Datatype:</b> Float	<b>Unit:</b> °C	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> INVERTER				
	Displays internal inverter heatsink temperature.				
<b>r0039</b>	<b>CO: Energy consumpt. meter [kWh]</b>	<b>Datatype:</b> Float	<b>Unit:</b> kWh	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> INVERTER				
	Displays electrical energy used by inverter since display was last reset (see P0040 - reset energy consumption meter).				
	<b>Dependency:</b> Value is reset when P0040 = 1 reset energy consumption meter.				

<b>P0040</b>	<b>Reset energy consumption meter</b>				<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0		
	<b>P-Group:</b> INVERTER	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 1		

Resets value of parameter r0039 (energy consumption meter) to zero.

**Possible Settings:**

0 No reset  
1 Reset r0039 to 0

**Dependency:**

No reset until "P" is pressed.



<b>r0052</b>	<b>CO/BO: Act. status word 1</b>	<b>Min:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> COMMANDS	<b>Datatype:</b> U16 <b>Unit:</b> -	

Displays first active status word of inverter (bit format) and can be used to diagnose inverter status.

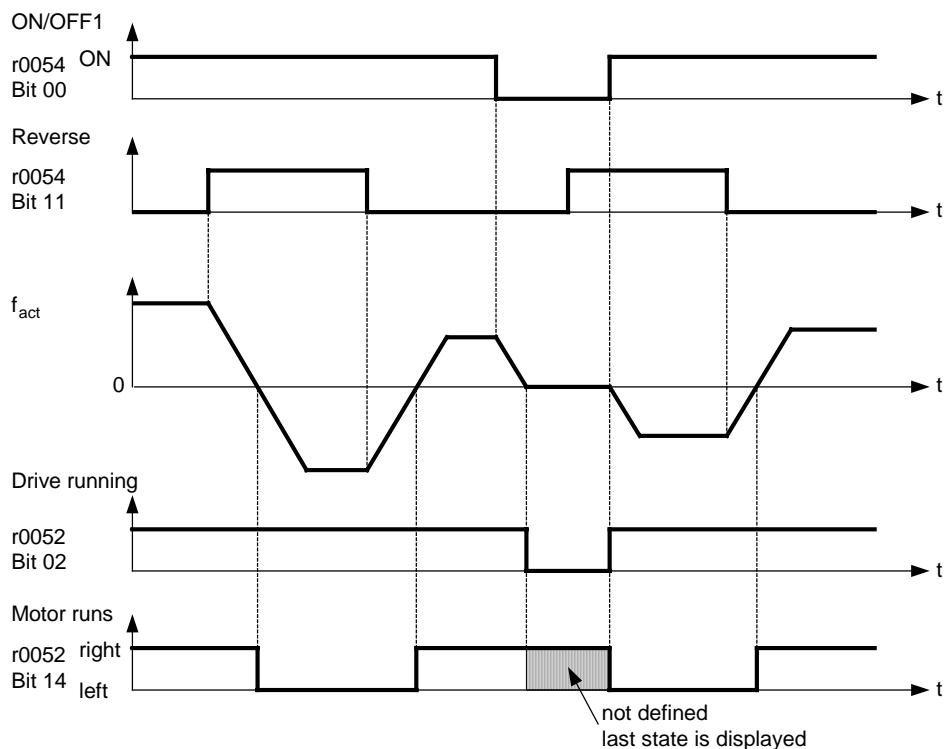
**Bitfields:**

Bit00	Drive ready	0	NO
		1	YES
Bit01	Drive ready to run	0	NO
		1	YES
Bit02	Drive running	0	NO
		1	YES
Bit03	Drive fault active	0	NO
		1	YES
Bit04	OFF2 active	0	YES
		1	NO
Bit05	OFF3 active	0	YES
		1	NO
Bit06	ON inhibit active	0	NO
		1	YES
Bit07	Drive warning active	0	NO
		1	YES
Bit08	Deviation setpoint / act. value	0	YES
		1	NO
Bit09	PZD control	0	NO
		1	YES
Bit10	Maximum frequency reached	0	NO
		1	YES
Bit11	Warning: Motor current limit	0	YES
		1	NO
Bit12	Motor holding brake active	0	NO
		1	YES
Bit13	Motor overload	0	YES
		1	NO
Bit14	Motor runs right	0	NO
		1	YES
Bit15	Inverter overload	0	YES
		1	NO

**Note:**

r0052 Bit03 "Drive fault active"  
Output of Bit3 (Fault) will be inverted on digital output (Low = Fault, High = No Fault).

r0052 Bit14 "Motor runs right"



The display segments for the status word are shown in the "Introduction to MICROMASTER System Parameters".

<b>r0053</b>	<b>CO/BO: Act. status word 2</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> COMMANDS			<b>Def:</b> -	
				<b>Max:</b> -	

Displays second status word of inverter (in bit format).

**Bitfields:**

Bit00	DC brake active	0	NO
		1	YES
Bit01	f_act >= P2167 (f_off)	0	NO
		1	YES
Bit02	f_act > P1080 (f_min)	0	NO
		1	YES
Bit03	Act. current r0027 >= P2170	0	NO
		1	YES
Bit04	f_act > P2155 (f_1)	0	NO
		1	YES
Bit05	f_act <= P2155 (f_1)	0	NO
		1	YES
Bit06	f_act >= setpoint	0	NO
		1	YES
Bit07	Act. Vdc r0026 < P2172	0	NO
		1	YES
Bit08	Act. Vdc r0026 > P2172	0	NO
		1	YES
Bit09	Ramping finished	0	NO
		1	YES
Bit10	PID output r2294 == P2292 (PID_min)	0	NO
		1	YES
Bit11	PID output r2294 == P2291 (PID_max)	0	NO
		1	YES
Bit14	Download data set 0 from AOP	0	NO
		1	YES
Bit15	Download data set 1 from AOP	0	NO
		1	YES

**Details:**

See description of seven-segment display given in the "Introduction to MICROMASTER System Parameters" in this manual.

<b>r0054</b>	<b>CO/BO: Act. control word 1</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMMANDS			<b>Def:</b> - <b>Max:</b> -	

Displays first control word of inverter and can be used to diagnose which commands are active.

**Bitfields:**

Bit00	ON/OFF1	0	NO
		1	YES
Bit01	OFF2: Electrical stop	0	YES
		1	NO
Bit02	OFF3: Fast stop	0	YES
		1	NO
Bit03	Pulse enable	0	NO
		1	YES
Bit04	RFG enable	0	NO
		1	YES
Bit05	RFG start	0	NO
		1	YES
Bit06	Setpoint enable	0	NO
		1	YES
Bit07	Fault acknowledge	0	NO
		1	YES
Bit08	JOG right	0	NO
		1	YES
Bit09	JOG left	0	NO
		1	YES
Bit10	Control from PLC	0	NO
		1	YES
Bit11	Reverse (setpoint inversion)	0	NO
		1	YES
Bit13	Motor potentiometer MOP up	0	NO
		1	YES
Bit14	Motor potentiometer MOP down	0	NO
		1	YES
Bit15	Local / Remote	0	NO
		1	YES

**Details:**

See description of seven-segment display given in the "Introduction to MICROMASTER System Parameters" in this manual.

<b>r0055</b>	<b>CO/BO: Act. control word 2</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMMANDS			<b>Def:</b> - <b>Max:</b> -	

Displays additional control word of inverter and can be used to diagnose which commands are active.

**Bitfields:**

Bit00	Fixed frequency Bit 0	0	NO
		1	YES
Bit01	Fixed frequency Bit 1	0	NO
		1	YES
Bit02	Fixed frequency Bit 2	0	NO
		1	YES
Bit08	PID enabled	0	NO
		1	YES
Bit09	DC brake enabled	0	NO
		1	YES
Bit13	External fault 1	0	YES
		1	NO
Bit15	State of digital output 1	0	NO
		1	YES

**Details:**

See description of seven-segment display given in the "Introduction to MICROMASTER System Parameters" in this handbook.

<b>r0056</b>	<b>CO/BO: Status of motor control</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>Datatype:</b> U16 <b>Unit:</b> -	<b>Def:</b> -	
	<b>P-Group:</b> CONTROL	<b>Max:</b> -	

Displays status of motor control (MM420: V/f status), which can be used to diagnose inverter status.

**Bitfields:**

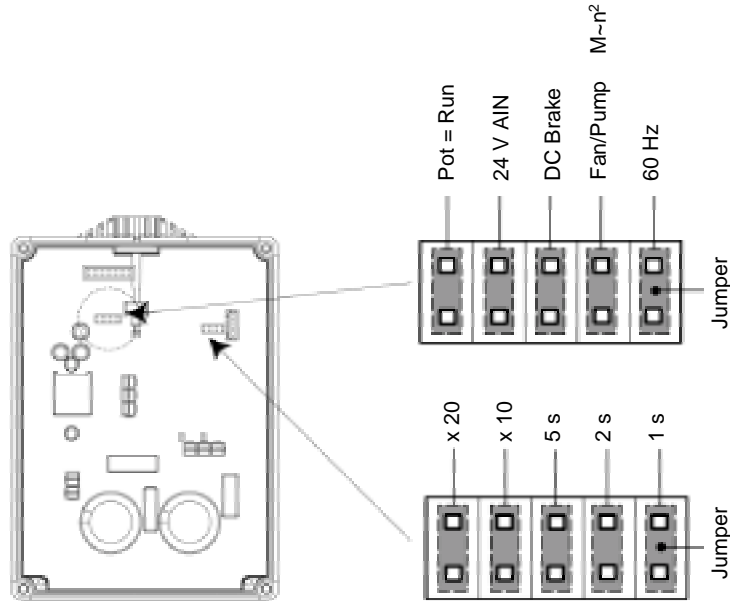
Bit00	Init. control finished	0	NO
		1	YES
Bit01	Motor demagnetizing finished	0	NO
		1	YES
Bit02	Pulses enabled	0	NO
		1	YES
Bit03	Voltage soft start select	0	NO
		1	YES
Bit04	Motor excitation finished	0	NO
		1	YES
Bit05	Starting boost active	0	NO
		1	YES
Bit06	Acceleration boost active	0	NO
		1	YES
Bit07	Frequency is negative	0	NO
		1	YES
Bit08	Field weakening active	0	NO
		1	YES
Bit09	Volts setpoint limited	0	NO
		1	YES
Bit10	Slip frequency limited	0	NO
		1	YES
Bit11	F_out > F_max Freq. limited	0	NO
		1	YES
Bit12	Phase reversal selected	0	NO
		1	YES
Bit13	I-max controller active	0	NO
		1	YES
Bit14	Vdc-max controller active	0	NO
		1	YES

**Details:**

See description of seven-segment display given in the introduction.

<b>r0057</b>	<b>Jumper status</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> CONTROL			<b>Def:</b> - <b>Max:</b> -	

Displays status of jumpers, which can be used to diagnose ramp times and operation mode.



**Bitfields:**

Bit00	Accumulate ramp time by 1 s	0	NO
		1	YES
Bit01	Accumulate ramp time by 2 s	0	NO
		1	YES
Bit02	Accumulate ramp time by 5 s	0	NO
		1	YES
Bit03	Multiply acc ramp time by 10	0	NO
		1	YES
Bit04	Multiply acc ramp time by 20	0	NO
		1	YES
Bit05	Command source status	0	NO
		1	YES
Bit06	Use DC injection brake	0	NO
		1	YES
Bit07	Use fan curve	0	NO
		1	YES
Bit08	50/60 Hz Jumper status	0	NO
		1	YES

**Note:**

Jumpers for ramp times apply to parameter P1120 (ramp-up time) and parameter P1121 (ramp-down time). Jumpers have priority in setting ramp times compared with parameters P1120 and P1121. Using up to 5 jumpers allows ramp times to be set between 1 - 240 s. See Jumper Reference Table for further clarification.

Time	Jumper				
	1 s	2 s	5 s	x10	x20
1 s					
2 s					
3 s					
5 s					
6 s					
7 s					
8 s					
10 s					
20 s					
30 s					
50 s					
60 s					

Time	Jumper				
	1 s	2 s	5 s	x10	x20
70 s					
80 s					
90 s					
100 s					
120 s					
140 s					
150 s					
160 s					
180 s					
210 s					
240 s					

**Details:**

See description of seven-segment display given in the introduction.

<b>P0058</b>	<b>Jumper masking value</b>	<b>Min:</b> 0	<b>Level:</b> <b>4</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U16		<b>Unit:</b> -
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately		<b>QuickComm. No</b>
		<b>Def:</b> 0		
		<b>Max:</b> 511		

Used to allow the user to disable individual functionality of jumper settings.

**Bitfields:**

Bit00	Accumulate ramp time by 1 s	0	NO
		1	YES
Bit01	Accumulate ramp time by 2 s	0	NO
		1	YES
Bit02	Accumulate ramp time by 5 s	0	NO
		1	YES
Bit03	Multiply acc ramp time by 10	0	NO
		1	YES
Bit04	Multiply acc ramp time by 20	0	NO
		1	YES
Bit05	Command source status	0	NO
		1	YES
Bit06	Use DC injection brake	0	NO
		1	YES
Bit07	Use fan curve	0	NO
		1	YES
Bit08	50/60 Hz Jumper status	0	NO
		1	YES

**Details:**

See description of seven-segment display given in the introduction.

<b>r0059</b>	<b>Jumper memory value</b>	<b>Min:</b> -	<b>Level:</b> <b>4</b>	
		<b>Datatype:</b> U16		<b>Unit:</b> -
	<b>P-Group:</b> CONTROL			<b>Max:</b> -
		<b>Def:</b> -		
		<b>Max:</b> -		

After power cycling the values of this parameter will be compared with the current jumper settings. If a change is detected in jumper settings, the parameters associated with a particular jumper will be changed i.e. if a jumper has been put in place or removed since the last power cycle. The current jumper settings are then stored in P0059 for use in the next power cycle.

**Details:**

See description of seven-segment display given in the introduction.

<b>r0067</b>	<b>CO: Act. output current limit</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>	
		<b>Datatype:</b> Float		<b>Unit:</b> A
	<b>P-Group:</b> CONTROL			<b>Max:</b> -
		<b>Def:</b> -		
		<b>Max:</b> -		

Displays valid maximum output current of inverter.

This value is influenced by P0640 (max. output current), the derating characteristics and the thermal motor and inverter protection.

**Dependency:**

P0610 (motor I2t temperature reaction) defines reaction when limit is reached.

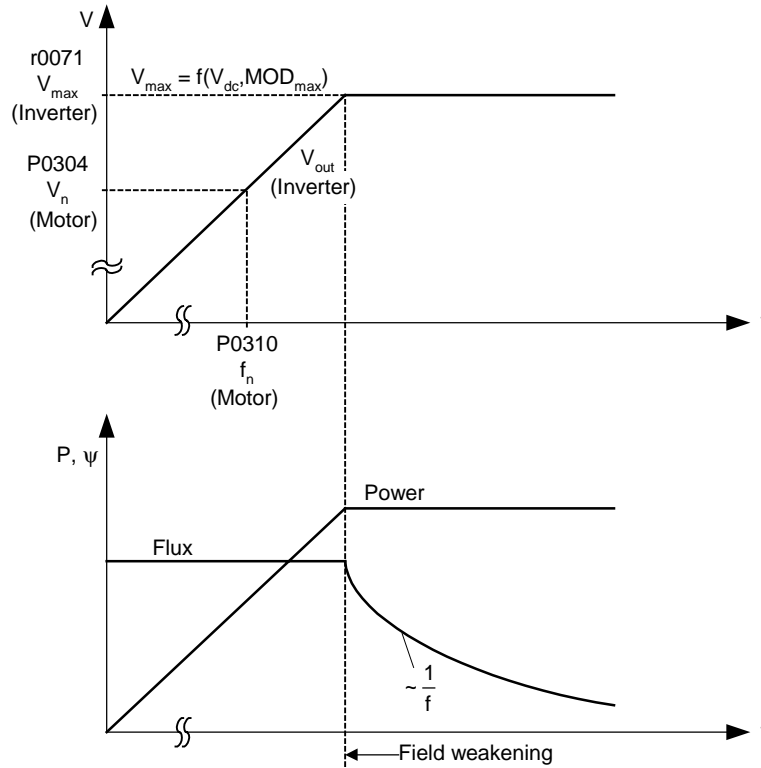
**Note:**

Normally, current limit = rated motor current (P0305) x motor current limit (P0640). It is less than or equal to maximum inverter current r0209.

The current limit may be reduced if the motor thermal model calculation indicates that overheating will occur.

<b>r0071</b>	<b>CO: Max. output voltage</b>	<b>Datatype:</b> Float	<b>Unit:</b> V	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> CONTROL				

Displays maximum output voltage.



**Dependency:**

Actual maximum output voltage depends on the actual input supply voltage.

<b>r0078</b>	<b>CO: Act. current Isq</b>	<b>Datatype:</b> Float	<b>Unit:</b> A	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> CONTROL				

Displays component of torque generating current.

<b>r0084</b>	<b>CO: Act. air gap flux</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>4</b>
	<b>P-Group:</b> CONTROL				

Displays air gap flux in [%] relative to the rated motor flux.

<b>r0086</b>	<b>CO: Act. active current</b>	<b>Datatype:</b> Float	<b>Unit:</b> A	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> CONTROL				

Displays active (real part) of motor current.

**Dependency:**

Applies when V/f control is selected in P1300 (control mode); otherwise, the display shows the value zero.

<b>P0100</b>	<b>Europe / North America</b>	<b>Min:</b> 0	<b>Level:</b> <b>1</b>	
	<b>CStat:</b> C	<b>Datatype:</b> U16		<b>Unit:</b> -
	<b>P-Group:</b> QUICK	<b>Active:</b> first confirm		<b>QuickComm. Yes</b>
		<b>Def:</b> 0		
		<b>Max:</b> 2		

Determines whether power settings (e.g. nominal rating plate power - P0307) are expressed in [kW] or [hp].

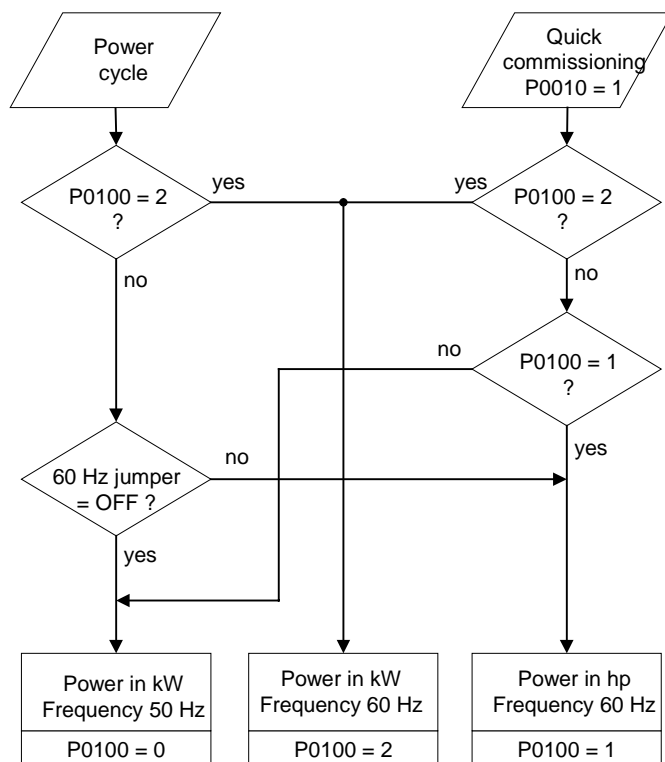
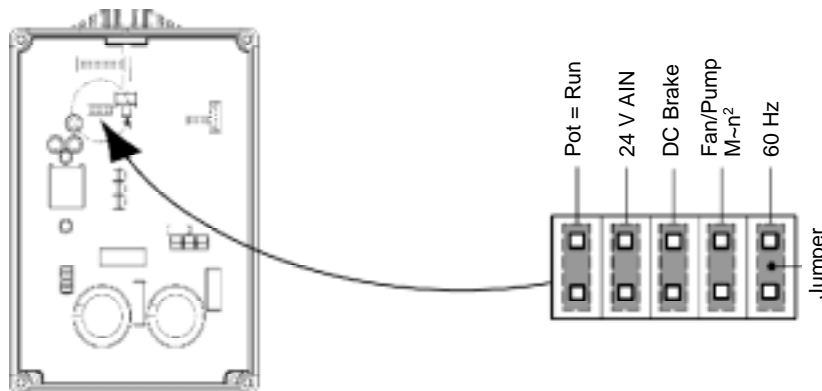
The default settings for the nominal rating plate frequency (P0310) and maximum motor frequency (P1082) are also set automatically here, in addition to reference frequency (P2000).

**Possible Settings:**

- 0 Europe [kW], frequency default 50 Hz
- 1 North America [hp], frequency default 60 Hz
- 2 North America [kW], frequency default 60 Hz

**Dependency:**

The setting of 60 Hz jumper determines the validity of settings 0 and 1 for P0100 according to the diagram below:



Stop drive first (i.e. disable all pulses) before you change this parameter.

P0010 = 1 (commissioning mode) enables changes to be made.

Changing P0100 resets all rated motor parameters as well as other parameters that depend on the rated motor parameters (see P0340 - calculation of motor parameters).

**Notice:**

P0100 setting 2 (==> [kW], frequency default 60 [Hz]) is not overwritten by the setting of 60 Hz jumper (see diagram above).



<b>P0199</b>	<b>Equipment system number</b>	<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> UT <b>Datatype:</b> U16 <b>Unit:</b> - <b>Def:</b> 0	<b>Max:</b> 255	
	<b>P-Group:</b> - <b>Active:</b> first confirm <b>QuickComm. No</b>		

Equipment system number. This parameter has no operation effect.

<b>r0200</b>	<b>Act. power stack code number</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>Datatype:</b> U32 <b>Unit:</b> - <b>Def:</b> -	<b>Max:</b> -	
	<b>P-Group:</b> INVERTER		

Identifies hardware variant as shown in table below.

Code-No.	MM411 MLFB	Input Voltage & Frequency	CT Power kW	Internal Filter	Protection Degree	Frame Size
3001	6SE6411-6UD13-7BAx	3AC380-480V +10% -10% 47-63Hz	0,37	no	IP66	B
3002	6SE6411-6UD15-5BAx	3AC380-480V +10% -10% 47-63Hz	0,55	no	IP66	B
3003	6SE6411-6UD17-5BAx	3AC380-480V +10% -10% 47-63Hz	0,75	no	IP66	B
3004	6SE6411-6UD21-1BAx	3AC380-480V +10% -10% 47-63Hz	1,1	no	IP66	B
3005	6SE6411-6UD21-5BAx	3AC380-480V +10% -10% 47-63Hz	1,5	no	IP66	B
3006	6SE6411-6UD22-2CAx	3AC380-480V +10% -10% 47-63Hz	2,2	no	IP66	C
3007	6SE6411-6UD23-0CAx	3AC380-480V +10% -10% 47-63Hz	3	no	IP66	C
3008	6SE6411-6BD13-7BAx	3AC380-480V +10% -10% 47-63Hz	0,37	Cl. B	IP66	B
3009	6SE6411-6BD15-5BAx	3AC380-480V +10% -10% 47-63Hz	0,55	Cl. B	IP66	B
3010	6SE6411-6BD17-5BAx	3AC380-480V +10% -10% 47-63Hz	0,75	Cl. B	IP66	B
3011	6SE6411-6BD21-1BAx	3AC380-480V +10% -10% 47-63Hz	1,1	Cl. B	IP66	B
3012	6SE6411-6BD21-5BAx	3AC380-480V +10% -10% 47-63Hz	1,5	Cl. B	IP66	B
3013	6SE6411-6BD22-2CAx	3AC380-480V +10% -10% 47-63Hz	2,2	Cl. B	IP66	C
3014	6SE6411-6BD23-0CAx	3AC380-480V +10% -10% 47-63Hz	3	Cl. B	IP66	C

**Notice:**

Parameter r0200 = 0 indicates that no power stack has been identified.

<b>P0201</b>	<b>Power stack code number</b>	<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> C <b>Datatype:</b> U16 <b>Unit:</b> - <b>Def:</b> 0	<b>Max:</b> 65535	
	<b>P-Group:</b> INVERTER <b>Active:</b> first confirm <b>QuickComm. No</b>		

Confirms actual power stack identified.

<b>r0203</b>	<b>Act. inverter type</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>Datatype:</b> U16 <b>Unit:</b> - <b>Def:</b> -	<b>Max:</b> -	
	<b>P-Group:</b> INVERTER		

Type number of actual inverter identified.

**Possible Settings:**

- 1 MICROMASTER 420
- 2 MICROMASTER 440
- 3 MICRO- / COMBIMASTER 411
- 4 MICROMASTER 410
- 5 Reserved
- 6 MICROMASTER 440 PX
- 7 MICROMASTER 430
- 8 MICROMASTER 430 PX

<b>r0204</b>	<b>Power stack features</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>Datatype:</b> U32 <b>Unit:</b> - <b>Def:</b> -	<b>Max:</b> -	
	<b>P-Group:</b> INVERTER		

Displays hardware features of power stack.

**Bitfields:**

Bit00	DC input voltage	0	NO
		1	YES
Bit01	RFI filter	0	NO
		1	YES

**Note:**

Parameter r0204 = 0 indicates that no power stack has been identified.

<b>r0206</b>	<b>Rated inverter power [kW] / [hp]</b>	<b>Min:</b> -	<b>Level:</b> <b>2</b>
	<b>Datatype:</b> Float <b>Unit:</b> - <b>Def:</b> -	<b>Max:</b> -	
	<b>P-Group:</b> INVERTER		

Displays nominal rated motor power from inverter.

**Dependency:**

Value is displayed in [kW] or [hp] depending on setting for P0100 (operation for Europe / North America).

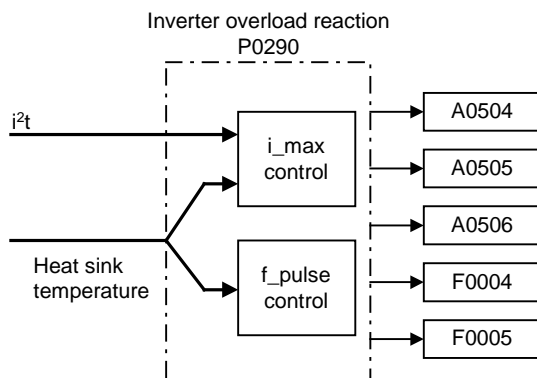
<b>r0207</b>	<b>Rated inverter current</b>	<b>Datatype:</b> Float	<b>Unit:</b> A	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> INVERTER				
Displays maximum continuous output current of inverter.					
<b>r0208</b>	<b>Rated inverter voltage</b>	<b>Datatype:</b> U32	<b>Unit:</b> V	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> INVERTER				
Displays nominal AC supply voltage of inverter.					
<b>Value:</b> r0208 = 400 : 380 - 480 V +/- 10 %					
<b>r0209</b>	<b>Maximum inverter current</b>	<b>Datatype:</b> Float	<b>Unit:</b> A	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> INVERTER				
Displays maximum output current of inverter.					
<b>Dependency:</b> Parameter r0209 depends on the derating which is affected by pulse frequency P1800, ambient temperature and altitude. The data of deration is given in the OPERATING INSRTRUCTION.					
<b>P0210</b>	<b>Supply voltage</b>	<b>Datatype:</b> U16	<b>Unit:</b> V	<b>Min:</b> 0 <b>Def:</b> 230 <b>Max:</b> 1000	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>P-Group:</b> INVERTER	<b>Active:</b> Immediately	<b>QuickComm. No</b>		
Optimizes Vdc controller, which extends the ramp-down time if regenerative energy from motor would otherwise cause DC link overvoltage trips.					
Reducing the value enables controller to cut in earlier and reduce the risk of overvoltage.					
<b>Dependency:</b> Set P1254 ("Auto detect Vdc switch-on levels") = 0. Cut-in levels for Vdc-controller and compound braking are then derived directly from P0210 (supply voltage).					
Vdc_max switch-on level = $1.15 \cdot \sqrt{2} \cdot P0210$					
Compound braking switch-on level = $1.13 \cdot \sqrt{2} \cdot P0210$					
<b>Note:</b> If mains voltage is higher than value entered, automatic deactivation of the Vdc controller may occur to avoid acceleration of the motor. An alarm will be issued in this case (A0910).  Default value is dependant on inverter rated power.					

<b>P0290</b>	<b>Inverter overload reaction</b>	<b>Min:</b> 0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U16		<b>Def:</b> 2
	<b>P-Group:</b> INVERTER	<b>Active:</b> first confirm		<b>QuickComm. No</b> <b>Max:</b> 3

Selects reaction of inverter to an internal over-temperature.

Following physical values influence the inverter overload protection (see diagram):

- heat sink temperature
- inverter I<sup>2</sup>t



**Possible Settings:**

- 0 Reduce output frequency
- 1 Trip (F0004)
- 2 Reduce pulse frequency and output frequency
- 3 Reduce pulse frequency then trip (F0004)

**Notice:**

P0290 = 0:  
Reduction of output frequency is usually only effective if the load is also reduced. This is for example valid for variable torque applications with a quadratic torque characteristic as pumps or fans.

A trip will always result eventually, if the action taken does not sufficiently reduce internal temperature.

The pulse frequency P1800 is normally reduced only if higher than 2 kHz. The actual pulse frequency is displayed in parameter r1801.

<b>P0291</b>	<b>Inverter protection</b>	<b>Min:</b> 0	<b>Level:</b> <b>4</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U16		<b>Def:</b> 1
	<b>P-Group:</b> INVERTER	<b>Active:</b> Immediately		<b>QuickComm. No</b> <b>Max:</b> 1

Control bit 0 for enabling/disabling automatic pulse frequency reduction at output frequencies below 2 Hz.

**Bitfields:**

Bit00	Pulse frequency reduced below 2Hz	0	NO
		1	YES

**Details:**

See P0290 (inverter overload reaction)

<b>P0292</b>	<b>Inverter overload warning</b>	<b>Min:</b> 0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> U16		<b>Def:</b> 5
	<b>P-Group:</b> INVERTER	<b>Active:</b> first confirm		<b>QuickComm. No</b> <b>Max:</b> 25

Defines temperature difference (in [°C]) between inverter over-temperature trip and warning thresholds.

<b>P0294</b>	<b>Inverter I<sup>2</sup>t overload warning</b>	<b>Min:</b> 10.0	<b>Level:</b> <b>4</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Def:</b> 95.0
	<b>P-Group:</b> INVERTER	<b>Active:</b> first confirm		<b>QuickComm. No</b> <b>Max:</b> 100.0

Defines the [%] value at which alarm A0504 (inverter overtemperature) is generated.

Inverter I<sup>2</sup>t calculation is used to estimate a maximum tolerable period for inverter overload. The I<sup>2</sup>t calculation value is deemed = 100 % when this maximum tolerable period is reached.

**Dependency:**

Motor overload factor (P0640) reduced to 100 % at this point.

**Note:**

P0294 = 100 % corresponds to stationary nominal load.

<b>P0300</b>	<b>Select motor type</b>			<b>Min:</b> 1	<b>Level:</b> <b>2</b>
	<b>CStat:</b> C	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 1	
	<b>P-Group:</b> MOTOR	<b>Active:</b> first confirm	<b>QuickComm.</b> Yes	<b>Max:</b> 2	

Selects motor type.

This parameter is required during commissioning to select motor type and optimize inverter performance. Most motors are asynchronous; if in doubt, use the formula below.

$$x = P0310 \cdot \frac{60}{P0311}$$

x = 1, 2, ..., n : Synchronous motor

x ≠ 1, 2, ..., n : Asynchronous motor

If the result is a whole number, the motor is synchronous.

**Possible Settings:**

- 1 Asynchronous motor
- 2 Synchronous motor

**Dependency:**

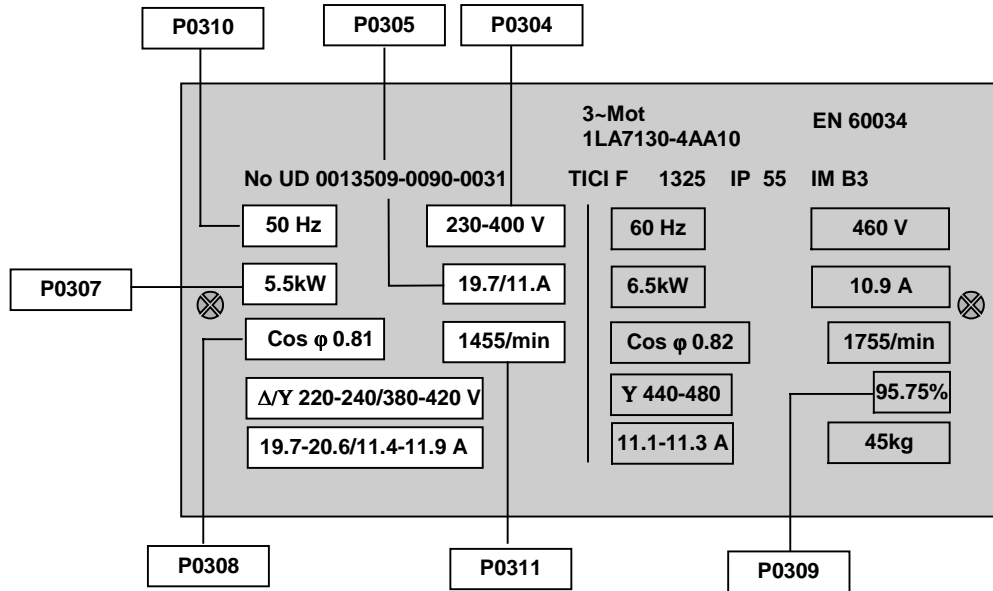
Changeable only when P0010 = 1 (quick commissioning).

If synchronous motor is selected, the following functions are not available:

- P0308 Power factor
- P0309 Motor efficiency
- P0346 Magnetization time
- P0347 Demagnetization time
- P1335 Slip compensation
- P1336 Slip limit
- P0320 Motor magnetizing current
- P0330 Rated motor slip
- P0331 Rated magnetization current
- P0332 Rated power factor
- P0384 Rotor time constant
- P1200, P1202, P1203 Flying start
- P1230, P1232, P1233 DC braking

<b>P0304</b>	<b>Rated motor voltage</b>	<b>Min:</b> 10	<b>Level:</b> <b>1</b>	
	<b>CStat:</b> C	<b>Datatype:</b> U16		<b>Unit:</b> V
	<b>P-Group:</b> MOTOR	<b>Active:</b> first confirm		<b>QuickComm.</b> Yes
		<b>Def:</b> 230		
		<b>Max:</b> 2000		

Nominal motor voltage [V] from rating plate. Following diagram shows a typical rating plate with the locations of the relevant motor data.

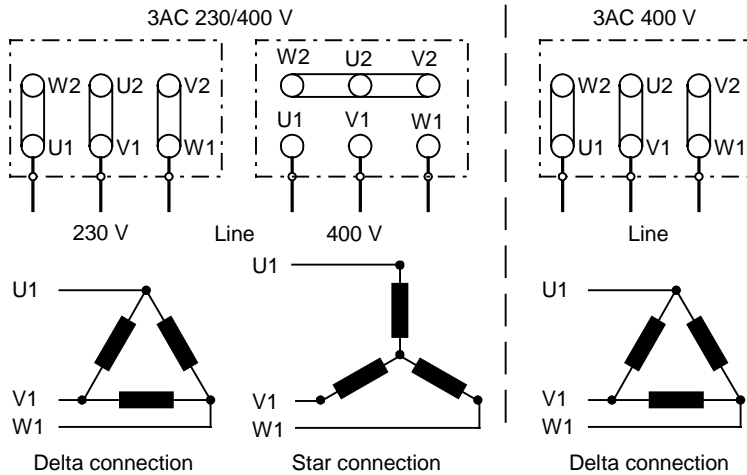


**Dependency:**  
Changeable only when P0010 = 1 (quick commissioning).



**Caution:**  
The input of rating plate data must correspond with the wiring of the motor (star / delta). This means, if delta wiring is used for the motor, delta rating plate data has to be entered.

**Three-phase motor connection**



**Note:**  
Default value is dependant on inverter rated power.

<b>P0305</b>	<b>Rated motor current</b>	<b>Min:</b> 0.01	<b>Level:</b> <b>1</b>	
	<b>CStat:</b> C	<b>Datatype:</b> Float		<b>Unit:</b> A
	<b>P-Group:</b> MOTOR	<b>Active:</b> first confirm		<b>QuickComm.</b> Yes
		<b>Def:</b> 3.25		
		<b>Max:</b> 10000.00		

Nominal motor current [A] from rating plate - see diagram in P0304.

**Dependency:**

Changeable only when P0010 = 1 (quick commissioning).

Depends also on P0320 (motor magnetization current).

**Note:**

The maximum value of P0305 depends on the maximum inverter current r0209 and the motor type:

Asynchronous motor :  $P0305_{max, asyn} = r0209$

Synchronous motor :  $P0305_{max, syn} = 2 \cdot r0209$

It is recommended that the ratio of P0305 (rated motor current) and r0207 (rated inverter current) should not be lower than:

$$U/f \text{ and FCC} : \frac{1}{8} \leq \frac{P0305}{r0207}$$

The absolute minimum value of P0305 is defined as 1/32 times inverter rated current (r0207).

When the relation of the nominal motor current P0305 and half of the maximal inverter current (r0209) exceeds 1,5 an additional current derating is applied. This is necessary to protect the inverter from harmonic current waves.

Default value is dependant on inverter rated power.

<b>P0307</b>	<b>Rated motor power</b>	<b>Min:</b> 0.01	<b>Level:</b> <b>1</b>	
	<b>CStat:</b> C	<b>Datatype:</b> Float		<b>Unit:</b> -
	<b>P-Group:</b> MOTOR	<b>Active:</b> first confirm		<b>QuickComm.</b> Yes
		<b>Def:</b> 0.75		
		<b>Max:</b> 2000.00		

Nominal motor power [kW/hp] from rating plate.

**Dependency:**

If P0100 = 1, values will be in [hp] - see diagram P0304 (rating plate).

Changeable only when P0010 = 1 (quick commissioning).

**Note:**

Default value is dependant on inverter rated power.

<b>P0308</b>	<b>Rated motor cosPhi</b>	<b>Min:</b> 0.000	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> C	<b>Datatype:</b> Float		<b>Unit:</b> -
	<b>P-Group:</b> MOTOR	<b>Active:</b> first confirm		<b>QuickComm.</b> Yes
		<b>Def:</b> 0.000		
		<b>Max:</b> 1.000		

Nominal motor power factor (cosPhi) from rating plate - see diagram P0304.

**Dependency:**

Changeable only when P0010 = 1 (quick commissioning).

Visible only when P0100 = 0 or 2, (motor power entered in [kW]).

Setting 0 causes internal calculation of value (see r0332).

<b>P0309</b>	<b>Rated motor efficiency</b>	<b>Min:</b> 0.0	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> C	<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> MOTOR	<b>Active:</b> first confirm		<b>QuickComm.</b> Yes
		<b>Def:</b> 0.0		
		<b>Max:</b> 99.9		

Nominal motor efficiency in [%] from rating plate.

**Dependency:**

Changeable only when P0010 = 1 (quick commissioning).

Visible only when P0100 = 1, (i.e. motor power entered in [hp]).

Setting 0 causes internal calculation of value (see r0332).

**Note:**

P0309 = 100 % corresponds to superconducting.

**Details:**

See diagram in P0304 (rating plate).

<b>P0310</b>	<b>Rated motor frequency</b>	<b>Min:</b> 12.00	<b>Level:</b> <b>1</b>	
	<b>CStat:</b> C	<b>Datatype:</b> Float		<b>Unit:</b> Hz
	<b>P-Group:</b> MOTOR	<b>Active:</b> first confirm		<b>QuickComm.</b> Yes

Nominal motor frequency [Hz] from rating plate.

**Dependency:**

Changeable only when P0010 = 1 (quick commissioning).

Pole pair number recalculated automatically if parameter is changed.

**Details:**

See diagram in P0304 (rating plate)

<b>P0311</b>	<b>Rated motor speed</b>	<b>Min:</b> 0	<b>Level:</b> <b>1</b>	
	<b>CStat:</b> C	<b>Datatype:</b> U16		<b>Unit:</b> 1/min
	<b>P-Group:</b> MOTOR	<b>Active:</b> first confirm		<b>QuickComm.</b> Yes

Nominal motor speed [rpm] from rating plate.

**Dependency:**

Changeable only when P0010 = 1 (quick commissioning).

Setting 0 causes internal calculation of value.

Required for vector control and V/f control with speed controller.

Slip compensation in V/f control requires rated motor speed for correct operation.

Pole pair number recalculated automatically if parameter is changed.

**Note:**

Default value is dependant on inverter rated power.

**Details:**

See diagram in P0304 (rating plate)

<b>r0313</b>	<b>Motor pole pairs</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>Datatype:</b> U16	<b>Unit:</b> -	
	<b>P-Group:</b> MOTOR	<b>Max:</b> -	

Displays number of motor pole pairs that the inverter is currently using for internal calculations.

**Value:**

r0313 = 1 : 2-pole motor  
r0313 = 2 : 4-pole motor  
etc.

**Dependency:**

Recalculated automatically when P0310 (rated motor frequency) or P0311 (rated motor speed) is changed.

<b>P0320</b>	<b>Motor magnetizing current</b>	<b>Min:</b> 0.0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> MOTOR	<b>Active:</b> Immediately		<b>QuickComm.</b> Yes

Defines motor magnetization current in [%] relative to P0305 (rated motor current).

**Dependency:**

P0320 = 0:

Setting 0 causes calculation by P0340 = 1 (data entered from rating plate) or by P3900 = 1 - 3 (end of quick commissioning). The calculated value is displayed in parameter r0331.

<b>r0330</b>	<b>Rated motor slip</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>Datatype:</b> Float	<b>Unit:</b> %	
	<b>P-Group:</b> MOTOR	<b>Max:</b> -	

Displays nominal motor slip in [%] relative to P0310 (rated motor frequency) and P0311 (rated motor speed).

$$r0330 [\%] = \frac{P0310 - \frac{P0311}{60} \cdot r0313}{P0310} \cdot 100 \%$$

<b>r0331</b>	<b>Rated magnetization current</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>Datatype:</b> Float	<b>Unit:</b> A	
	<b>P-Group:</b> MOTOR	<b>Max:</b> -	

Displays calculated magnetizing current of motor in [A].

<b>r0332</b>	<b>Rated power factor</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>Datatype:</b> Float	<b>Unit:</b> -	
	<b>P-Group:</b> MOTOR	<b>Max:</b> -	

Displays power factor for motor

**Dependency:**

Value is calculated internally if P0308 (rated motor cosPhi) set to 0; otherwise, value entered in P0308 is displayed.

<b>P0335</b>	<b>Motor cooling</b>			<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> MOTOR	<b>Active:</b> first confirm	<b>QuickComm.</b> Yes	<b>Max:</b> 1	

Selects motor cooling system used.

**Possible Settings:**

- 0 Self-cooled: Using shaft mounted fan attached to motor  
1 Force-cooled: Using separately powered cooling fan

**Caution:**

The following combination of parameter setting should not be combined:

P0610 = 1 and P0335 = 0 or 2 :

When P0335 = 0 or 2 the inverter cools the motor using a shaft mounted fan. If this is used in conjunction with P0610 the cooling of the motor will be inefficient.

In essence, if the i2t calculation reduces the output frequency, then the shaft mounted fan will also reduce its cooling effect, the motor will then eventually overheat and trip.

Exception:

Applications with variable torque the reduction of max. current leads automatically to a reduction of the load / output current.

**Notice:**

Motors of series 1LA1 and 1LA8 have an internal fan. This internal motor fan must not be confused with the fan at the end of the motor shaft.

<b>P0340</b>	<b>Calculation of motor parameters</b>			<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> MOTOR	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 1	

Calculates various motor parameters, including:

- P0344 Motor weight  
P0346 Magnetization time  
P0347 Demagnetization time  
P0350 Stator resistance  
P0611 Motor I2t time constant  
P1253 Vdc-controller output limitation  
P1316 Boost end frequency  
P2000 Reference frequency  
P2002 Reference current

**Possible Settings:**

- 0 No calculation  
1 Complete parameterization

**Note:**

This parameter is required during commissioning to optimize inverter performance.

<b>P0344</b>	<b>Motor weight</b>			<b>Min:</b> 1.0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> kg	<b>Def:</b> 9.4	
	<b>P-Group:</b> MOTOR	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 6500.0	

Specifies motor weight [kg].

**Note:**

This value is used in the motor thermal model.

It is normally calculated automatically from P0340 (motor parameters) but can also be entered manually.

Default value is dependant on inverter rated power.

<b>P0346</b>	<b>Magnetization time</b>			<b>Min:</b> 0.000	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> s	<b>Def:</b> 1.000	
	<b>P-Group:</b> MOTOR	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 20.000	

Sets magnetization time [s], i.e. waiting time between pulse enable and start of ramp-up. Motor magnetization builds up during this time.

Magnetization time is normally calculated automatically from the motor data and corresponds to the rotor time constant (r0384).

**Note:**

If boost settings are higher than 100 %, magnetization may be reduced.

Default value is dependant on inverter rated power.

**Notice:**

An excessive reduction of this time can result in insufficient motor magnetization.



<b>P0347</b>	<b>Demagnetization time</b>	<b>Min:</b> 0.000	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> s
	<b>P-Group:</b> MOTOR	<b>Active:</b> Immediately		<b>QuickComm. No</b>
		<b>Def:</b> 1.000		
		<b>Max:</b> 20.000		

Changes time allowed after OFF2 / fault condition, before pulses can be re-enabled.

**Note:**

The demagnetization time is approximately 2.5 x rotor time constant (r0384) in seconds.

Default value is dependant on inverter rated power.

**Notice:**

Not active following a normally completed ramp-down, e.g. after OFF1, OFF3 or JOG.

Overcurrent trips will occur if the time is decreased excessively.

<b>P0350</b>	<b>Stator resistance (line-to-line)</b>	<b>Min:</b> 0.00001	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> Ohm
	<b>P-Group:</b> MOTOR	<b>Active:</b> Immediately		<b>QuickComm. No</b>
		<b>Def:</b> 4.00000		
		<b>Max:</b> 2000.00000		

Stator resistance value in [Ohms] for connected motor (from line-to-line). The parameter value includes the cable resistance.

There are three ways to determine the value for this parameter:

1. Calculate using  
P0340 = 1 (data entered from rating plate) or  
P0010 = 1, P3900 = 1,2 or 3 (end of quick commissioning).
2. Measure using P1910 = 1 (motor data identification - value for stator resistance is overwritten).
3. Measure manually using an Ohmmeter.

**Note:**

Since measured line-to-line, this value may appear to be higher (up to 2 times higher) than expected.

The value entered in P0350 (stator resistance) is the one obtained by the method last used.

Default value is dependant on inverter rated power.

<b>r0370</b>	<b>Stator resistance [%]</b>	<b>Min:</b> -	<b>Level:</b> <b>4</b>	
		<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> MOTOR			<b>Def:</b> -
		<b>Max:</b> -		

Displays standardized stator resistance of motor equivalent circuit (phase value) in [%].

**Note:**

$$100 \% \text{ means : } Z_{ratedmot} \cdot \frac{P0304}{P0305}$$

<b>r0373</b>	<b>Rated stator resistance [%]</b>	<b>Min:</b> -	<b>Level:</b> <b>4</b>	
		<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> MOTOR			<b>Def:</b> -
		<b>Max:</b> -		

Displays rated stator resistance of the motor equivalent circuit (phase value) in [%].

**Note:**

$$100 \% \text{ means : } Z_{ratedmot} \cdot \frac{P0304}{P0305}$$

<b>r0374</b>	<b>Rotor resistance [%]</b>	<b>Min:</b> -	<b>Level:</b> <b>4</b>	
		<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> MOTOR			<b>Def:</b> -
		<b>Max:</b> -		

Displays standardized rotor resistance of the motor equivalent circuit (phase value) in [%].

**Note:**

$$100 \% \text{ means : } Z_{ratedmot} \cdot \frac{P0304}{P0305}$$

<b>r0376</b>	<b>Rated rotor resistance [%]</b>	<b>Min:</b> -	<b>Level:</b> <b>4</b>	
		<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> MOTOR			<b>Def:</b> -
		<b>Max:</b> -		

Displays rated rotor resistance of the motor equivalent circuit (phase value) in [%].

**Note:**

$$100 \% \text{ means : } Z_{ratedmot} \cdot \frac{P0304}{P0305}$$

<b>r0377</b>	<b>Total leakage reactance [%]</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>4</b>
	<b>P-Group:</b> MOTOR				

Displays standardized total leakage reactance of the motor equivalent circuit (phase value) in [%].

**Note:**

$$100 \% \text{ means : } Z_{ratedmot} \cdot \frac{P0304}{P0305}$$

<b>r0382</b>	<b>Main reactance [%]</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>4</b>
	<b>P-Group:</b> MOTOR				

Displays standardized main reactance of the motor equivalent circuit (phase value) in [%].

**Note:**

$$100 \% \text{ means : } Z_{ratedmot} \cdot \frac{P0304}{P0305}$$

<b>r0384</b>	<b>Rotor time constant</b>	<b>Datatype:</b> Float	<b>Unit:</b> ms	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> MOTOR				

Displays calculated rotor time constant [ms].

<b>r0386</b>	<b>Total leakage time constant</b>	<b>Datatype:</b> Float	<b>Unit:</b> ms	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>4</b>
	<b>P-Group:</b> MOTOR				

Displays total leakage time constant of motor.

<b>r0395</b>	<b>CO: Total stator resistance [%]</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> MOTOR				

Displays stator resistance of motor as [%] of combined stator/cable resistance.

**Note:**

$$100 \% \text{ means : } Z_{ratedmot} \cdot \frac{P0304}{P0305}$$

<b>P0399</b>	<b>Motor mirror mode</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> 0 <b>Def:</b> 0 <b>Max:</b> 2	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>P-Group:</b> MOTOR	<b>Active:</b> Immediately	<b>QuickComm. No</b>		

Controls reset state of motor parameters when factory reset performed.

**Possible Settings:**

- 0 No action
- 1 Minimum motor parameter set
- 2 Full motor parameter set

**Note:**

P0399 = 1: Minimum motor parameters stored  
P0304 Rated motor voltage  
P0305 Rated motor current  
P0307 Rated motor power  
P0310 Rated motor frequency  
P0311 Rated motor speed  
P0320 Motor magnetizing current  
P0350 Stator resistance (line-to-line)

P0399 = 2: All motor parameters stored  
P0304 Rated motor voltage  
P0305 Rated motor current  
P0307 Rated motor power  
P0308 Rated motor cosPhi  
P0310 Rated motor frequency  
P0311 Rated motor speed  
P0320 Motor magnetizing current  
P0346 Magnetization time  
P0347 Demagnetization time  
P0350 Stator resistance (line-to-line)

The setting of P399 will be retained after a factory reset.

<b>P0610</b>	<b>Motor I2t temperature reaction</b>				<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 2		
	<b>P-Group:</b> MOTOR	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 2		

Defines reaction when motor I2t reaches warning threshold.

**Possible Settings:**

- 0 No reaction, warning only
- 1 Warning and I<sub>max</sub> reduction (results in reduced output frequency)
- 2 Warning and trip (F0011)

**Dependency:**

Trip level = P0614 (motor I2t overload warning level) \* 110 %

**Note:**

The purpose of motor I<sup>2</sup>t is to calculate or measure the motor temperature and disable the inverter if the motor is in danger of overheating.

The motor temperature will be dependent on many factors, including the size of the motor, the ambient temperature, the previous history of the loading of the motor, and of course, the load current. (The square of the current actually determines the heating of the motor and the temperature rises with time - hence I<sup>2</sup>t).

Because most motors are cooled by built in fans running at motor speed, the speed of the motor is also important. Clearly a motor running at high current (maybe due to boost) and a low speed, will overheat more quickly than one running at 50 or 60 Hz, full load. The MM4 take account of these factors.

The drives also include inverter I<sup>2</sup>t protection (i.e. overheating protection, see P0290) in order to protect the units themselves. This operates independently of the motor I<sup>2</sup>t, and is not described here.

**I<sup>2</sup>t operation:**

The measured motor current (r0027) is compared with the rated motor current (P0305), and other motor parameters (P0304, P0307, etc.), and the temperature of the motor calculated, a calculation which also includes the output frequency (motor speed) to account for fan cooling. If parameter P0335 is changed to indicate a forced cooled motor, the calculation is modified accordingly.

Where parameters are not entered by the user, such as P0344 (motor weight), a calculated value will be used based on a Siemens motor. If required, the motor time constant can be adjusted using P0611, in effect overwriting the calculated value.

The resulting temperature is displayed in % of maximum temperature in r0034. When this value reaches the value set in P0614 (default 100%), a warning A0511 occurs. If no action is taken and the temperature reaches 110%, then the inverter trips, showing F0011. The reaction to the warning can be changed from this default using P0610; for example, the drive can react as though a current limit has occurred, or a fault forced immediately. The warning level of P0614 can also be adjusted to raise and lower the warning or trip level as required.

Parameter r0034 is particularly useful to monitor if the calculated motor temperature is rising excessively.

<b>P0611</b>	<b>Motor I2t time constant</b>				<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> s	<b>Def:</b> 100		
	<b>P-Group:</b> MOTOR	<b>Active:</b> Immediately	<b>QuickComm. No</b>	<b>Max:</b> 16000		

Defines motor thermal time constant and is calculated automatically from the motor data (see P0340).

**Notice:**

A larger number increases the time taken for the calculated motor temperature to change.

Default value is dependant on inverter rated power.

<b>P0614</b>	<b>Motor I2t overload warning level</b>				<b>Min:</b> 0.0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Def:</b> 100.0		
	<b>P-Group:</b> MOTOR	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 400.0		

Defines the [%] value at which alarm A0511 (motor overtemperature) is generated.

Motor I2t calculation is used to estimate a maximum tolerable period (i.e. without overheating) for motor overload. The I2t calculation value is deemed = 100 % when this maximum tolerable period is reached (see r0034).

**Dependency:**

A motor over-temperature trip (F0011) is produced at 110 % of this level.

<b>P0640</b>	<b>Motor overload factor [%]</b>	<b>Min:</b> 10.0	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> MOTOR	<b>Active:</b> Immediately		<b>QuickComm.</b> Yes
		<b>Def:</b> 150.0		
		<b>Max:</b> 400.0		

Defines motor overload current limit in [%] relative to P0305 (rated motor current).

**Dependency:**

Limited to maximum inverter current or to 400 % of rated motor current (P0305), whichever is the lower.

$$P0640_{max} = \frac{\min(r0209, 4 \cdot P0305)}{P0305} \cdot 100$$

**Details:**

See function diagram for current limitation.

<b>P0700</b>	<b>Selection of command source</b>	<b>Min:</b> 0	<b>Level:</b> <b>1</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U16		<b>Unit:</b> -
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm		<b>QuickComm.</b> Yes
		<b>Def:</b> 2		
		<b>Max:</b> 6		

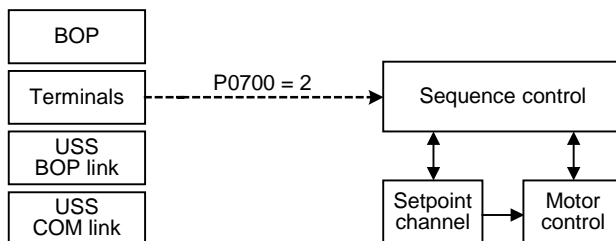
Selects digital command source.

**Possible Settings:**

- 0 Factory default setting
- 1 BOP (keypad)
- 2 Terminal
- 4 USS on BOP link
- 5 USS on COM link
- 6 CB on COM link

**Example:**

Changing from P0700 = 1 to P0700 = 2 sets all digital inputs to default settings.



**Caution:**

If the Inverter is being controlled via the AOP, select USS (with the corresponding interface) for the Command Source. If the AOP is connected to the BOP-Link Interface, then set Parameter P0700 to the value 4 (P0700 = 4).

**Note:**

Changing this parameter sets (to default) all settings on item selected (see table).

	P0700 = 0	P0700 = 1	P0700 = 2	P0700 = 4	P0700 = 6
P0840	722.0	19.0	722.4	2032.0	2090.0
P0844	1.0	19.1	1.0	2032.1	2090.1
P0845	19.1	19.1	19.1	19.1	19.1
P0848	1.0	1.0	1.0	2032.2	2090.2
P0852	1.0	1.0	1.0	2032.3	2090.3
P1035	19.13	19.13	19.13	2032.13	2090.13
P1036	19.14	19.14	19.14	2032.14	2090.14
P1055	0.0	19.8	0.0	2032.8	2090.8
P1056	0.0	0.0	0.0	2032.9	2090.9
P1113	722.1	19.11	722.1	2032.11	2090.11
P1140	1.0	1.0	1.0	2032.4	2090.4
P1141	1.0	1.0	1.0	2032.5	2090.5
P1142	1.0	1.0	1.0	2032.6	2090.6
P2103	722.2	722.2	722.2	722.2	722.2
P2104	0.0	0.0	0.0	2032.7	2090.7
P2235	19.13	19.13	19.13	2032.13	2090.13
P2236	19.14	19.14	19.14	2032.14	2090.14

USS on COM link is not supported on MM411

<b>P0701</b>	<b>Function of digital input 1</b>				<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 1		
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 99		

Selects function of digital input 1.

**Possible Settings:**

- 0 Digital input disabled
- 1 ON/OFF1
- 2 ON reverse /OFF1
- 3 OFF2 - coast to standstill
- 4 OFF3 - quick ramp-down
- 9 Fault acknowledge
- 10 JOG right
- 11 JOG left
- 12 Reverse
- 13 MOP up (increase frequency)
- 14 MOP down (decrease frequency)
- 15 Fixed setpoint (Direct selection)
- 16 Fixed setpoint (Direct selection + ON)
- 17 Fixed setpoint (Binary coded selection + ON)
- 21 Local/remote
- 25 DC brake enable
- 29 External trip
- 33 Disable additional freq setpoint
- 99 Enable BICO parameterization

**Dependency:**

- Setting 99 (enable BICO parameterization) requires
  - P0700 command source or
  - P0010 = 1, P3900 = 1, 2 or 3 quick commissioning or
  - P0010 = 30, P0970 = 1 factory reset in order to reset.

**Notice:**

Setting 99 (BICO) for expert use only.

<b>P0702</b>	<b>Function of digital input 2</b>				<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 12		
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 99		

Selects function of digital input 2.

**Possible Settings:**

- 0 Digital input disabled
- 1 ON/OFF1
- 2 ON reverse /OFF1
- 3 OFF2 - coast to standstill
- 4 OFF3 - quick ramp-down
- 9 Fault acknowledge
- 10 JOG right
- 11 JOG left
- 12 Reverse
- 13 MOP up (increase frequency)
- 14 MOP down (decrease frequency)
- 15 Fixed setpoint (Direct selection)
- 16 Fixed setpoint (Direct selection + ON)
- 17 Fixed setpoint (Binary coded selection + ON)
- 21 Local/remote
- 25 DC brake enable
- 29 External trip
- 33 Disable additional freq setpoint
- 99 Enable BICO parameterization

**Details:**

See P0701 (function of digital input1).

<b>P0703</b>	<b>Function of digital input 3</b>				<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 9		
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 99		

Selects function of digital input 3.

Normally used for PTC sensing motor temperature.

**Possible Settings:**

0	Digital input disabled
1	ON/OFF1
2	ON reverse /OFF1
3	OFF2 - coast to standstill
4	OFF3 - quick ramp-down
9	Fault acknowledge
10	JOG right
11	JOG left
12	Reverse
13	MOP up (increase frequency)
14	MOP down (decrease frequency)
15	Fixed setpoint (Direct selection)
16	Fixed setpoint (Direct selection + ON)
17	Fixed setpoint (Binary coded selection + ON)
21	Local/remote
25	DC brake enable
29	External trip
33	Disable additional freq setpoint
99	Enable BICO parameterization

**Details:**

See P0701 (function of digital input 1).

<b>P0704</b>	<b>Function of digital input 4</b>				<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0		
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 99		

Selects function of digital input 4 (via analog input).

**Possible Settings:**

0	Digital input disabled
1	ON/OFF1
2	ON reverse /OFF1
3	OFF2 - coast to standstill
4	OFF3 - quick ramp-down
9	Fault acknowledge
10	JOG right
11	JOG left
12	Reverse
13	MOP up (increase freq.)
14	MOP down (decrease freq.)
21	Local/remote
25	DC brake enable
29	External trip
33	Disable additional freq setpoint
99	Enable BICO parameterization

**Details:**

See P0701 (function of digital input 1).

<b>P0705</b>	<b>Function of digital input 5</b>				<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0		
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 99		

Selects function of digital input 5 (via Control Pot). Options 15,16 and 17 have no effect for MM411.

**Possible Settings:**

0	Digital input disabled
1	ON/OFF1
2	ON reverse /OFF1
3	OFF2 - coast to standstill
4	OFF3 - quick ramp-down
9	Fault acknowledge
10	JOG right
11	JOG left
12	Reverse
13	MOP up (increase frequency)
14	MOP down (decrease frequency)
15	Fixed setpoint (Direct selection)
16	Fixed setpoint (Direct selection + ON)
17	Fixed setpoint (Binary coded selection + ON)
21	Local/remote
25	DC brake enable
29	External trip
33	Disable additional freq setpoint
99	Enable BICO parameterization

**Details:**

See P0701 (function of digital input 1).

<b>P0719[2]</b>	<b>Selection of cmd. &amp; freq. setp.</b>				<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0		
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 66		

Central switch to select control command source for inverter.

Switches command and setpoint source between freely programmable BICO parameters and fixed command/setpoint profiles. Command and setpoint sources can be changed independently.

The tens digit chooses the command source and the units digit chooses the setpoint source.

The two indices of this parameter are used for local/remote switching. The local/remote signal switches between these settings.

The default setting is 0 for the first index (i.e. normal parameterization is active).

The second index is for control via BOP (i.e. activating the local/remote signal will then switch to BOP).

**Possible Settings:**

0	Cmd = BICO parameter	Setpoint = BICO parameter
1	Cmd = BICO parameter	Setpoint = MOP setpoint
2	Cmd = BICO parameter	Setpoint = Analog setpoint
3	Cmd = BICO parameter	Setpoint = Fixed frequency
4	Cmd = BICO parameter	Setpoint = USS on BOP link
5	Cmd = BICO parameter	Setpoint = USS on COM link
6	Cmd = BICO parameter	Setpoint = CB on COM link
10	Cmd = BOP	Setpoint = BICO parameter
11	Cmd = BOP	Setpoint = MOP setpoint
12	Cmd = BOP	Setpoint = Analog setpoint
13	Cmd = BOP	Setpoint = Fixed frequency
15	Cmd = BOP	Setpoint = USS on COM link
16	Cmd = BOP	Setpoint = CB on COM link
40	Cmd = USS on BOP link	Setpoint = BICO parameter
41	Cmd = USS on BOP link	Setpoint = MOP setpoint
42	Cmd = USS on BOP link	Setpoint = Analog setpoint
43	Cmd = USS on BOP link	Setpoint = Fixed frequency
44	Cmd = USS on BOP link	Setpoint = USS on BOP link
45	Cmd = USS on BOP link	Setpoint = USS on COM link
46	Cmd = USS on BOP link	Setpoint = CB on COM link
60	Cmd = CB on COM link	Setpoint = BICO parameter
61	Cmd = CB on COM link	Setpoint = MOP setpoint
62	Cmd = CB on COM link	Setpoint = Analog setpoint
63	Cmd = CB on COM link	Setpoint = Fixed frequency
64	Cmd = CB on COM link	Setpoint = USS on BOP link
66	Cmd = CB on COM link	Setpoint = CB on COM link

**Index:**

P0719[0] : 1st Control source (Remote)

P0719[1] : 2nd Control source (Local)

**Note:**

If set to a value other than 0 (i.e. BICO parameter is not the setpoint source), P0844 / P0848 (first source of OFF2 / OFF3) are not effective; instead, P0845 / P0849 (second source of OFF2 / OFF3) apply and the OFF commands are obtained via the particular source defined.

BICO connections made previously remain unchanged.

USS on COM link is not supported on MM411

<b>r0720</b>	<b>Number of digital inputs</b>				<b>Min:</b> -	<b>Level:</b> <b>3</b>
		<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> -		
	<b>P-Group:</b> COMMANDS			<b>Max:</b> -		

Displays number of digital inputs.



<b>r0722</b>	<b>CO/BO: Binary input values</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> COMMANDS				

Displays status of digital inputs.

**Bitfields:**

Bit00	Digital input 1	0	OFF
		1	ON
Bit01	Digital input 2	0	OFF
		1	ON
Bit02	Digital input 3	0	OFF
		1	ON
Bit03	Digital input 4 (via ADC)	0	OFF
		1	ON
Bit04	Digital input 5 (via POT)	0	OFF
		1	ON

**Note:**

Segment is lit when signal is active.

<b>P0724</b>	<b>Debounce time for digital inputs</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> 0 <b>Def:</b> 3 <b>Max:</b> 3	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>P-Group:</b> COMMANDS	<b>Active:</b> Immediately	<b>QuickComm. No</b>		

Defines debounce time (filtering time) used for digital inputs.

**Possible Settings:**

0	No debounce time
1	2.5 ms debounce time
2	8.2 ms debounce time
3	12.3 ms debounce time

<b>r0730</b>	<b>Number of digital outputs</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMMANDS				

Displays number of digital outputs (relays).

<b>P0731</b>	<b>BI: Function of digital output 1</b>	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Min:</b> 0:0 <b>Def:</b> 52:3 <b>Max:</b> 4000:0	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm. No</b>		

Defines source of digital output 1.

**Common Settings:**

52.0	Drive ready	0	Closed
52.1	Drive ready to run	0	Closed
52.2	Drive running	0	Closed
52.3	Drive fault active	0	Closed
52.4	OFF2 active	1	Closed
52.5	OFF3 active	1	Closed
52.6	Switch on inhibit active	0	Closed
52.7	Drive warning active	0	Closed
52.8	Deviation setpoint/actual value	1	Closed
52.9	PZD control (Process Data Control)	0	Closed
52.A	Maximum frequency reached	0	Closed
52.B	Warning: Motor current limit	1	Closed
52.C	Motor holding brake (MHB) active	0	Closed
52.D	Motor overload	1	Closed
52.E	Motor running direction right	0	Closed
52.F	Inverter overload	1	Closed
53.0	DC brake active	0	Closed
53.1	Act. freq. f_act >= P2167 (f_off)	0	Closed
53.2	Act. freq. f_act > P1080 (f_min)	0	Closed
53.3	Act. current r0027 >= P2170	0	Closed
53.4	Act. freq. f_act > P2155 (f_1)	0	Closed
53.5	Act. freq. f_act <= P2155 (f_1)	0	Closed
53.6	Act. freq. f_act >= setpoint	0	Closed
53.7	Act. Vdc r0026 < P2172	0	Closed
53.8	Act. Vdc r0026 > P2172	0	Closed
53.A	PID output r2294 == P2292 (PID_min)	0	Closed
53.B	PID output r2294 == P2291 (PID_max)	0	Closed
2091.F	Control word 2, Bit 15 for CB (PROFIBUS)	1	Closed

<b>r0747</b>	<b>CO/BO: State of digital outputs</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMMANDS				
	Displays status of digital outputs (also includes inversion of digital outputs via P0748).				
	<b>Bitfields:</b>				
	Bit00	Digital output 1 energized		0 NO 1 YES	
	<b>Dependency:</b>				
	Bit 0 = 0 :	Relay de-energized / contacts open			
	Bit 0 = 1 :	Relay energized / contacts closed			
<b>P0748</b>	<b>Invert digital outputs</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> 0 <b>Def:</b> 0 <b>Max:</b> 1	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Active:</b> first confirm	<b>QuickComm.</b> No		
	<b>P-Group:</b> COMMANDS				
	Defines high and low states of relay for a given function.				
	<b>Bitfields:</b>				
	Bit00	Invert digital output 1		0 NO 1 YES	
<b>r0750</b>	<b>Number of ADCs</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> TERMINAL				
	Displays number of analog inputs available.				
<b>r0751</b>	<b>BO: Status word of ADC</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>4</b>
	<b>P-Group:</b> TERMINAL				
	Displays status of analog input.				
	<b>Bitfields:</b>				
	Bit00	Signal lost on ADC 1		0 NO 1 YES	
<b>r0752[2]</b>	<b>Act. input of ADC [V]</b>	<b>Datatype:</b> Float	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> TERMINAL				
	Displays smoothed analog input value in volts before the characteristic block.				
	<b>Index:</b>	index[1]: Control Potentionmeter			
		r0752[0] : Analog input 1 (ADC 1)			
		r0752[1] : Analog input 2 (ADC 2)			
<b>P0753</b>	<b>Smooth time ADC</b>	<b>Datatype:</b> U16	<b>Unit:</b> ms	<b>Min:</b> 0 <b>Def:</b> 3 <b>Max:</b> 10000	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Active:</b> first confirm	<b>QuickComm.</b> No		
	<b>P-Group:</b> TERMINAL				
	Defines filter time (PT1 filter) in [ms] for analog input.				
	<b>Note:</b>	Increasing this time (smooth) reduces jitter but slows down response to the analog input.			
	P0753 = 0 : No filtering				
<b>r0754[2]</b>	<b>Act. ADC value after scaling [%]</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> TERMINAL				
	Shows smoothed value of analog input in [%] after scaling block.				
	<b>Index:</b>	index[1]: Control Potentionmeter			
		r0754[0] : Analog input 1 (ADC 1)			
		r0754[1] : Analog input 2 (ADC 2)			
	<b>Dependency:</b>	P0757 to P0760 define range (ADC scaling).			

<b>r0755[2]</b>	<b>CO: Act. ADC after scal. [4000h]</b>	<b>Min:</b> -	<b>Level:</b> <b>2</b>
	<b>Datatype:</b> l16	<b>Unit:</b> -	
<b>P-Group:</b> TERMINAL			

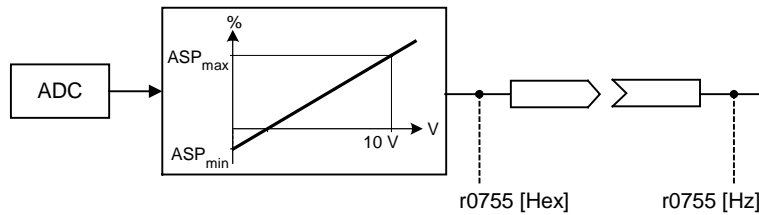
Displays analog input, scaled using ASPmin and ASPmax.

Analog setpoint (ASP) from the analog scaling block can vary from min. analog setpoint (ASPmin) to a max. analog setpoint (ASPmax) as shown in P0757 (ADC scaling).

The largest magnitude (value without sign) of ASPmin and ASPmax defines the scaling of 16384.

index[1]: Control Potentionmeter

By associating parameter r0755 with an internal value (e.g. frequency setpoint), a scaled value is calculated internally by the MM4. The frequency value is calculated using the following equation:



$$r0755 [Hz] = \frac{r0755 [Hex]}{4000 [Hex]} \cdot P2000 \cdot \frac{\max(|ASP_{max}|, |ASP_{min}|)}{100\%}$$

**Index:**

- r0755[0] : Analog input 1 (ADC 1)
- r0755[1] : Analog input 2 (ADC 2)

**Example:**

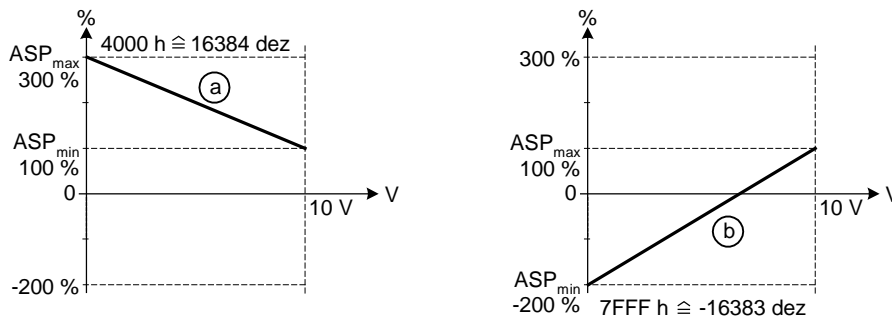
Case a:

ASPmin = 300 %, ASPmax = 100 % then 16384 represents 300 %. This parameter will vary from 5461 to 16384.

Case b:

ASPmin = -200 %, ASPmax = 100 % then 16384 represents 200 %. This parameter will vary from -16384 to +8192.

$$4000 h = \max(|ASP_{max}|, |ASP_{min}|)$$



**Note:**

This value is used as an input to analog BICO connectors.

ASPmax represents the highest analog setpoint (this may be at 10 V).

ASPmin represents the lowest analog setpoint (this may be at 0 V).

**Details:**

See parameters P0757 to P0760 (ADC scaling)

<b>P0756</b>	<b>Type of ADC</b>			<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> TERMINAL	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 1	

Defines type of analog input and also enables analog input monitoring.

**Possible Settings:**

- 0 Unipolar voltage input (0 to +10 V)
- 1 Unipolar voltage input with monitoring (0 to 10 V)

**Dependency:**

Function disabled if analog scaling block programmed to output negative setpoints (see P0757 to P0760).

**Notice:**

When monitoring is enabled and a deadband defined (P0761), a fault condition will be generated (F0080) if the analog input voltage falls below 50 % of the deadband voltage.

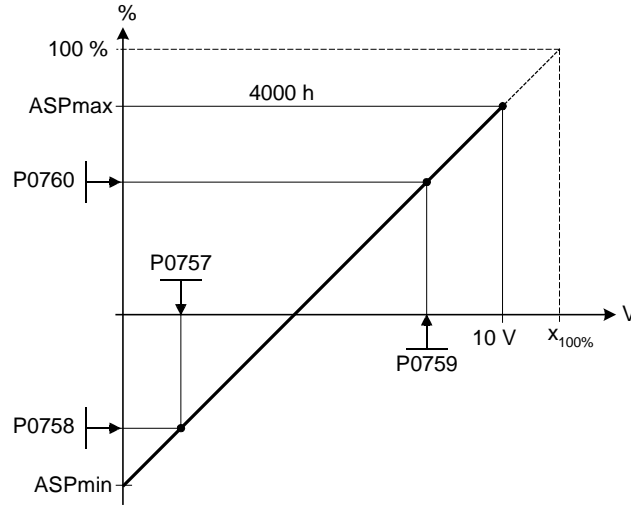
**Details:**

See P0757 to P0760 (ADC scaling).

<b>P0757</b>	<b>Value x1 of ADC scaling [V]</b>			<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> V	<b>Def:</b> 0	
	<b>P-Group:</b> TERMINAL	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 10	

Parameters P0757 - P0760 configure the input scaling as shown in the diagram:

**P0761 = 0**



Where:

Analog setpoints represent a [%] of the normalized frequency in P2000.  
 Analog setpoints may be larger than 100 %.  
 ASPmax represents highest analog setpoint (this may be at 10 V).  
 ASPmin represents lowest analog setpoint (this may be at 0 V).  
 Default values provide a scaling of 0 V = 0 %, and 10 V = 100 %.

**Note:**

The ADC-linear characteristic is described by 4 coordinates, based on a two-point equation:

$$\frac{y - P0758}{x - P0757} = \frac{P0760 - P0758}{P0759 - P0757}$$

For calculations the point-gradient form (offset and gradient) is more advantageous:

$$y = m \cdot x + y_0$$

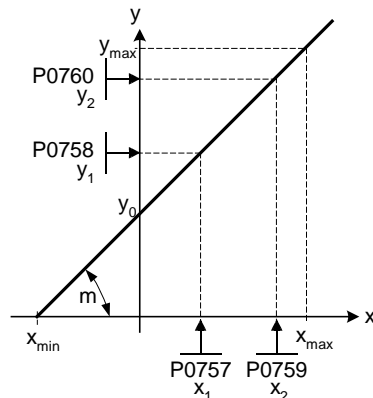
The transformation between these two forms is given by:

$$m = \frac{P0760 - P0758}{P0759 - P0757} \quad y_0 = \frac{P0758 \cdot P0759 - P0757 \cdot P0760}{P0759 - P0757}$$

For scaling of the input the value of y\_max and x\_min has to be determined. This is done by the following equations:

$$x_{min} = \frac{P0760 \cdot P0757 - P0758 \cdot P0759}{P0760 - P0758}$$

$$y_{max} = (x_{max} - x_{min}) \cdot \frac{P0760 - P0758}{P0759 - P0757}$$



**Notice:**

The value x2 of ADC scaling P0759 must be greater than the value x1 of ADC scaling P0757.

<b>P0758</b>	<b>Value y1 of ADC scaling</b>	<b>Min:</b> -99999.9	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Def:</b> 0.0
	<b>P-Group:</b> TERMINAL	<b>Active:</b> first confirm	<b>QuickComm. No</b> <b>Max:</b> 99999.9

Sets value of Y1 in [%] as described in P0757 (ADC scaling)

**Dependency:**

Affects P2000 to P2003 (reference frequency, voltage, current or torque) depending on which setpoint is to be generated.

<b>P0759</b>	<b>Value x2 of ADC scaling [V]</b>	<b>Min:</b> 0	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Def:</b> 10
	<b>P-Group:</b> TERMINAL	<b>Active:</b> first confirm	<b>QuickComm. No</b> <b>Max:</b> 10

Sets value of X2 as described in P0757 (ADC scaling).

**Notice:**

The value x2 of ADC scaling P0759 must be greater than the value x1 of ADC scaling P0757.

<b>P0760</b>	<b>Value y2 of ADC scaling</b>	<b>Min:</b> -99999.9	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Def:</b> 100.0
	<b>P-Group:</b> TERMINAL	<b>Active:</b> first confirm	<b>QuickComm. No</b> <b>Max:</b> 99999.9

Sets value of Y2 in [%] as described in P0757 (ADC scaling).

**Dependency:**

Affects P2000 to P2003 (reference frequency, voltage, current or torque) depending on which setpoint is to be generated.

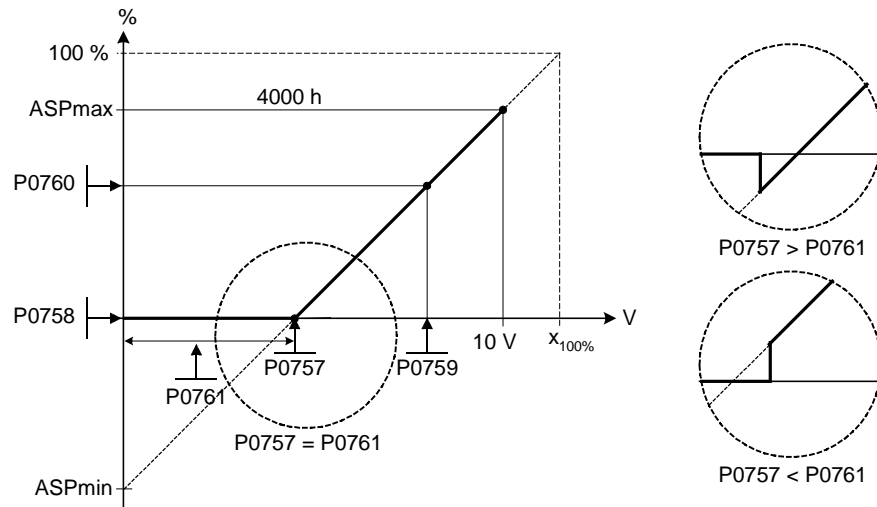
<b>P0761</b>	<b>Width of ADC deadband [V]</b>			<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> V	<b>Def:</b> 0	
	<b>P-Group:</b> TERMINAL	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 10	

Defines width of deadband on analog input. The diagrams below explain its use.

**Example:**

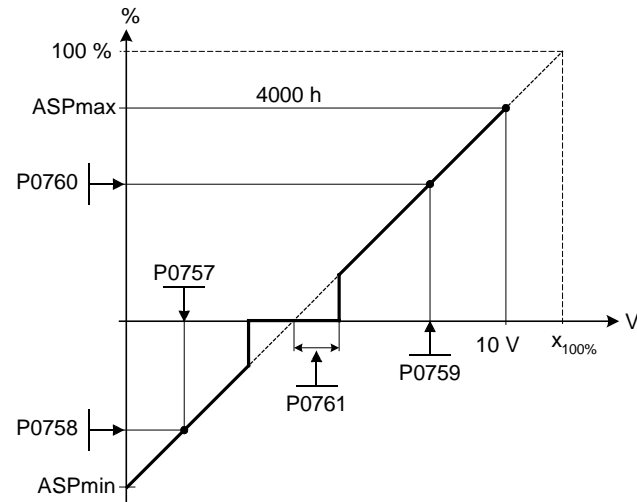
ADC value 2 to 10 V (0 to 50 Hz)  
 The below example produces a 2 to 10 V analog input (0 to 50 Hz):  
 P2000 = 50 Hz  
 P0759 = 8 V P0760 = 75 %  
 P0757 = 2 V P0758 = 0 %  
 P0761 = 2 V  
 P0756 = 0 or 1

**P0761 > 0**  
**0 < P0758 < P0760 || 0 > P0758 > P0760**



ADC value 0 to 10 V (-50 to +50 Hz):  
 The below example produces a 0 to 10 V analog input (-50 to +50 Hz) with center zero and a "holding point" 0.2 V wide (0.1 V to each side of center).  
 P2000 = 50 Hz  
 P0759 = 8 V P0760 = 75 %  
 P0757 = 2 V P0758 = -75 %  
 P0761 = 0.1 V  
 P0756 = 0 or 1

**P0761 > 0**  
**P0758 < 0 < P0760**



**Note:**  
 P0761[x] = 0 : No deadband active.

**Notice:**

Deadband starts from 0 V to value of P0761, if both values of P0758 and P0760 (y coordinates of ADC scaling) are positive or negative respectively. However, deadband is active in both directions from point of intersection (x axis with ADC scaling curve), if sign of P0758 and P0760 are opposite.

Min. frequency P1080 should be zero when using center zero setup. There is no hysteresis at the end of the deadband.

<b>P0762</b>	<b>Delay for loss of signal action</b>				<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> ms	<b>Def:</b> 10		
	<b>P-Group:</b> TERMINAL	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 10000		

Defines time delay between loss of analog setpoint and appearance of fault code F0080.

**Note:**

Expert users can choose the desired reaction to F0080 (default is OFF2).

<b>P0800</b>	<b>BI: Download parameter set 0</b>				<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 0:0		
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 4000:0		

Defines source of command to start download of parameter set 0 from attached AOP. The first three digits describe the parameter number of the command source, the last digit refers to the bit setting for that parameter.

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)

**Note:**

Signal of digital input:  
 0 = No download  
 1 = Start download parameter set 0 from AOP.

<b>P0801</b>	<b>BI: Download parameter set 1</b>				<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 0:0		
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 4000:0		

Defines sources of command to start download of parameter set 1 from attached AOP. The first three digits describe the parameter number of the command source, the last digit refers to the bit setting for that parameter.

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)

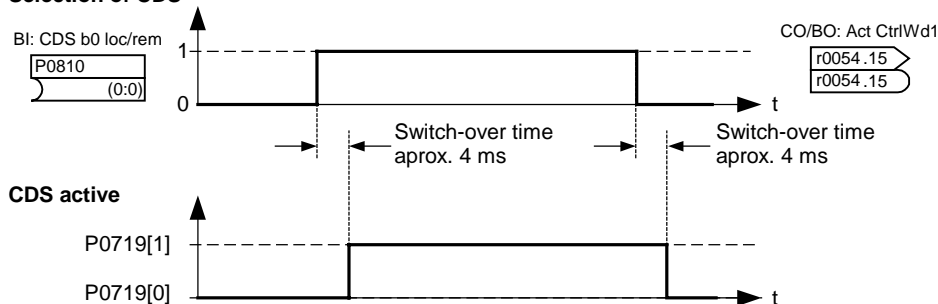
**Note:**

Signal of digital input:  
 0 = No download  
 1 = Start download parameter set 1 from AOP.

<b>P0810</b>	<b>BI: CDS bit 0 (Local / Remote)</b>				<b>Min:</b> 0:0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 0:0		
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 4095:0		

Selects command source from which to read Bit 0 for selecting a command data set (CDS).

**Selection of CDS**



**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)



<b>P0840</b>	<b>BI: ON/OFF1</b>			<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 722:0	
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 4000:0	

Allows ON/OFF1 command source to be selected using BICO. The first three digits describe the parameter number of the command source; the last digit denotes the bit setting for that parameter.

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

19.0 = ON/OFF1 via BOP

**Dependency:**

Active only when P0719 = 0 (remote selection of command/setpoint source).

BICO requires P0700 set to 2 (enable BICO).

The default setting (ON right) is digital input 1 (722.0). Alternative source possible only when function of digital input 1 is changed (via P0701) before changing value of P0840.

<b>P0842</b>	<b>BI: ON reverse/OFF1</b>			<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 0:0	
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 4000:0	

Allows ON/OFF1 reverse command source to be selected using BICO. The first three digits describe the parameter number of the command source and the last digit denotes the bit setting for that parameter.

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

19.0 = ON/OFF1 via BOP

**Dependency:**

Active only when P0719 = 0 (remote selection of command/setpoint source).

<b>P0844</b>	<b>BI: 1. OFF2</b>			<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 1:0	
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 4000:0	

Defines first source of OFF2 when P0719 = 0 (BICO). The first three digits describe the parameter number of the command source and the last digit denotes the bit setting for that parameter.

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

19.0 = ON/OFF1 via BOP

19.1 = OFF2: Electrical stop via BOP

**Dependency:**

Active only when P0719 = 0 (remote selection of command/setpoint source).

If one of the digital inputs is selected for OFF2, the inverter will not run unless the digital input is active.

**Note:**

OFF2 means immediate pulse-disabling; the motor is coasting.

OFF2 is low-active, i.e. :

0 = Pulse disabling.

1 = Operating condition.

<b>P0845</b>	<b>BI: 2. OFF2</b>			<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 19:1	
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 4000:0	

Defines second source of OFF2. The first three digits describe the parameter number of the command source and the last digit denotes the bit setting for that parameter.

**Common Settings:**

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)  
 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)  
 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)  
 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

19.0 = ON/OFF1 via BOP

**Dependency:**

In contrast to P0844 (first source of OFF2), this parameter is always active, independent of P0719 (selection of command and frequency setpoint).

If one of the digital inputs is selected for OFF2, the inverter will not run unless the digital input is active.

**Note:**

OFF2 means immediate pulse-disabling; the motor is coasting.

OFF2 is low-active, i.e. :  
 0 = Pulse disabling.  
 1 = Operating condition.

<b>P0848</b>	<b>BI: 1. OFF3</b>			<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 1:0	
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 4000:0	

Defines first source of OFF3 when P0719 = 0 (BICO). The first three digits describe the parameter number of the command source and the last digit denotes the bit setting for that parameter.

**Common Settings:**

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)  
 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)  
 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)  
 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

19.0 = ON/OFF1 via BOP

**Dependency:**

Active only when P0719 = 0 (remote selection of command/setpoint source).

If one of the digital inputs is selected for OFF3, the inverter will not run unless the digital input is active.

**Note:**

OFF3 means fast ramp-down to 0.

OFF3 is low-active, i.e.  
 0 = Ramp-down.  
 1 = Operating condition.

<b>P0849</b>	<b>BI: 2. OFF3</b>			<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 1:0	
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 4000:0	

Defines second source of OFF3. The first three digits describe the parameter number of the command source and the last digit denotes the bit setting for that parameter.

**Common Settings:**

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)  
 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)  
 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)  
 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

19.0 = ON/OFF1 via BOP

**Dependency:**

In contrast to P0848 (first source of OFF3), this parameter is always active, independent of P0719 (selection of command and frequency setpoint).

If one of the digital inputs is selected for OFF3, the inverter will not run unless the digital input is active.

**Note:**

OFF3 means fast ramp-down to 0.

OFF3 is low-active, i.e.  
 0 = Ramp-down.  
 1 = Operating condition.

<b>P0852</b>	<b>BI: Pulse enable</b>			<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 1:0	
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 4000:0	

Defines source of pulse enable/disable signal.

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

**Dependency:**

Active only when P0719 = 0 (remote selection of command/setpoint source).

<b>P0918</b>	<b>CB address</b>			<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 3	
	<b>P-Group:</b> COMM	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 65535	

Defines address of CB (communication board) or address of the other option modules.

There are two ways to set the bus address:  
 1 via DIP switches on the PROFIBUS module  
 2 via a user-entered value

**Note:**

Possible PROFIBUS settings:  
 1 ... 125  
 0, 126, 127 are not allowed

The following applies when a PROFIBUS module is used:  
 DIP switch = 0 Address defined in P0918 (CB address) is valid  
 DIP switch not = 0 DIP switch setting has priority and P0918 indicates DIP switch setting.

<b>P0927</b>	<b>Parameter changeable via</b>			<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 15	
	<b>P-Group:</b> COMM	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 15	

Specifies the interfaces which can be used to change parameters.

**Bitfields:**

Bit00	PROFIBUS / CB	0	NO
		1	YES
Bit01	BOP	0	NO
		1	YES
Bit02	USS on BOP link	0	NO
		1	YES
Bit03	USS on COM link	0	NO
		1	YES

**Example:**

"b - - n n" (bits 0, 1, 2 and 3 set) in the default setting means that parameters can be changed via any interface.

"b - - r n" (bits 0, 1 and 3 set) would specify that parameters can be changed via PROFIBUS/CB, BOP and USS on COM link (RS485 USS) but not via USS on BOP link (RS232).

**Note:**

USS on COM link is not supported on MM411

**Details:**

The seven-segment display is explained in the "Introduction to MICROMASTER System Parameters" in this handbook.

<b>r0947[8]</b>	<b>Last fault code</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> ALARMS				

Displays fault history according to the diagram below

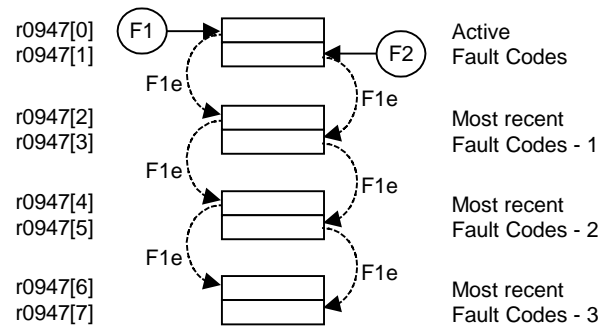
where:

"F1" is the first active fault (not yet acknowledged).

"F2" is the second active fault (not yet acknowledged).

"F1e" is the occurrence of the fault acknowledgement for F1 & F2.

This moves the value in the 2 indices down to the next pair of indices, where they are stored. Indices 0 & 1 contain the active faults. When faults are acknowledged, indices 0 & 1 are reset to 0.



**Index:**

r0947[0] : Recent fault trip --, fault 1  
 r0947[1] : Recent fault trip --, fault 2  
 r0947[2] : Recent fault trip -1, fault 3  
 r0947[3] : Recent fault trip -1, fault 4  
 r0947[4] : Recent fault trip -2, fault 5  
 r0947[5] : Recent fault trip -2, fault 6  
 r0947[6] : Recent fault trip -3, fault 7  
 r0947[7] : Recent fault trip -3, fault 8

**Example:**

If the inverter trips on undervoltage and then receives an external trip before the undervoltage is acknowledged, you will obtain:

r0947[0] = 3 Undervoltage (F0003)  
 r0947[1] = 85 External trip (F0085)

Whenever a fault in index 0 is acknowledged (F1e), the fault history shifts as indicated in the diagram above.

**Dependency:**

Index 1 used only if second fault occurs before first fault is acknowledged.

**Details:**

See "Faults and Warnings"

<b>r0948[12]</b>	<b>Fault time</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> ALARMS				

Time stamp to indicate when the fault has occurred. P2114 (run-time counter) or P2115 (real time clock) are the possible sources of the time stamp.

**Index:**

r0948[0] : Recent fault trip --, fault time seconds+minutes  
 r0948[1] : Recent fault trip --, fault time hours+days  
 r0948[2] : Recent fault trip --, fault time month+year  
 r0948[3] : Recent fault trip -1, fault time seconds+minutes  
 r0948[4] : Recent fault trip -1, fault time hours+days  
 r0948[5] : Recent fault trip -1, fault time month+year  
 r0948[6] : Recent fault trip -2, fault time seconds+minutes  
 r0948[7] : Recent fault trip -2, fault time hours+days  
 r0948[8] : Recent fault trip -2, fault time month+year  
 r0948[9] : Recent fault trip -3, fault time seconds+minutes  
 r0948[10] : Recent fault trip -3, fault time hours+days  
 r0948[11] : Recent fault trip -3, fault time month+year

**Example:**

The time is taken from P2115 if this parameter has been updated with the real time. If not, P2114 is used.

**Note:**

P2115 can be updated via AOP, Starter, DriveMonitor, etc.

<b>r0949[8]</b>	<b>Fault value</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> ALARMS				

Displays drive fault values. It is for service purposes and indicate the type of fault reported. The values are not documented. They are listed in the code where faults are reported.

**Index:**

- r0949[0] : Recent fault trip --, fault value 1
- r0949[1] : Recent fault trip --, fault value 2
- r0949[2] : Recent fault trip -1, fault value 3
- r0949[3] : Recent fault trip -1, fault value 4
- r0949[4] : Recent fault trip -2, fault value 5
- r0949[5] : Recent fault trip -2, fault value 6
- r0949[6] : Recent fault trip -3, fault value 7
- r0949[7] : Recent fault trip -3, fault value 8

<b>P0952</b>	<b>Total number of faults</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> 0 <b>Def:</b> 0 <b>Max:</b> 8	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Active:</b> first confirm	<b>QuickComm. No</b>		
	<b>P-Group:</b> ALARMS				

Displays number of faults stored in P0947 (last fault code).

**Dependency:**

Setting 0 resets fault history. (changing to 0 also resets parameter r0948 - fault time).

<b>r0964[5]</b>	<b>Firmware version data</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM				

Firmware version data.

**Index:**

- r0964[0] : Company (Siemens = 42)
- r0964[1] : Product type
- r0964[2] : Firmware version
- r0964[3] : Firmware date (year)
- r0964[4] : Firmware date (day/month)

**Example:**

No.	Value	Meaning
r0964[0]	42	SIEMENS
r0964[1]	1001	MICROMASTER 420
	1002	MICROMASTER 440
	1003	MICRO- / COMBIMASTER 411
	1004	MICROMASTER 410
	1005	reserved
	1006	MICROMASTER 440 PX
	1007	MICROMASTER 430
r0964[2]	105	Firmware V1.05
r0964[3]	2001	27.10.2001
r0964[4]	2710	

<b>r0965</b>	<b>Profibus profile</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM				

Identification for PROFIDrive. Profile number and version.

<b>r0967</b>	<b>Control word 1</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM			<b>Def:</b> -	
				<b>Max:</b> -	

Displays control word 1.

**Bitfields:**

Bit00	ON/OFF1	0	NO
		1	YES
Bit01	OFF2: Electrical stop	0	YES
		1	NO
Bit02	OFF3: Fast stop	0	YES
		1	NO
Bit03	Pulse enable	0	NO
		1	YES
Bit04	RFG enable	0	NO
		1	YES
Bit05	RFG start	0	NO
		1	YES
Bit06	Setpoint enable	0	NO
		1	YES
Bit07	Fault acknowledge	0	NO
		1	YES
Bit08	JOG right	0	NO
		1	YES
Bit09	JOG left	0	NO
		1	YES
Bit10	Control from PLC	0	NO
		1	YES
Bit11	Reverse (setpoint inversion)	0	NO
		1	YES
Bit13	Motor potentiometer MOP up	0	NO
		1	YES
Bit14	Motor potentiometer MOP down	0	NO
		1	YES
Bit15	Local / Remote	0	NO
		1	YES

<b>r0968</b>	<b>Status word 1</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM			<b>Def:</b> -	
				<b>Max:</b> -	

Displays active status word of inverter (in binary) and can be used to diagnose which commands are active.

**Bitfields:**

Bit00	Drive ready	0	NO
		1	YES
Bit01	Drive ready to run	0	NO
		1	YES
Bit02	Drive running	0	NO
		1	YES
Bit03	Drive fault active	0	NO
		1	YES
Bit04	OFF2 active	0	YES
		1	NO
Bit05	OFF3 active	0	YES
		1	NO
Bit06	ON inhibit active	0	NO
		1	YES
Bit07	Drive warning active	0	NO
		1	YES
Bit08	Deviation setpoint / act. value	0	YES
		1	NO
Bit09	PZD control	0	NO
		1	YES
Bit10	Maximum frequency reached	0	NO
		1	YES
Bit11	Warning: Motor current limit	0	YES
		1	NO
Bit12	Motor holding brake active	0	NO
		1	YES
Bit13	Motor overload	0	YES
		1	NO
Bit14	Motor runs right	0	NO
		1	YES
Bit15	Inverter overload	0	YES
		1	NO

<b>P0970</b>	<b>Factory reset</b>			<b>Min:</b> 0	<b>Level:</b> <b>1</b>
	<b>CStat:</b> C	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> PAR_RESET	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 1	

P0970 = 1 resets all parameters to their default values.

**Possible Settings:**

0 Disabled  
1 Parameter reset

**Dependency:**

First set P0010 = 30 (factory settings).

Stop drive (i.e. disable all pulses) before you can reset parameters to default values.

**Note:**

The following parameters retain their values after a factory reset:

P0014 Store mode

r0039 CO: Energy consumption meter [kWh]

P0100 Europe / North America

P0918 CB address

P2010 USS baud rate

P2011 USS address

<b>P0971</b>	<b>Transfer data from RAM to EEPROM</b>			<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> COMM	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 1	

Transfers values from RAM to EEPROM when set to 1.

**Possible Settings:**

0 Disabled  
1 Start transfer

**Note:**

All values in RAM are transferred to EEPROM.

Parameter is automatically reset to 0 (default) after successful transfer.

<b>P1000</b>	<b>Selection of frequency setpoint</b>				<b>Min:</b> 0	<b>Level:</b> <b>1</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 27		
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm	<b>QuickComm.</b> Yes	<b>Max:</b> 1		

Selects frequency setpoint source. In the table of possible settings below, the main setpoint is selected from the least significant digit (i.e., 0 to 6) and any additional setpoint from the most significant digit (i.e., x0 through to x6).

**Possible Settings:**

0	No main setpoint	
1	MOP setpoint	
2	Analog setpoint	
3	Fixed frequency	
4	USS on BOP link	
5	USS on COM link	
6	CB on COM link	
7	Pot setpoint	
10	No main setpoint	+ MOP setpoint
11	MOP setpoint	+ MOP setpoint
12	Analog setpoint	+ MOP setpoint
13	Fixed frequency	+ MOP setpoint
14	USS on BOP link	+ MOP setpoint
15	USS on COM link	+ MOP setpoint
16	CB on COM link	+ MOP setpoint
17	Pot setpoint	+ MOP setpoint
20	No main setpoint	+ Analog setpoint
21	MOP setpoint	+ Analog setpoint
22	Analog setpoint	+ Analog setpoint
23	Fixed frequency	+ Analog setpoint
24	USS on BOP link	+ Analog setpoint
25	USS on COM link	+ Analog setpoint
26	CB on COM link	+ Analog setpoint
27	Pot setpoint	+ Analog setpoint
30	No main setpoint	+ Fixed frequency
31	MOP setpoint	+ Fixed frequency
32	Analog setpoint	+ Fixed frequency
33	Fixed frequency	+ Fixed frequency
34	USS on BOP link	+ Fixed frequency
35	USS on COM link	+ Fixed frequency
36	CB on COM link	+ Fixed frequency
37	Pot setpoint	+ Fixed frequency
40	No main setpoint	+ USS on BOP link
41	MOP setpoint	+ USS on BOP link
42	Analog setpoint	+ USS on BOP link
43	Fixed frequency	+ USS on BOP link
44	USS on BOP link	+ USS on BOP link
45	USS on COM link	+ USS on BOP link
46	CB on COM link	+ USS on BOP link
47	Pot setpoint	+ USS on BOP link
50	No main setpoint	+ USS on COM link
51	MOP setpoint	+ USS on COM link
52	Analog setpoint	+ USS on COM link
53	Fixed frequency	+ USS on COM link
54	USS on BOP link	+ USS on COM link
55	USS on COM link	+ USS on COM link
57	Pot setpoint	+ USS on COM link
60	No main setpoint	+ CB on COM link
61	MOP setpoint	+ CB on COM link
62	Analog setpoint	+ CB on COM link
63	Fixed frequency	+ CB on COM link
64	USS on BOP link	+ CB on COM link
66	CB on COM link	+ CB on COM link
67	Pot setpoint	+ CB on COM link
70	No main setpoint	+ Pot setpoint
71	MOP setpoint	+ Pot setpoint
72	Analog setpoint	+ Pot setpoint
73	Fixed frequency	+ Pot setpoint
74	USS on BOP link	+ Pot setpoint
75	USS on COM link	+ Pot setpoint
76	CB on COM link	+ Pot setpoint
77	Pot setpoint	+ Pot setpoint

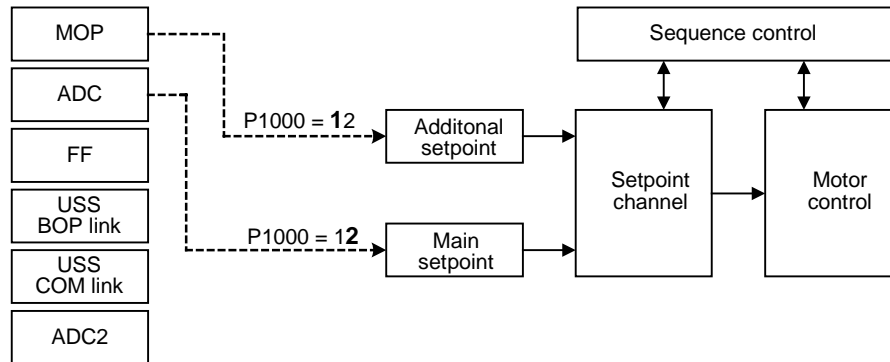
**Example:**

Setting 12 selects main setpoint (2) derived from analog input with additional setpoint (1) taken from the motor potentiometer.



**Example P1000 = 12 :**

P1000 = 12	P1070 = 755	P1070 CI: Main setpoint
		r0755 CO: Act. ADC after scal. [4000h]
P1000 = 12	P1075 = 1050	P1075 CI: Additional setpoint
		r1050 CO: Act. Output freq. of the MOP



**Note:**

Single digits denote main setpoints that have no additional setpoint.

Changing this parameter sets (to default) all settings on item selected (see table).

		P1000 = xy							
		y = 0	y = 1	y = 2	y = 3	y = 4	y = 6	y = 7	
P1000 = xy	x = 0	0.0	1050.0	755.0	1024.0	2015.1	2050.1	755.1	P1070
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1071
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	P1075
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1076
	x = 1	0.0	1050.0	755.0	1024.0	2015.1	2050.1	755.1	P1070
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1071
		1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	P1075
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1076
	x = 2	0.0	1050.0	755.0	1024.0	2015.1	2050.1	755.1	P1070
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1071
		755.0	755.0	755.0	755.0	755.0	755.0	755.0	P1075
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1076
	x = 3	0.0	1050.0	755.01	1024.0	2015.1	2050.1	755.1	P1070
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1071
		1024.0	1024.0	1024.0	1024.0	1024.0	1024.0	1024.0	P1075
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1076
	x = 4	0.0	1050.0	755.0	1024.0	2015.1	2050.1	755.1	P1070
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1071
		2015.1	2015.1	2015.1	2015.1	2015.1	2015.1	2015.1	P1075
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1076
	x = 6	0.0	1050.0	755.0	1024.0	2015.1	2050.1	755.1	P1070
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1071
		2050.1	2050.1	2050.1	2050.1	2050.1	2050.1	2050.1	P1075
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1076
	x = 7	0.0	1050.0	755.0	1024.0	2015.1	2050.1	755.1	P1070
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1071
		755.1	755.1	755.1	755.1	755.1	755.1	755.1	P1075
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1076

**Example:**

P1000 = 21 → P1070 = 1050.0  
P1071 = 1.0  
P1075 = 755.0  
P1076 = 1.0

USS on COM link is not supported on MM411

<b>P1001</b>	<b>Fixed frequency 1</b>			<b>Min:</b> -650.00	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 0.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 650.00	

Defines fixed frequency setpoint 1.

There are 3 types of fixed frequencies:

1. Direct selection
2. Direct selection + ON command
3. Binary coded selection + ON command

1. Direct selection (P0701 - P0703 = 15):

In this mode of operation 1 digital input selects 1 fixed frequency.  
If several inputs are active together, the selected frequencies are summed.  
E.g.: FF1 + FF2 + FF3.

2. Direct selection + ON command (P0701 - P0703 = 16):

The fixed frequency selection combines the fixed frequencies with an ON command.  
In this mode of operation 1 digital input selects 1 fixed frequency.  
If several inputs are active together, the selected frequencies are summed.  
E.g.: FF1 + FF2 + FF3.

3. Binary coded selection + ON command (P0701 - P0703 = 17):

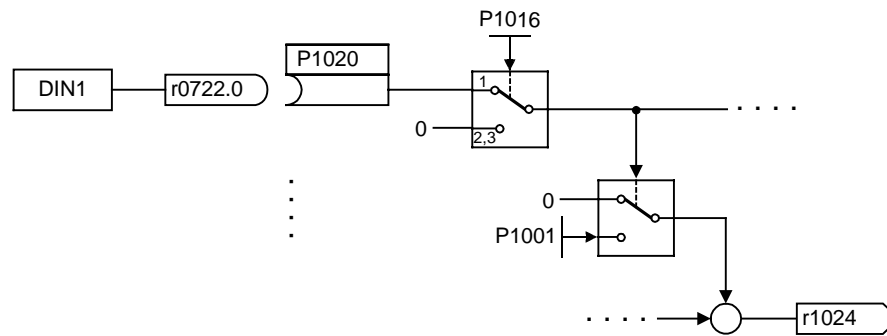
Up to 7 fixed frequencies can be selected using this method.  
The fixed frequencies are selected according to the following table:

**Example:**

		DIN3	DIN2	DIN1
	OFF	Inactive	Inactive	Inactive
P1001	FF1	Inactive	Inactive	<b>Active</b>
P1002	FF2	Inactive	<b>Active</b>	Inactive
P1003	FF3	Inactive	<b>Active</b>	<b>Active</b>
P1004	FF4	<b>Active</b>	Inactive	Inactive
P1005	FF5	<b>Active</b>	Inactive	<b>Active</b>
P1006	FF6	<b>Active</b>	<b>Active</b>	Inactive
P1007	FF7	<b>Active</b>	<b>Active</b>	<b>Active</b>

Direct selection of FF P1001 via DIN 1:

P0701 = 15  
or  
P0701 = 99, P1020 = 722.0, P1016 = 1



**Dependency:**

Select fixed frequency operation (using P1000).

Inverter requires ON command to start in the case of direct selection (P0701 - P0703 = 15).

**Note:**

Fixed frequencies can be selected using the digital inputs, and can also be combined with an ON command.

<b>P1002</b>	<b>Fixed frequency 2</b>			<b>Min:</b> -650.00	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 5.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 650.00	

Defines fixed frequency setpoint 2.

**Details:**

See parameter P1001 (fixed frequency 1).

<b>P1003</b>	<b>Fixed frequency 3</b>			<b>Min:</b> -650.00	Level: <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 10.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 650.00	

Defines fixed frequency setpoint 3.

**Details:**

See parameter P1001 (fixed frequency 1).

<b>P1004</b>	<b>Fixed frequency 4</b>			<b>Min:</b> -650.00	Level: <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 15.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 650.00	

Defines fixed frequency setpoint 4.

**Details:**

See parameter P1001 (fixed frequency 1).

<b>P1005</b>	<b>Fixed frequency 5</b>			<b>Min:</b> -650.00	Level: <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 20.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 650.00	

Defines fixed frequency setpoint 5.

**Details:**

See parameter P1001 (fixed frequency 1).

<b>P1006</b>	<b>Fixed frequency 6</b>			<b>Min:</b> -650.00	Level: <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 25.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 650.00	

Defines fixed frequency setpoint 6.

**Details:**

See parameter P1001 (fixed frequency 1).

<b>P1007</b>	<b>Fixed frequency 7</b>			<b>Min:</b> -650.00	Level: <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 30.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 650.00	

Defines fixed frequency setpoint 7.

**Details:**

See parameter P1001 (fixed frequency 1).

<b>P1016</b>	<b>Fixed frequency mode - Bit 0</b>			<b>Min:</b> 1	Level: <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 1	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 3	

Fixed frequencies can be selected in three different modes. Parameter P1016 defines the mode of selection Bit 0.

**Possible Settings:**

- 1 Direct selection
- 2 Direct selection + ON command
- 3 Binary coded selection + ON command

**Details:**

See table in P1001 (fixed frequency 1) for description of how to use fixed frequencies.

<b>P1017</b>	<b>Fixed frequency mode - Bit 1</b>			<b>Min:</b> 1	Level: <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 1	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 3	

Fixed frequencies can be selected in three different modes. Parameter P1017 defines the mode of selection Bit 1.

**Possible Settings:**

- 1 Direct selection
- 2 Direct selection + ON command
- 3 Binary coded selection + ON command

**Details:**

See table in P1001 (fixed frequency 1) for description of how to use fixed frequencies.

<b>P1018</b>	<b>Fixed frequency mode - Bit 2</b>			<b>Min:</b> 1	Level: <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 1	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 3	

Fixed frequencies can be selected in three different modes. Parameter P1018 defines the mode of selection Bit 2.

**Possible Settings:**

- 1 Direct selection
- 2 Direct selection + ON command
- 3 Binary coded selection + ON command

**Details:**

See table in P1001 (fixed frequency 1) for description of how to use fixed frequencies.

<b>P1020</b>	<b>BI: Fixed freq. selection Bit 0</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>Datatype:</b> U32 <b>Unit:</b> - <b>Def:</b> 0:0		
	<b>P-Group:</b> COMMANDS <b>Active:</b> first confirm <b>QuickComm. No</b> <b>Max:</b> 4000:0		

Defines origin of fixed frequency selection.

**Common Settings:**

P1020 = 722.0 ==> Digital input 1  
P1021 = 722.1 ==> Digital input 2  
P1022 = 722.2 ==> Digital input 3

**Dependency:**

Accessible only if P0701 - P0703 = 99 (function of digital inputs = BICO)

<b>P1021</b>	<b>BI: Fixed freq. selection Bit 1</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>Datatype:</b> U32 <b>Unit:</b> - <b>Def:</b> 0:0		
	<b>P-Group:</b> COMMANDS <b>Active:</b> first confirm <b>QuickComm. No</b> <b>Max:</b> 4000:0		

Defines origin of fixed frequency selection.

**Dependency:**

Accessible only if P0701 - P0703 = 99 (function of digital inputs = BICO)

**Details:**

See P1020 (fixed frequency selection Bit 0) for most common settings

<b>P1022</b>	<b>BI: Fixed freq. selection Bit 2</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>Datatype:</b> U32 <b>Unit:</b> - <b>Def:</b> 0:0		
	<b>P-Group:</b> COMMANDS <b>Active:</b> first confirm <b>QuickComm. No</b> <b>Max:</b> 4000:0		

Defines origin of fixed frequency selection.

**Dependency:**

Accessible only if P0701 - P0703 = 99 (function of digital inputs = BICO)

**Details:**

See P1020 (fixed frequency selection Bit 0) for most common settings

<b>r1024</b>	<b>CO: Act. fixed frequency</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>Datatype:</b> Float <b>Unit:</b> Hz <b>Def:</b> -		
	<b>P-Group:</b> SETPOINT <b>Max:</b> -		

Displays sum total of selected fixed frequencies.

<b>P1031</b>	<b>Setpoint memory of the MOP</b>	<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT <b>Datatype:</b> U16 <b>Unit:</b> - <b>Def:</b> 0		
	<b>P-Group:</b> SETPOINT <b>Active:</b> Immediately <b>QuickComm. No</b> <b>Max:</b> 1		

Saves last motor potentiometer setpoint (MOP) that was active before OFF command or power down.

**Possible Settings:**

0 MOP setpoint will not be stored  
1 MOP setpoint will be stored (P1040 is updated)

**Note:**

On next ON command, motor potentiometer setpoint will be the saved value in parameter P1040 (setpoint of the MOP).

<b>P1032</b>	<b>Inhibit reverse direction of MOP</b>	<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT <b>Datatype:</b> U16 <b>Unit:</b> - <b>Def:</b> 1		
	<b>P-Group:</b> SETPOINT <b>Active:</b> first confirm <b>QuickComm. No</b> <b>Max:</b> 1		

Inhibits reverse setpoint selection

**Possible Settings:**

0 Reverse direction is allowed  
1 Reverse direction inhibited

**Dependency:**

Motor potentiometer (P1040) must be chosen as main setpoint or additional setpoint (using P1000).

**Note:**

It is possible to change motor direction using the motor potentiometer setpoint (increase / decrease frequency either by using digital inputs or BOP/AOP keypad up / down).

<b>P1035</b>	<b>BI: Enable MOP (UP-command)</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>Datatype:</b> U32 <b>Unit:</b> - <b>Def:</b> 19:13		
	<b>P-Group:</b> COMMANDS <b>Active:</b> first confirm <b>QuickComm. No</b> <b>Max:</b> 4000:0		

Defines source for motor potentiometer setpoint increase frequency.

**Common Settings:**

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)  
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)  
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)  
722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

19.D = MOP up via BOP

<b>P1036</b>	<b>BI: Enable MOP (DOWN-command)</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U32		<b>Unit:</b> -
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm		<b>QuickComm. No</b>
		<b>Def:</b> 19:14		
		<b>Max:</b> 4000:0		

Defines source for motor potentiometer setpoint decrease frequency.

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

19.E = MOP down via BOP

<b>P1040</b>	<b>Setpoint of the MOP</b>	<b>Min:</b> -650.00	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> Hz
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately		<b>QuickComm. No</b>
		<b>Def:</b> 5.00		
		<b>Max:</b> 650.00		

Determines setpoint for motor potentiometer control (P1000 = 1).

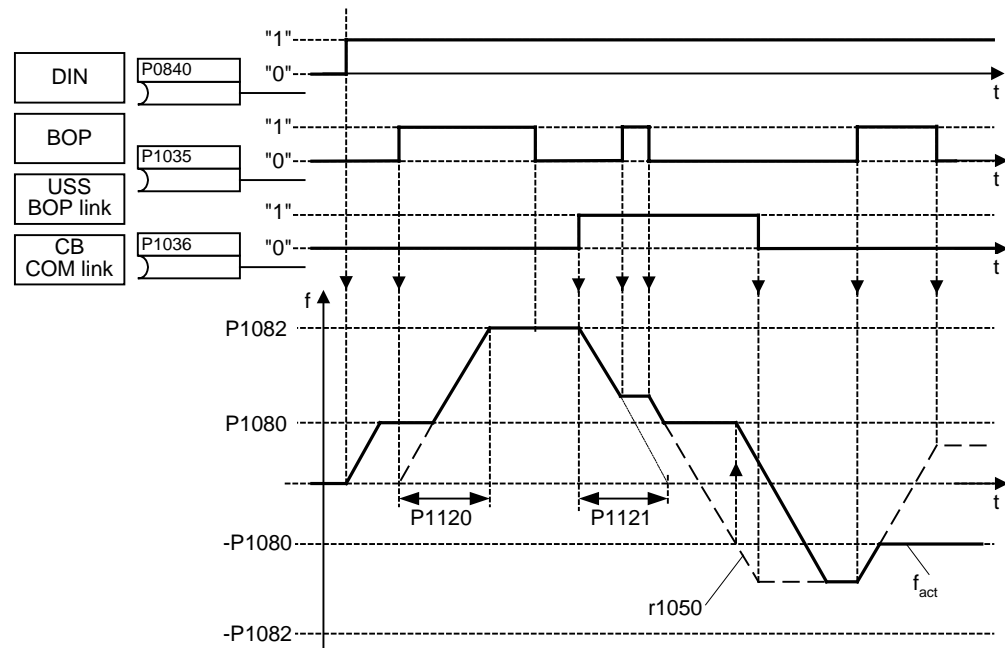
**Note:**

If motor potentiometer setpoint is selected either as main setpoint or additional setpoint, the reverse direction will be inhibited by default of P1032 (inhibit reverse direction of MOP).

To re-enable reverse direction, set P1032 = 0.

<b>r1050</b>	<b>CO: Act. Output freq. of the MOP</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>	
		<b>Datatype:</b> Float		<b>Unit:</b> Hz
	<b>P-Group:</b> SETPOINT	<b>Active:</b> -		<b>QuickComm. No</b>
		<b>Def:</b> -		
		<b>Max:</b> -		

Displays output frequency of motor potentiometer setpoint ([Hz]).



<b>P1055</b>	<b>BI: Enable JOG right</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U32		<b>Unit:</b> -
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm		<b>QuickComm. No</b>
		<b>Def:</b> 0:0		
		<b>Max:</b> 4000:0		

Defines source of JOG right when P0719 = 0 (remote selection of command/setpoint source).

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

19.8 = JOG right via BOP

<b>P1056</b>	<b>BI: Enable JOG left</b>			<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 0:0	
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 4000:0	

Defines source of JOG left when P0719 = 0 (remote selection of command/setpoint source).

**Common Settings:**

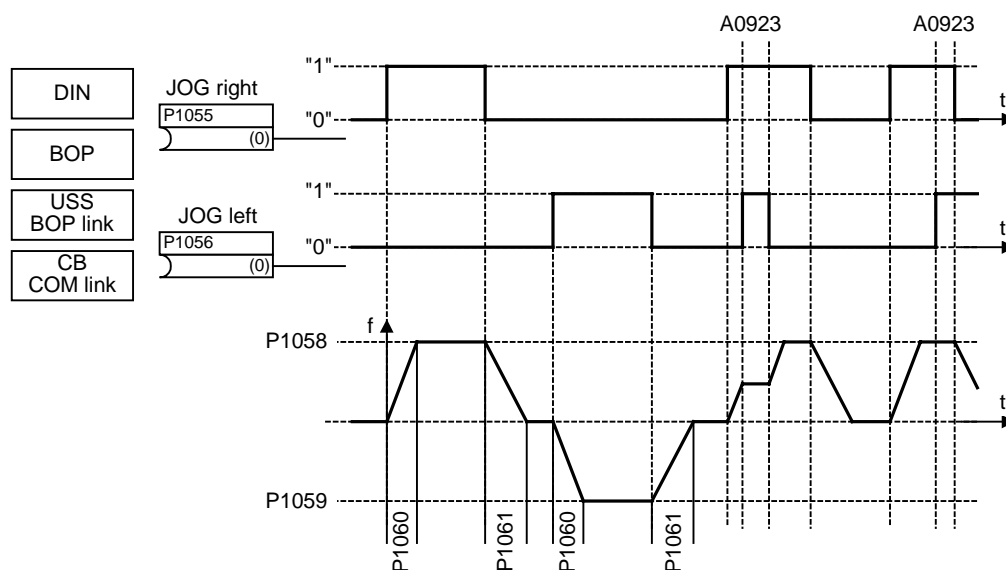
- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

19.9 = JOG left via BOP

<b>P1058</b>	<b>JOG frequency right</b>			<b>Min:</b> 0.00	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 5.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately	<b>QuickComm. No</b>	<b>Max:</b> 650.00	

Jogging increases the motor speed by small amounts. The JOG buttons uses a non-latching switch on one of the digital inputs to control the motor speed.

While JOG right is selected, this parameter determines the frequency at which the inverter will run.



**Dependency:**

P1060 and P1061 set up and down ramp times respectively for jogging.

<b>P1059</b>	<b>JOG frequency left</b>			<b>Min:</b> 0.00	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 5.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately	<b>QuickComm. No</b>	<b>Max:</b> 650.00	

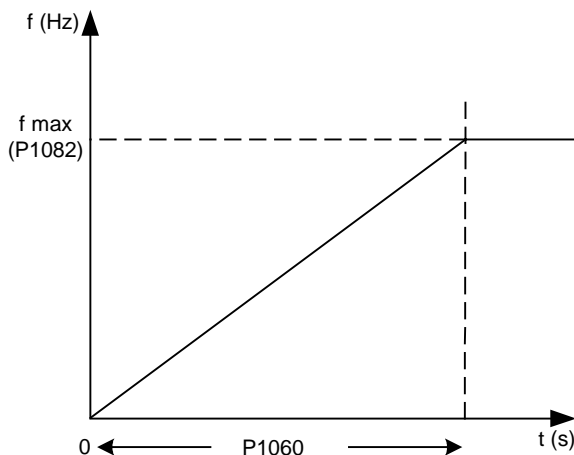
While JOG left is selected, this parameter determines the frequency at which the inverter will run.

**Dependency:**

P1060 and P1061 set up and down ramp times respectively for jogging.

<b>P1060</b>	<b>JOG ramp-up time</b>			<b>Min:</b> 0.00	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> s	<b>Def:</b> 10.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 650.00	

Sets jog ramp-up time. This is the time used while jogging is active.

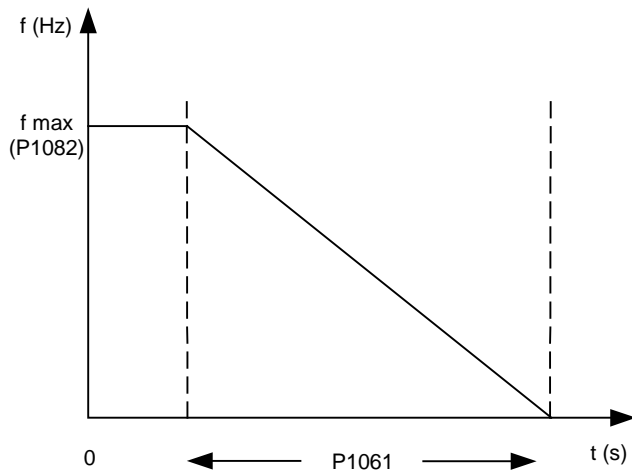


**Notice:**

Ramp times will be used as follows:  
 P1060 / P1061 : JOG mode is active  
 P1120 / P1121 : Normal mode (ON/OFF) is active  
 P1060 / P1061 : Normal mode (ON/OFF) and P1124 is active

<b>P1061</b>	<b>JOG ramp-down time</b>			<b>Min:</b> 0.00	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> s	<b>Def:</b> 10.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 650.00	

Sets ramp-down time. This is the time used while jogging is active.



**Notice:**

Ramp times will be used as follows:  
 P1060 / P1061 : JOG mode is active  
 P1120 / P1121 : Normal mode (ON/OFF) is active  
 P1060 / P1061 : Normal mode (ON/OFF) and P1124 is active

<b>P1070</b>	<b>CI: Main setpoint</b>			<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 755:0	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 4000:0	

Defines source of main setpoint.

**Common Settings:**

- 755 = Analog input 1 setpoint
- 1024 = Fixed frequency setpoint
- 1050 = Motor potentiometer (MOP) setpoint



<b>P1071</b>	<b>CI: Main setpoint scaling</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>Datatype:</b> U32 <b>Unit:</b> - <b>Def:</b> 1:0		
	<b>P-Group:</b> SETPOINT <b>Active:</b> first confirm <b>QuickComm. No</b> <b>Max:</b> 4000:0		

Defines source of the main setpoint scaling.

**Common Settings:**

- 755 = Analog input 1 setpoint
- 1024 = Fixed frequency setpoint
- 1050 = Motor potentiometer (MOP) setpoint

<b>P1074</b>	<b>BI: Disable additional setpoint</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT <b>Datatype:</b> U32 <b>Unit:</b> - <b>Def:</b> 0:0		
	<b>P-Group:</b> COMMANDS <b>Active:</b> first confirm <b>QuickComm. No</b> <b>Max:</b> 4000:0		

Disables additional setpoint

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

<b>P1075</b>	<b>CI: Additional setpoint</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>Datatype:</b> U32 <b>Unit:</b> - <b>Def:</b> 755:1		
	<b>P-Group:</b> SETPOINT <b>Active:</b> first confirm <b>QuickComm. No</b> <b>Max:</b> 4000:0		

Defines source of the additional setpoint (to be added to main setpoint).

**Common Settings:**

- 755 = Analog input 1 setpoint
- 1024 = Fixed frequency setpoint
- 1050 = Motor potentiometer (MOP) setpoint

<b>P1076</b>	<b>CI: Additional setpoint scaling</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>Datatype:</b> U32 <b>Unit:</b> - <b>Def:</b> 1:0		
	<b>P-Group:</b> SETPOINT <b>Active:</b> first confirm <b>QuickComm. No</b> <b>Max:</b> 4000:0		

Defines source of scaling for additional setpoint (to be added to main setpoint).

**Common Settings:**

- 1 = Scaling of 1.0 (100%)
- 755 = Analog input 1 Setpoint
- 1024 = Fixed Frequency Setpoint
- 1050 = MOP Setpoint

<b>r1078</b>	<b>CO: Total frequency setpoint</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>Datatype:</b> Float <b>Unit:</b> Hz <b>Def:</b> -		
	<b>P-Group:</b> SETPOINT <b>Max:</b> -		

Displays sum of main and additional setpoints in [Hz].

<b>r1079</b>	<b>CO: Selected frequency setpoint</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>Datatype:</b> Float <b>Unit:</b> Hz <b>Def:</b> -		
	<b>P-Group:</b> SETPOINT <b>Max:</b> -		

Displays selected frequency setpoint.

Following frequency setpoints are displayed:

- r1078 Total frequency setpoint
- P1058 JOG frequency right
- P1059 JOG frequency left

**Dependency:**

P1055 (BI: Enable JOG right) or P1056 (BI: Enable JOG left) define command source of JOG right or JOG left respectively.

**Note:**

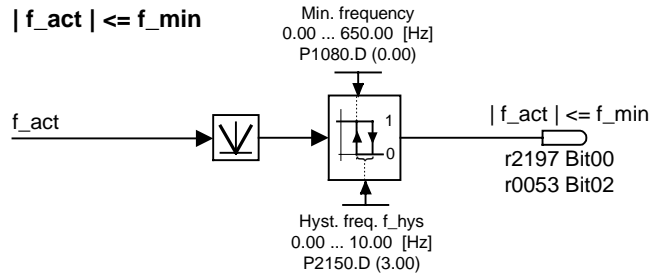
P1055 = 0 and P1056 = 0 ==> Total frequency setpoint is selected.

<b>P1080</b>	<b>Min. frequency</b>			<b>Min:</b> 0.00	<b>Level:</b> <b>1</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 0.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately	<b>QuickComm.</b> Yes	<b>Max:</b> 650.00	

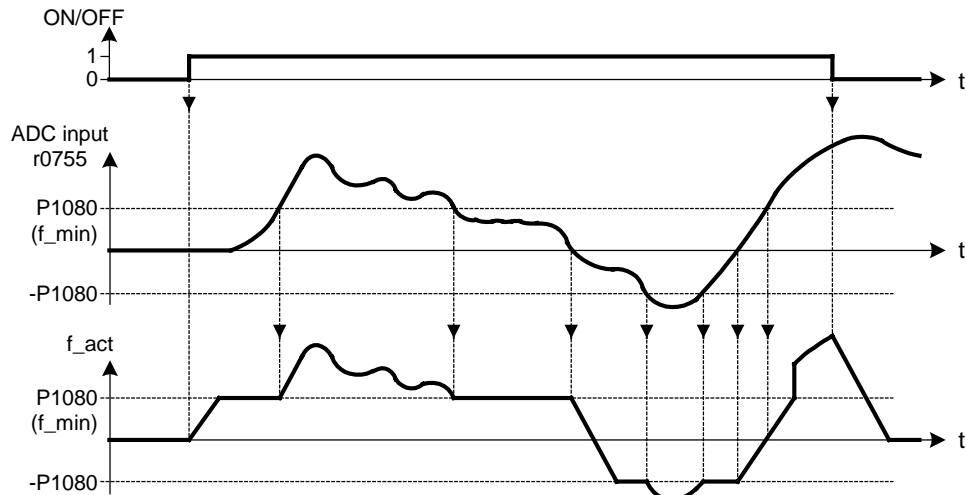
Sets minimum motor frequency [Hz] at which motor will run irrespective of frequency setpoint.

The minimum frequency P1080 represents a masking frequency of 0 Hz for all frequency target value sources (e.g. ADC, MOP, FF, USS), with the exception of the JOG target value source (analogous to P1091). Thus the frequency band +/- P1080 is run through in optimum time by means of the acceleration/deceleration ramps. Dwelling in the frequency band is not possible (see example).

Furthermore, an undershoot of the actual frequency  $f_{act}$  below min. frequency P1080 is output by the following signal function.



**Example:**



**Note:**

Value set here is valid both for clockwise and for anticlockwise rotation.

Under certain conditions (e.g. ramping, current limiting), motor can run below minimum frequency.

<b>P1082</b>	<b>Max. frequency</b>			<b>Min:</b> 0.00	<b>Level:</b> <b>1</b>
	<b>CStat:</b> CT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 50.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm	<b>QuickComm.</b> Yes	<b>Max:</b> 650.00	

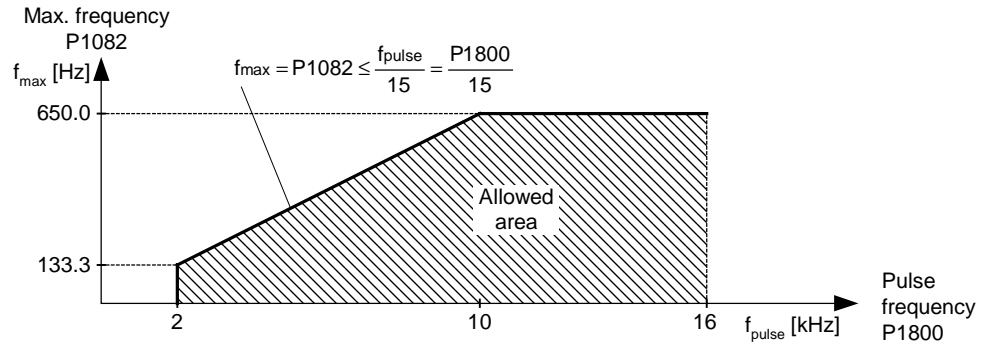
Sets maximum motor frequency [Hz] at which motor will run irrespective of the frequency setpoint.

**Dependency:**

The maximal value of motor frequency P1082 is limited to pulse frequency P1800. P1082 is dependent on the derating characteristic as followed:

P1300 < 20:

When P1300 < 20 (control mode = VF or FCC modes) then max output frequency is limited to smallest of 650 Hz or ( maximum pulse frequency / 15)

**Note:**

The value set here is valid for both clockwise and anticlockwise rotation.

The maximum output frequency of inverter can be exceeded if one of the following is active:

P1335 ≠ 0 (Slip compensation active) :

$$f_{\max}(P1335) = f_{\max} + f_{\text{slip,max}} = P1082 + \frac{P1336}{100} \cdot \frac{r0330}{100} \cdot P0310$$

P1200 ≠ 0 (Flying restart active) :

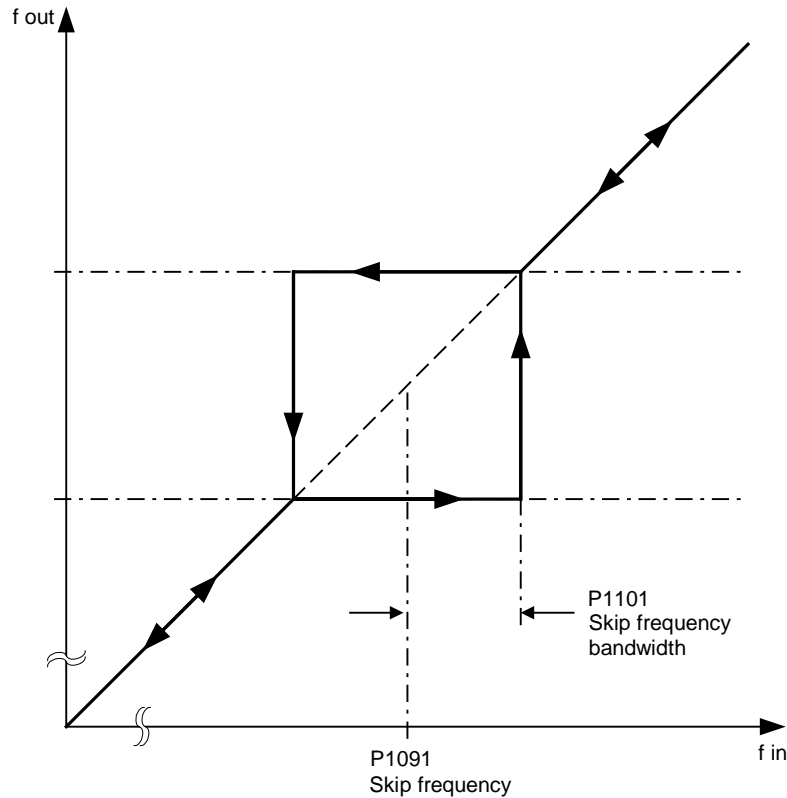
$$f_{\max}(P1200) = f_{\max} + 2 \cdot f_{\text{slip,nom}} = P1082 + 2 \cdot \frac{r0330}{100} \cdot P0310$$

**Notice:**

Maximum motor speed is subject to mechanical limitations.

<b>P1091</b>	<b>Skip frequency 1</b>			<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 0.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 650.00	

Defines skip frequency 1 which avoids effects of mechanical resonance and suppresses frequencies within +/- P1101 (skip frequency bandwidth).

**Notice:**

Stationary operation is not possible within the suppressed frequency range; the range is merely passed through (on the ramp).

For example, if P1091 = 10 Hz and P1101 = 2 Hz, it is not possible to operate continuously between 10 Hz +/- 2 Hz (i.e. between 8 and 12 Hz).

<b>P1092</b>	<b>Skip frequency 2</b>			<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 0.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 650.00	

Defines skip frequency 2 which avoids effects of mechanical resonance and suppresses frequencies within +/- P1101 (skip frequency bandwidth).

**Details:**

See P1091 (skip frequency 1).

<b>P1093</b>	<b>Skip frequency 3</b>			<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 0.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 650.00	

Defines skip frequency 3 which avoids effects of mechanical resonance and suppresses frequencies within +/- P1101 (skip frequency bandwidth).

**Details:**

See P1091 (skip frequency 1).

<b>P1094</b>	<b>Skip frequency 4</b>			<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> 0.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 650.00	

Defines skip frequency 4 which avoids effects of mechanical resonance and suppresses frequencies within +/- P1101 (skip frequency bandwidth).

**Details:**

See P1091 (skip frequency 1).

<b>P1101</b>	<b>Skip frequency bandwidth</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> Hz
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately		<b>QuickComm.</b> No

Delivers frequency bandwidth to be applied to skip frequencies (in [Hz]).

**Details:**

See P1091 (skip frequency 1).

<b>P1110</b>	<b>BI: Inhibit neg. freq. setpoint</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U32		<b>Unit:</b> -
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm		<b>QuickComm.</b> No

Inhibits direction reversal, thus preventing a negative setpoint from causing motor from running in reverse. Instead, it will run at minimum frequency (P1080) in the normal direction.

**Common Settings:**

0 = Disabled  
1 = Enabled

**Note:**

It is possible to disable all reverse commands (i.e. the command is ignored). To do this, set P0719 = 0 (remote selection of command/setpoint source) and define the command sources (P1113) individually.

**Notice:**

This function does not disable the "reverse" command function; rather, a reverse command causes motor to run in the normal direction as described above.

<b>P1113</b>	<b>BI: Reverse</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U32		<b>Unit:</b> -
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm		<b>QuickComm.</b> No

Defines source of reverse command used when P0719 = 0 (remote selection of command/setpoint source).

**Common Settings:**

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)  
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)  
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)

19.B = Reverse via BOP

<b>r1114</b>	<b>CO: Freq. setp. after dir. ctrl.</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>	
		<b>Datatype:</b> Float		<b>Unit:</b> Hz
	<b>P-Group:</b> SETPOINT			<b>Def:</b> - <b>Max:</b> -

Displays setpoint frequency after change of direction.

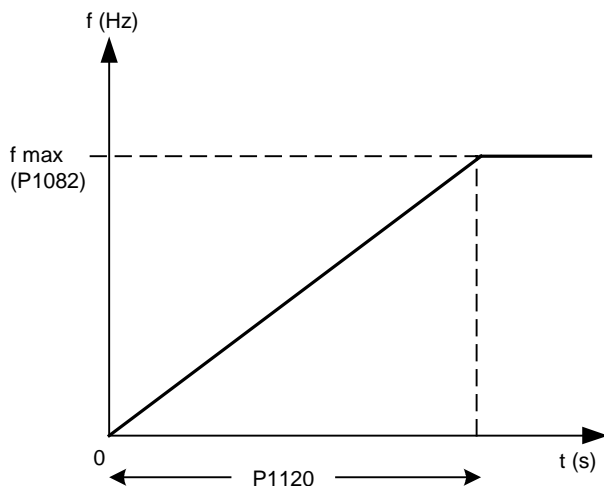
<b>r1119</b>	<b>CO: Freq. setpoint before RFG</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>	
		<b>Datatype:</b> Float		<b>Unit:</b> Hz
	<b>P-Group:</b> SETPOINT			<b>Def:</b> - <b>Max:</b> -

Displays output frequency after modification by other functions, e.g.:

- \* P1110 BI: Inhibit neg. freq. setpoint,
- \* P1091 - P1094 skip frequencies,
- \* P1080 Min. frequency,
- \* P1082 Max. frequency,
- \* limitations,
- \* etc.

<b>P1120</b>	<b>Ramp-up time</b>			<b>Min:</b> 0.00	<b>Level:</b> <b>1</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> s	<b>Def:</b> 10.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm	<b>QuickComm.</b> Yes	<b>Max:</b> 650.00	

Time taken for motor to accelerate from standstill up to maximum motor frequency (P1082) when no rounding is used.



Setting the ramp-up time too short can cause the inverter to trip (overcurrent).

**Note:**

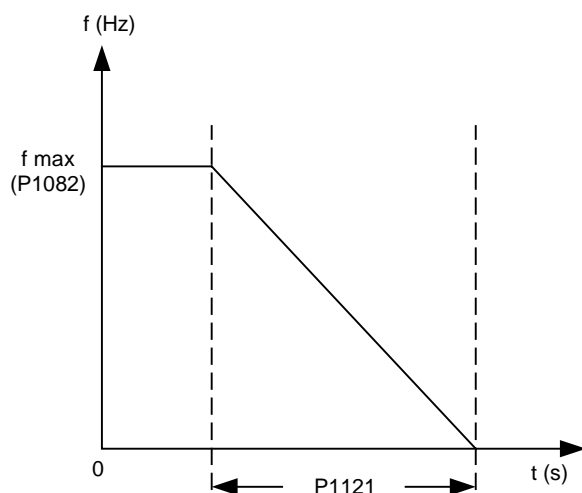
If an external frequency setpoint with set ramp rates is used (e.g. from a PLC). The best way to achieve optimum drive performance is to set ramp times in P1120 and P1121 slightly shorter than those of the PLC.

**Notice:**

Ramp times will be used as follows:  
 P1060 / P1061 : JOG mode is active  
 P1120 / P1121 : Normal mode (ON/OFF) is active  
 P1060 / P1061 : Normal mode (ON/OFF) and P1124 is active

<b>P1121</b>	<b>Ramp-down time</b>			<b>Min:</b> 0.00	<b>Level:</b> <b>1</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> s	<b>Def:</b> 10.00	
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm	<b>QuickComm.</b> Yes	<b>Max:</b> 650.00	

Time taken for motor to decelerate from maximum motor frequency (P1082) down to standstill when no rounding is used.



**Notice:**

Setting the ramp-down time too short can cause the inverter to trip (overcurrent (F0001) / overvoltage (F0002)).

Ramp times will be used as follows:  
 P1060 / P1061 : JOG mode is active  
 P1120 / P1121 : Normal mode (ON/OFF) is active  
 P1060 / P1061 : Normal mode (ON/OFF) and P1124 is active

<b>P1124</b>	<b>BI: Enable JOG ramp times</b>				<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 0:0		
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 4000:0		

Defines source for switching between jog ramp times (P1060, P1061) and normal ramp times (P1120, P1121) as applied to the RFG. This parameter is valid for normal mode (ON/OFF) only.

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)

**Notice:**

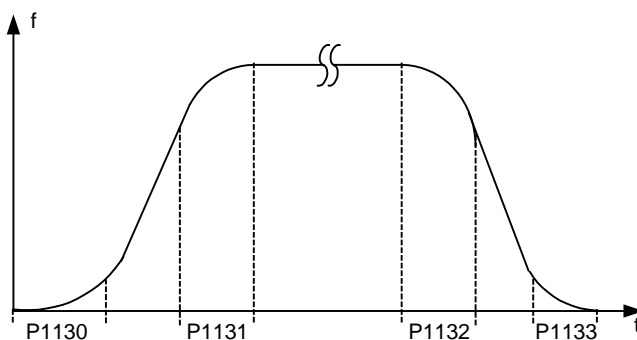
P1124 does not have any impact when JOG mode is selected. In this case, jog ramp times (P1060, P1061) will be used all the time.

Ramp times will be used as follows:

- P1060 / P1061 : JOG mode is active
- P1120 / P1121 : Normal mode (ON/OFF) is active
- P1060 / P1061 : Normal mode (ON/OFF) and P1124 is active

<b>P1130</b>	<b>Ramp-up initial rounding time</b>				<b>Min:</b> 0.00	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> s	<b>Def:</b> 0.00		
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 40.00		

Defines initial rounding time in seconds as shown on the diagram below.



where:

$$T_{up\ total} = \frac{1}{2}P1130 + X \cdot P1120 + \frac{1}{2}P1131$$

$$T_{down\ total} = \frac{1}{2}P1130 + X \cdot P1121 + \frac{1}{2}P1133$$

X is defined as:  $X = \Delta f / f_{max}$

i.e. X is the ratio between the frequency step and  $f_{max}$

**Note:**

Rounding times are recommended, since they prevent an abrupt response, thus avoiding detrimental effects on the mechanics.

**Notice:**

Rounding times are not recommended when analog inputs are used, since they would result in overshoot/undershoot in the inverter response.

<b>P1131</b>	<b>Ramp-up final rounding time</b>				<b>Min:</b> 0.00	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> s	<b>Def:</b> 0.00		
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 40.00		

Defines rounding time at end of ramp-up as shown in P1130 (ramp-up initial rounding time).

**Note:**

Rounding times are recommended, since they prevent an abrupt response, thus avoiding detrimental effects on the mechanics.

**Notice:**

Rounding times are not recommended when analog inputs are used, since they would result in overshoot/undershoot in the inverter response.

<b>P1132</b>	<b>Ramp-down initial rounding time</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> s
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm		<b>QuickComm.</b> No
		<b>Def:</b> 0.00		
		<b>Max:</b> 40.00		

Defines rounding time at start of ramp-down as shown in P1130 (ramp-up initial rounding time).

**Note:**

Rounding times are recommended, since they prevent an abrupt response, thus avoiding detrimental effects on the mechanics.

**Notice:**

Rounding times are not recommended when analog inputs are used, since they would result in overshoot/undershoot in the inverter response.

<b>P1133</b>	<b>Ramp-down final rounding time</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> s
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm		<b>QuickComm.</b> No
		<b>Def:</b> 0.00		
		<b>Max:</b> 40.00		

Defines rounding time at end of ramp-down as shown in P1130 (ramp-up initial rounding time).

**Note:**

Rounding times are recommended, since they prevent an abrupt response, thus avoiding detrimental effects on the mechanics.

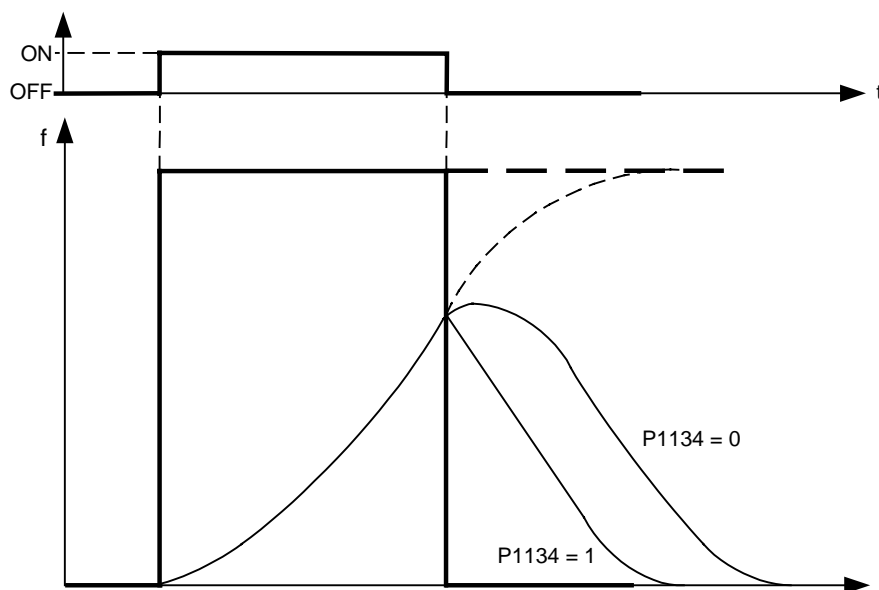
**Notice:**

Rounding times are not recommended when analog inputs are used, since they would result in overshoot/undershoot in the inverter response.

<b>P1134</b>	<b>Rounding type</b>	<b>Min:</b> 0	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> U16		<b>Unit:</b> -
	<b>P-Group:</b> SETPOINT	<b>Active:</b> Immediately		<b>QuickComm.</b> No
		<b>Def:</b> 0		
		<b>Max:</b> 1		

Defines smoothing response to OFF1 command or setpoint reduction.

If parameter P1134 = 0 it avoids sudden changes in setpoint frequency. Moreover, it gives smoother torque (no jerk).



**Possible Settings:**

- 0 Continuous smoothing
- 1 Discontinuous smoothing

**Dependency:**

No effect until total rounding time (P1130) > 0 s.

**Notice:**

P1134 = 0:  
Rounding acts at all times. At a sudden reduction of the input value, overshoot can occur.

P1134 = 1:  
Rounding does not act upon sudden reduction of input value during acceleration process.

Rounding times are not recommended when analog inputs are used. They would result in overshoot/undershoot in the inverter response.



<b>P1135</b>	<b>OFF3 ramp-down time</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> s
	<b>P-Group:</b> SETPOINT	<b>Active:</b> first confirm		<b>QuickComm.</b> Yes
		<b>Def:</b> 5.00		
		<b>Max:</b> 650.00		

Defines ramp-down time from maximum frequency to standstill for OFF3 command.

**Note:**

This time may be exceeded if the VDC\_max. level is reached.

<b>P1140</b>	<b>BI: RFG enable</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U32		<b>Unit:</b> -
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm		<b>QuickComm.</b> No
		<b>Def:</b> 1:0		
		<b>Max:</b> 4000:0		

Defines command source of RFG enable command (RFG: ramp function generator). If binary input is equal to zero than the RFG output will be set immediately to 0.

<b>P1141</b>	<b>BI: RFG start</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U32		<b>Unit:</b> -
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm		<b>QuickComm.</b> No
		<b>Def:</b> 1:0		
		<b>Max:</b> 4000:0		

Defines command source of RFG start command (RFG: ramp function generator). If binary input is equal to zero than the RFG output is held at it present value.

<b>P1142</b>	<b>BI: RFG enable setpoint</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U32		<b>Unit:</b> -
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm		<b>QuickComm.</b> No
		<b>Def:</b> 1:0		
		<b>Max:</b> 4000:0		

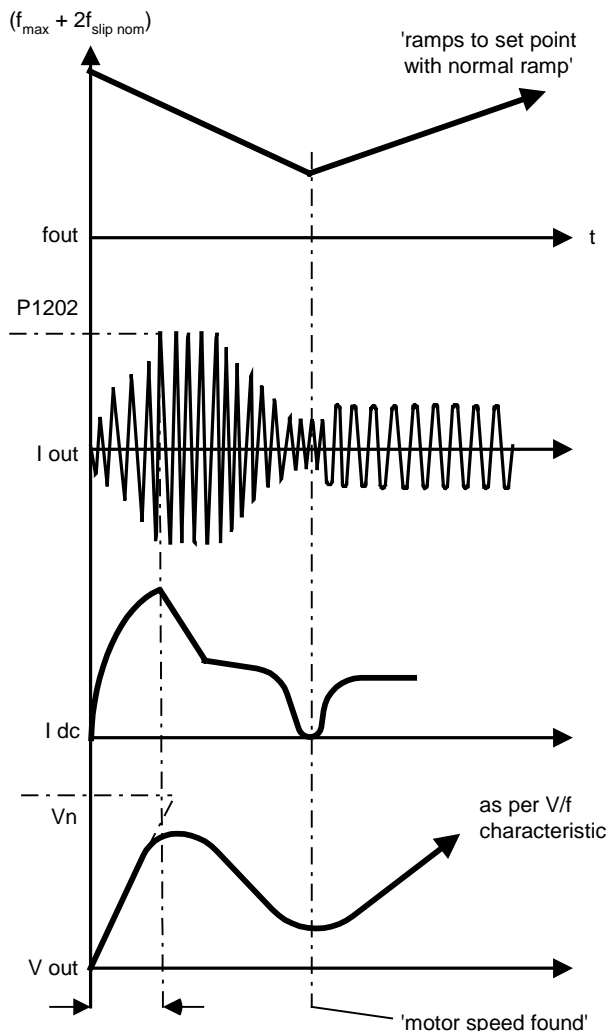
Defines command source of RFG enable setpoint command (RFG: ramp function generator). If binary input is equal to zero than the RFG input will be set to zero and the RFG output will be ramp-down to zero.

<b>r1170</b>	<b>CO: Frequency setpoint after RFG</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>	
		<b>Datatype:</b> Float		<b>Unit:</b> Hz
	<b>P-Group:</b> SETPOINT			<b>QuickComm.</b> -
		<b>Def:</b> -		
		<b>Max:</b> -		

Displays overall frequency setpoint after ramp generator.

<b>P1200</b>	<b>Flying start</b>			<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> FUNC	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 6	

Starts inverter onto a spinning motor by rapidly changing the output frequency of the inverter until the actual motor speed has been found. Then, the motor runs up to setpoint using the normal ramp time.



**Possible Settings:**

- 0 Flying start disabled
- 1 Flying start is always active, start in direction of setpoint
- 2 Flying start is active if power on, fault, OFF2, start in direction of setpoint
- 3 Flying start is active if fault, OFF2, start in direction of setpoint
- 4 Flying start is always active, only in direction of setpoint
- 5 Flying start is active if power on, fault, OFF2, only in direction of setpoint
- 6 Flying start is active if fault, OFF2, only in direction of setpoint

**Note:**

Useful for motors with high inertia loads.

Settings 1 to 3 search in both directions.  
Settings 4 to 6 search only in direction of setpoint.

**Notice:**

Flying start must be used in cases where the motor may still be turning (e.g. after a short mains break) or can be driven by the load. Otherwise, overcurrent trips will occur.

<b>P1202</b>	<b>Motor-current: Flying start</b>			<b>Min:</b> 10	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> %	<b>Def:</b> 100	
	<b>P-Group:</b> FUNC	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 200	

Defines search current used for flying start.

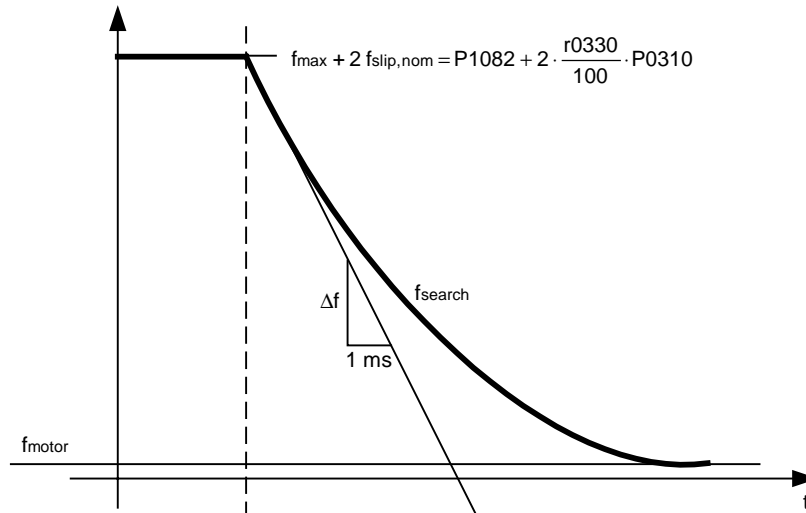
Value is in [%] based on rated motor current (P0305).

**Note:**

Reducing the search current may improve performance for flying start if the inertia of the system is not very high.

<b>P1203</b>	<b>Search rate: Flying start</b>	<b>Min:</b> 10	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> U16		<b>Unit:</b> %
	<b>P-Group:</b> FUNC	<b>Active:</b> first confirm		<b>QuickComm. No</b>
		<b>Def:</b> 100		
		<b>Max:</b> 200		

Sets factor by which the output frequency changes during flying start to synchronize with turning motor. This value is entered in [%] defines the reciprocal initial gradient in the search sequence (see curve below). Parameter P1203 influences the time taken to search for the motor frequency.



$$P1203 [\%] = \frac{\Delta t [\text{ms}]}{\Delta f [\text{Hz}]} \cdot \frac{f_{\text{slip,nom}} [\text{Hz}]}{1 [\text{ms}]} \cdot 2 [\%]$$

$$\Delta f = \frac{2 [\%]}{P1203 [\%]} \cdot \frac{r0330}{100} \cdot P0310$$

The search time is the time taken to search through all frequencies between max. frequency P1082 + 2 x f\_slip to 0 Hz.

P1203 = 100 % is defined as giving a rate of 2 % of f\_slip,nom / [ms].

P1203 = 200 % would result in a rate of frequency change of 1 % of f\_slip,nom / [ms].

**Example:**

For a motor with 50 Hz, 1350 rpm, 100 % would produce a maximum search time of 600 ms. If the motor is turning, the motor frequency is found in a shorter time.

**Note:**

A higher value produces a flatter gradient and thus a longer search time.  
A lower value has the opposite effect.

<b>r1204</b>	<b>Status word: Flying start V/f</b>	<b>Min:</b> -	<b>Level:</b> <b>4</b>	
		<b>Datatype:</b> U16		<b>Unit:</b> -
	<b>P-Group:</b> FUNC			<b>Def:</b> -
		<b>Max:</b> -		

Bit parameter for checking and monitoring states during search, if V/f control mode is selected (see P1300).

**Bitfields:**

Bit00	Current applied	0	NO
		1	YES
Bit01	Current could not be applied	0	NO
		1	YES
Bit02	Voltage reduced	0	NO
		1	YES
Bit03	Slope-filter started	0	NO
		1	YES
Bit04	Current less threshold	0	NO
		1	YES
Bit05	Current-minimum	0	NO
		1	YES
Bit07	Speed could not be found	0	NO
		1	YES

<b>P1210</b>	<b>Automatic restart</b>			<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 1	
	<b>P-Group:</b> FUNC	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 6	

Configures automatic restart function

**Possible Settings:**

0	Disabled	
1	Trip reset after power on,	P1211 disabled
2	Restart after mains blackout,	P1211 disabled
3	Restart after mains brownout or fault,	P1211 enabled
4	Restart after mains brownout,	P1211 enabled
5	Restart after mains blackout and fault,	P1211 disabled
6	Restart after mains brown- /blackout or fault,	P1211 enabled

**Dependency:**

Automatic restart requires constant ON command via a digital input wire link.



**Caution:**

P1210 > 2 can cause the motor to restart automatically without toggling the ON command !

**Notice:**

A "mains brownout" is where the power is interrupted and re-applied before the display on the BOP (if one is fitted to the inverter) has gone dark (a very short mains break where the DC link has not fully collapsed).

A "mains blackout" is where the display has gone dark (a long mains break where the DC link has fully collapsed) before the power is re-applied.

P1210 = 0:  
Automatic restart is disabled.

P1210 = 1:  
The inverter will acknowledge (reset) faults i.e. it will reset a fault when the is re-applied. This means the inverter must be fully powered down, a brownout is not sufficed. The inverter will not run until the ON command has been toggled.

P1210 = 2:  
The inverter will acknowledge the fault F0003 at power on after blackout and restarts the drive. It is necessary that the ON command is wired via digital input (DIN).

P1210 = 3:  
For these settings it is fundamental that the drive only restarts if it has been in a RUN state at the time of the faults (F0003, etc.). The inverter will acknowledge the fault and restarts the drive after a blackout or brownout. It is necessary that the ON command is wired via digital input (DIN).

P1210 = 4:  
For these settings it is fundamental that the drive only restarts if it has been in a RUN state at the time of the fault (F0003). The inverter will acknowledge the fault and restarts the drive after a blackout or brownout. It is necessary that the ON command is wired via digital input (DIN).

P1210 = 5:  
The inverter will acknowledge the faults F0003 etc. at power on after blackout and restarts the drive. It is necessary that the ON command is wired via digital input (DIN).

P1210 = 6:  
The inverter will acknowledge the faults (F0003 etc.) at power on after blackout or brownout and restarts the drive. It is necessary that the ON command is wired via digital input (DIN). Setting 6 causes the motor to restart immediately.

Following table presents an overview of parameter P1210 and its functionality.

P1210	Blackout F003	Brownout F003	All other faults without power cycle	All other faults with power cycle	ON command enabled during Power OFF
0	-	-	-	-	-
1	Fault acknowledge	-	-	-	Fault acknowledge
2	Fault acknowledge + restart	-	-	-	Fault acknowledge + restart
3	Fault acknowledge + restart	Fault acknowledge + restart	Fault acknowledge + restart	Fault acknowledge + restart	-
4	Fault acknowledge + restart	Fault acknowledge + restart	-	-	-
5	Fault acknowledge + restart	-	-	Fault acknowledge + restart	Fault acknowledge + restart
6	Fault acknowledge + restart	Fault acknowledge + restart	Fault acknowledge + restart	Fault acknowledge + restart	Fault acknowledge + restart

Flying start must be used in cases where the motor may still be turning (e.g. after a short mains break) or can be driven by the load (P1200).

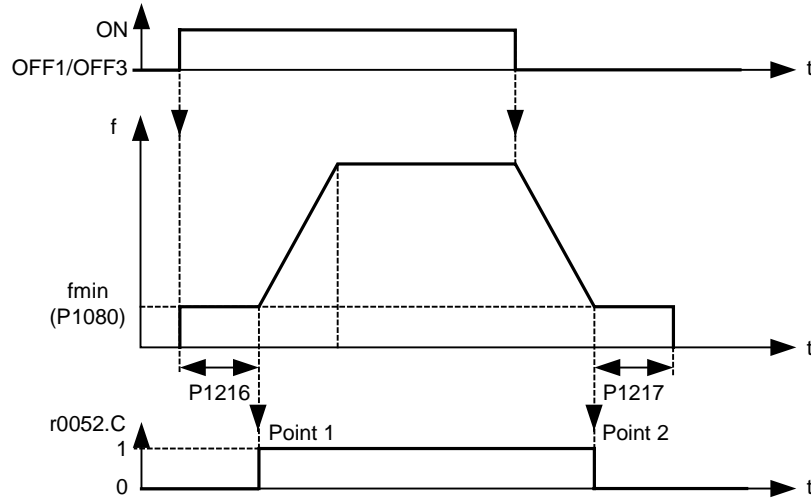
<b>P1211</b>	<b>Number of restart attempts</b>				Min: 0	Level: <b>3</b>
	CStat: CUT	Datatype: U16	Unit: -	Def: 3		
	P-Group: FUNC	Active: first confirm	QuickComm. No	Max: 10		

Specifies number of times inverter will attempt to restart if automatic restart P1210 is activated.

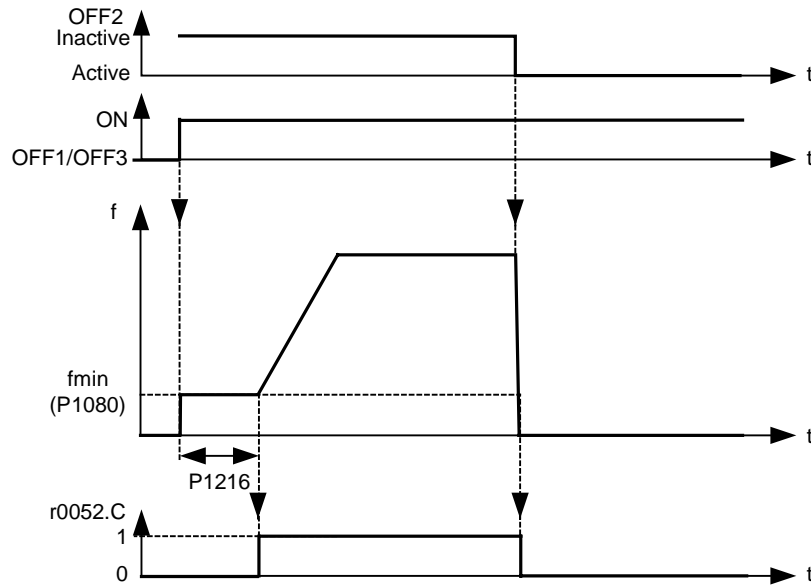
<b>P1215</b>	<b>Holding brake enable</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> T	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Def:</b> 0	
	<b>P-Group:</b> FUNC			<b>Max:</b> 1	

Enables/disables holding brake function. This function applies the following profile to the inverter:

#### ON / OFF1/OFF3:



#### ON / OFF2:



#### Possible Settings:

- 0 Motor holding brake disabled
- 1 Motor holding brake enabled

#### Note:

The brake relay opens at point 1, if enabled using P0731 (function of digital output), and closes at point 2.

<b>P1216</b>	<b>Holding brake release delay</b>	<b>Min:</b> 0.0	Level: <b>2</b>	
	<b>CStat:</b> T	<b>Datatype:</b> Float		<b>Unit:</b> s
	<b>P-Group:</b> FUNC	<b>Active:</b> first confirm		<b>QuickComm. No</b>
		<b>Def:</b> 1.0		
		<b>Max:</b> 20.0		

Defines period during which inverter runs at min. frequency P1080 before ramping up at point 1 (as shown in P1215 - holding brake enable). Inverter starts at min. frequency P1080 on this profile, i.e. it does not use a ramp.

**Note:**

A typical value of min. frequency P1080 for this type of application is the slip frequency of the motor.

You can calculate the rated slip frequency by using the following formula:

$$f_{\text{Slip}}[\text{Hz}] = \frac{r0330}{100} \cdot P0310 = \frac{n_{\text{syn}} - n_n}{n_{\text{syn}}} \cdot f_n$$

**Notice:**

If used to hold the motor at a certain frequency against a mechanical brake (i.e. you are using a relay to control mechanical brake), it is important that min. frequency P1080 < 5 Hz; otherwise, the current drawn may be too high and the relay may not open.

<b>P1217</b>	<b>Holding time after ramp down</b>	<b>Min:</b> 0.0	Level: <b>2</b>	
	<b>CStat:</b> T	<b>Datatype:</b> Float		<b>Unit:</b> s
	<b>P-Group:</b> FUNC	<b>Active:</b> first confirm		<b>QuickComm. No</b>
		<b>Def:</b> 1.0		
		<b>Max:</b> 20.0		

Defines time for which inverter runs at minimum frequency (P1080) after ramping down at point 2.

**Details:**

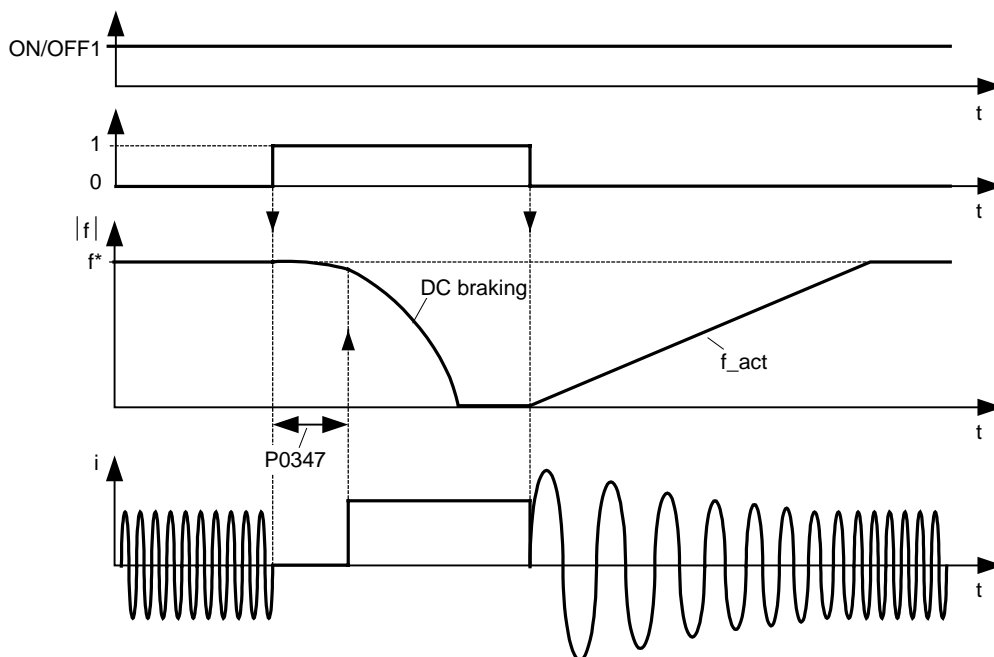
See diagram P1215 (holding brake enable).

<b>P1230</b>	<b>BI: Enable DC braking</b>	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Def:</b> 0:0	
	<b>P-Group:</b> COMMANDS			<b>Max:</b> 4000:0	

Enables DC braking via a signal applied from an external source. Function remains active while external input signal is active.

DC braking causes the motor to stop rapidly by applying a DC braking current (current applied also holds shaft stationary).

When the DC braking signal is applied, the inverter output pulses are blocked and the DC current is not applied until the motor has been sufficiently demagnetized.



The level of DC braking is set in P1232 (DC braking current - relative to the rated motor current) which is set to 100 % by default.

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

**Caution:**

Frequent use of long periods of DC braking can cause the motor to overheat.

**Notice:**

This delay time is set in P0347 (demagnetization time). If this delay is too short, overcurrent trips can occur.

DC braking is not possible when using a synchronous motor (i.e. P0300 = 2).

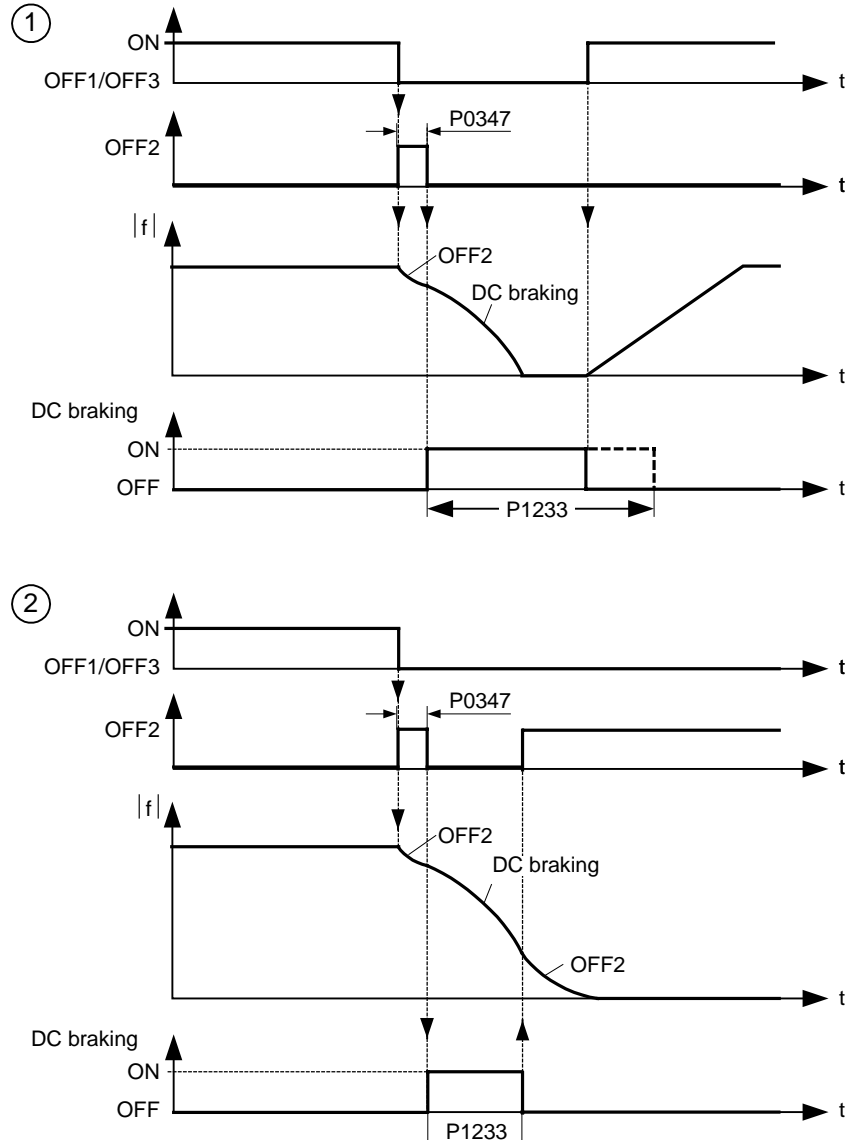
<b>P1232</b>	<b>DC braking current</b>	<b>Datatype:</b> U16	<b>Unit:</b> %	<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Def:</b> 100	
	<b>P-Group:</b> FUNC			<b>Max:</b> 250	

Defines level of DC current in [%] relative to rated motor current (P0305).



<b>P1233</b>	<b>Duration of DC braking</b>	<b>Min:</b> 0	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> U16		<b>Unit:</b> s
	<b>P-Group:</b> FUNC	<b>Active:</b> Immediately		<b>QuickComm. No</b> Def: 0 Max: 250

Defines duration for which DC injection braking is to be active following an OFF1 or OFF3 command. Setting this parameter between 1 and 250 sets the time duration (in seconds) of the DC injection starting with the OFF1 or OFF3 command.



Parameter P1232 still controls the level of DC injection.

**Value:**  
 P1233 = 0 :  
 Not active following OFF1 / OFF3.

P1233 = 1 - 250 :  
 Active for the specified duration.

**Caution:**  
 Frequent use of long periods of DC braking can cause the motor to overheat.

**Notice:**  
 The DC braking function causes the motor to stop rapidly by applying a DC braking current (the current applied also holds the shaft stationary). When the DC braking signal is applied, the inverter output pulses are blocked and the DC current not applied until the motor has been sufficiently demagnetized (demagnetization time is calculated automatically from motor data).

The inverter will not restart if an ON-command is given during this period.

DC braking is not possible when using a synchronous motor (i.e. P0300 = 2).

<b>P1236</b>	<b>Compound braking current</b>	<b>Min:</b> 0	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> U16		<b>Def:</b> 0
	<b>P-Group:</b> FUNC	<b>Active:</b> Immediately		<b>QuickComm. No</b> <b>Max:</b> 250

Defines DC level superimposed on AC waveform after OFF1 / OFF3 command. The value is entered in [%] relative to rated motor current (P0305).

If P1254 = 0 :

$$\text{Compound braking switch-on level} = 1.13 \cdot \sqrt{2} \cdot V_{\text{mains}} = 1.13 \cdot \sqrt{2} \cdot P0210$$

otherwise :

$$\text{Compound braking switch-on level} = 0.98 \cdot r1242$$

**Value:**

P1236 = 0 :  
Compound braking disabled.

P1236 = 1 - 250 :  
Level of DC braking current defined as a [%] of rated motor current (P0305).

**Dependency:**

Compound braking depends on the DC link voltage only (see threshold above). This will happen on OFF1, OFF3 and any regenerative condition.

It is disabled, when:  
- DC braking is active  
- Flying start is active

**Notice:**

Increasing the value will generally improve braking performance; however, if you set the value too high, an overcurrent trip may result.

If used with dynamic braking enabled as well compound braking will take priority.

If used with the Vdc max controller enabled the drive behaviour whilst braking may be worsened particularly with high values of compound braking.

<b>P1240</b>	<b>Configuration of Vdc controller</b>	<b>Min:</b> 0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U16		<b>Def:</b> 1
	<b>P-Group:</b> FUNC	<b>Active:</b> Immediately		<b>QuickComm. No</b> <b>Max:</b> 1

Enables / disables Vdc controller.

The Vdc controller dynamically controls the DC link voltage to prevent overvoltage trips on high inertia systems.

**Possible Settings:**

0 Vdc controller disabled  
1 Vdc-max controller enabled

**Note:**

Vdc max controller automatically increases ramp-down times to keep the DC-link voltage (r0026) within limits (P2172).

<b>r1242</b>	<b>CO: Switch-on level of Vdc-max</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>	
		<b>Datatype:</b> Float		<b>Def:</b> -
	<b>P-Group:</b> FUNC	<b>Unit:</b> V		<b>Max:</b> -

Displays switch-on level of Vdc max controller. The formula is only valid if auto detection is not activated (P1254=0).

Following equation is only valid, if P1254 = 0 :

$$r1242 = 1.15 \cdot \sqrt{2} \cdot V_{\text{mains}} = 1.15 \cdot \sqrt{2} \cdot P0210$$

<b>P1243</b>	<b>Dynamic factor of Vdc-max</b>	<b>Min:</b> 10	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> U16		<b>Def:</b> 100
	<b>P-Group:</b> FUNC	<b>Active:</b> Immediately		<b>QuickComm. No</b> <b>Max:</b> 200

Defines dynamic factor for DC link controller in [%].

**Dependency:**

P1243 = 100 % means parameters P1250, P1251 and P1252 (gain, integration time and differential time) are used as set. Otherwise, these are multiplied by P1243 (dynamic factor of Vdc-max).

**Note:**

Vdc controller adjustment is calculated automatically from motor and inverter data.

<b>P1250</b>	<b>Gain of Vdc-controller</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>4</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Def:</b> 1.00
	<b>P-Group:</b> FUNC	<b>Active:</b> Immediately		<b>QuickComm. No</b> <b>Max:</b> 10.00

Enters gain for Vdc controller.

<b>P1251</b>	<b>Integration time Vdc-controller</b>	<b>Min:</b> 0.1	<b>Level:</b> <b>4</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> ms
	<b>P-Group:</b> FUNC	<b>Active:</b> Immediately		<b>QuickComm. No</b>
		<b>Def:</b> 40.0		<b>Max:</b> 1000.0

Enters integral time constant for Vdc controller.

<b>P1252</b>	<b>Differential time Vdc-controller</b>	<b>Min:</b> 0.0	<b>Level:</b> <b>4</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> ms
	<b>P-Group:</b> FUNC	<b>Active:</b> Immediately		<b>QuickComm. No</b>
		<b>Def:</b> 1.0		<b>Max:</b> 1000.0

Enters differential time constant for Vdc controller.

<b>P1253</b>	<b>Vdc-controller output limitation</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> Hz
	<b>P-Group:</b> FUNC	<b>Active:</b> Immediately		<b>QuickComm. No</b>
		<b>Def:</b> 10.00		<b>Max:</b> 600.00

Limits maximum effect of Vdc max controller.

<b>P1254</b>	<b>Auto detect Vdc switch-on levels</b>	<b>Min:</b> 0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U16		<b>Unit:</b> -
	<b>P-Group:</b> FUNC	<b>Active:</b> Immediately		<b>QuickComm. No</b>
		<b>Def:</b> 1		<b>Max:</b> 1

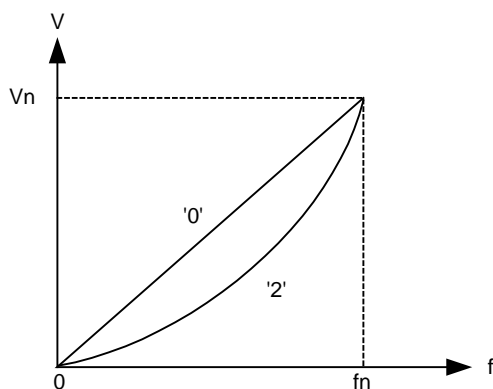
Enables/disables auto-detection of switch-on levels for Vdc max controller.

**Possible Settings:**

0 Disabled  
1 Enabled

<b>P1300</b>	<b>Control mode</b>			<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> CONTROL	<b>Active:</b> first confirm	<b>QuickComm.</b> Yes	<b>Max:</b> 3	

Controls relationship between speed of motor and voltage supplied by inverter as illustrated in the diagram below.



**Possible Settings:**

- 0 V/f with linear characteristic
- 1 V/f with FCC
- 2 V/f with parabolic characteristic
- 3 V/f with programmable characteristic

**Note:**

V/f modes (P1300 < 20):

P1300 = 1 : V/f with FCC (flux current control)

\* Maintains motor flux current for improved efficiency.

\* If FCC is chosen, linear V/f is active at low frequencies.

P1300 = 2 : V/f with a quadratic characteristic

\* Suitable for centrifugal fans / pumps

P1300 = 3 : V/f with a programmable characteristic

\* User defined characteristic (see P1320)

\* For synchronous motors (e.g. SIEMOSYN motors)

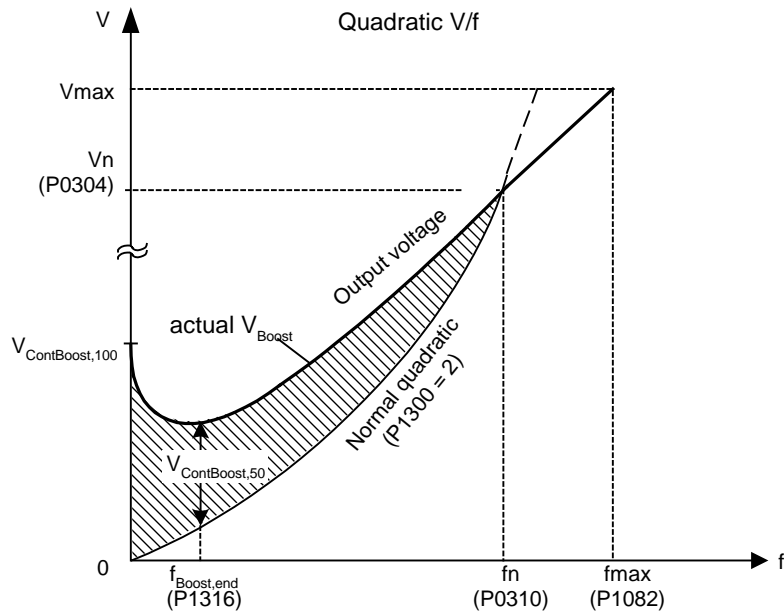
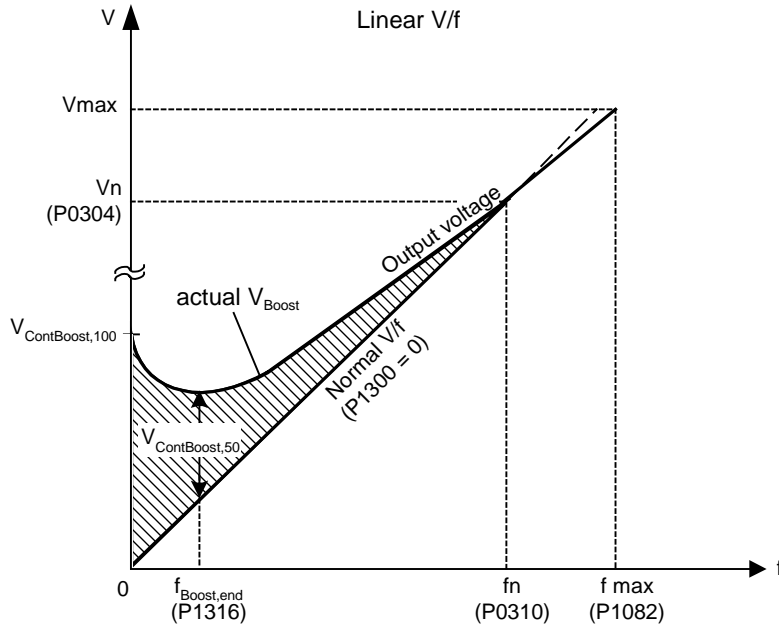
The following table presents an overview of control parameters (V/f) that can be modify in relationship to P1300 dependencies:

ParNo.	ParText	Level	U/f			
			P1300 =			
			0	1	2	3
P1300	Control mode	2	x	x	x	x
P1310	Continuous boost	2	x	x	x	x
P1311	Acceleration boost	2	x	x	x	x
P1312	Starting boost	2	x	x	x	x
P1316	Boost end frequency	3	x	x	x	x
P1320	Programmable V/f freq. coord. 1	3	-	-	-	x
P1321	Programmable V/f volt. coord. 1	3	-	-	-	x
P1322	Programmable V/f freq. coord. 2	3	-	-	-	x
P1323	Programmable V/f volt. coord. 2	3	-	-	-	x
P1324	Programmable V/f freq. coord. 3	3	-	-	-	x
P1325	Programmable V/f volt. coord. 3	3	-	-	-	x
P1333	Start frequency for FCC	3	-	x	-	-
P1335	Slip compensation	2	x	x	x	x
P1336	Slip limit	2	x	x	x	x
P1338	Resonance damping gain V/f	3	x	x	x	x
P1340	Imax controller prop. gain	3	x	x	x	x
P1341	Imax controller integral time	3	x	x	x	x
P1345	Imax controller prop. gain	3	x	x	x	x
P1346	Imax controller integral time	3	x	x	x	x
P1350	Voltage soft start	3	x	x	x	x

<b>P1310</b>	<b>Continuous boost</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> 0.0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Active:</b> Immediately	<b>QuickComm. No</b>	<b>Def:</b> 50.0	
	<b>P-Group:</b> CONTROL			<b>Max:</b> 250.0	

At low output frequencies the output voltage is low to keep the flux level constant. However, the output voltage may be too low  
 - for magnetisation the asynchronous motor  
 - to hold the load  
 - to overcome losses in the system. The output voltage can be increased using parameter P1310.

Defines boost level in [%] relative to P0305 (rated motor current) applicable to both linear and quadratic V/f curves according to the diagram below:



where voltage values are given

$$V\_ConBoost,100 = \text{rated motor current (P0305)} * \text{Stator resistance (P0350)} * \text{Continuous boost (P1310)}$$

$$V\_ConBoost,50 = V\_ConBoost,100 / 2$$

**Dependency:**

Setting in P0640 (motor overload factor [%]) limits the boost.

**Note:**

The boost values are combined when continuous boost (P1310) used in conjunction with other boost parameters (acceleration boost P1311 and starting boost P1312).

However priorities are allocated to these parameters as follows:  
P1310 > P1311 > P1312

**Notice:**

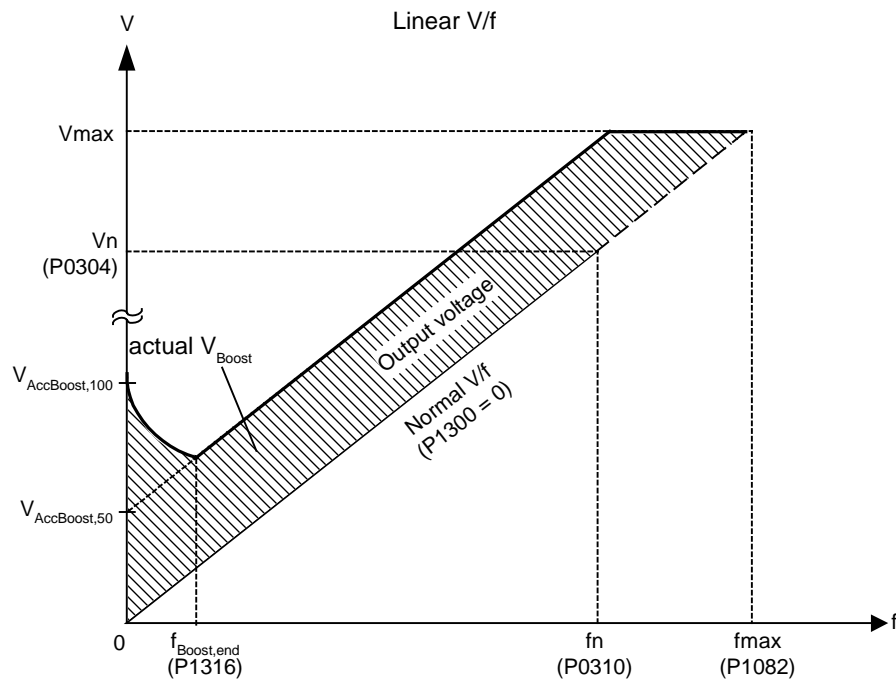
Increasing the boost levels increases motor heating (especially at standstill).

$$\text{Boosts} \leq 300 \cdot R_s \cdot I_{\text{mot}}$$

<b>P1311</b>	<b>Acceleration boost</b>			<b>Min:</b> 0.0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Def:</b> 0.0	
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 250.0	

P1311 will only produce boost during ramping, and is therefore useful for additional torque during acceleration and deceleration.

Applies boost in [%] relative to P0305 (rated motor current) following a positive setpoint change and drops back out once the setpoint is reached.



where voltage values are given

$$V_{\text{AccBoost},100} = \text{rated motor current (P0305)} \cdot \text{Stator resistance (P0350)} \cdot \text{Acceleration boost (P1311)}$$

$$V_{\text{AccBoost},50} = V_{\text{AccBoost},100} / 2$$

**Dependency:**

Setting in P0640 (motor overload factor [%]) limits boost.

**Note:**

Acceleration boost can help to improve response to small positive setpoint changes.

$$\text{Boosts} \leq 300 \cdot R_s \cdot I_{\text{mot}}$$

**Notice:**

Increasing the boost level increases motor heating.

**Details:**

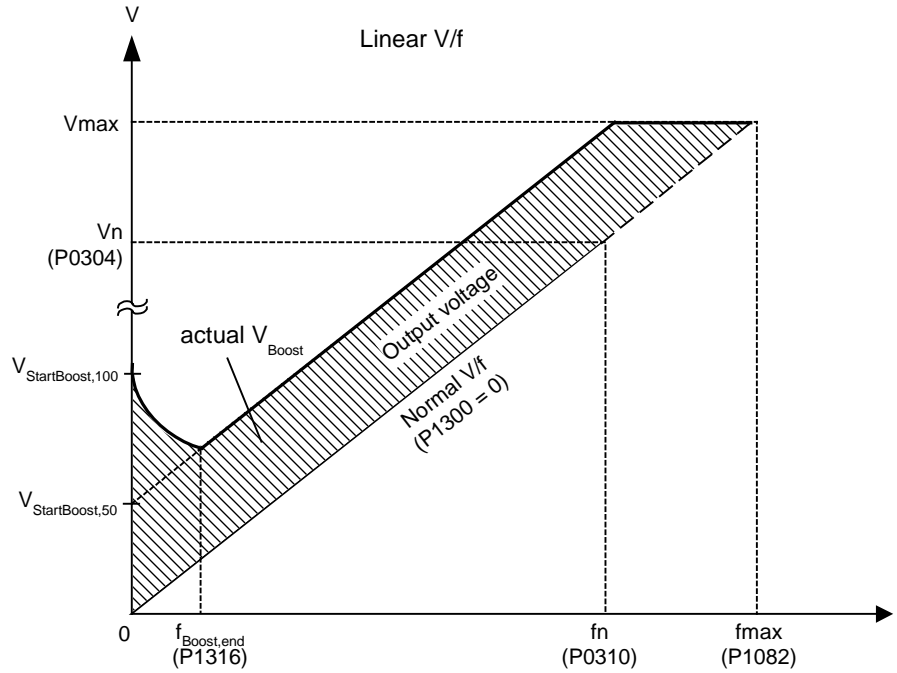
See note in P1310 for boost priorities.

<b>P1312</b>	<b>Starting boost</b>			<b>Min:</b> 0.0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Def:</b> 0.0	
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 250.0	

Applies a constant linear offset (in [%] relative to P0305 (rated motor current)) to active V/f curve (either linear or quadratic) after an ON command and is active until  
 1) ramp output reaches setpoint for the first time respectively  
 2) setpoint is reduced to less than present ramp output

This is useful for starting loads with high inertia.

Setting the starting boost (P1312) too high will cause the inverter to limit the current, which will in turn restrict the output frequency to below the setpoint frequency.



where voltage values are given

$$V\_StartBoost,100 = \text{rated motor current (P0305)} \cdot \text{Stator resistance (P0350)} \cdot \text{Starting boost (P1312)}$$

$$V\_StartBoost,50 = V\_StartBoost,100 / 2$$

**Example:**

Setpoint = 50Hz. Ramping up with starting boost. During ramp up, setpoint changed to 20Hz. As soon as setpoint changed, starting boost removed because setpoint smaller than present ramp output.

**Dependency:**

Setting in P0640 (motor overload factor [%]) limits boost.

**Notice:**

Increasing the boost levels increases motor heating.

$$\text{Boosts} \leq 300 \cdot R_s \cdot I_{mot}$$

**Details:**

See note in P1310 for boost priorities.

<b>r1315</b>	<b>CO: Total boost voltage</b>			<b>Min:</b> -	<b>Level:</b> <b>4</b>
		<b>Datatype:</b> Float	<b>Unit:</b> V	<b>Def:</b> -	
	<b>P-Group:</b> CONTROL			<b>Max:</b> -	

Displays total value of voltage boost (in volts).

<b>P1316</b>	<b>Boost end frequency</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> 0.0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Def:</b> 20.0	
	<b>P-Group:</b> CONTROL			<b>Max:</b> 100.0	

Defines point at which programmed boost reaches 50 % of its value.

This value is expressed in [%] relative to P0310 (rated motor frequency).

The default frequency is defined as follows:

$$f_{\text{Boost min}} = 2 \cdot \left( \frac{153}{\sqrt{P_{\text{motor}}}} + 3 \right)$$

**Note:**

The expert user may change this value to alter the shape of the curve, e.g. to increase torque at a particular frequency.

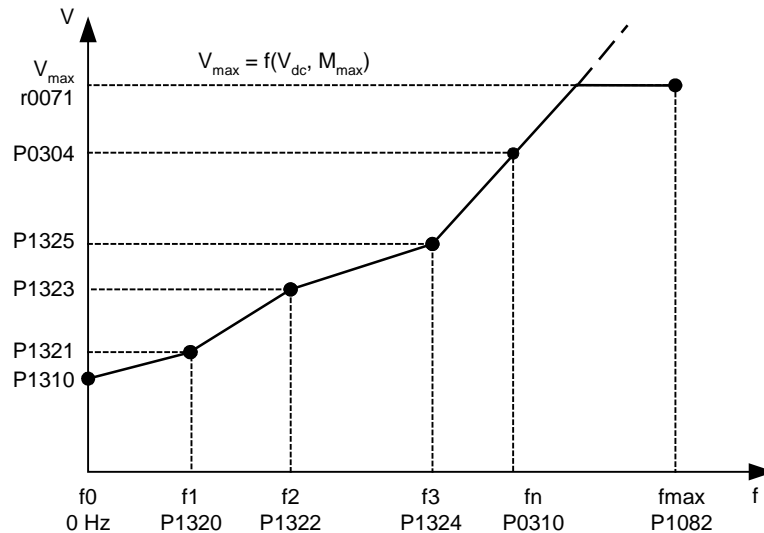
Default value is dependant on inverter rated power.

**Details:**

See diagram in P1310 (continuous boost).

<b>P1320</b>	<b>Programmable V/f freq. coord. 1</b>	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Def:</b> 0.00	
	<b>P-Group:</b> CONTROL			<b>Max:</b> 650.00	

Sets V/f coordinates (P1320/1321 to P1324/1325) to define V/f characteristic.



$$P1310[V] = \frac{P1310[\%]}{100[\%]} \cdot \frac{r0395[\%]}{100[\%]} \cdot P0304[V]$$

**Example:**

This parameter can be used to provide correct torque at correct frequency and is useful when used with synchronous motors.

**Dependency:**

To set parameter, select P1300 = 3 (V/f with programmable characteristic).

**Note:**

Linear interpolation will be applied between the individual data points.

V/f with programmable characteristic (P1300 = 3) has 3 programmable points. The two non-programmable points are:

- Continuous boost P1310 at zero 0 Hz
- Rated motor voltage P0304 at rated motor frequency P0310

The acceleration boost and starting boost defined in P1311 and P1312 are applied to V/f with programmable characteristic.

<b>P1321</b>	<b>Programmable V/f volt. coord. 1</b>	<b>Datatype:</b> Float	<b>Unit:</b> V	<b>Min:</b> 0.0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Def:</b> 0.0	
	<b>P-Group:</b> CONTROL			<b>Max:</b> 3000.0	

See P1320 (programmable V/f freq. coord. 1).



<b>P1322</b>	<b>Programmable V/f freq. coord. 2</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> Float		<b>Unit:</b> Hz
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately		<b>QuickComm:</b> No
		<b>Def:</b> 0.00		
		<b>Max:</b> 650.00		

See P1320 (programmable V/f freq. coord. 1).

<b>P1323</b>	<b>Programmable V/f volt. coord. 2</b>	<b>Min:</b> 0.0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> V
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately		<b>QuickComm:</b> No
		<b>Def:</b> 0.0		
		<b>Max:</b> 3000.0		

See P1320 (programmable V/f freq. coord. 1).

<b>P1324</b>	<b>Programmable V/f freq. coord. 3</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> Float		<b>Unit:</b> Hz
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately		<b>QuickComm:</b> No
		<b>Def:</b> 0.00		
		<b>Max:</b> 650.00		

See P1320 (programmable V/f freq. coord. 1).

<b>P1325</b>	<b>Programmable V/f volt. coord. 3</b>	<b>Min:</b> 0.0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> V
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately		<b>QuickComm:</b> No
		<b>Def:</b> 0.0		
		<b>Max:</b> 3000.0		

See P1320 (programmable V/f freq. coord. 1).

<b>P1333</b>	<b>Start frequency for FCC</b>	<b>Min:</b> 0.0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately		<b>QuickComm:</b> No
		<b>Def:</b> 10.0		
		<b>Max:</b> 100.0		

Defines start frequency at which FCC (flux current control) is enabled as [%] of rated motor frequency (P0310).

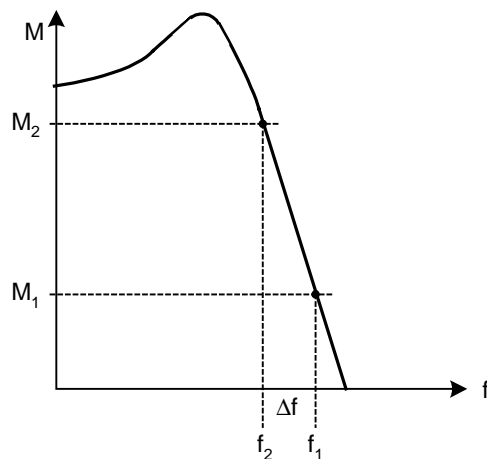
**Notice:**

If this value is too low, the system may become unstable.

<b>P1335</b>	<b>Slip compensation</b>	<b>Min:</b> 0.0	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately		<b>QuickComm:</b> No
		<b>Def:</b> 0.0		
		<b>Max:</b> 600.0		

Dynamically adjusts output frequency of inverter so that motor speed is kept constant independent of motor load.

Increasing the load from md1 to md2 (see diagram) will decrease the motor speed from f1 to f2, due to the slip. The inverter can compensate for this by increasing the output frequency slightly as the load increases. The inverter measures the current and increases the output frequency to compensate for the expected slip.



**Value:**

P1335 = 0 % :  
Slip compensation disabled.

P1335 = 50 % - 70 % :  
Full slip compensation at cold motor (partial load).

P1335 = 100 % :  
Full slip compensation at warm motor (full load).

**Note:**

Gain adjustment enables fine-tuning of the actual motor speed (see P1460 - gain speed control).

100% = standard setting for warm stator.

<b>P1336</b>	<b>Slip limit</b>	<b>Min:</b> 0	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Def:</b> 250
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Max:</b> 600

Compensation slip limit in [%] relative to r0330 (rated motor slip), which is added to frequency setpoint.

**Dependency:**

Slip compensation (P1335) active.

<b>r1337</b>	<b>CO: V/f slip frequency</b>	<b>Min:</b> -	<b>Level:</b>
	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Def:</b> -
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Max:</b> -

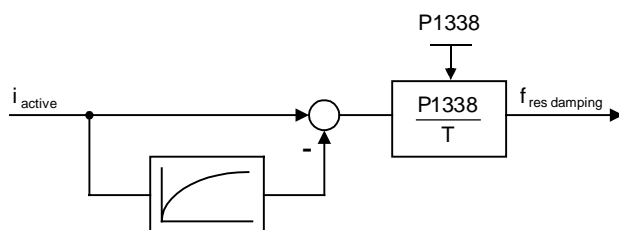
Displays actual compensated motor slip as [%]

**Dependency:**

Slip compensation (P1335) active.

<b>P1338</b>	<b>Resonance damping gain V/f</b>	<b>Min:</b> 0.00	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Def:</b> 0.00
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Max:</b> 10.00

Defines resonance damping gain for V/f. Here, di/dt of the active current will be scaled by P1338 (see diagram below). If di/dt increases the resonance damping circuit decreases the inverter output frequency.



**Note:**

The resonance circuit damps oscillations of the active current which frequently occur during no-load operation.

In V/f modes (see P1300), the resonance damping circuit is active in a range from approx. 6 % to 80 % of rated motor frequency (P0310).

If the value of P1338 is too high, this will cause instability (forward control effect).

<b>P1340</b>	<b>I<sub>max</sub> controller prop. gain</b>	<b>Min:</b> 0.000	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Def:</b> 0.000
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Max:</b> 0.499

Proportional gain of the I<sub>max</sub> controller.

Dynamically controls the inverter if the output current exceeds the maximum motor current (r0067). It does this by first limiting the inverter output frequency (to a possible minimum of the nominal slip frequency). If this action does not successfully remove the overcurrent condition, the inverter output voltage is reduced. When the overcurrent condition has been removed successfully, frequency limiting is removed using the ramp-up time set in P1120.

<b>P1341</b>	<b>I<sub>max</sub> controller integral time</b>	<b>Min:</b> 0.000	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Def:</b> 0.300
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Max:</b> 50.000

Integral time constant of the I<sub>max</sub> controller.

P1341 = 0 :  
I<sub>max</sub> controller disabled

P1340 = 0 and P1341 > 0 :  
enhanced integral

P1340 > 0 and P1341 > 0 :  
normal PI control

See description in parameter P1340 for further information.

<b>r1343</b>	<b>CO: I<sub>max</sub> controller freq. output</b>	<b>Min:</b> -	<b>Level:</b>
	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Def:</b> -
	<b>P-Group:</b> CONTROL	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Max:</b> -

Displays effective frequency limitation.

**Dependency:**

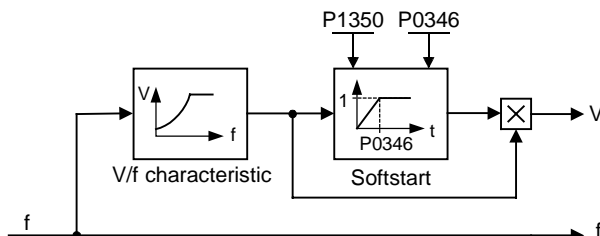
If I<sub>max</sub> controller not in operation, parameter normally shows max. frequency P1082.

<b>r1344</b>	<b>CO: lmax controller volt. output</b>	<b>Datatype:</b> Float	<b>Unit:</b> V	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> CONTROL			<b>Def:</b> - <b>Max:</b> -	

Displays amount by which the l\_max controller is reducing the inverter output voltage.

<b>P1350</b>	<b>Voltage soft start</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT <b>P-Group:</b> CONTROL	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Def:</b> 0 <b>Max:</b> 1	

Sets whether voltage is built up smoothly during magnetization time (ON) or whether it simply jumps to boost voltage (OFF).



**Possible Settings:**

- 0 OFF
- 1 ON

**Note:**

The settings for this parameter bring benefits and drawbacks:

P1350 = 0: OFF (jump to boost voltage)  
Benefit: flux is built up quickly  
Drawback: motor may move

P1350 = 1: ON (smooth voltage build-up)  
Benefit: motor less likely to move  
Drawback: flux build-up takes longer

<b>P1800</b>	<b>Pulse frequency</b>	<b>Datatype:</b> U16	<b>Unit:</b> kHz	<b>Min:</b> 2	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT <b>P-Group:</b> INVERTER	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Def:</b> 4 <b>Max:</b> 16	

Sets pulse frequency of power switches in inverter. The frequency can be changed in steps of 2 kHz.

**Dependency:**

Minimum pulse frequency depends on P1082 (maximum frequency) and P0310 (rated motor frequency).

The maximal value of motor frequency P1082 is limited to pulse frequency P1800 (see P1082).

**Note:**

If the pulse frequency is increased, max. inverter current r0209 can be reduced (derating). The derating characteristic depends on the type and power of the inverter (see manual OPERATING INSTRUCTION).

If silent operation is not absolutely necessary, lower pulse frequencies may be selected to reduce inverter losses and radio-frequency emissions.

Under certain circumstances, the inverter may reduce the switching frequency to provide protection against over-temperature (see P0290).

<b>r1801</b>	<b>CO: Act. pulse frequency</b>	<b>Datatype:</b> U16	<b>Unit:</b> kHz	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> INVERTER			<b>Def:</b> - <b>Max:</b> -	

Actual pulse frequency of power switches in inverter.

**Notice:**

Under certain conditions (inverter overtemperature, see P0290), this can differ from the values selected in P1800 (pulse frequency).

<b>P1802</b>	<b>Modulator mode</b>			<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> INVERTER	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 2	

Selects inverter modulator mode.

**Possible Settings:**

- 0 SVM/ASVM automatic mode
- 1 Asymmetric SVM
- 2 Space vector modulation

**Notice:**

Asymmetric space vector modulation (ASVM) produces lower switching losses than space vector modulation (SVM), but may cause irregular rotation at very low speeds.

Space vector modulation (SVM) with over-modulation may produce current waveform distortion at high output voltages.

Space vector modulation (SVM) without over-modulation will reduce maximum output voltage available to motor.

<b>P1803</b>	<b>Max. modulation</b>			<b>Min:</b> 20.0	<b>Level:</b> <b>4</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Def:</b> 106.0	
	<b>P-Group:</b> INVERTER	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 150.0	

Sets maximum modulation index.

**Note:**

P1803 = 100 % : Limit for over-control (for ideal inverter without switching delay). For vector control the modulation limit will be reduced automatically with 4 %.

<b>P1820</b>	<b>Reverse output phase sequence</b>			<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> INVERTER	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 1	

Changes direction of motor rotation without changing setpoint polarity.

**Possible Settings:**

- 0 OFF
- 1 ON

**Dependency:**

If positive and negative revolution is enabled, frequency setpoint is directly used.

If both positive and negative revolution are disabled, reference value is set to zero.

**Details:**

See P1000 (select frequency setpoint)

<b>P1910</b>	<b>Select motor data identification</b>			<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> MOTOR	<b>Active:</b> first confirm	<b>QuickComm.</b> Yes	<b>Max:</b> 2	

Performs a motor data identification.

Performs stator resistance measuring.

**Possible Settings:**

- 0 Disabled
- 1 Identification of Rs with parameter change
- 2 Identification of Rs without parameter change

**Dependency:**

No measurement if motor data incorrect.

P1910 = 1 : Calculated value for stator resistance (see P0350) is overwritten.

P1910 = 2 : Values already calculated are not overwritten.

**Note:**

Before selecting motor data identification, "Quick commissioning" has to be performed in advance.

Once enabled (P1910 = 1), A0541 generates a warning that the next ON command will initiate measurement of motor parameters.

**Notice:**

When choosing the setting for measurement, observe the following:

1. "with parameter change"  
means that the value is actually adopted as P0350 parameter setting and applied to the control as well as being shown in the read-only parameters below.
2. "without parameter change"  
means that the value is only displayed, i.e. shown for checking purposes in the read-only parameter r1912 (identified stator resistance). The value is not applied to the control.

<b>r1912</b>	<b>Identified stator resistance</b>	<b>Datatype:</b> Float	<b>Unit:</b> Ohm	<b>Min:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> MOTOR			<b>Def:</b> - <b>Max:</b> -	

Displays measured stator resistance value (line-to-line) in [Ohms]

**Note:**

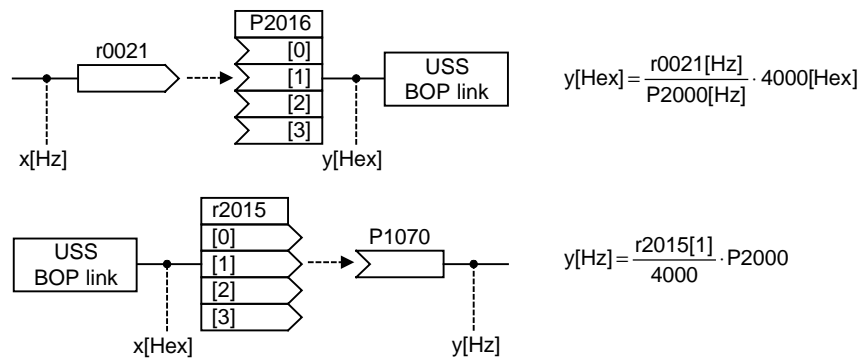
This value is measured using P1910 = 1 or 2 , i.e., identification of all parameters with/without change.

<b>P2000</b>	<b>Reference frequency</b>	<b>Datatype:</b> Float	<b>Unit:</b> Hz	<b>Min:</b> 1.00	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CT <b>P-Group:</b> COMM	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Def:</b> 50.00 <b>Max:</b> 650.00	

Full-scale frequency setting used by serial link (corresponds to 4000H), analog I/O and P/D controller.

**Example:**

If a BICO connection is made between two parameters or alternatively using P0719 or P1000, the 'unit' of the parameters (standardized (Hex) or physical (i.e. Hz) values) may differ. MICROMASTER implicitly makes an automatic conversion to the target value.



**Notice:**

Reference variables are intended as an aid to presenting setpoint and actual value signals in a uniform manner. This also applies to fixed settings entered as a percentage. A value of 100 % (USS / CB) corresponds to a process data value of 4000H, or 4000 0000H in the case of double values.

In this respect, the following parameters are available:

P2000	Reference frequency	Hz
P2001	Reference voltage	V
P2002	Reference current	A

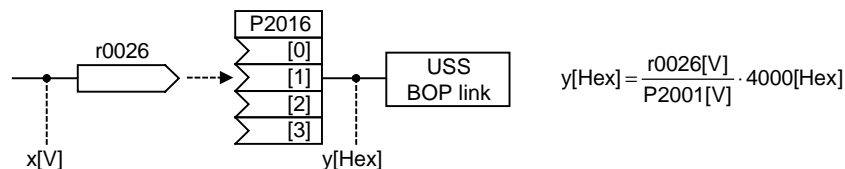
<b>P2001</b>	<b>Reference voltage</b>	<b>Datatype:</b> U16	<b>Unit:</b> V	<b>Min:</b> 10	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Def:</b> 1000 <b>Max:</b> 2000	

Full-scale output voltage (i.e. 100 % ) used over serial link (corresponds to 4000H).

**Example:**

P2001 = 230 specifies that 4000H received via USS denotes 230 V.

If a BICO connection is made between two parameters, the 'unit' of the parameters (standardized (Hex) or physical (i.e. V) values) may differ. MICROMASTER implicitly makes an automatic conversion to the target value.

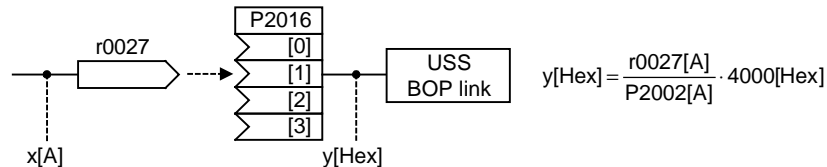


<b>P2002</b>	<b>Reference current</b>			<b>Min:</b> 0.10	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> Float	<b>Unit:</b> A	<b>Def:</b> 0.10	
	<b>P-Group:</b> COMM	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 10000.00	

Full-scale output current used over serial link (corresponds to 4000H).

**Example:**

If a BICO connection is made between two parameters, the 'unit' of the parameters (standardized (Hex) or physical (i.e. A) values) may differ. MICROMASTER implicitly makes an automatic conversion to the target value.



<b>P2009[2]</b>	<b>USS normalization</b>			<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> COMM	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 1	

Enables special normalization for USS.

**Possible Settings:**

- 0 Disabled
- 1 Enabled

**Index:**

- P2009[0] : Serial interface COM link
- P2009[1] : Serial interface BOP link

**Note:**

If enabled, the main setpoint (word 2 in PZD) is not interpreted as 100 % = 4000H, but as "absolute" instead (e.g. 4000H = 16384 means 163.84 Hz).

USS on COM link is not supported on MM411

<b>P2010[2]</b>	<b>USS baudrate</b>			<b>Min:</b> 3	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 6	
	<b>P-Group:</b> COMM	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 9	

Sets baud rate for USS communication.

**Possible Settings:**

- 3 1200 baud
- 4 2400 baud
- 5 4800 baud
- 6 9600 baud
- 7 19200 baud
- 8 38400 baud
- 9 57600 baud

**Index:**

- P2010[0] : Serial interface COM link
- P2010[1] : Serial interface BOP link

**Note:**

USS on COM link is not supported on MM411

<b>P2011[2]</b>	<b>USS address</b>			<b>Min:</b> 0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> COMM	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 31	

Sets unique address for inverter.

**Index:**

- P2011[0] : Serial interface COM link
- P2011[1] : Serial interface BOP link

**Note:**

USS on COM link is not supported on MM411

<b>P2012[2]</b>	<b>USS PZD length</b>			<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 2	
	<b>P-Group:</b> COMM	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 4	

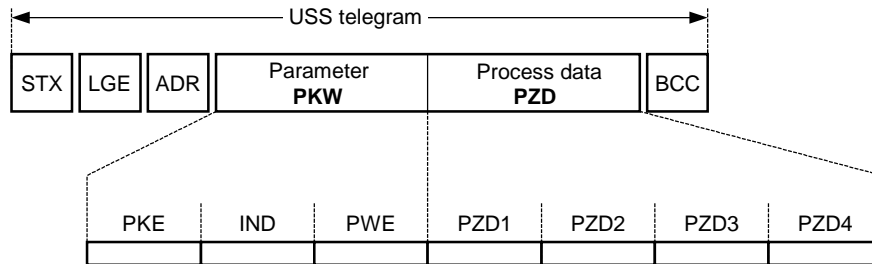
Defines the number of 16-bit words in PZD part of USS telegram. In this area, process data (PZD) are continually exchanged between the master and slaves. The PZD part of the USS telegram is used for the main setpoint, and to control the inverter.

**Index:**

- P2012[0] : Serial interface COM link
- P2012[1] : Serial interface BOP link

**Notice:**

USS protocol consists of PZD and PKW which can be changed by the user via parameters P2012 and P2013 respectively.

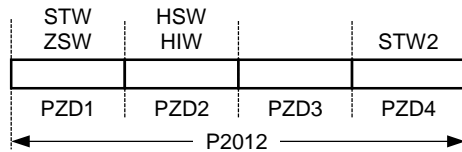


- |     |                       |     |                 |
|-----|-----------------------|-----|-----------------|
| STX | Start of text         | PKE | Parameter ID    |
| LGE | Length                | IND | Sub-index       |
| ADR | Address               | PWE | Parameter value |
| PKW | Parameter ID value    |     |                 |
| PZD | Process data          |     |                 |
| BCC | Block check character |     |                 |

PZD transmits a control word and setpoint or status word and actual values. The number of PZD-words in a USS-telegram are determined by parameter P2012, where the first two words (P2012 >= 2) are either:

- a) control word and main setpoint or
- b) status word and actual value.

When P2012 is greater or equal to 4 the additional control word is transferred as the 4th PZD-word (default setting).



- |     |              |     |                   |
|-----|--------------|-----|-------------------|
| STW | Control word | HSW | Main setpoint     |
| ZSW | Status word  | HIW | Main actual value |
| PZD | Process data |     |                   |

USS on COM link is not supported on MM411

<b>P2013[2]</b>	<b>USS PKW length</b>			<b>Min:</b> 0	<b>Level: 3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 127	
	<b>P-Group:</b> COMM	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 127	

Defines the number of 16-bit words in PKW part of USS telegram. The PKW area can be varied. Depending on the particular requirement, 3-word, 4-word or variable word lengths can be parameterized. The PKW part of the USS telegram is used to read and write individual parameter values.

**Possible Settings:**

- 0 No words
- 3 3 words
- 4 4 words
- 127 Variable

**Index:**

- P2013[0] : Serial interface COM link
- P2013[1] : Serial interface BOP link

**Example:**

	Data type		
	U16 (16 Bit)	U32 (32 Bit)	Float (32 Bit)
P2013 = 3	✓	Parameter access fault	Parameter access fault
P2013 = 4	✓	✓	✓
P2013 = 127	✓	✓	✓

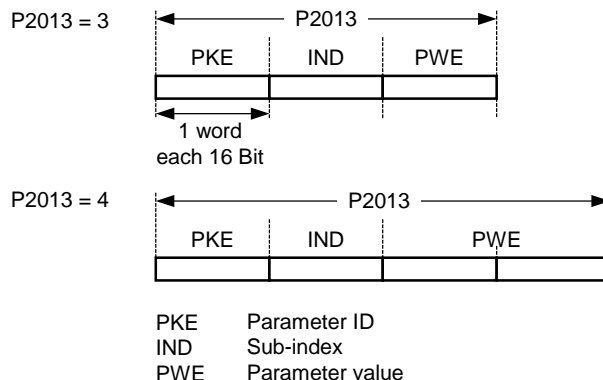
**Note:**

USS on COM link is not supported on MM411

**Notice:**

USS protocol consists of PZD and PKW which can be changed by the user via parameters P2012 and P2013 respectively.

Parameter P2013 determines the number of PKW-words in a USS-telegram. Setting P2013 = 3 or 4 will determine the number of PZD-words which are fixed during P2013 = 127, the length will be changed automatically.



P2013 = 3, fixes PKW length, but does not allow access to many parameter values. A parameter fault is generated when an out-of-range value is used, the value will not be accepted but the inverter state will not be affected. Useful for applications where parameters are not changed, but MM3s are also used. Broadcast mode is not possible with this setting.

P2013 = 4, fixes PKW length. Allows access to all parameters, but indexed parameters can only be read one index at a time. Word order for single word values are different to setting 3 or 127, see example below.

P2013 = 127, most useful setting. PKW reply length varies depending on the amount of information needed. Can read fault information and all indices of a parameter with a single telegram with this setting.

**Example:**

Set P0700 to value 5 (0700 = 2BC (hex))

	P2013 = 3	P2013 = 4	P2013 = 127
Master → MM4	22BC 0000 0005	22BC 0000 0000 0005	22BC 0000 0005 0000
MM4 → Master	12BC 0000 0005	12BC 0000 0000 0005	12BC 0000 0005



<b>P2014[2]</b>	<b>USS telegram off time</b>	<b>Min:</b> 0	<b>Level:</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> ms
	<b>P-Group:</b> COMM	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Def:</b> 0
		<b>Max:</b> 65535	<b>3</b>

Defines a time T\_off after which a fault will be generated (F0070) if no telegram is received via the USS channels.

**Index:**

- P2014[0] : Serial interface COM link
- P2014[1] : Serial interface BOP link

**Note:**

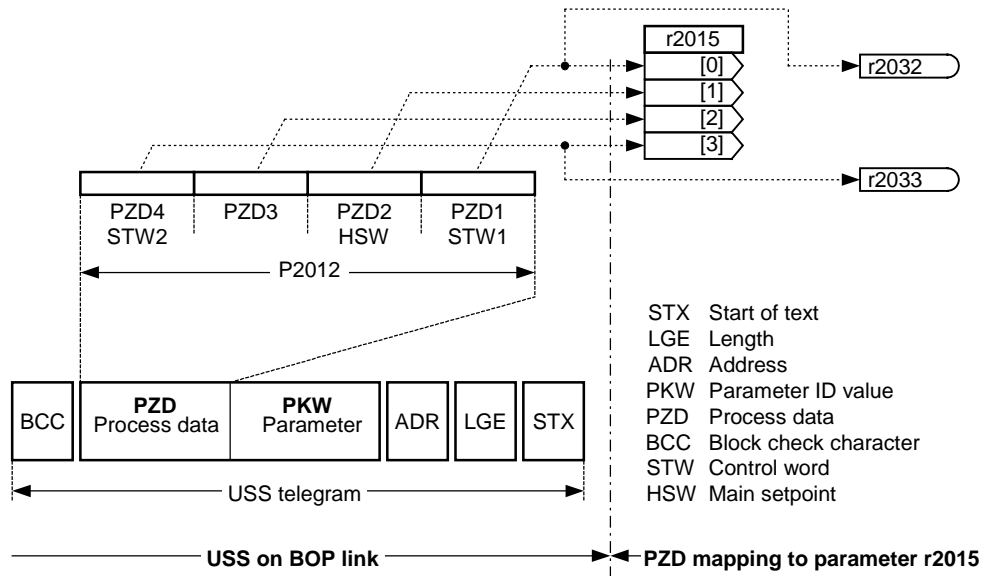
USS on COM link is not supported on MM411

**Notice:**

By default (time set to 0), no fault is generated (i.e. watchdog disabled).

<b>r2015[4]</b>	<b>CO: PZD from BOP link (USS)</b>	<b>Min:</b> -	<b>Level:</b>
		<b>Datatype:</b> U16	<b>Unit:</b> -
	<b>P-Group:</b> COMM	<b>Def:</b> -	<b>Max:</b> -
			<b>3</b>

Displays process data received via USS on BOP link (RS232 USS).



**Index:**

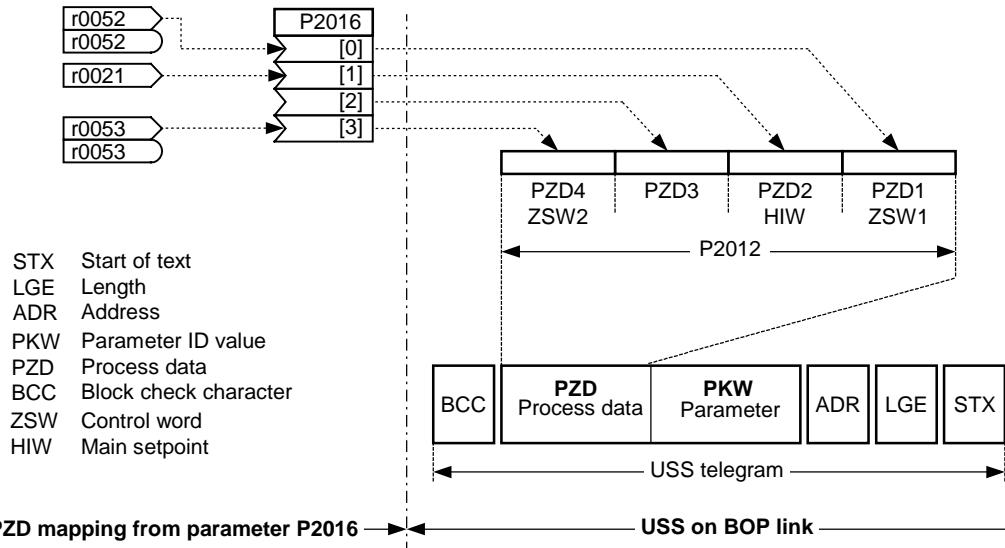
- r2015[0] : Received word 0
- r2015[1] : Received word 1
- r2015[2] : Received word 2
- r2015[3] : Received word 3

**Note:**

The control words can be viewed as bit parameters r2032 and r2033.

<b>P2016[4]</b>	<b>CI: PZD to BOP link (USS)</b>				<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 52:0		
	<b>P-Group:</b> COMM	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 4000:0		

Selects signals to be transmitted to serial interface via BOP link.



**Index:**

- P2016[0] : Transmitted word 0
- P2016[1] : Transmitted word 1
- P2016[2] : Transmitted word 2
- P2016[3] : Transmitted word 3

**Example:**

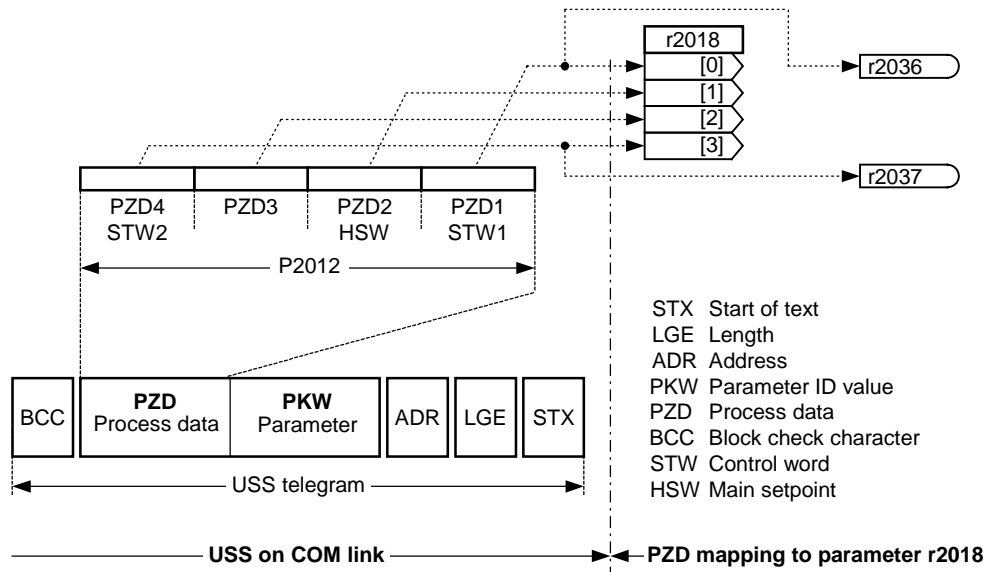
P2016[0] = 52.0 (default). In this case, the value of r0052[0] (CO/BO: Status word) is transmitted as 1st PZD to the BOP link.

**Note:**

If r0052 not indexed, display does not show an index (".0" ).

<b>r2018[4]</b>	<b>CO: PZD from COM link (USS)</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM	<b>Datatype:</b> U16 <b>Unit:</b> -	

Displays process data received via USS on COM link.



**Index:**

- r2018[0] : Received word 0
- r2018[1] : Received word 1
- r2018[2] : Received word 2
- r2018[3] : Received word 3

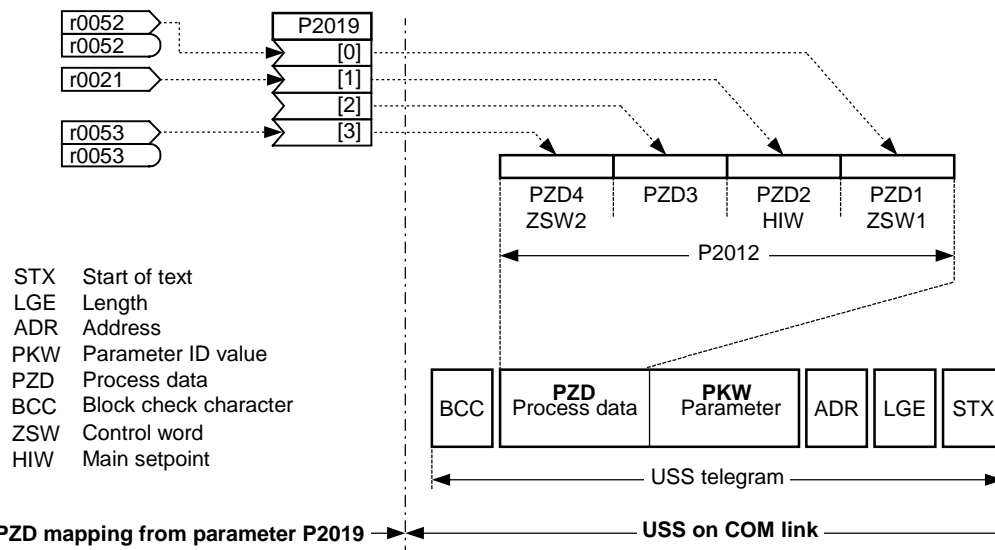
**Note:**

The control words can be viewed as bit parameters r2036 and r2037.

USS on COM link is not supported on MM411

<b>P2019[4]</b>	<b>CI: PZD to COM link (USS)</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U32		<b>Def:</b> 52:0
	<b>P-Group:</b> COMM	<b>Active:</b> first confirm		<b>QuickComm. No</b> <b>Max:</b> 4000:0

Displays process data received via USS on COM link.



**Index:**

- P2019[0] : Transmitted word 0
- P2019[1] : Transmitted word 1
- P2019[2] : Transmitted word 2
- P2019[3] : Transmitted word 3

**Note:**

USS on COM link is not supported on MM411

**Details:**

See P2016 (PZD to BOP link)

<b>r2024[2]</b>	<b>USS error-free telegrams</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>	
		<b>Datatype:</b> U16		<b>Def:</b> -
	<b>P-Group:</b> COMM	<b>Unit:</b> -		<b>Max:</b> -

Displays number of error-free USS telegrams received.

**Index:**

- r2024[0] : Serial interface COM link
- r2024[1] : Serial interface BOP link

**Note:**

USS on COM link is not supported on MM411

<b>r2025[2]</b>	<b>USS rejected telegrams</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>	
		<b>Datatype:</b> U16		<b>Def:</b> -
	<b>P-Group:</b> COMM	<b>Unit:</b> -		<b>Max:</b> -

Displays number of USS telegrams rejected.

**Index:**

- r2025[0] : Serial interface COM link
- r2025[1] : Serial interface BOP link

**Note:**

USS on COM link is not supported on MM411

<b>r2026[2]</b>	<b>USS character frame error</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>	
		<b>Datatype:</b> U16		<b>Def:</b> -
	<b>P-Group:</b> COMM	<b>Unit:</b> -		<b>Max:</b> -

Displays number of USS character frame errors.

**Index:**

- r2026[0] : Serial interface COM link
- r2026[1] : Serial interface BOP link

**Note:**

USS on COM link is not supported on MM411

<b>r2027[2]</b>	<b>USS overrun error</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM				
Displays number of USS telegrams with overrun error.					
<b>Index:</b> r2027[0] : Serial interface COM link r2027[1] : Serial interface BOP link					
<b>Note:</b> USS on COM link is not supported on MM411					
<b>r2028[2]</b>	<b>USS parity error</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM				
Displays number of USS telegrams with parity error.					
<b>Index:</b> r2028[0] : Serial interface COM link r2028[1] : Serial interface BOP link					
<b>Note:</b> USS on COM link is not supported on MM411					
<b>r2029[2]</b>	<b>USS start not identified</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM				
Displays number of USS telegrams with unidentified start.					
<b>Index:</b> r2029[0] : Serial interface COM link r2029[1] : Serial interface BOP link					
<b>Note:</b> USS on COM link is not supported on MM411					
<b>r2030[2]</b>	<b>USS BCC error</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM				
Displays number of USS telegrams with BCC error.					
<b>Index:</b> r2030[0] : Serial interface COM link r2030[1] : Serial interface BOP link					
<b>Note:</b> USS on COM link is not supported on MM411					
<b>r2031[2]</b>	<b>USS length error</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM				
Displays number of USS telegrams with incorrect length.					
<b>Index:</b> r2031[0] : Serial interface COM link r2031[1] : Serial interface BOP link					
<b>Note:</b> USS on COM link is not supported on MM411					

<b>r2032</b>	<b>BO: CtrlWrd1 from BOP link (USS)</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>Datatype:</b> U16 <b>Unit:</b> -	<b>Def:</b> -	
	<b>P-Group:</b> COMM	<b>Max:</b> -	

Displays control word 1 from BOP link (word 1 within USS).

**Bitfields:**

Bit00	ON/OFF1	0	NO
		1	YES
Bit01	OFF2: Electrical stop	0	YES
		1	NO
Bit02	OFF3: Fast stop	0	YES
		1	NO
Bit03	Pulse enable	0	NO
		1	YES
Bit04	RFG enable	0	NO
		1	YES
Bit05	RFG start	0	NO
		1	YES
Bit06	Setpoint enable	0	NO
		1	YES
Bit07	Fault acknowledge	0	NO
		1	YES
Bit08	JOG right	0	NO
		1	YES
Bit09	JOG left	0	NO
		1	YES
Bit10	Control from PLC	0	NO
		1	YES
Bit11	Reverse (setpoint inversion)	0	NO
		1	YES
Bit13	Motor potentiometer MOP up	0	NO
		1	YES
Bit14	Motor potentiometer MOP down	0	NO
		1	YES
Bit15	Local / Remote	0	NO
		1	YES

<b>r2033</b>	<b>BO: CtrlWrd2 from BOP link (USS)</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>Datatype:</b> U16 <b>Unit:</b> -	<b>Def:</b> -	
	<b>P-Group:</b> COMM	<b>Max:</b> -	

Displays control word 2 from BOP link (i.e. word 4 within USS).

**Bitfields:**

Bit00	Fixed frequency Bit 0	0	NO
		1	YES
Bit01	Fixed frequency Bit 1	0	NO
		1	YES
Bit02	Fixed frequency Bit 2	0	NO
		1	YES
Bit08	PID enabled	0	NO
		1	YES
Bit09	DC brake enabled	0	NO
		1	YES
Bit13	External fault 1	0	YES
		1	NO
Bit15	State of digital output 1	0	NO
		1	YES

**Dependency:**

P0700 = 4 (USS on BOP link) and P0719 = 0 (Cmd / Setpoint = BICO parameter).

<b>r2036</b>	<b>BO: CtrlWrd1 from COM link (USS)</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM			<b>Def:</b> - <b>Max:</b> -	

Displays control word 1 from COM link (i.e. word 1 within USS).

**Bitfields:**

Bit00	ON/OFF1	0	NO
		1	YES
Bit01	OFF2: Electrical stop	0	YES
		1	NO
Bit02	OFF3: Fast stop	0	YES
		1	NO
Bit03	Pulse enable	0	NO
		1	YES
Bit04	RFG enable	0	NO
		1	YES
Bit05	RFG start	0	NO
		1	YES
Bit06	Setpoint enable	0	NO
		1	YES
Bit07	Fault acknowledge	0	NO
		1	YES
Bit08	JOG right	0	NO
		1	YES
Bit09	JOG left	0	NO
		1	YES
Bit10	Control from PLC	0	NO
		1	YES
Bit11	Reverse (setpoint inversion)	0	NO
		1	YES
Bit13	Motor potentiometer MOP up	0	NO
		1	YES
Bit14	Motor potentiometer MOP down	0	NO
		1	YES
Bit15	Local / Remote	0	NO
		1	YES

**Note:**

USS on COM link is not supported on MM411

**Details:**

See r2033 (control word 2 from BOP link).

<b>r2037</b>	<b>BO: CtrlWrd2 from COM link (USS)</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM			<b>Def:</b> - <b>Max:</b> -	

Displays control word 2 from COM link (i.e. word 4 within USS).

**Bitfields:**

Bit00	Fixed frequency Bit 0	0	NO
		1	YES
Bit01	Fixed frequency Bit 1	0	NO
		1	YES
Bit02	Fixed frequency Bit 2	0	NO
		1	YES
Bit08	PID enabled	0	NO
		1	YES
Bit09	DC brake enabled	0	NO
		1	YES
Bit13	External fault 1	0	YES
		1	NO
Bit15	State of digital output 1	0	NO
		1	YES

**Note:**

USS on COM link is not supported on MM411

**Details:**

See r2033 (control word 2 from BOP link).

<b>P2040</b>	<b>CB telegram off time</b>	<b>Datatype:</b> U16	<b>Unit:</b> ms	<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Active:</b> Immediately	<b>QuickComm. No</b>	<b>Def:</b> 20 <b>Max:</b> 65535	

Defines time after which a fault will be generated (F0070) if no telegram is received via the link.

**Dependency:**

Setting 0 = watchdog disabled

<b>P2041[5]</b>	<b>CB parameter</b>			<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> COMM	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 65535	

Configures a communication board (CB).

**Index:**

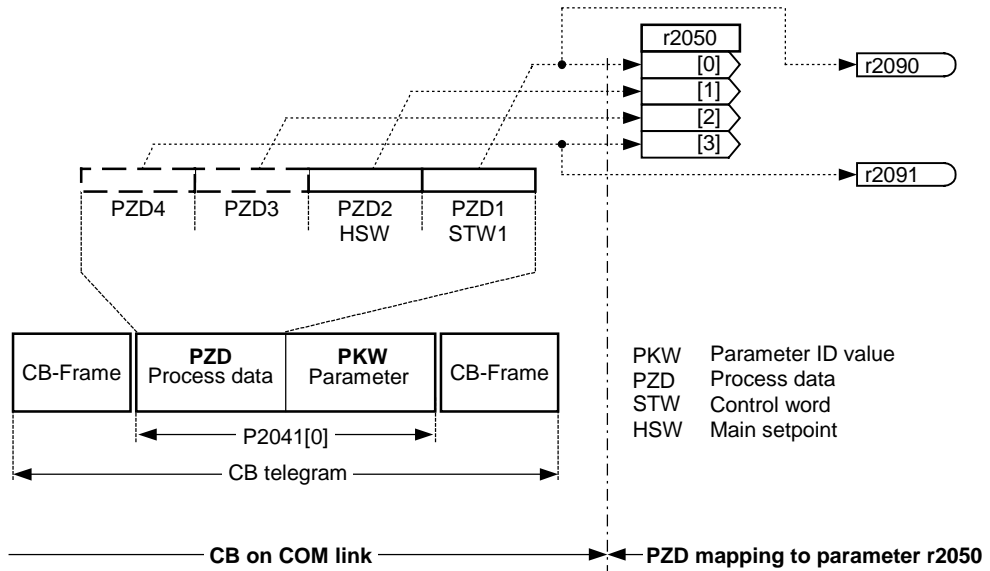
- P2041[0] : CB parameter 0
- P2041[1] : CB parameter 1
- P2041[2] : CB parameter 2
- P2041[3] : CB parameter 3
- P2041[4] : CB parameter 4

**Details:**

See relevant communication board manual for protocol definition and appropriate settings.

<b>r2050[4]</b>	<b>CO: PZD from CB</b>			<b>Min:</b> -	<b>Level:</b> <b>3</b>
		<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> -	
	<b>P-Group:</b> COMM			<b>Max:</b> -	

Displays PZD received from communication board (CB).



**Index:**

- r2050[0] : Received word 0
- r2050[1] : Received word 1
- r2050[2] : Received word 2
- r2050[3] : Received word 3

**Note:**

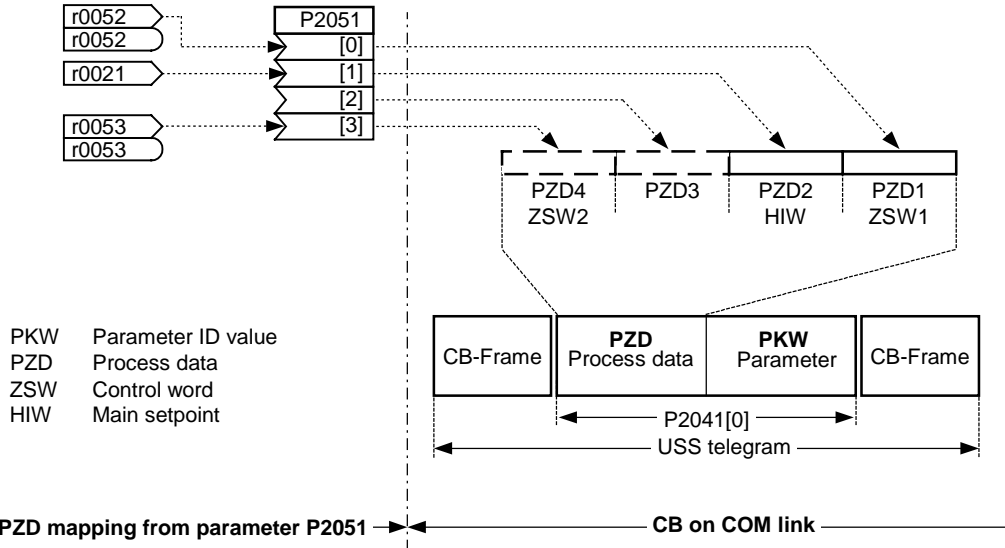
The control words can be viewed as bit parameters r2090 and r2091.



<b>P2051[4]</b>	<b>CI: PZD to CB</b>			<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Def:</b> 52:0	
	<b>P-Group:</b> COMM	<b>Active:</b> Immediately	<b>QuickComm. No</b>	<b>Max:</b> 4000:0	

Connects PZD to CB.

This parameter allows the user to define the source of status words and actual values for the reply PZD.



**Index:**

- P2051[0] : Transmitted word 0
- P2051[1] : Transmitted word 1
- P2051[2] : Transmitted word 2
- P2051[3] : Transmitted word 3

**Common Settings:**

- Status word 1 = 52 CO/BO: Act. status word 1 (see r0052)
- Actual value 1 = 21 inverter output frequency (see r0021)

Other BICO settings are possible

<b>r2053[5]</b>	<b>CB identification</b>			<b>Min:</b> -	<b>Level:</b> <b>3</b>
		<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> -	
	<b>P-Group:</b> COMM			<b>Max:</b> -	

Displays identification data of the communication board (CB). The different CB types (r2053[0]) are given in the Enum declaration.

**Possible Settings:**

- 0 No CB option board
- 1 PROFIBUS DP
- 2 DeviceNet
- 256 not defined

**Index:**

- r2053[0] : CB type (PROFIBUS = 1)
- r2053[1] : Firmware version
- r2053[2] : Firmware version detail
- r2053[3] : Firmware date (year)
- r2053[4] : Firmware date (day/month)

<b>r2054[7]</b>	<b>CB diagnosis</b>			<b>Min:</b> -	<b>Level:</b> <b>3</b>
		<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> -	
	<b>P-Group:</b> COMM			<b>Max:</b> -	

Displays diagnostic information of communication board (CB).

**Index:**

- r2054[0] : CB diagnosis 0
- r2054[1] : CB diagnosis 1
- r2054[2] : CB diagnosis 2
- r2054[3] : CB diagnosis 3
- r2054[4] : CB diagnosis 4
- r2054[5] : CB diagnosis 5
- r2054[6] : CB diagnosis 6

**Details:**

See relevant communications board manual.

<b>r2090</b>	<b>BO: Control word 1 from CB</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM			<b>Def:</b> - <b>Max:</b> -	

Displays control word 1 received from communication board (CB).

**Bitfields:**

Bit00	ON/OFF1	0	NO
		1	YES
Bit01	OFF2: Electrical stop	0	YES
		1	NO
Bit02	OFF3: Fast stop	0	YES
		1	NO
Bit03	Pulse enable	0	NO
		1	YES
Bit04	RFG enable	0	NO
		1	YES
Bit05	RFG start	0	NO
		1	YES
Bit06	Setpoint enable	0	NO
		1	YES
Bit07	Fault acknowledge	0	NO
		1	YES
Bit08	JOG right	0	NO
		1	YES
Bit09	JOG left	0	NO
		1	YES
Bit10	Control from PLC	0	NO
		1	YES
Bit11	Reverse (setpoint inversion)	0	NO
		1	YES
Bit13	Motor potentiometer MOP up	0	NO
		1	YES
Bit14	Motor potentiometer MOP down	0	NO
		1	YES
Bit15	Local / Remote	0	NO
		1	YES

**Note:**

If P700 = 6 (Profibus) then P810 must be set to 2090.15 for correct operation. This will not be cleared automatically when P700 is no longer equal to 6.

**Details:**

See relevant communication board manual for protocol definition and appropriate settings.

<b>r2091</b>	<b>BO: Control word 2 from CB</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>P-Group:</b> COMM			<b>Def:</b> - <b>Max:</b> -	

Displays control word 2 received from communication board (CB).

**Bitfields:**

Bit00	Fixed frequency Bit 0	0	NO
		1	YES
Bit01	Fixed frequency Bit 1	0	NO
		1	YES
Bit02	Fixed frequency Bit 2	0	NO
		1	YES
Bit08	PID enabled	0	NO
		1	YES
Bit09	DC brake enabled	0	NO
		1	YES
Bit13	External fault 1	0	YES
		1	NO
Bit15	State of digital output 1	0	NO
		1	YES

**Details:**

See relevant communication board manual for protocol definition and appropriate settings.

<b>P2100[3]</b>	<b>Alarm number selection</b>	<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>Datatype:</b> U16 <b>Unit:</b> - <b>Def:</b> 0		
	<b>P-Group:</b> ALARMS <b>Active:</b> first confirm <b>QuickComm. No</b> <b>Max:</b> 65535		

Selects up to 3 faults or warnings for non-default reactions.

**Index:**

- P2100[0] : Fault Number 1
- P2100[1] : Fault Number 2
- P2100[2] : Fault Number 3

**Example:**

If you want F0005 to perform an OFF3 instead of an OFF2, set P2100[0] = 5, then select the desired reaction in P2101[0] (in this case, set P2101[0] = 3).

**Note:**

All fault codes have a default reaction to OFF2. Some fault codes caused by hardware trips (e.g. overcurrent) cannot be changed from the default reactions.

<b>P2101[3]</b>	<b>Stop reaction value</b>	<b>Min:</b> 0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>Datatype:</b> U16 <b>Unit:</b> - <b>Def:</b> 0		
	<b>P-Group:</b> ALARMS <b>Active:</b> first confirm <b>QuickComm. No</b> <b>Max:</b> 4		

Sets drive stop reaction values for fault selected by P2100 (alarm number stop reaction).

This indexed parameter specifies the special reaction to the faults/warnings defined in P2100 indices 0 to 2.

**Possible Settings:**

- 0 No reaction, no display
- 1 OFF1 stop reaction
- 2 OFF2 stop reaction
- 3 OFF3 stop reaction
- 4 No reaction warning only

**Index:**

- P2101[0] : Stop reaction value 1
- P2101[1] : Stop reaction value 2
- P2101[2] : Stop reaction value 3

**Note:**

Settings 0 - 3 only are available for fault codes.

Settings 0 and 4 only are available for warnings.

Index 0 (P2101) refers to fault/warning in index 0 (P2100).

<b>P2103</b>	<b>BI: 1. Faults acknowledgement</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>Datatype:</b> U32 <b>Unit:</b> - <b>Def:</b> 722:2		
	<b>P-Group:</b> COMMANDS <b>Active:</b> first confirm <b>QuickComm. No</b> <b>Max:</b> 4000:0		

Defines first source of fault acknowledgement, e.g. keypad/DIN, etc. (depending on setting).

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

<b>P2104</b>	<b>BI: 2. Faults acknowledgement</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>Datatype:</b> U32 <b>Unit:</b> - <b>Def:</b> 0:0		
	<b>P-Group:</b> COMMANDS <b>Active:</b> first confirm <b>QuickComm. No</b> <b>Max:</b> 4000:0		

Selects second source of fault acknowledgement.

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

<b>P2106</b>	<b>BI: External fault</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CT <b>Datatype:</b> U32 <b>Unit:</b> - <b>Def:</b> 1:0		
	<b>P-Group:</b> COMMANDS <b>Active:</b> first confirm <b>QuickComm. No</b> <b>Max:</b> 4000:0		

Selects source of external faults.

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

<b>r2110[4]</b>	<b>Warning number</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	Level: <b>2</b>
	<b>P-Group:</b> ALARMS			<b>Def:</b> - <b>Max:</b> -	

Displays warning information.

A maximum of 2 active warnings (indices 0 and 1) and 2 historical warnings (indices 2 and 3) may be viewed.

**Index:**

r2110[0] : Recent Warnings --, warning 1  
 r2110[1] : Recent Warnings --, warning 2  
 r2110[2] : Recent Warnings -1, warning 3  
 r2110[3] : Recent Warnings -1, warning 4

**Note:**

The keypad will flash while a warning is active. The LEDs indicate the warning status in this case.

If an AOP is in use, the display will show number and text of the active warning.

**Notice:**

Indices 0 and 1 are not stored.

<b>P2111</b>	<b>Total number of warnings</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> 0	Level: <b>3</b>
	<b>CStat:</b> CT	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Def:</b> 0 <b>Max:</b> 4	

Displays number of warning (up to 4) since last reset. Set to 0 to reset the warning history.

<b>r2114[2]</b>	<b>Run time counter</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	Level: <b>3</b>
	<b>P-Group:</b> ALARMS			<b>Def:</b> - <b>Max:</b> -	

Displays run time counter. It is the total time the drive has been powered up. When power goes value is saved, then restored on powerup. The run time counter r2114 will be calculate as followed:  
 Multiply the value in r2114[0], by 65536 and then add it to the value in r2114[1]. The resultant answer will be in seconds. This means that r2114[0] is not days.

Total powerup time= 65536\*r2114[0]+r2114[1] Secs.

When AOP is not connected, the time in this parameter is used by r0948 to indicate when a fault has occurred.

**Index:**

r2114[0] : System Time, Seconds, Upper Word  
 r2114[1] : System Time, Seconds, Lower Word

**Example:**

If r2114[0] = 1 & r2114[1] = 20864  
 We get 1 \* 65536 + 20864 = 86400 seconds which equals 1 day.

**Details:**

See r0948 (fault time)

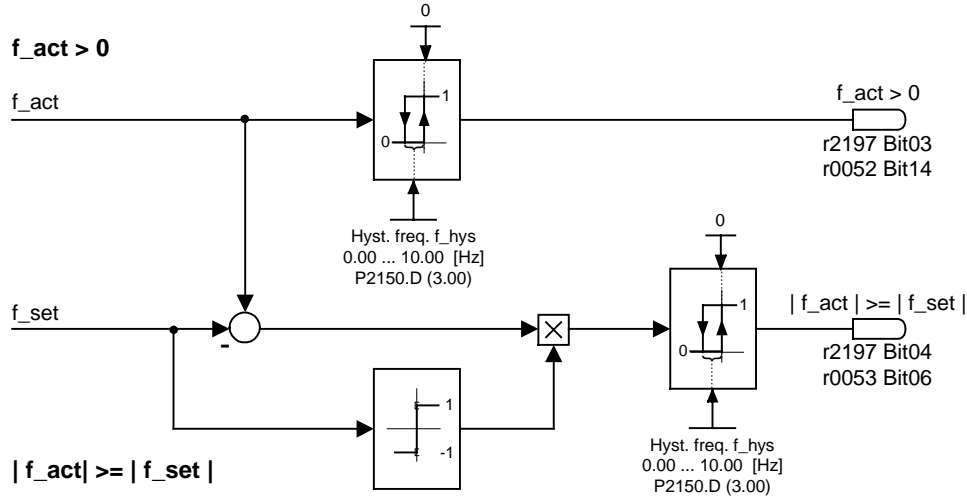
<b>P2120</b>	<b>Indication counter</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> 0	Level: <b>4</b>
	<b>CStat:</b> CUT	<b>Active:</b> Immediately	<b>QuickComm. No</b>	<b>Def:</b> 0 <b>Max:</b> 65535	

Indicates total number of alarm events. This parameter is incremented whenever an alarm event occurs. It also gets incremented when a warning is cleared or faults are cleared.

This parameter is used by the PC tools.

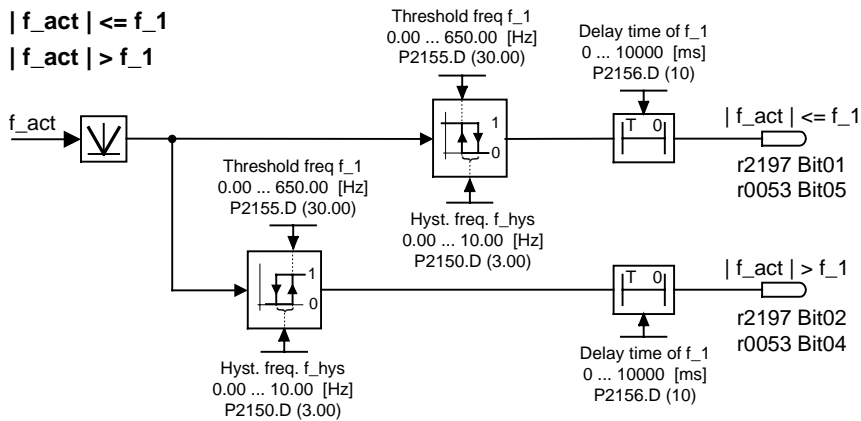
<b>P2150</b>	<b>Hysteresis frequency f_hys</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> Hz
	<b>P-Group:</b> ALARMS	<b>Active:</b> Immediately		<b>QuickComm. No</b>
		<b>Def:</b> 3.00		
		<b>Max:</b> 10.00		

Defines hysteresis level applied for comparing frequency and speed to threshold as illustrated in the diagram below.



<b>P2155</b>	<b>Threshold frequency f_1</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> Hz
	<b>P-Group:</b> ALARMS	<b>Active:</b> Immediately		<b>QuickComm. No</b>
		<b>Def:</b> 30.00		
		<b>Max:</b> 650.00		

Sets a threshold for comparing actual speed or frequency to threshold values f\_1. This threshold controls status bits 4 and 5 in status word 2 (r0053).



<b>P2156</b>	<b>Delay time of threshold freq f_1</b>	<b>Min:</b> 0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> U16		<b>Unit:</b> ms
	<b>P-Group:</b> ALARMS	<b>Active:</b> Immediately		<b>QuickComm. No</b>
		<b>Def:</b> 10		
		<b>Max:</b> 10000		

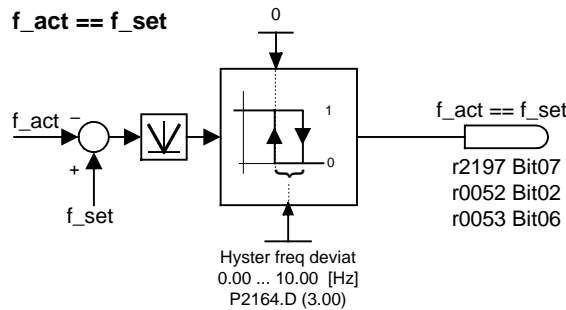
Sets delay time prior to threshold frequency f\_1 comparison (P2155).

**Details:**

See diagram in P2155 (threshold frequency f\_1)

<b>P2164</b>	<b>Hysteresis frequency deviation</b>	<b>Min:</b> 0.00	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz
	<b>P-Group:</b> ALARMS	<b>Active:</b> Immediately	<b>QuickComm. No</b>
		<b>Def:</b> 3.00	<b>3</b>
		<b>Max:</b> 10.00	

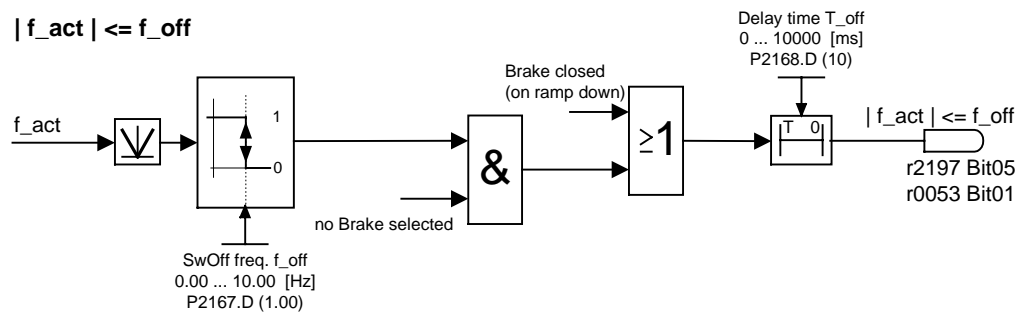
Hysteresis frequency for detecting permitted deviation (from setpoint) or frequency or speed. This frequency controls bit 8 in status word 1 (r0052) and bit 6 in status word 2 (r0053).



<b>P2167</b>	<b>Switch-off frequency <math>f_{off}</math></b>	<b>Min:</b> 0.00	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> Hz
	<b>P-Group:</b> ALARMS	<b>Active:</b> Immediately	<b>QuickComm. No</b>
		<b>Def:</b> 1.00	<b>3</b>
		<b>Max:</b> 10.00	

Sets frequency threshold below which inverter switches off.

If the frequency falls below this threshold, bit 1 in status word 2 (r0053) is set.



**Dependency:**

Switched off only if OFF1 or OFF3 active.

<b>P2168</b>	<b>Delay time <math>T_{off}</math></b>	<b>Min:</b> 0	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> ms
	<b>P-Group:</b> ALARMS	<b>Active:</b> Immediately	<b>QuickComm. No</b>
		<b>Def:</b> 10	<b>3</b>
		<b>Max:</b> 10000	

Defines time for which the inverter may operate below switch-off frequency (P2167) before switch off occurs.

**Dependency:**

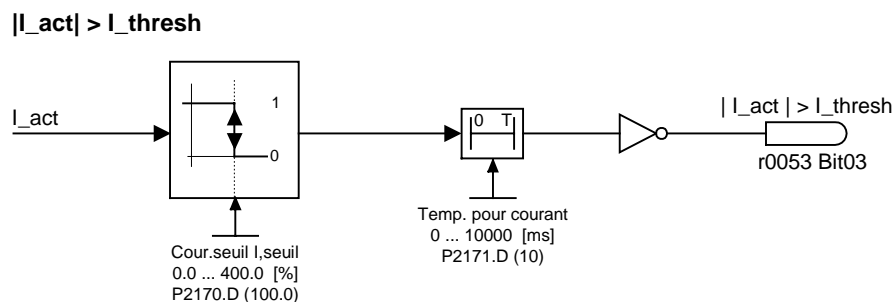
Active if holding brake (P1215) not parameterized.

**Details:**

See diagram in P2167 (switch-off frequency)

<b>P2170</b>	<b>Threshold current <math>I_{thresh}</math></b>	<b>Min:</b> 0.0	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> %
	<b>P-Group:</b> ALARMS	<b>Active:</b> Immediately	<b>QuickComm. No</b>
		<b>Def:</b> 100.0	<b>3</b>
		<b>Max:</b> 400.0	

Defines threshold current in [%] relative to P0305 (rated motor current) to be used in comparisons of  $I_{act}$  and  $I_{Thresh}$  as illustrated in the diagram below.



**Note:**

This threshold controls bit 3 in status word 3 (r0053).

<b>P2171</b>	<b>Delay time current</b>	<b>Min:</b> 0	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Def:</b> 10
	<b>P-Group:</b> ALARMS	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Max:</b> 10000

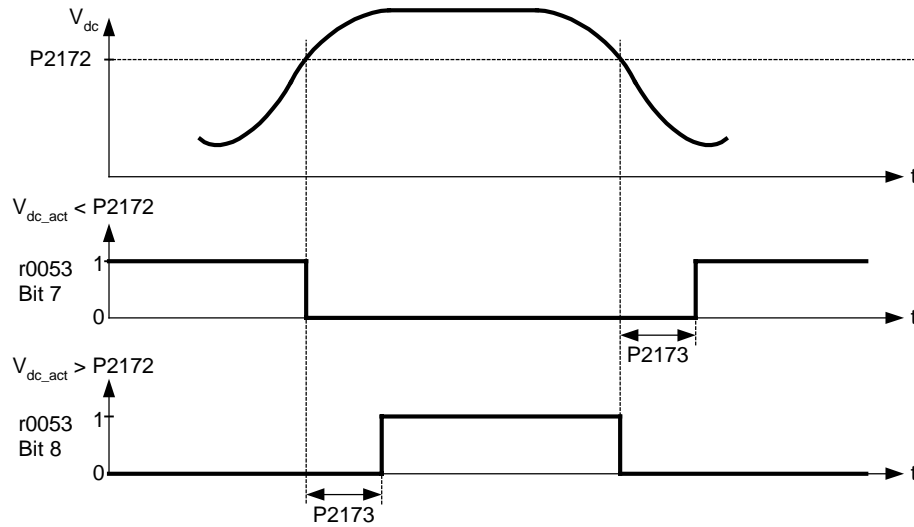
Defines delay time prior to activation of current comparison.

**Details:**

See diagram in P2170 (threshold current  $I_{thresh}$ )

<b>P2172</b>	<b>Threshold DC-link voltage</b>	<b>Min:</b> 0	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Def:</b> 800
	<b>P-Group:</b> ALARMS	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Max:</b> 2000

Defines DC link voltage to be compared to actual voltage as illustrated in the diagram below.



**Note:**

This voltage controls bits 7 and 8 in status word 3 (r0053).

<b>P2173</b>	<b>Delay time DC-link voltage</b>	<b>Min:</b> 0	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Def:</b> 10
	<b>P-Group:</b> ALARMS	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Max:</b> 10000

Defines delay time prior to activation of threshold comparison.

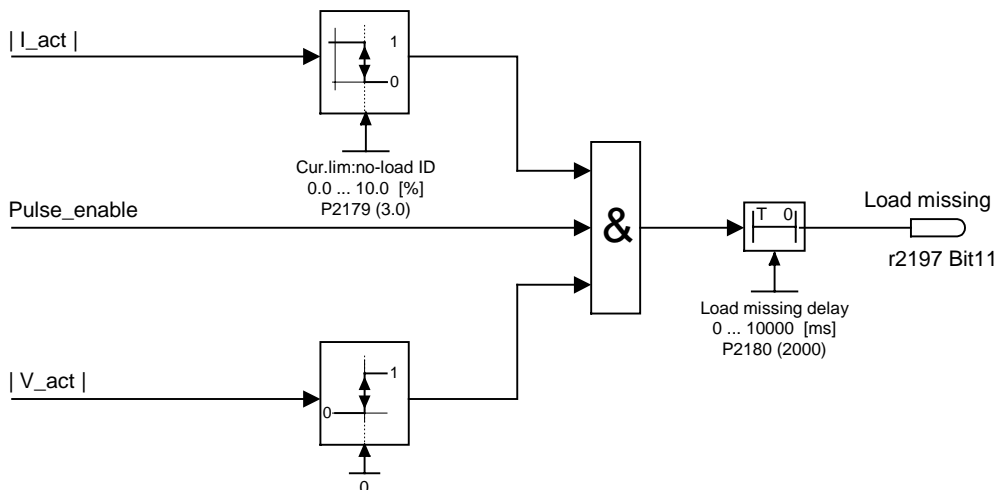
**Details:**

See diagram in P2172 (threshold DC-link voltage)

<b>P2179</b>	<b>Current limit for no load ident.</b>	<b>Min:</b> 0.0	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Def:</b> 3.0
	<b>P-Group:</b> ALARMS	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Max:</b> 100.0

Threshold current for A0922 (load missing) in [%] relative to P0305 (rated motor current) as illustrated in the diagram below.

**Load missing**



**Note:**

It may be that the motor is not connected (load missing) or a phase could be missing.

**Notice:**

If a motor setpoint cannot be entered and the current limit (P2179) is not exceeded, Alarm A0922 (no load applied) is issued when delay time (P2180) expires.

<b>P2180</b>	<b>Delay time for load missing</b>	<b>Min:</b> 0	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Def:</b> 2000
	<b>P-Group:</b> ALARMS	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Max:</b> 10000

Delay time load missing

**Note:**

It may be that the motor is not connected (load missing) or a phase could be missing.

**Notice:**

If a motor setpoint cannot be entered and the current limit (P2179) is not exceeded, alarm A0922 (no load applied) is issued when delay time (P2180) expires.

**Details:**

See diagram in P2179 (current limit for no load identification).



<b>r2197</b>	<b>CO/BO: Monitoring word 1</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> ALARMS			<b>Def:</b> -	
				<b>Max:</b> -	

Monitoring word 1 which indicates the state of monitor functions. Each bit represents one monitor function.

**Bitfields:**

Bit00	f_act >	P1080 (f_min)	0	NO
			1	YES
Bit01	f_act <=	P2155 (f_1)	0	NO
			1	YES
Bit02	f_act >	P2155 (f_1)	0	NO
			1	YES
Bit03	f_act >	zero	0	NO
			1	YES
Bit04	f_act >=	setp. (f_set)	0	NO
			1	YES
Bit05	f_act >=	P2167 (f_off)	0	NO
			1	YES
Bit06	f_act >	P1082 (f_max)	0	NO
			1	YES
Bit07	f_act ==	setp. (f_set)	0	NO
			1	YES
Bit08	Act. current r0027 >=	P2170	0	NO
			1	YES
Bit09	Act. unfilt. Vdc <	P2172	0	NO
			1	YES
Bit10	Act. unfilt. Vdc >	P2172	0	NO
			1	YES
Bit11	No load condition		0	NO
			1	YES

<b>P2200</b>	<b>BI: Enable PID controller</b>	<b>Datatype:</b> U32	<b>Unit:</b> -	<b>Min:</b> 0:0	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Def:</b> 0:0	
	<b>P-Group:</b> TECH			<b>Max:</b> 4000:0	

PID mode Allows user to enable/disable the PID controller. Setting to 1 enables the PID closed-loop controller.

**Dependency:**

Setting 1 automatically disables normal ramp times set in P1120 and P1121 and the normal frequency setpoints.

Following an OFF1 or OFF3 command, however, the inverter frequency will ramp down to zero using the ramp time set in P1121 (P1135 for OFF3).

**Note:**

The PID setpoint source is selected using P2253. The PID setpoint and the PID feedback signal are interpreted as [%] values (not [Hz]). The output of the PID controller is displayed as [%] and then normalized into [Hz] through P2000 (reference frequency) when PID is enabled.

In level 3, the PID controller source enable can also come from the digital inputs in settings 722.0 to 722.2 for DIN1 to DIN3 or from any other BiCo source.

The reverse command is not active whilst PID is active.

**Notice:**

The minimum and maximum motor frequencies (P1080 and P1082) as well as the skip frequencies (P1091 to P1094) remain active on the inverter output. However, enabling skip frequencies with PID control can produce instabilities.

<b>P2201</b>	<b>Fixed PID setpoint 1</b>			<b>Min:</b> -200.00	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Def:</b> 0.00	
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately	<b>QuickComm. No</b>	<b>Max:</b> 200.00	

Defines Fixed PID Setpoint 1

In addition, you can set any of the digital input parameters to fixed PID setpoint (FF-PID) via the digital inputs (P0701 - P0703).

There are three selection modes for the PID fixed setpoint:

1 Direct selection (P0701 = 15 or P0702 = 15, etc):

In this mode of operation, 1 digital input selects one PID fixed setpoint.

2 Direct selection with ON command (P0701 = 16 or P0702 = 16, etc.):

Description as for 1), except that this type of selection issues an ON command concurrent with any setpoint selection.

3 Binary Coded Decimal selection (P0701 - P0703 = 17):

Using this method to select the fixed PID setpoint (FF-PID) allows you to choose up to 7 different PID setpoints.

The setpoints are selected according to the following table:

**Example:**

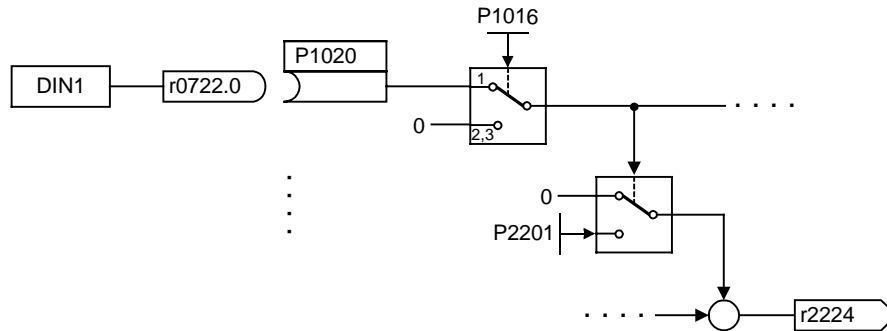
		DIN3	DIN2	DIN1
	OFF	Inactive	Inactive	Inactive
P2201	PID-FF1	Inactive	Inactive	<b>Active</b>
P2202	PID-FF2	Inactive	<b>Active</b>	Inactive
P2203	PID-FF3	Inactive	<b>Active</b>	<b>Active</b>
P2204	PID-FF4	<b>Active</b>	Inactive	Inactive
P2205	PID-FF5	<b>Active</b>	Inactive	<b>Active</b>
P2206	PID-FF6	<b>Active</b>	<b>Active</b>	Inactive
P2207	PID-FF7	<b>Active</b>	<b>Active</b>	<b>Active</b>

Direct selection of PID-FF1 P2201 via DIN 1:

P0701 = 15

or

P0701 = 99, P1020 = 722.0, P1016 = 1



**Dependency:**

P2200 = 1 required in user access level 2 to enable setpoint source.

**Note:**

You may mix different types of frequencies; however, remember that they will be summed if selected together.

P2201 = 100 % corresponds to 4000 hex

<b>P2202</b>	<b>Fixed PID setpoint 2</b>			<b>Min:</b> -200.00	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Def:</b> 10.00	
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately	<b>QuickComm. No</b>	<b>Max:</b> 200.00	

Defines Fixed PID Setpoint 2

**Details:**

See P2201 (Fixed PID Setpoint 1).

<b>P2203</b>	<b>Fixed PID setpoint 3</b>			<b>Min:</b> -200.00	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Def:</b> 20.00	
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately	<b>QuickComm. No</b>	<b>Max:</b> 200.00	

Defines Fixed PID Setpoint 3

**Details:**

See P2201 fixed PID setpoint 1 (FF-PID 1).

<b>P2204</b>	<b>Fixed PID setpoint 4</b>	<b>Min:</b> -200.00	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately		<b>QuickComm.</b> No

Defines Fixed PID Setpoint 4

**Details:**

See P2201 (Fixed PID Setpoint 1).

<b>P2205</b>	<b>Fixed PID setpoint 5</b>	<b>Min:</b> -200.00	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately		<b>QuickComm.</b> No

Defines Fixed PID Setpoint 5

**Details:**

See P2201 (Fixed PID Setpoint 1).

<b>P2206</b>	<b>Fixed PID setpoint 6</b>	<b>Min:</b> -200.00	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately		<b>QuickComm.</b> No

Defines Fixed PID Setpoint 6

**Details:**

See P2201 (Fixed PID Setpoint 1).

<b>P2207</b>	<b>Fixed PID setpoint 7</b>	<b>Min:</b> -200.00	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately		<b>QuickComm.</b> No

Defines Fixed PID Setpoint 7

**Details:**

See P2201 (Fixed PID Setpoint 1).

<b>P2216</b>	<b>Fixed PID setpoint mode - Bit 0</b>	<b>Min:</b> 1	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U16		<b>Unit:</b> -
	<b>P-Group:</b> TECH	<b>Active:</b> first confirm		<b>QuickComm.</b> No

Fixed frequencies for PID setpoint can be selected in three different modes. Parameter P2216 defines the mode of selection Bit 0.

**Possible Settings:**

- 1 Direct selection
- 2 Direct selection + ON command
- 3 Binary coded selection + ON command

<b>P2217</b>	<b>Fixed PID setpoint mode - Bit 1</b>	<b>Min:</b> 1	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U16		<b>Unit:</b> -
	<b>P-Group:</b> TECH	<b>Active:</b> first confirm		<b>QuickComm.</b> No

BCD or direct selection Bit 1 for PID setpoint.

**Possible Settings:**

- 1 Direct selection
- 2 Direct selection + ON command
- 3 Binary coded selection + ON command

<b>P2218</b>	<b>Fixed PID setpoint mode - Bit 2</b>	<b>Min:</b> 1	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U16		<b>Unit:</b> -
	<b>P-Group:</b> TECH	<b>Active:</b> first confirm		<b>QuickComm.</b> No

BCD or direct selection Bit 2 for PID setpoint.

**Possible Settings:**

- 1 Direct selection
- 2 Direct selection + ON command
- 3 Binary coded selection + ON command

<b>P2220</b>	<b>BI: Fixed PID setp. select Bit 0</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U32		<b>Unit:</b> -
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm		<b>QuickComm.</b> No

Defines command source of fixed PID setpoint selection Bit 0

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

<b>P2221</b>	<b>BI: Fixed PID setp. select Bit 1</b> CStat: CT      Datatype: U32      Unit: - P-Group: COMMANDS      Active: first confirm      QuickComm. No	Min: 0:0 Def: 0:0 Max: 4000:0	Level: <b>3</b>
Defines command source of fixed PID setpoint selection Bit 1.			
<b>Common Settings:</b> 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO) 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO) 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)			
<b>P2222</b>	<b>BI: Fixed PID setp. select Bit 2</b> CStat: CT      Datatype: U32      Unit: - P-Group: COMMANDS      Active: first confirm      QuickComm. No	Min: 0:0 Def: 0:0 Max: 4000:0	Level: <b>3</b>
Defines command source of fixed PID setpoint selection Bit 2			
<b>Common Settings:</b> 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO) 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO) 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)			
<b>r2224</b>	<b>CO: Act. fixed PID setpoint</b> Datatype: Float      Unit: % P-Group: TECH	Min: - Def: - Max: -	Level: <b>2</b>
Displays total output of PID fixed setpoint selection.			
<b>Note:</b> r2224 = 100 % corresponds to 4000 hex			
<b>P2231</b>	<b>Setpoint memory of PID-MOP</b> CStat: CUT      Datatype: U16      Unit: - P-Group: TECH      Active: Immediately      QuickComm. No	Min: 0 Def: 0 Max: 1	Level: <b>2</b>
Setpoint memory			
<b>Possible Settings:</b> 0      PID-MOP setpoint will not be stored 1      PID-MOP setpoint will be stored (P2240 is updated)			
<b>Dependency:</b> P2231 = 0: If 0 selected, setpoint returns to value set in P2240 (setpoint of PID-MOP) after an OFF command.  P2231 = 1: If 1 is selected, active setpoint is 'remembered' and P2240 updated with current value.			
<b>Details:</b> See P2240 (setpoint of PID-MOP)			
<b>P2232</b>	<b>Inhibit rev. direct. of PID-MOP</b> CStat: CT      Datatype: U16      Unit: - P-Group: TECH      Active: first confirm      QuickComm. No	Min: 0 Def: 1 Max: 1	Level: <b>2</b>
Inhibits reverse setpoint selection when PID motor potentiometer is chosen either as a main setpoint or additional setpoint.			
<b>Possible Settings:</b> 0      Reverse direction is allowed 1      Reverse direction inhibited			
<b>Note:</b> Setting 0 enables a change of motor direction using the motor potentiometer setpoint (increase/decrease frequency either by using digital inputs or motor potentiometer up/down buttons).			
<b>P2235</b>	<b>BI: Enable PID-MOP (UP-cmd)</b> CStat: CT      Datatype: U32      Unit: - P-Group: COMMANDS      Active: first confirm      QuickComm. No	Min: 0:0 Def: 19:13 Max: 4000:0	Level: <b>3</b>
Defines source of UP command.			
<b>Common Settings:</b> 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO) 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO) 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)			
19.D = Keypad UP cursor			
<b>Dependency:</b> To change setpoint: 1. Use UP / DOWN key on BOP or 2. Set P0702/P0703 = 13/14 (function of digital inputs 2 and 3)			

<b>P2236</b>	<b>BI: Enable PID-MOP (DOWN-cmd)</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CT	<b>Datatype:</b> U32		<b>Unit:</b> -
	<b>P-Group:</b> COMMANDS	<b>Active:</b> first confirm		<b>QuickComm. No</b>
	<b>Def:</b> 19:14	<b>Max:</b> 4000:0		

Defines source of DOWN command.

**Common Settings:**

- 722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
- 722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
- 722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
- 722.3 = Digital input 4 (via analog input, requires P0704 to be set to 99)

19.E = Keypad DOWN cursor

**Dependency:**

To change setpoint:

1. Use UP / DOWN key on BOP or
2. Set P0702/P0703 = 13/14 (function of digital inputs 2 and 3)

<b>P2240</b>	<b>Setpoint of PID-MOP</b>	<b>Min:</b> -200.00	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately		<b>QuickComm. No</b>
	<b>Def:</b> 10.00	<b>Max:</b> 200.00		

Setpoint of the motor potentiometer.

Allows user to set a digital PID setpoint in [%].

**Note:**

P2240 = 100 % corresponds to 4000 hex

<b>r2250</b>	<b>CO: Output setpoint of PID-MOP</b>	<b>Min:</b> -	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> TECH	<b>Active:</b> -		<b>QuickComm. No</b>
	<b>Def:</b> -	<b>Max:</b> -		

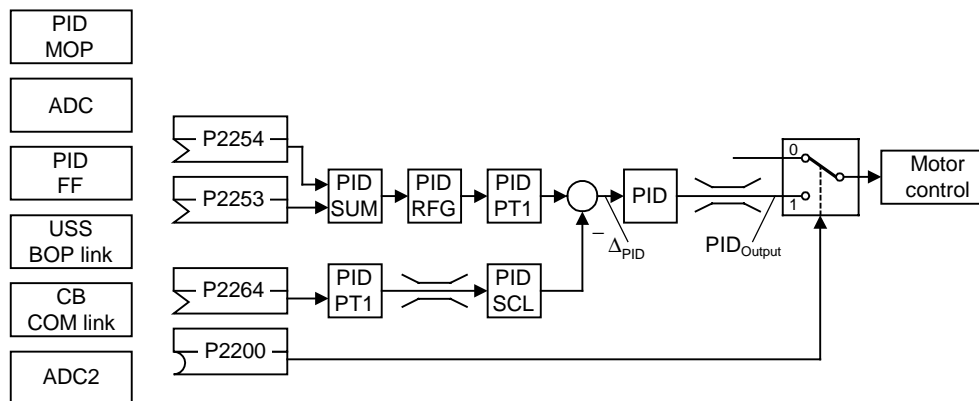
Displays output setpoint of motor potentiometer in [%].

**Note:**

r2250 = 100 % corresponds to 4000 hex

<b>P2253</b>	<b>CI: PID setpoint</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> U32		<b>Unit:</b> -
	<b>P-Group:</b> TECH	<b>Active:</b> first confirm		<b>QuickComm. No</b>
	<b>Def:</b> 0:0	<b>Max:</b> 4000:0		

Defines setpoint source for PID setpoint input.



This parameter allows the user to select the source of the PID setpoint. Normally, a digital setpoint is selected either using a fixed PID setpoint or an active setpoint.

**Common Settings:**

- 755 = Analog input 1
- 2224 = Fixed PI setpoint (see P2201 to P2207)
- 2250 = Active PI setpoint (see P2240)

<b>P2254</b>	<b>CI: PID trim source</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> U32		<b>Unit:</b> -
	<b>P-Group:</b> TECH	<b>Active:</b> first confirm		<b>QuickComm. No</b>
	<b>Def:</b> 0:0	<b>Max:</b> 4000:0		

Selects trim source for PID setpoint. This signal is multiplied by the trim gain and added to the PID setpoint.

**Common Settings:**

- 755 = Analog input 1
- 2224 = Fixed PI setpoint (see P2201 to P2207)
- 2250 = Active PI setpoint (see P2240)

<b>P2255</b>	<b>PID setpoint gain factor</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> -
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately		<b>QuickComm.</b> No
		<b>Def:</b> 100.00		
		<b>Max:</b> 100.00		

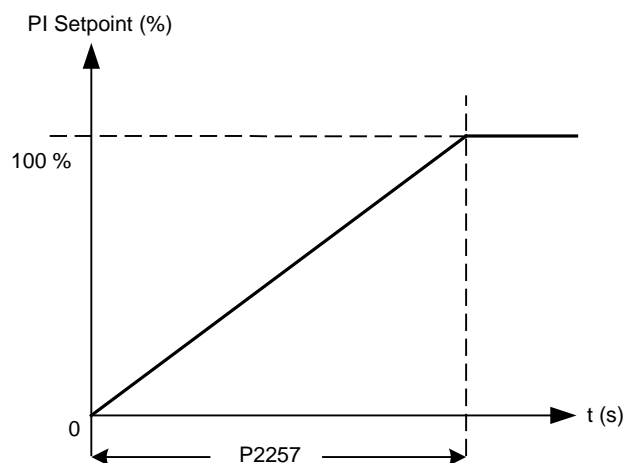
Gain factor for PID setpoint. The PID setpoint input is multiplied by this gain factor to produce a suitable ratio between setpoint and trim.

<b>P2256</b>	<b>PID trim gain factor</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> -
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately		<b>QuickComm.</b> No
		<b>Def:</b> 100.00		
		<b>Max:</b> 100.00		

Gain factor for PID trim. This gain factor scales the trim signal, which is added to the main PID setpoint.

<b>P2257</b>	<b>Ramp-up time for PID setpoint</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> s
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately		<b>QuickComm.</b> No
		<b>Def:</b> 1.00		
		<b>Max:</b> 650.00		

Sets the ramp-up time for the PID setpoint.



**Dependency:**

P2200 = 1 (PID control is enabled) disable normal ramp-up time (P1120).

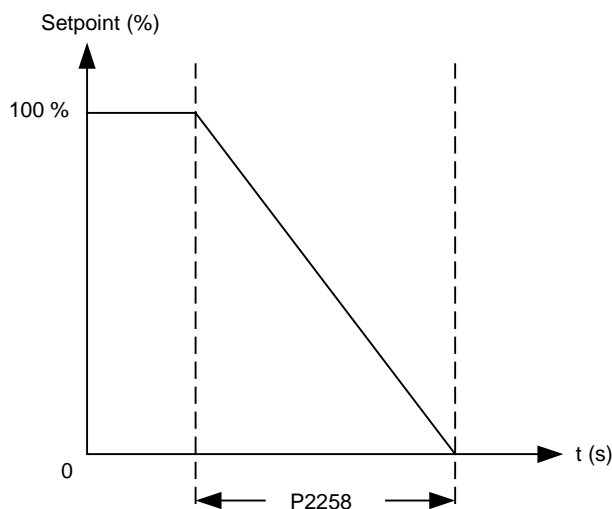
PID ramp time effective only on PID setpoint and only active when PID setpoint is changed or when RUN command is given (when PID setpoint uses this ramp to reach its value from 0 %).

**Notice:**

Setting the ramp-up time too short may cause the inverter to trip, on overcurrent for example.

<b>P2258</b>	<b>Ramp-down time for PID setpoint</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> s
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately		<b>QuickComm. No</b>
		<b>Def:</b> 1.00		
		<b>Max:</b> 650.00		

Sets ramp-down time for PID setpoint.



**Dependency:**

P2200 = 1 (PID control is enabled) disables normal ramp-up time (P1120).

PID setpoint ramp effective only on PID setpoint changes.

P1121 (ramp-down time) and P1135 (OFF3 ramp-down time) define the ramp times used after OFF1 and OFF3 respectively.

**Notice:**

Setting the ramp-down time too short can cause the inverter to trip on overvoltage (F0002) / overcurrent (F0001).

<b>r2260</b>	<b>CO: PID setpoint after PID-RFG</b>	<b>Min:</b> -	<b>Level:</b> <b>2</b>	
		<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> TECH	<b>Def:</b> -		<b>Max:</b> -

Displays total active PID setpoint after PID-RFG in [%].

**Note:**

r2260 = 100 % corresponds to 4000 hex

<b>P2261</b>	<b>PID setpoint filter timeconstant</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> s
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately		<b>QuickComm. No</b>
		<b>Def:</b> 0.00		
		<b>Max:</b> 60.00		

Sets a time constant for smoothing the PID setpoint.

**Note:**

0 = no smoothing

<b>r2262</b>	<b>CO: Filtered PID setp. after RFG</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>	
		<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> TECH	<b>Def:</b> -		<b>Max:</b> -

Displays filtered PID setpoint after PID-RFG in [%].

**Note:**

r2262 = 100 % corresponds to 4000 hex

<b>P2264</b>	<b>CI: PID feedback</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> U32		<b>Unit:</b> -
	<b>P-Group:</b> TECH	<b>Active:</b> first confirm		<b>QuickComm. No</b>
		<b>Def:</b> 755:0		
		<b>Max:</b> 4000:0		

Selects the source of the PID feedback signal.

**Common Settings:**

755 = Analog input 1 setpoint

2224 = Fixed PID setpoint

2250 = Output setpoint of PID-MOP

**Note:**

When analog input is selected, offset and gain can be implemented using parameters P0756 to P0760.

<b>P2265</b>	<b>PID feedback filter timeconstant</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> s
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately		<b>QuickComm. No</b>
		<b>Def:</b> 0.00		
		<b>Max:</b> 60.00		

Defines time constant for PID feedback filter.

<b>r2266</b>	<b>CO: PID filtered feedback</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> TECH				
	Displays PID feedback signal in [%].				
<b>Note:</b>	r2266 = 100 % corresponds to 4000 hex				
<b>P2267</b>	<b>Max. value for PID feedback</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> -200.00 <b>Def:</b> 100.00 <b>Max:</b> 200.00	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Def:</b> 100.00	
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 200.00	
	Sets the upper limit for the value of the feedback signal in [%].				
<b>Note:</b>	P2267 = 100 % corresponds to 4000 hex				
<b>Notice:</b>	When PID is enabled (P2200 = 1) and the signal rises above this value, the inverter will trip with F0222 .				
<b>P2268</b>	<b>Min. value for PID feedback</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> -200.00 <b>Def:</b> 0.00 <b>Max:</b> 200.00	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Def:</b> 0.00	
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 200.00	
	Sets lower limit for value of feedback signal in [%].				
<b>Note:</b>	P2268 = 100 % corresponds to 4000 hex				
<b>Notice:</b>	When PID is enabled (P2200 = 1) and the signal rises below this value, the inverter will trip with F0221.				
<b>P2269</b>	<b>Gain applied to PID feedback</b>	<b>Datatype:</b> Float	<b>Unit:</b> -	<b>Min:</b> 0.00 <b>Def:</b> 100.00 <b>Max:</b> 500.00	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> -	<b>Def:</b> 100.00	
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 500.00	
	Allows the user to scale the PID feedback as a percentage value [%].				
	A gain of 100.0 % means that feedback signal has not changed from its default value.				
<b>P2270</b>	<b>PID feedback function selector</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> 0 <b>Def:</b> 0 <b>Max:</b> 3	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 3	
	Applies mathematical functions to the PID feedback signal, allowing multiplication of the result by P2269 (gain applied to PID feedback).				
	<b>Possible Settings:</b>				
	0	Disabled			
	1	Square root (root(x))			
	2	Square (x*x)			
	3	Cube (x*x*x)			
<b>P2271</b>	<b>PID transducer type</b>	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Min:</b> 0 <b>Def:</b> 0 <b>Max:</b> 1	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0	
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 1	
	Allows the user to select the transducer type for the PID feedback signal.				
	<b>Possible Settings:</b>				
	0	Disabled			
	1	Inversion of PID feedback signal			
<b>Notice:</b>	It is essential that you select the correct transducer type.				
	If you are unsure whether 0 or 1 is applicable, you can determine the correct type as follows:				
	1. Disable the PID function (P2200 = 0).				
	2. Increase the motor frequency while measuring the feedback signal.				
	3. If the feedback signal increases with an increase in motor frequency, the PID transducer type should be 0.				
	4. If the feedback signal decreases with an increase in motor frequency the PID transducer type should be set to 1.				
<b>r2272</b>	<b>CO: PID scaled feedback</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> - <b>Def:</b> - <b>Max:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> TECH				
	Displays PID scaled feedback signal in [%].				
<b>Note:</b>	r2272 = 100 % corresponds to 4000 hex				



<b>r2273</b>	<b>CO: PID error</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> -	<b>Level:</b> <b>2</b>
	<b>P-Group:</b> TECH			<b>Def:</b> - <b>Max:</b> -	

Displays PID error (difference) signal between setpoint and feedback signals in [%].

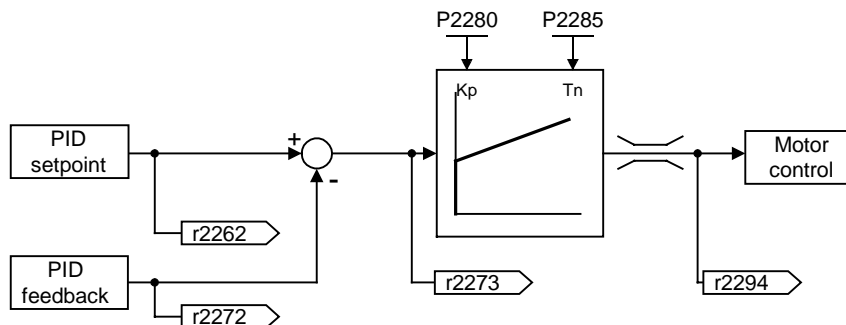
**Note:**

r2273 = 100 % corresponds to 4000 hex

<b>P2280</b>	<b>PID proportional gain</b>	<b>Datatype:</b> Float	<b>Unit:</b> -	<b>Min:</b> 0.000	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Active:</b> Immediately	<b>QuickComm. No</b>	<b>Def:</b> 3.000	
	<b>P-Group:</b> TECH			<b>Max:</b> 65.000	

Allows user to set proportional gain for PID controller.

The PID controller is implemented using the standard model.



For best results, enable both P and I terms.

**Dependency:**

P2280 = 0 (P term of PID = 0):

I term acts on the square of the error signal.

P2285 = 0 (I term of PID = 0):

PID controller acts as a P or PD controller respectively.

**Note:**

If the system is prone to sudden step changes in the feedback signal, P term should normally be set to a small value (0.5) with a faster I term for optimum performance.

<b>P2285</b>	<b>PID integral time</b>	<b>Datatype:</b> Float	<b>Unit:</b> s	<b>Min:</b> 0.000	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Active:</b> Immediately	<b>QuickComm. No</b>	<b>Def:</b> 0.000	
	<b>P-Group:</b> TECH			<b>Max:</b> 60.000	

Sets integral time constant for PID controller.

**Details:**

See P2280 (PID proportional gain).

<b>P2291</b>	<b>PID output upper limit</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> -200.00	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Active:</b> Immediately	<b>QuickComm. No</b>	<b>Def:</b> 100.00	
	<b>P-Group:</b> TECH			<b>Max:</b> 200.00	

Sets upper limit for PID controller output in [%].

**Dependency:**

If F max (P1082) is greater than P2000 (reference frequency), either P2000 or P2291 (PID output upper limit) must be changed to achieve F max.

**Note:**

P2291 = 100 % corresponds to 4000 hex (as defined by P2000 (reference frequency)).

<b>P2292</b>	<b>PID output lower limit</b>	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Min:</b> -200.00	<b>Level:</b> <b>2</b>
	<b>CStat:</b> CUT	<b>Active:</b> Immediately	<b>QuickComm. No</b>	<b>Def:</b> 0.00	
	<b>P-Group:</b> TECH			<b>Max:</b> 200.00	

Sets lower limit for the PID controller output in [%].

**Dependency:**

A negative value allows bipolar operation of PID controller.

**Note:**

P2292 = 100 % corresponds to 4000 hex

<b>P2293</b>	<b>Ramp-up /-down time of PID limit</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> s
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately		<b>QuickComm.</b> No
		<b>Def:</b> 1.00		
		<b>Max:</b> 100.00		

Sets maximum ramp rate on output of PID.

When PI is enabled, the output limits are ramped up from 0 to the limits set in P2291 (PID output upper limit) and P2292 (PID output lower limit). Limits prevent large step changes appearing on the output of the PID when the inverter is started. Once the limits have been reached, the PID controller output is instantaneous.

These ramp times are used whenever a RUN command is issued.

**Note:**

If an OFF1 or OFF 3 are issued, the inverter output frequency ramps down as set in P1121 (ramp-down time) or P1135 (OFF3 ramp-down time).

<b>r2294</b>	<b>CO: Act. PID output</b>	<b>Min:</b> -	<b>Level:</b> <b>2</b>	
		<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> TECH			<b>Def:</b> -
		<b>Max:</b> -		

Displays PID output in [%]

**Note:**

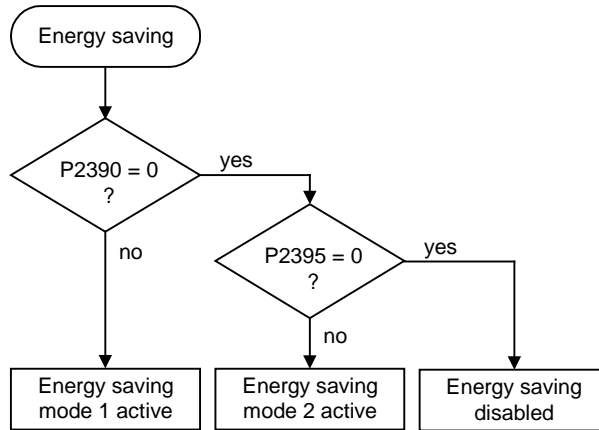
r2294 = 100 % corresponds to 4000 hex

<b>P2390</b>	<b>Energy saving setpoint</b>	<b>Min:</b> -200.00	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> %
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately	<b>QuickComm. No</b>
		<b>Def:</b> 0	<b>3</b>
		<b>Max:</b> 200.00	

In order to enhance the lifetime of a system and reduce the energy consumption the energy saving modes (ESM) were implemented. For example, protection of the pump against overheating if the load valve is closed and no fluid is being pumped.

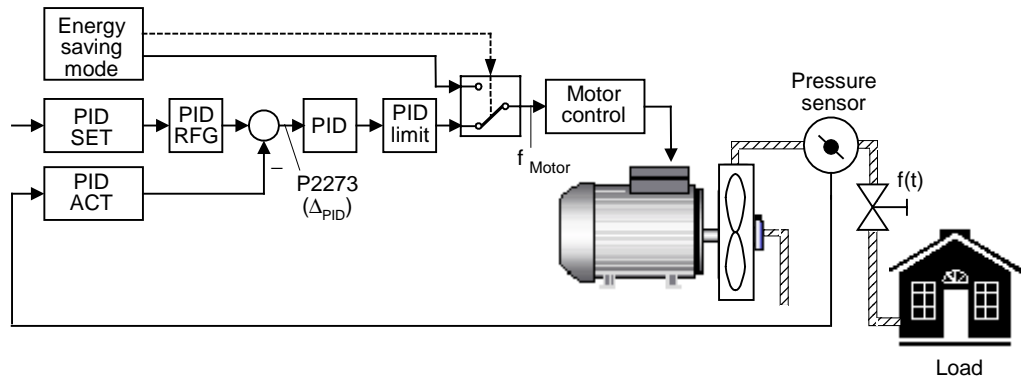
Energy Saving Mode 1 (P2390 - P2392):  
 - Easy to use mode (e.g. fan applications)

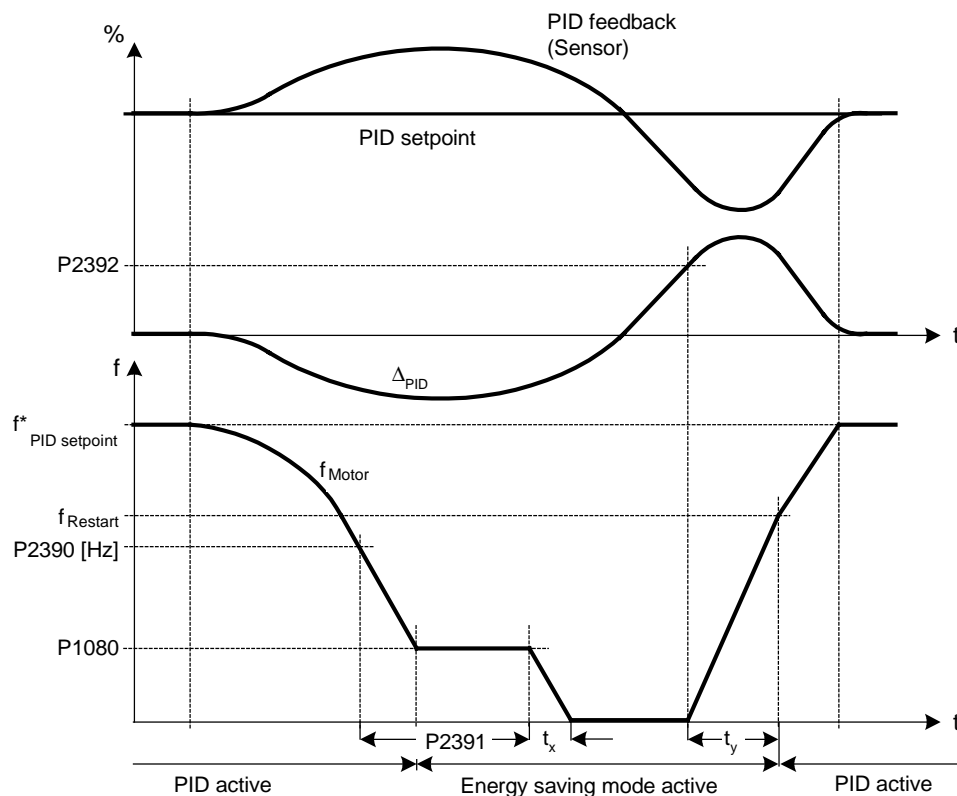
Energy Saving Mode 2 (P2393 - P2398):  
 - Enhanced mode (e.g. pump applications)



**Energy Saving Mode 1:**

When the inverter under PID control drops below energy saving setpoint, the energy saving timer P2391 is started. When the energy saving timer has expired, the inverter is ramped down to stop and enters energy saving mode (see diagram below).





$$f_{Restart} = P2000 \cdot \frac{P2390 + 5\%}{100\%}$$

$$P2390 \text{ [Hz]} = P2000 \cdot \frac{P2390}{100\%}$$

$$t_x = \frac{P1080}{P1082} \cdot P1121$$

$$t_y = \frac{f_{Restart}}{P1082} \cdot P1120$$

**Note:**

If energy saving setpoint is 0, the energy saving function is disabled. The energy saving setpoint should be greater than the minimum frequency (P1080). Reverse operation is not allowed with energy saving mode.

**Notice:**

Energy saving mode is an added feature to enhance PID functionality, and switches of the motor when the inverter is running at low setpoint.

<b>P2391</b>	<b>Energy saving timer</b>	<b>Min:</b> 0	<b>Level:</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Def:</b> 0
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Max:</b> 254
<b>3</b>			

When the energy saving timer P2391 has expired, the inverter is ramped down to stop and enters energy saving mode (see description and diagram of P2390).

<b>P2392</b>	<b>Energy saving restart setpoint</b>	<b>Min:</b> -200.00	<b>Level:</b>
	<b>CStat:</b> CT	<b>Datatype:</b> Float	<b>Def:</b> 0
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Max:</b> 200.00
<b>3</b>			

While in energy saving mode, the PID controller continues to generate the error P2273 - once this reaches the restart point P2392 the inverter immediately ramps to the setpoint calculated by the PID controller (see description and diagram of P2390).

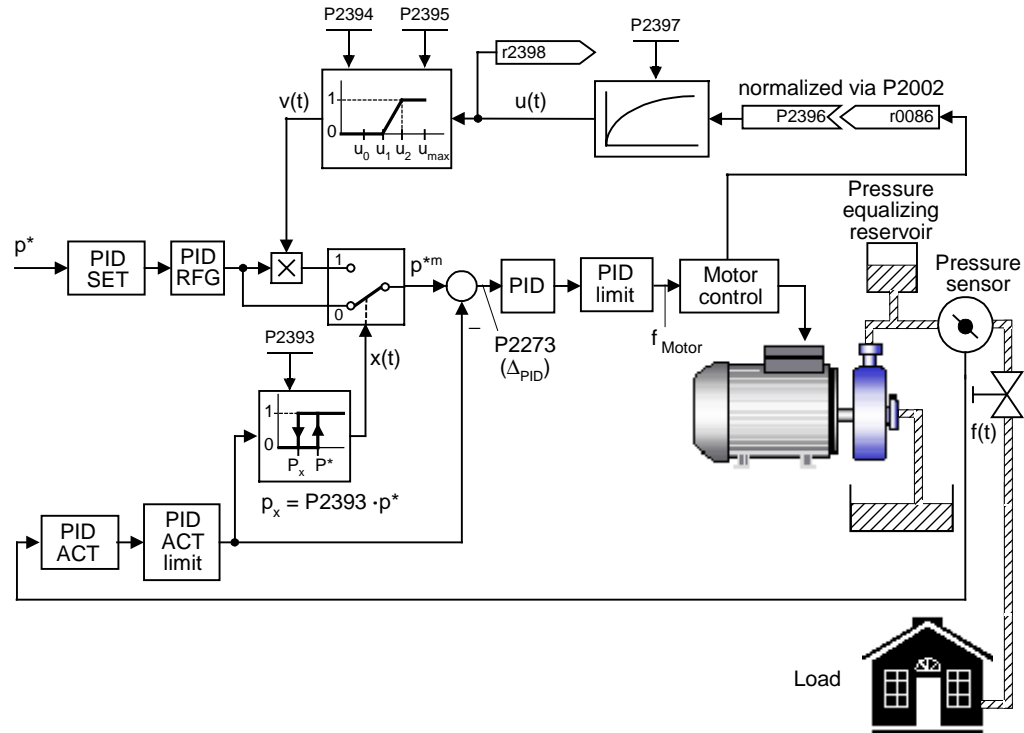
<b>P2393</b>	<b>EnerSav changeover threshold</b>	<b>Min:</b> 0.00	<b>Level:</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Def:</b> 90.0
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately	<b>QuickComm. No</b> <b>Max:</b> 200.00

Energy Saving Mode 2 (P2393 - P2398):

Using the energy saving functionality, the control loop behavior is controlled so that the inverter recognizes that the load is reduced. In this case, the inverter will be shutdown if the actual value lies above the threshold  $p_x$ , which is defined by parameter P2393 and the setpoint  $p^*$ .

$$p_x = P2393 \cdot p^*$$

When the load decreases, this is recognized by the active current  $r0086$ , which is fed via the BICO-Parameter P2396 to a normalized characteristic.

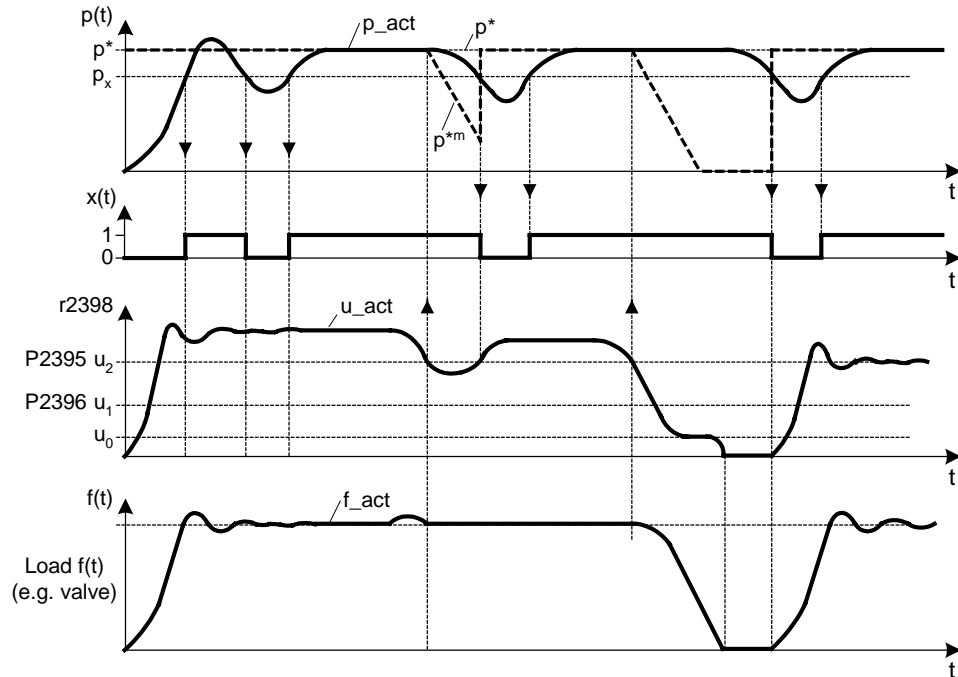


If the active current falls below the normalized threshold P2395, then the setpoint is linearly decreased as a function of the active current.

$$m = \frac{1}{P2395 - P2396}$$

This reduction causes the motor to be powered-down and in turn the system (e.g. pump), as long as the actual value (e.g. actual pressure) does not fall below the threshold  $p_x$ .

If the actual value falls below threshold  $p_x$ , while the setpoint is decreased via the active current, the decrease is stopped and the original setpoint  $p^*$  is again re-established.



If the actual value falls below threshold  $p_x$  after the motor was shutdown, the inverter automatically powers-up again without having to toggle the ON command.

Hints for commissioning of energy saving functionality:

1. Configuring of the PID control loop
2. Define setpoint  $p^*$
3. Determine threshold  $p_x$

This value should be selected so that it lies within the tolerance range of  $p^*$  therefore ensuring disturbance-free operation of the system. The margin between  $p^*$  and  $p_x$  should maintain a minimum quantity, in order to prevent "cyclic" switching. The value  $p_x$  is determined by parameter P2393, whereby the following applies:

$$p_x = P2393 \cdot p^*$$

4. Determine P2395 (threshold  $u_2$ )

In this case, the load valve should be completely open, and the value  $p_x$  should be entered as a setpoint. In the steady-state condition, the read parameter r2398 should be read-out. The value of P2395 should be defined so that it is less than the value r2398 that was read-out (e.g. 10 % lower).

5. Determine P2396 (threshold  $u_1$ )

In this case, the load valve should be closed, and value  $p_x$  should also be entered as a setpoint. Parameter r2398 should be read-out in the steady-state condition. Define the value of P2396 so that it is higher than the value r2398 that was read-out (e.g. 10 % greater).

Secondary conditions:

1.  $P2395 > P2396$ :

The setpoint is decreased using a ramp which is defined by the value pairs ( $P2395 \implies 1$ ) or ( $P2396 \implies 0$ ).

2.  $P2395 \leq P2396$ :

For P2395, the setpoint is decreased as a step function, from 1  $\implies$  0.

**Dependency:**

See parameters P2390, P2395

<b>P2394</b>	<b>Energy saving low characteristic</b>				<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> Float	<b>Unit:</b> %	<b>Def:</b> 5.00		
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately	<b>QuickComm.</b> No	<b>Max:</b> 200.00		

While in energy saving mode, this value corresponds to the point where the characteristic will go to zero.

**Details:**

See parameter P2393.

<b>P2395</b>	<b>Energy saving up characteristic</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>3</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> %
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately		<b>QuickComm.</b> No

While in energy saving mode, this value corresponds to the point where the characteristic will go to a value of one.

P2395 = 0:  
If this parameter is 0, the function is disabled. The other energy saving mode takes priority if both are set to be active.

**Details:**

See parameters P2390, P2393

<b>P2396</b>	<b>CI: Torque</b>	<b>Min:</b> 0:0	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> U32		<b>Unit:</b> -
	<b>P-Group:</b> TECH	<b>Active:</b> first confirm		<b>QuickComm.</b> No

Selects the source torque related signal.

**Details:**

See parameter P2393.

<b>P2397</b>	<b>Torque filtered timeconstant</b>	<b>Min:</b> 0.00	<b>Level:</b> <b>2</b>	
	<b>CStat:</b> CUT	<b>Datatype:</b> Float		<b>Unit:</b> s
	<b>P-Group:</b> TECH	<b>Active:</b> Immediately		<b>QuickComm.</b> No

Defines time constant for energy saving mode torque filter.

**Details:**

See parameter P2393.

<b>r2398</b>	<b>CO: Filtered torque</b>	<b>Min:</b> -	<b>Level:</b> <b>2</b>
	<b>Datatype:</b> Float	<b>Unit:</b> %	
	<b>P-Group:</b> TECH	<b>Def:</b> -	

Torque signal in [%].

**Details:**

See parameter P2393.

<b>r2399</b>	<b>CO/BO: Energy Saving status word</b>	<b>Min:</b> -	<b>Level:</b> <b>3</b>
	<b>Datatype:</b> U16	<b>Unit:</b> -	
	<b>P-Group:</b> TECH	<b>Def:</b> -	

Displays Energy Saving 2 status word.

**Bitfields:**

Bit00	Energy saving enabled	0	NO
		1	YES
Bit01	Reserved	0	NO
		1	YES
Bit02	Running and asleep	0	NO
		1	YES
Bit03	State of switch	0	NO
		1	YES
Bit04	Reserved	0	NO
		1	YES
Bit05	r2398 < P2395	0	NO
		1	YES
Bit06	r2398 < P2394	0	NO
		1	YES

**Details:**

See parameter P2393.

<b>P3900</b>	<b>End of quick commissioning</b>				<b>Min:</b> 0	<b>Level:</b> <b>1</b>
	<b>CStat:</b> C	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0		
	<b>P-Group:</b> QUICK	<b>Active:</b> first confirm	<b>QuickComm.</b> Yes	<b>Max:</b> 3		

Performs calculations necessary for optimized motor operation.

After completion of calculation, P3900 and P0010 (parameter groups for commissioning) are automatically reset to their original value 0.

**Possible Settings:**

- 0 No quick commissioning
- 1 Start quick commissioning with factory reset
- 2 Start quick commissioning
- 3 Start quick commissioning only for motor data

**Dependency:**

Changeable only when P0010 = 1 (quick commissioning)

**Note:**

P3900 = 1 :

When setting 1 is selected, only the parameter settings carried out via the commissioning menu "Quick commissioning", are retained; all other parameter changes, including the I/O settings, are lost. Motor calculations are also performed.

P3900 = 2 :

When setting 2 is selected, only those parameters, which depend on the parameters in the commissioning menu "Quick commissioning" (P0010 = 1) are calculated. The I/O settings are also reset to default and the motor calculations performed.

P3900 = 3 :

When setting 3 is selected, only the motor and controller calculations are performed. Exiting quick commissioning with this setting saves time (for example, if only motor rating plate data have been changed).

Calculates a variety of motor parameters, overwriting previous values. These include P0344 (motor weight), P0350 (demagnetization time), P2000 (reference frequency), P2002 (reference current).

<b>P3950</b>	<b>Access of hidden parameters</b>				<b>Min:</b> 0	<b>Level:</b> <b>4</b>
	<b>CStat:</b> CUT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0		
	<b>P-Group:</b> ALWAYS	<b>Active:</b> first confirm	<b>QuickComm.</b> No	<b>Max:</b> 255		

Accesses special parameters for development (expert only) and factory functionality (calibration parameter).

<b>r3954[13]</b>	<b>CM version and GUI ID</b>				<b>Min:</b> -	<b>Level:</b> <b>4</b>
		<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> -		
	<b>P-Group:</b> -			<b>Max:</b> -		

Used to classify firmware (only for SIEMENS internal purposes).

**Index:**

- r3954[0] : CM version (major release)
- r3954[1] : CM version (minor release)
- r3954[2] : CM version (baselevel or patch)
- r3954[3] : GUI ID
- r3954[4] : GUI ID
- r3954[5] : GUI ID
- r3954[6] : GUI ID
- r3954[7] : GUI ID
- r3954[8] : GUI ID
- r3954[9] : GUI ID
- r3954[10] : GUI ID
- r3954[11] : GUI ID major release
- r3954[12] : GUI ID minor release



<b>P3980</b>	<b>Commissioning command selection</b>				<b>Min:</b> 0	<b>Level:</b> <b>4</b>
	<b>CStat:</b> T	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0		
	<b>P-Group:</b> -	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 66		

Toggles command and setpoint sources between freely programmable BICO parameters and fixed command/setpoint profiles for commissioning.

The command and setpoint sources can be changed independently. The tens digit selects the command source, the ones digit the setpoint source.

**Possible Settings:**

0	Cmd = BICO parameter	Setpoint = BICO parameter
1	Cmd = BICO parameter	Setpoint = MOP setpoint
2	Cmd = BICO parameter	Setpoint = Analog setpoint
3	Cmd = BICO parameter	Setpoint = Fixed frequency
4	Cmd = BICO parameter	Setpoint = USS on BOP link
5	Cmd = BICO parameter	Setpoint = USS on COM link
6	Cmd = BICO parameter	Setpoint = CB on COM link
10	Cmd = BOP	Setpoint = BICO parameter
11	Cmd = BOP	Setpoint = MOP setpoint
12	Cmd = BOP	Setpoint = Analog setpoint
13	Cmd = BOP	Setpoint = Fixed frequency
15	Cmd = BOP	Setpoint = USS on COM link
16	Cmd = BOP	Setpoint = CB on COM link
40	Cmd = USS on BOP link	Setpoint = BICO parameter
41	Cmd = USS on BOP link	Setpoint = MOP setpoint
42	Cmd = USS on BOP link	Setpoint = Analog setpoint
43	Cmd = USS on BOP link	Setpoint = Fixed frequency
44	Cmd = USS on BOP link	Setpoint = USS on BOP link
45	Cmd = USS on BOP link	Setpoint = USS on COM link
46	Cmd = USS on BOP link	Setpoint = CB on COM link
60	Cmd = CB on COM link	Setpoint = BICO parameter
61	Cmd = CB on COM link	Setpoint = MOP setpoint
62	Cmd = CB on COM link	Setpoint = Analog setpoint
63	Cmd = CB on COM link	Setpoint = Fixed frequency
64	Cmd = CB on COM link	Setpoint = USS on BOP link
66	Cmd = CB on COM link	Setpoint = CB on COM link

**Note:**

USS on COM link is not supported on MM411

<b>P3981</b>	<b>Reset active fault</b>				<b>Min:</b> 0	<b>Level:</b> <b>4</b>
	<b>CStat:</b> CT	<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> 0		
	<b>P-Group:</b> ALARMS	<b>Active:</b> first confirm	<b>QuickComm. No</b>	<b>Max:</b> 1		

Resets active faults when changed from 0 to 1.

**Possible Settings:**

0	No fault reset
1	Reset fault

**Note:**

Automatically reset to 0.

**Details:**

See P0947 (last fault code)

<b>r3986[2]</b>	<b>Number of parameters</b>				<b>Min:</b> -	<b>Level:</b> <b>4</b>
			<b>Datatype:</b> U16	<b>Unit:</b> -	<b>Def:</b> -	
	<b>P-Group:</b> -				<b>Max:</b> -	

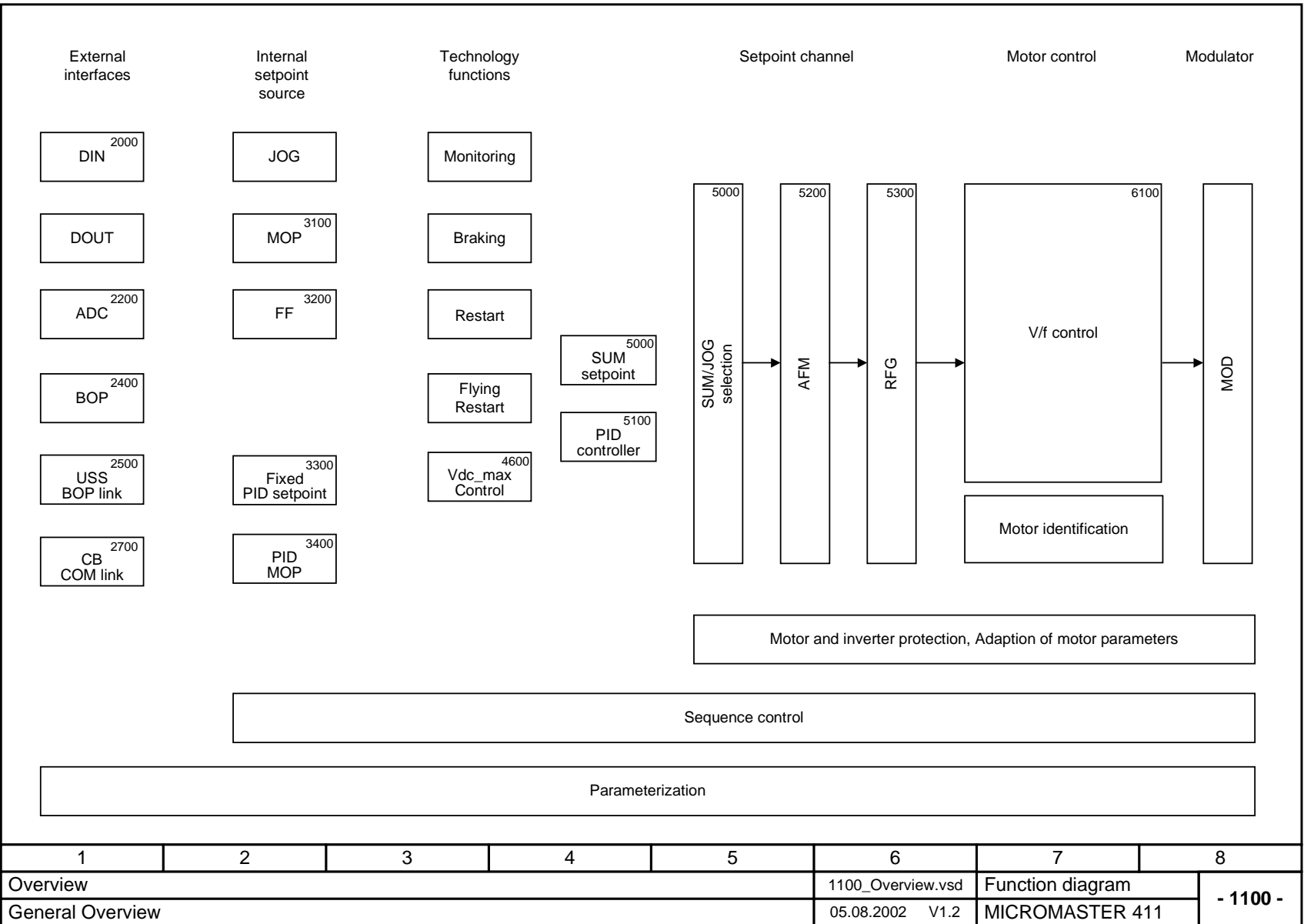
Number of parameters on the drive

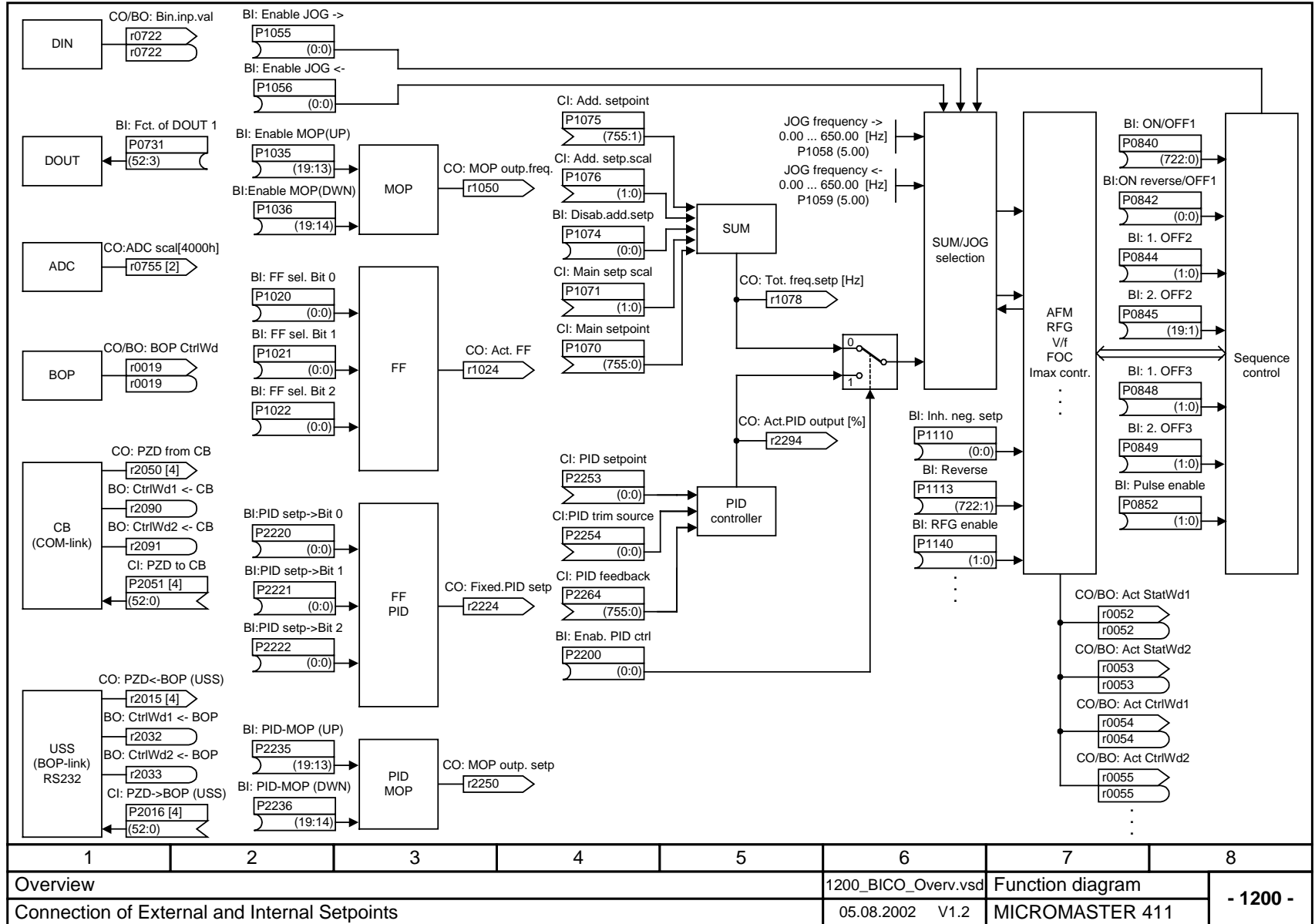
**Index:**

- r3986[0] : Read only
- r3986[1] : Read & write

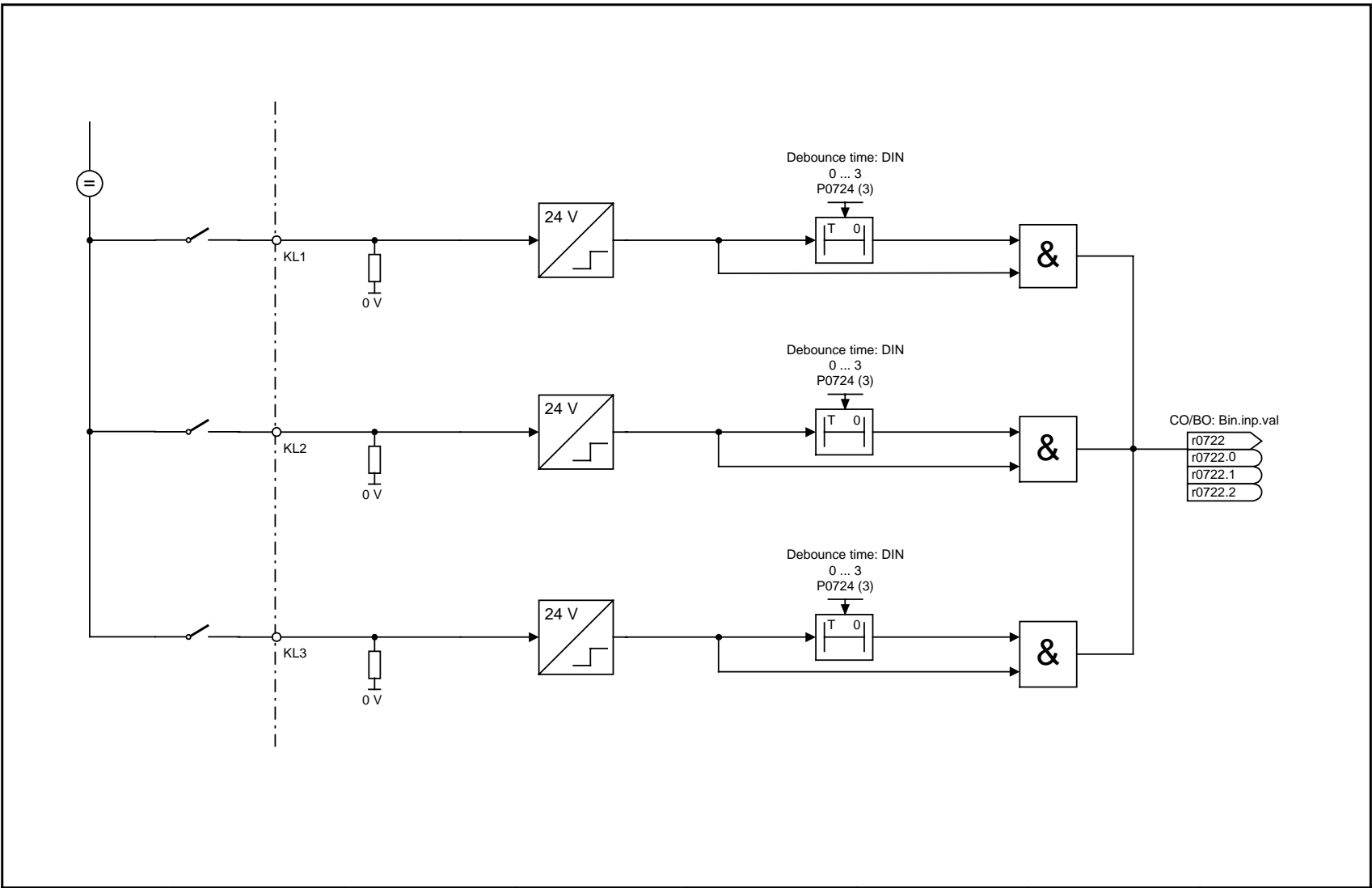


## 2 Function Diagrams

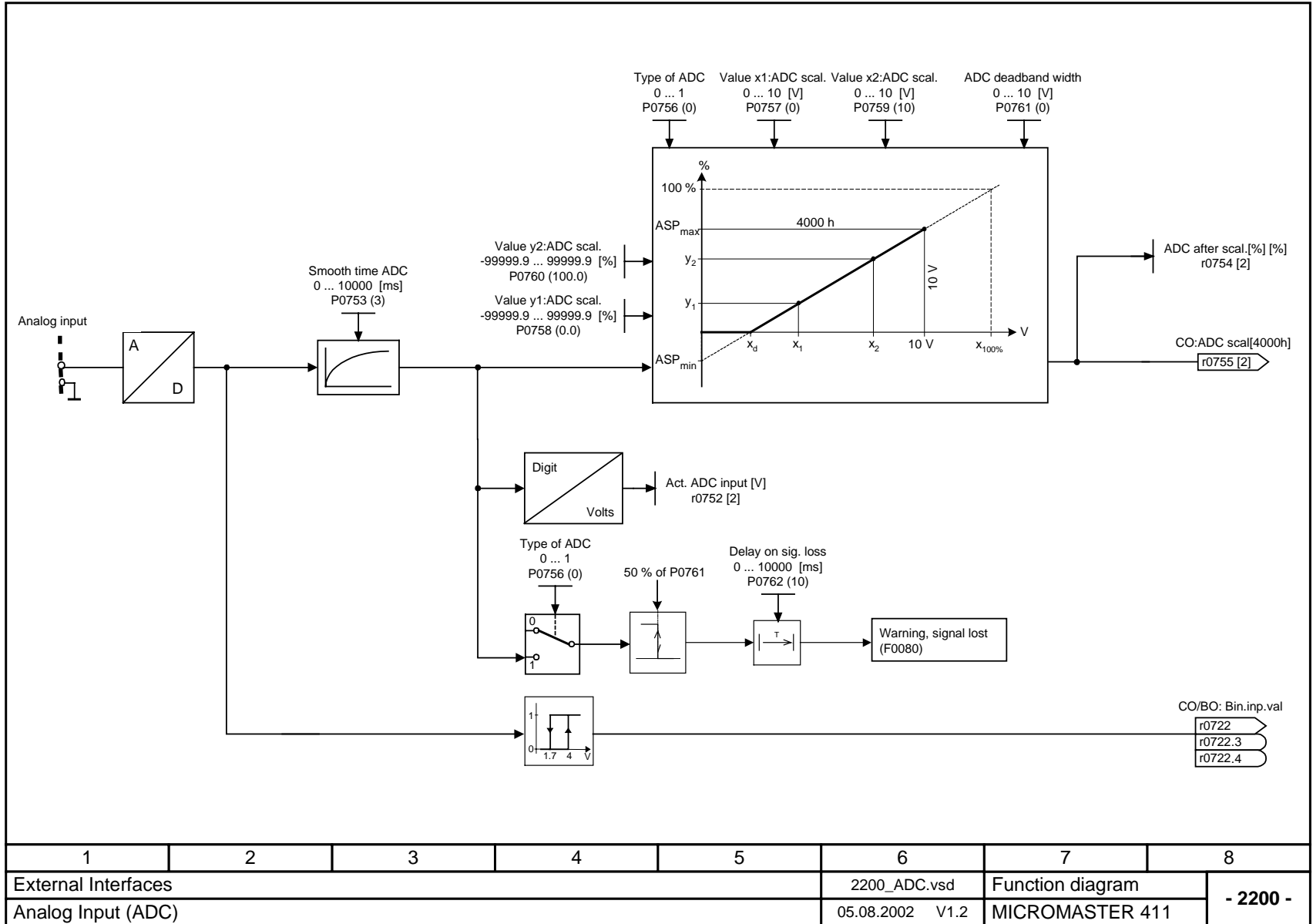


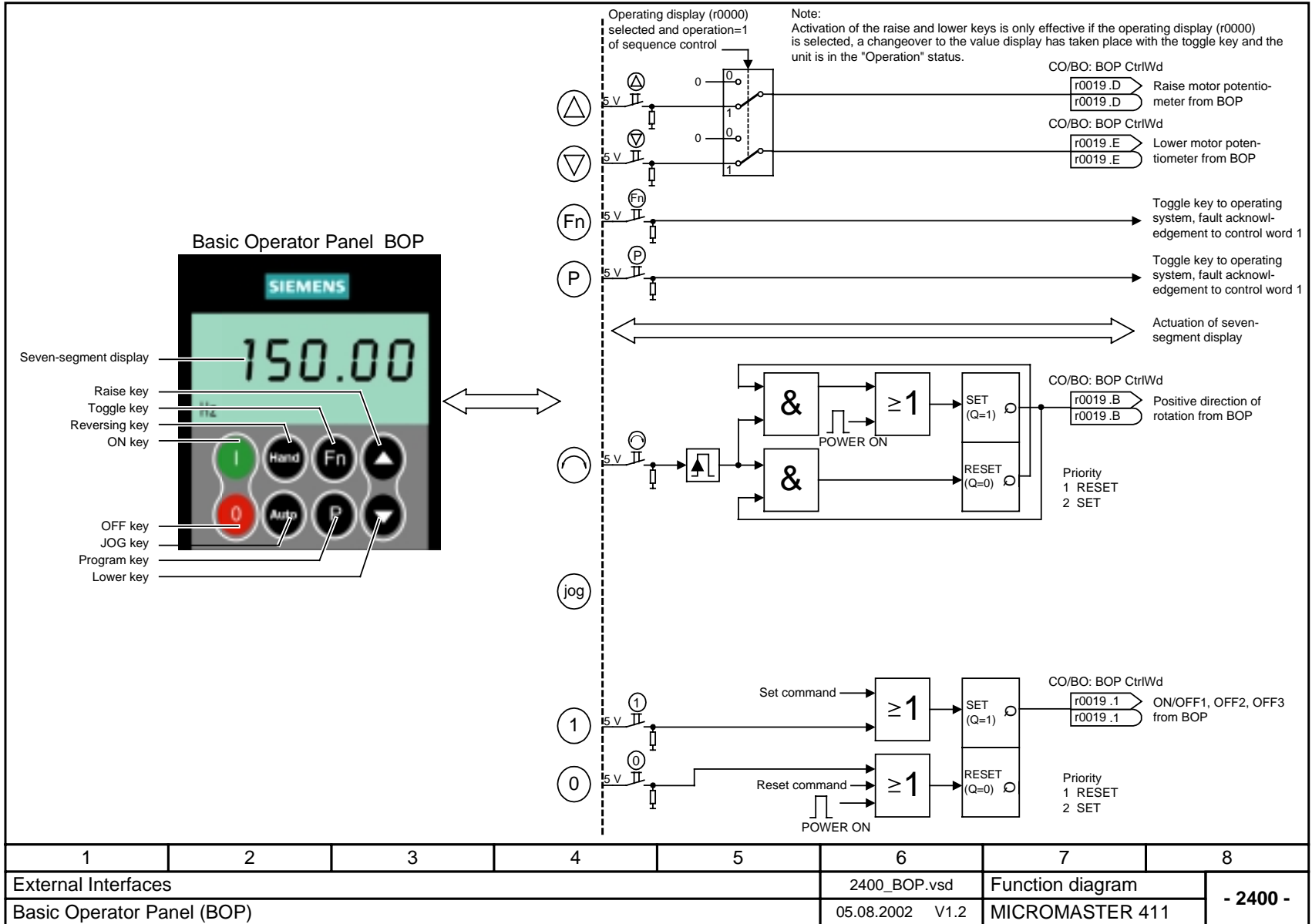


1	2	3	4	5	6	7	8
Overview					1200_BICO_Over.vsd	Function diagram	
Connection of External and Internal Setpoints					05.08.2002 V1.2	MICROMASTER 411	
							- 1200 -

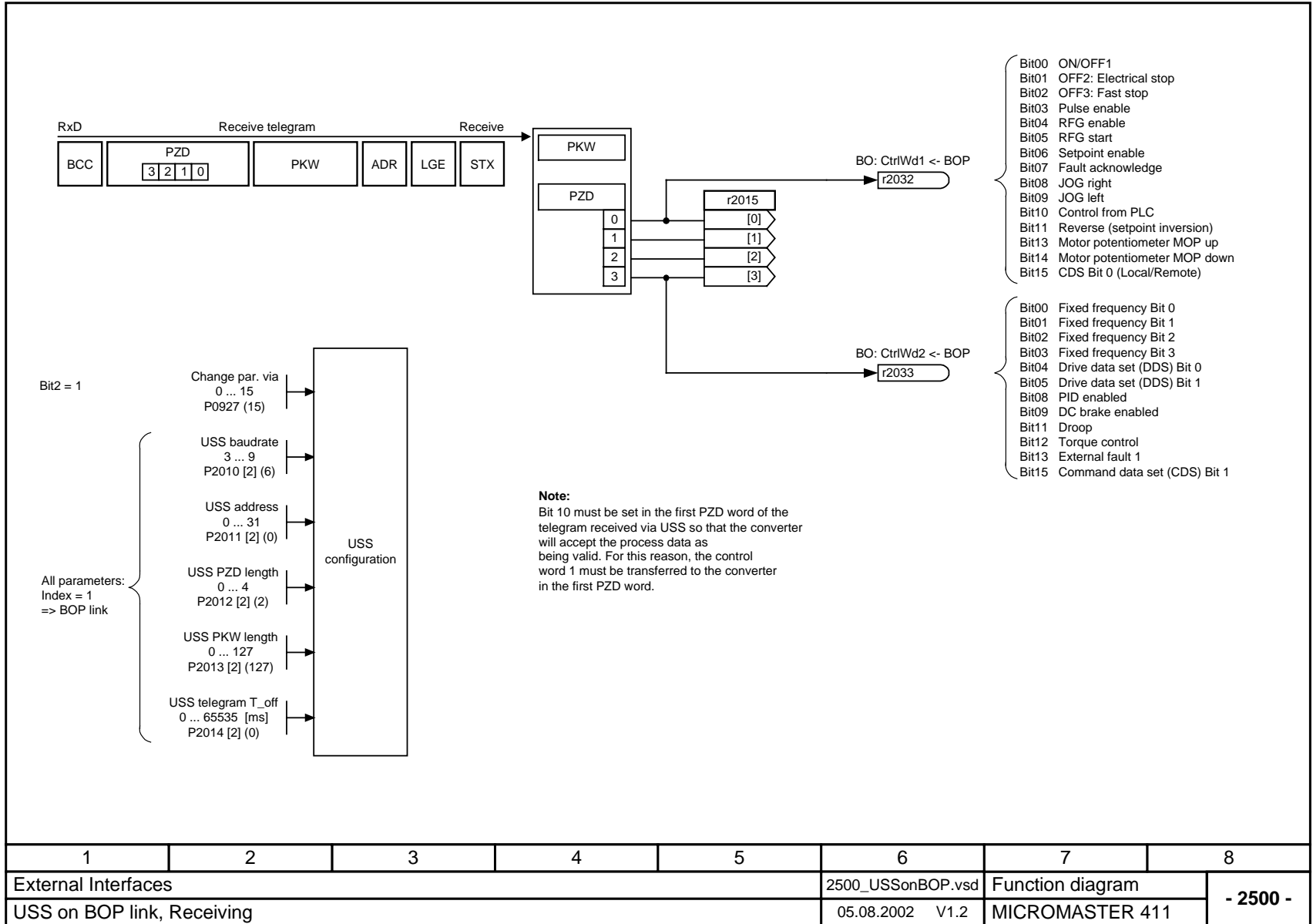


1	2	3	4	5	6	7	8
External Interfaces					2000_DIN.vsd	Function diagram	
Digital Inputs					05.08.2002 V1.2	MICROMASTER 411	
							- 2000 -



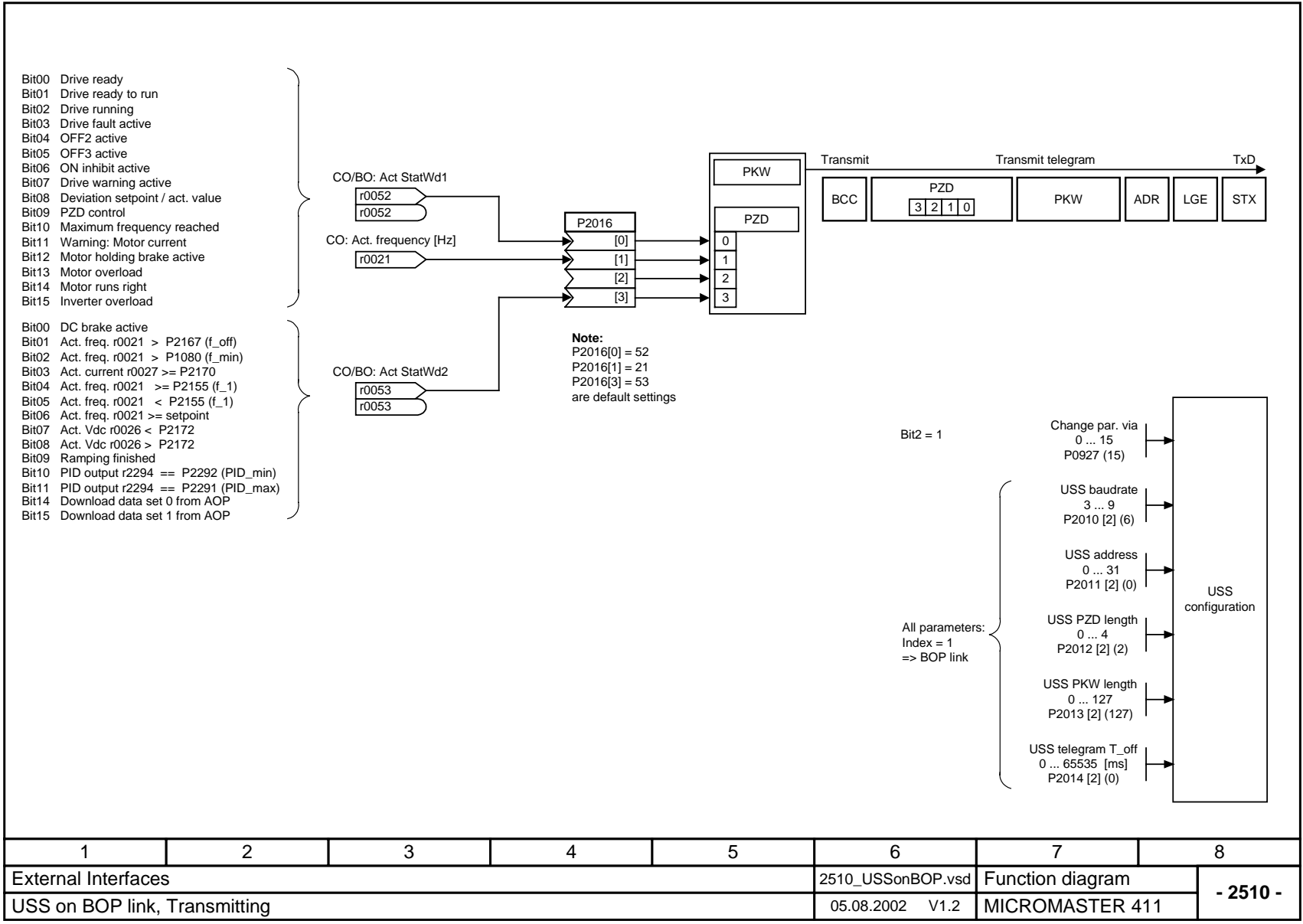


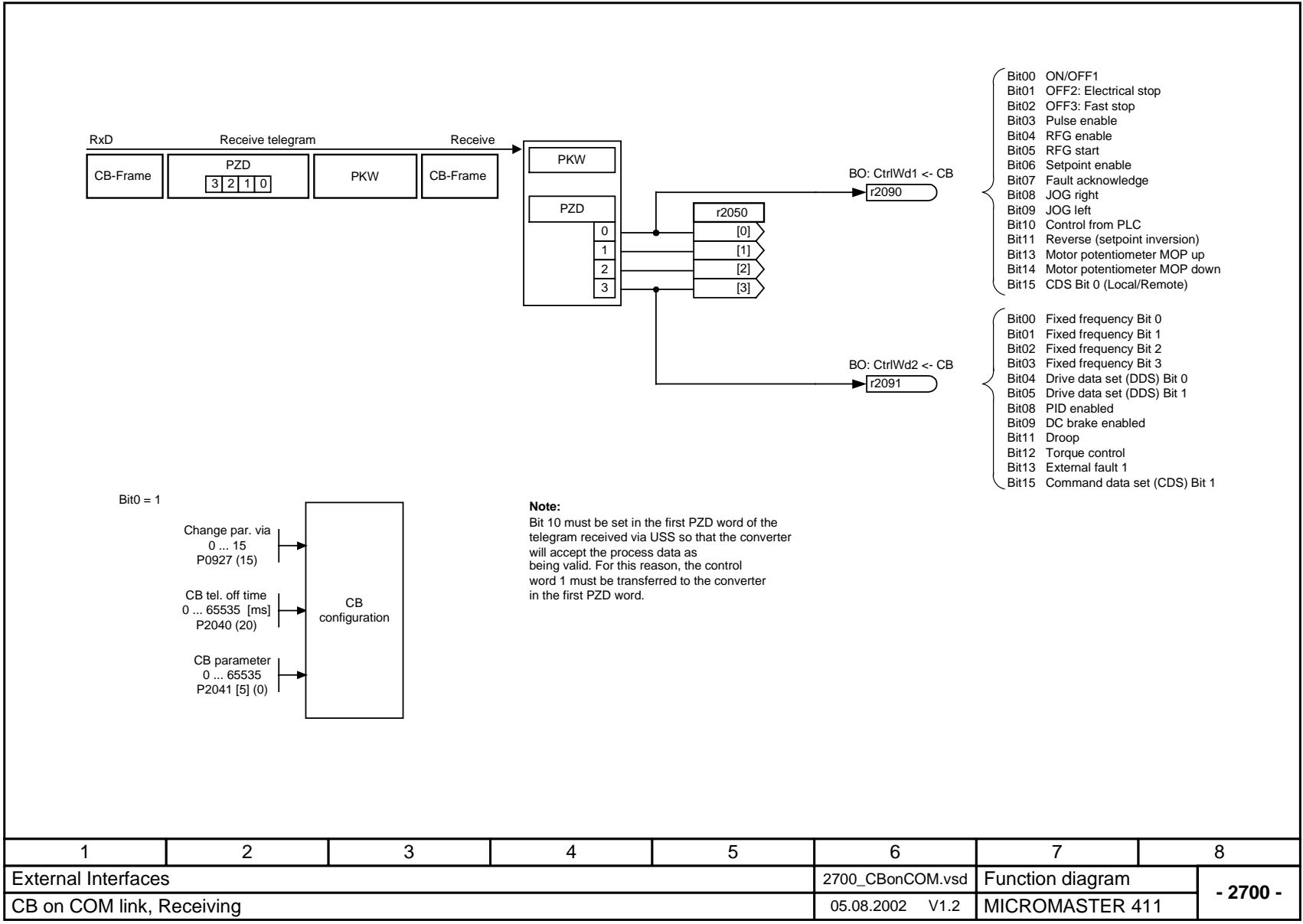
1	2	3	4	5	6	7	8
External Interfaces					2400_BOP.vsd	Function diagram	
Basic Operator Panel (BOP)					05.08.2002 V1.2	MICROMASTER 411	
							- 2400 -



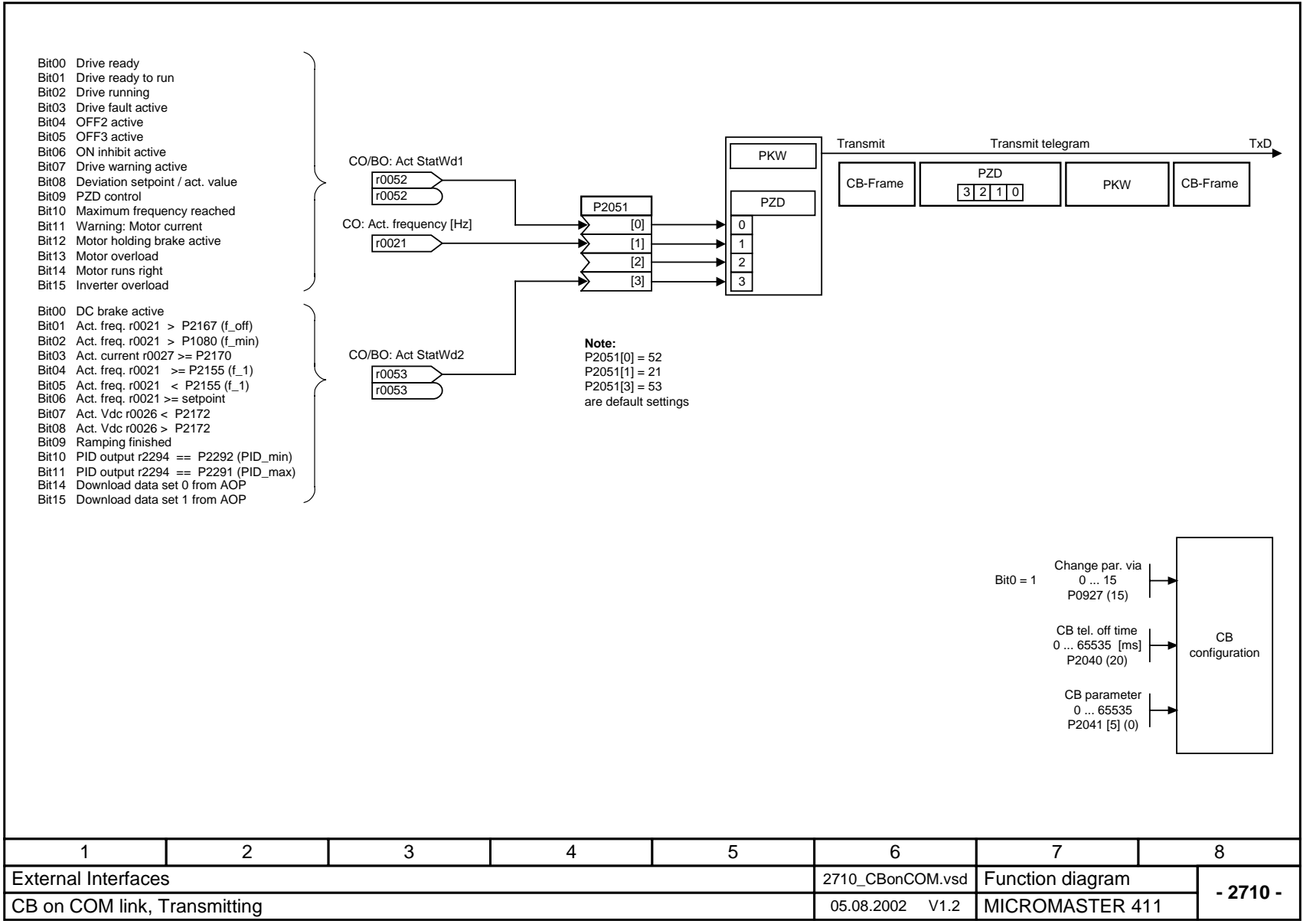
1	2	3	4	5	6	7	8
External Interfaces					2500_USSonBOP.vsd	Function diagram	
USS on BOP link, Receiving					05.08.2002 V1.2	MICROMASTER 411	
- 2500 -							



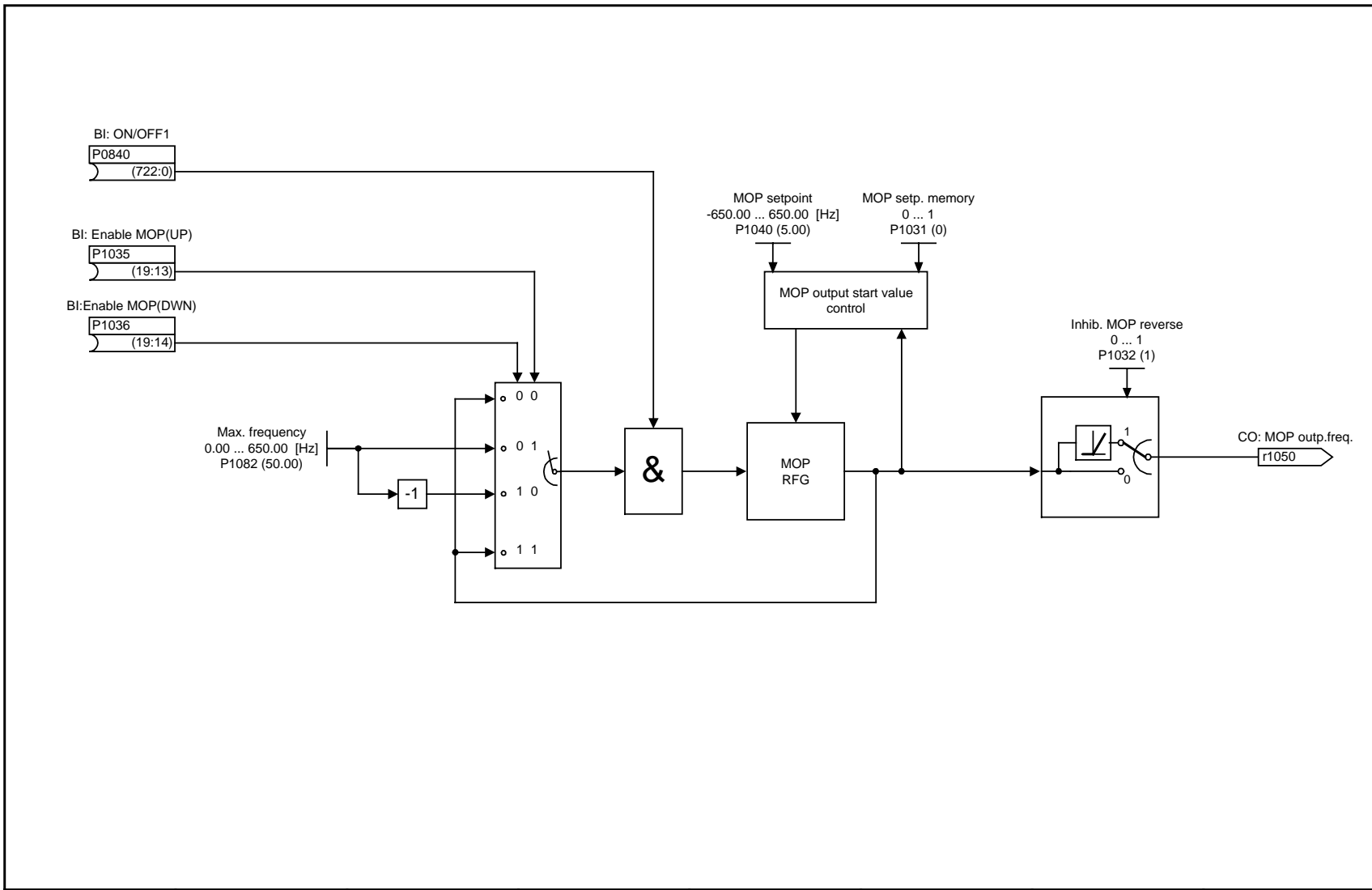




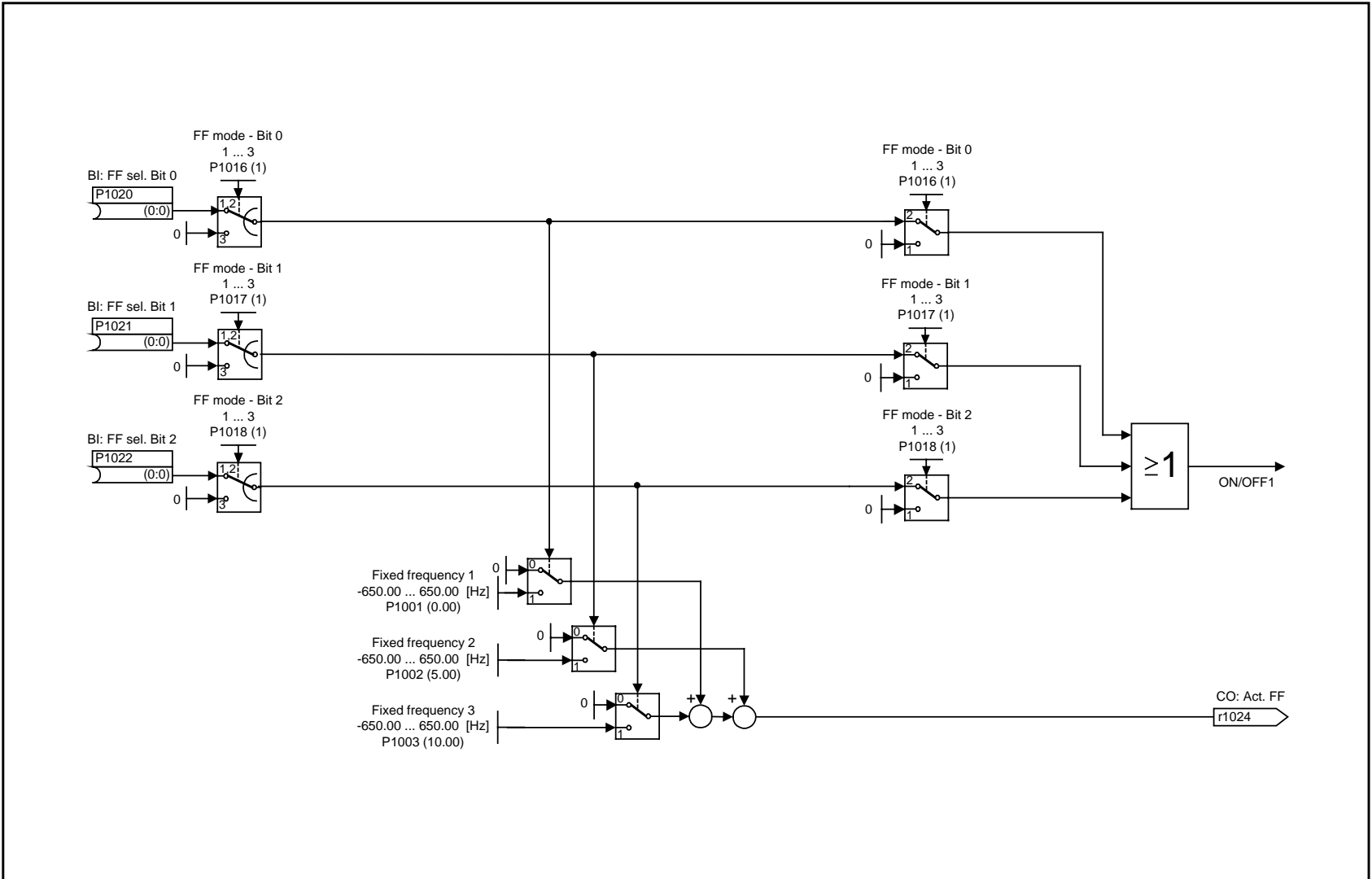
1	2	3	4	5	6	7	8
External Interfaces					2700_CBonCOM.vsd	Function diagram	
CB on COM link, Receiving					05.08.2002 V1.2	MICROMASTER 411	
- 2700 -							



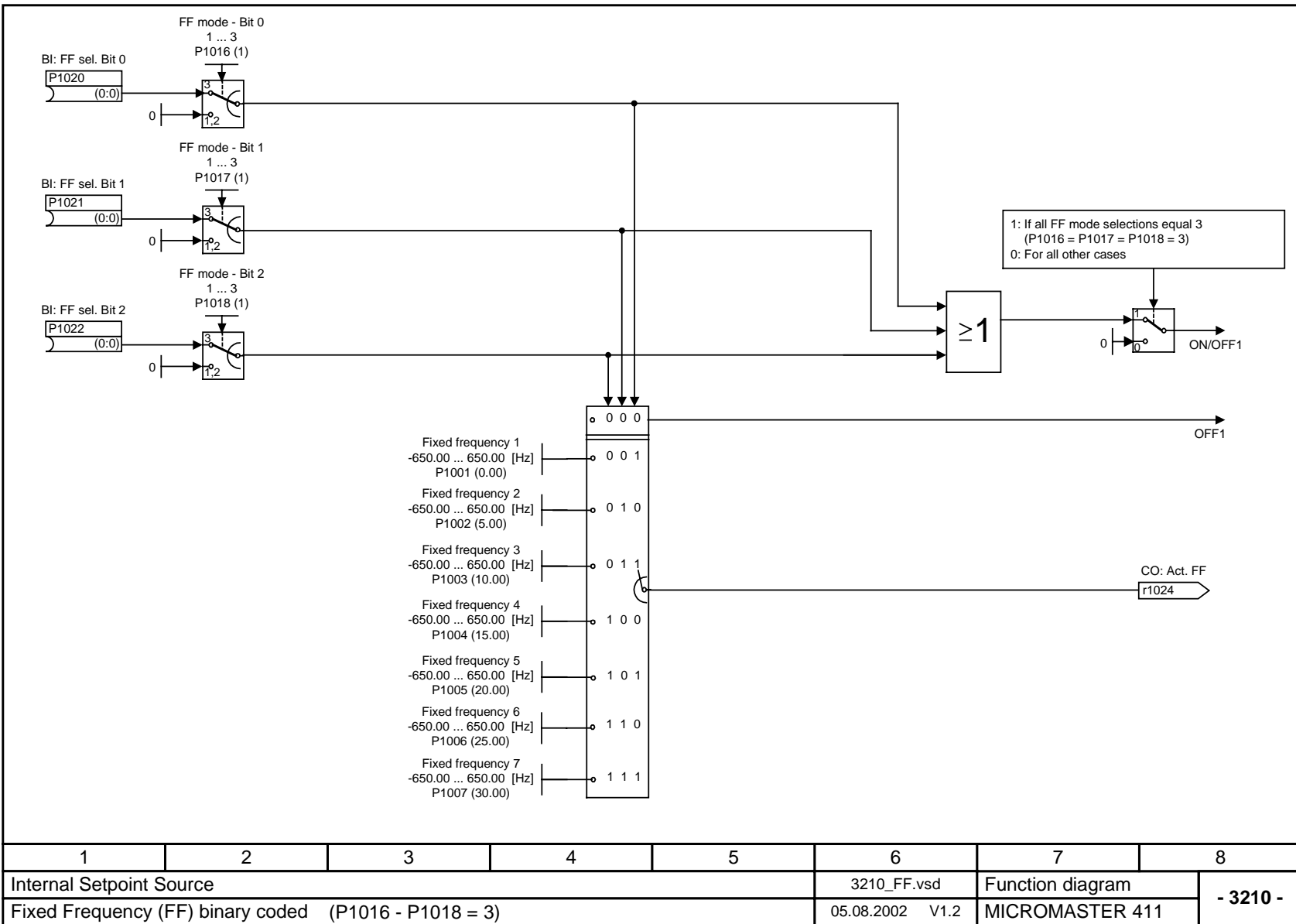
1	2	3	4	5	6	7	8
External Interfaces					2710_CBonCOM.vsd	Function diagram	
CB on COM link, Transmitting					05.08.2002 V1.2	MICROMASTER 411	
							- 2710 -



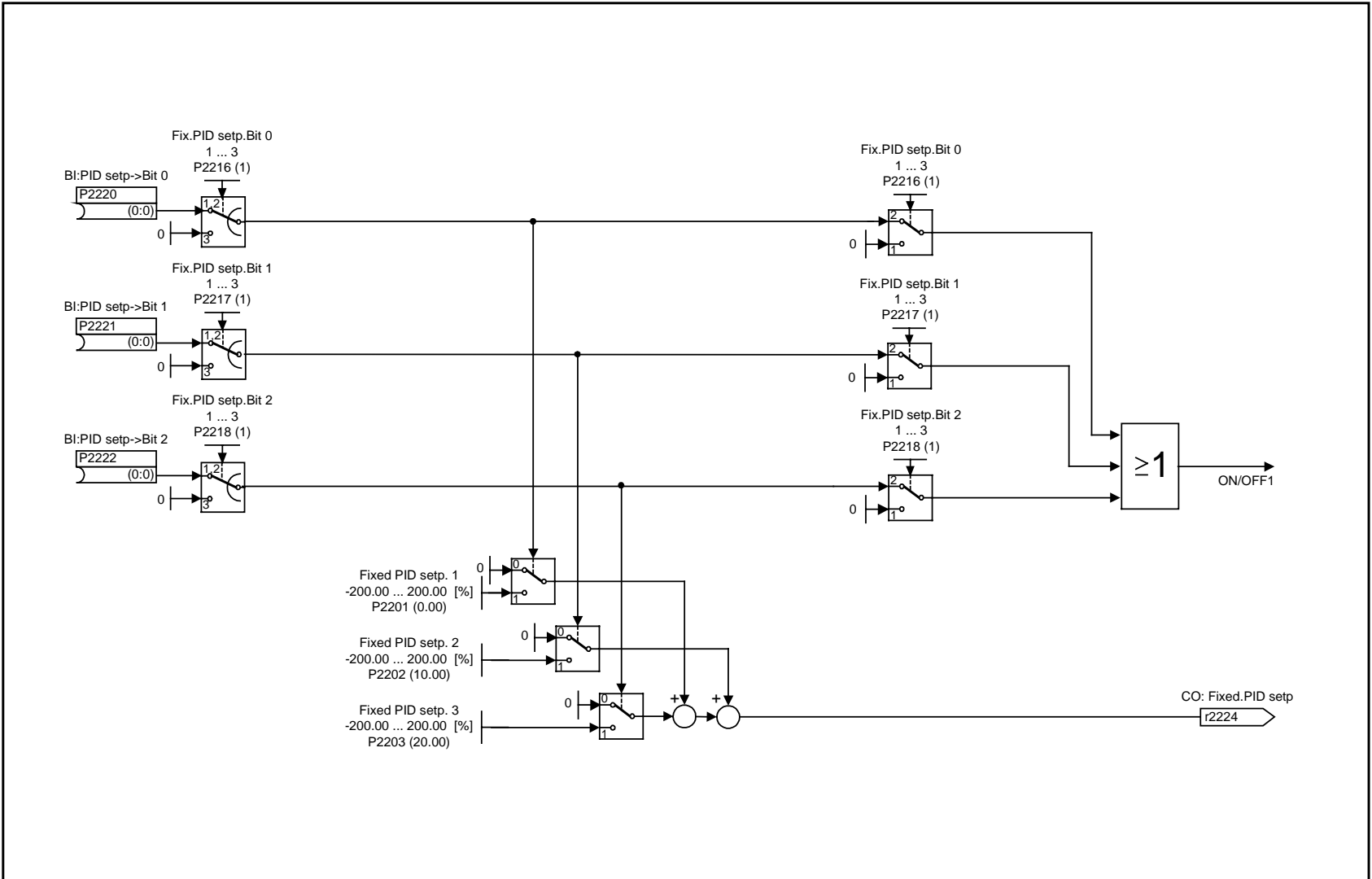
1	2	3	4	5	6	7	8
Internal Setpoint Source					3100_MOP.vsd	Function diagram	
Motor Potentiometer (MOP)					05.08.2002 V1.2	MICROMASTER 411	
							<b>- 3100 -</b>



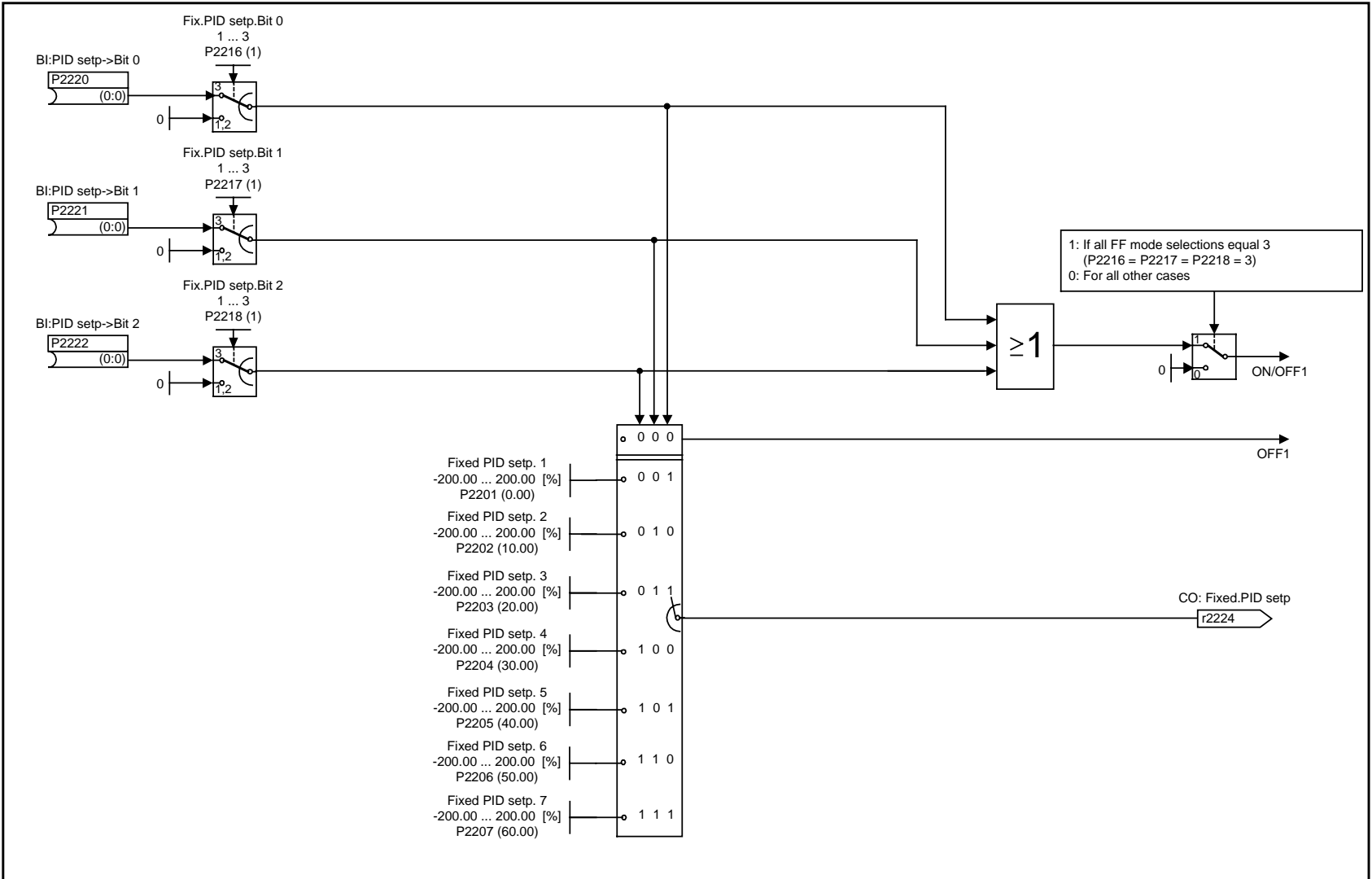
1	2	3	4	5	6	7	8
Internal Setpoint Source					3200_FF.vsd	Function diagram	
Fixed Frequency (FF) bit coded			(P1016 - P1018 = 1 or 2)		05.08.2002 V1.2	MICROMASTER 411	
							- 3200 -



1	2	3	4	5	6	7	8
Internal Setpoint Source					3210_FF.vsd	Function diagram	
Fixed Frequency (FF) binary coded (P1016 - P1018 = 3)					05.08.2002 V1.2	MICROMASTER 411	
							<b>- 3210 -</b>

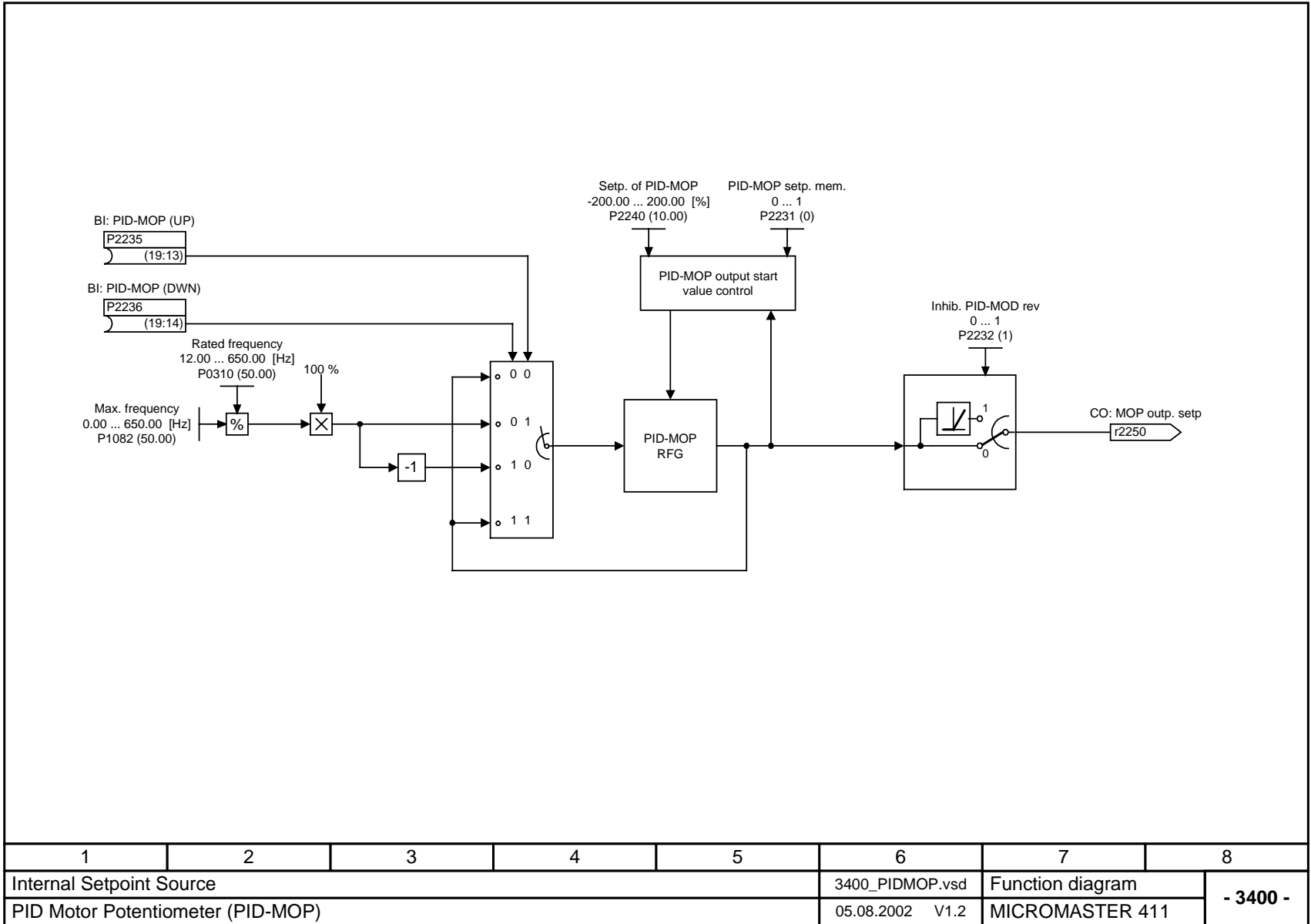


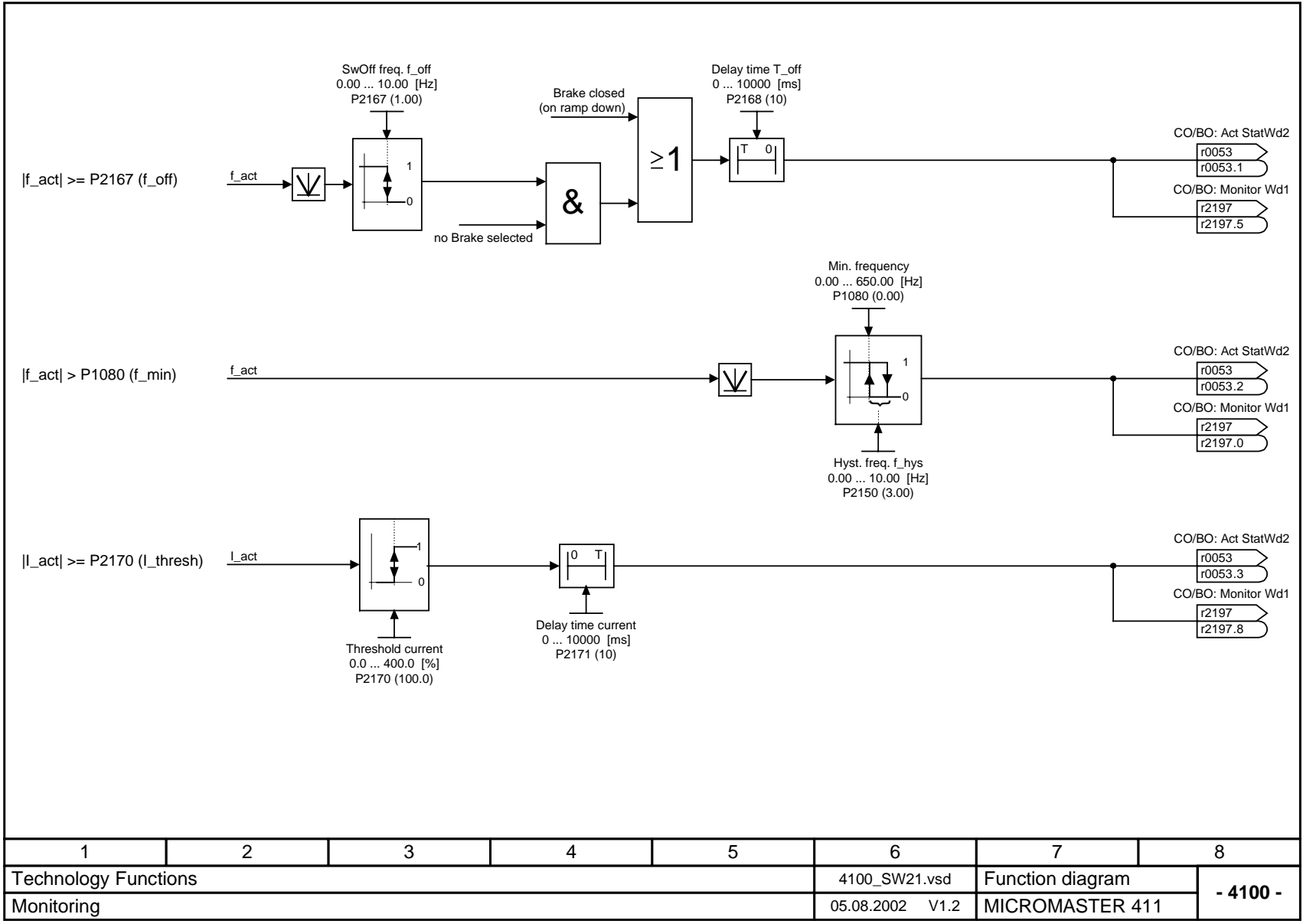
1	2	3	4	5	6	7	8
Internal Setpoint Source					3300_FPID.vsd	Function diagram	
Fixed PID setpoint, bit coded			(P2216 - P2218 = 1 or 2)		05.08.2002 V1.2	MICROMASTER 411	
							- 3300 -



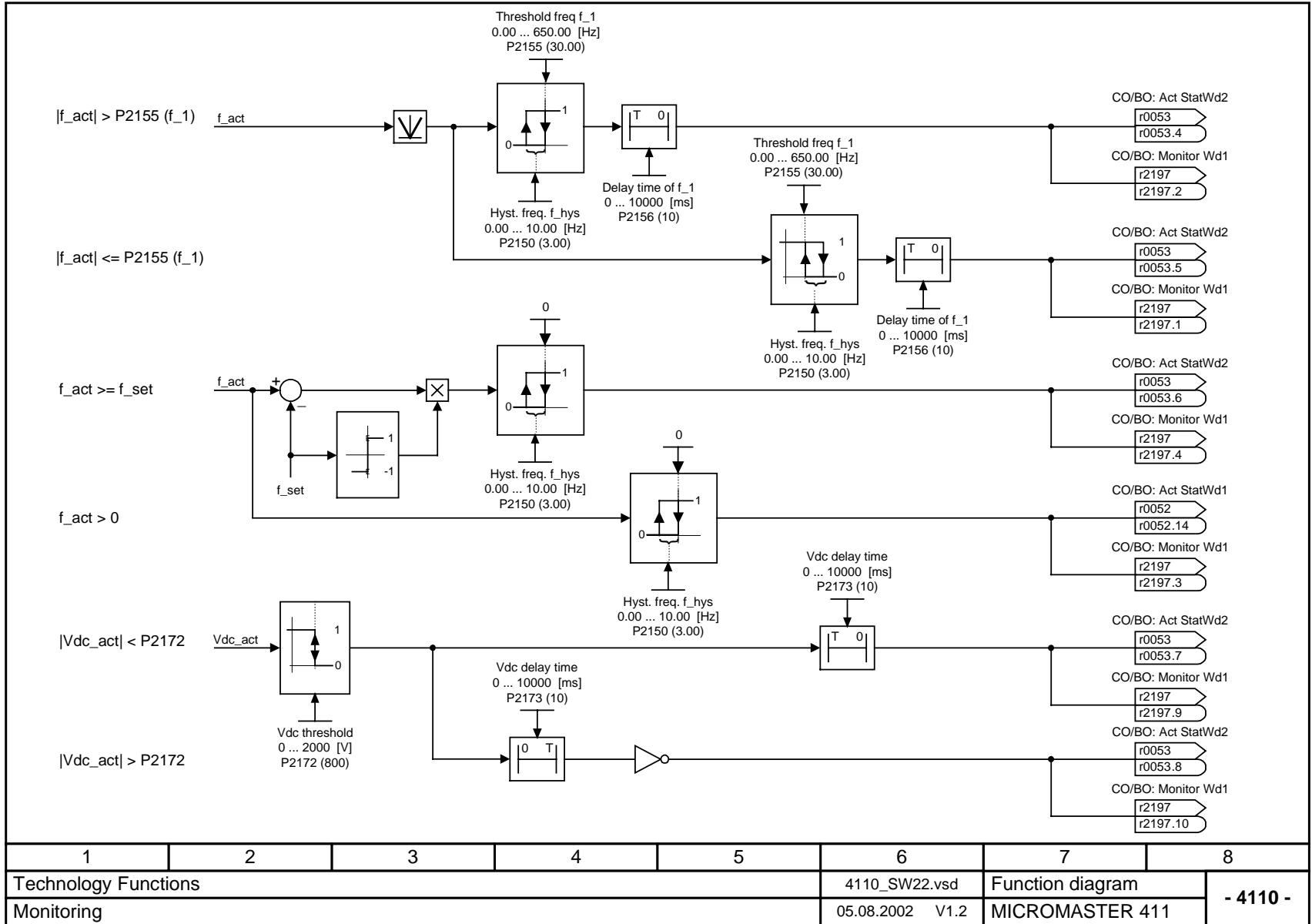
1	2	3	4	5	6	7	8
Internal Setpoint Source					3310_FPID.vsd	Function diagram	
Fixed PID setpoint, binary coded (P2216 - P2218 = 3)					05.08.2002 V1.2	MICROMASTER 411	
							<b>- 3310 -</b>

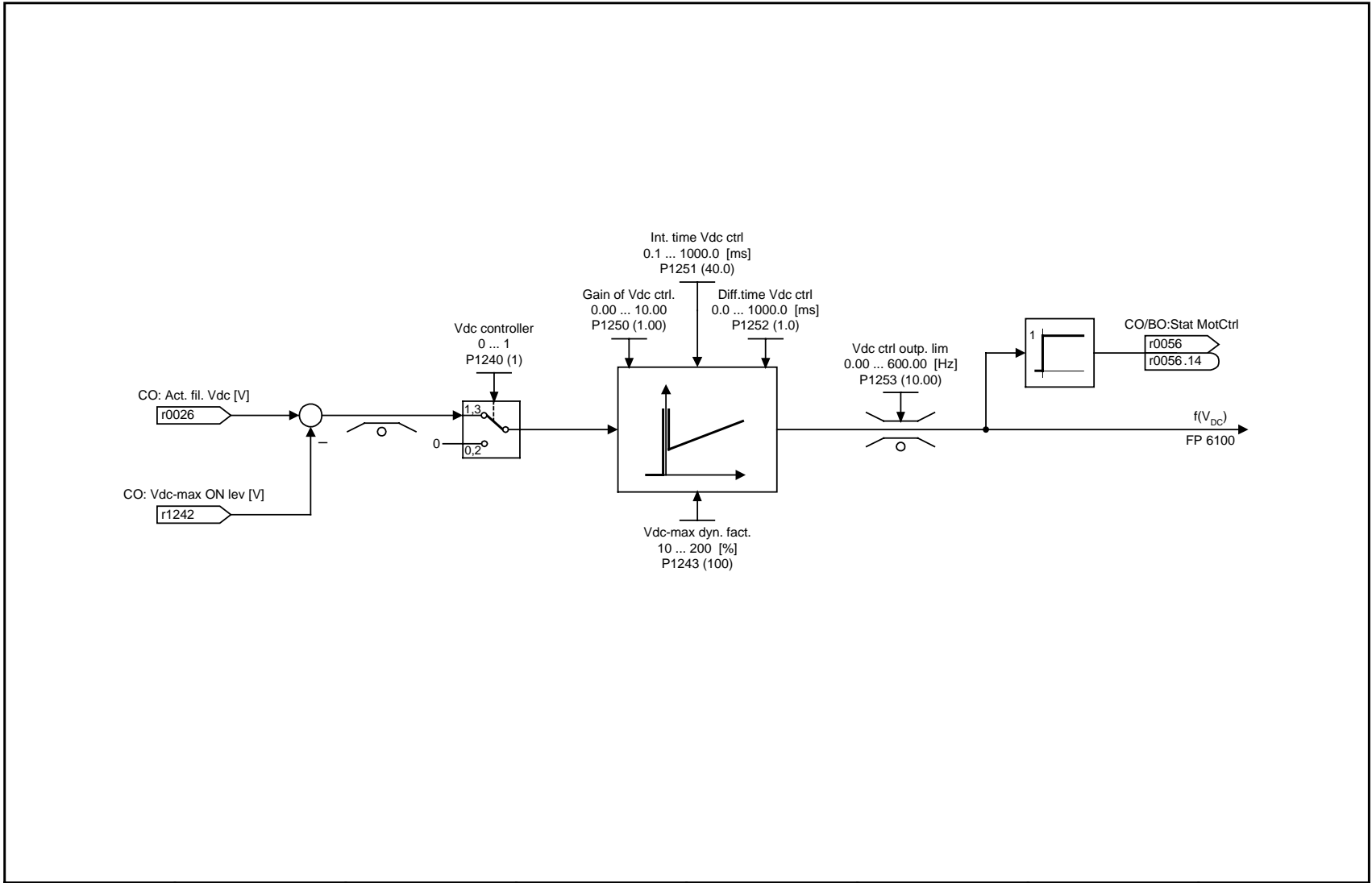




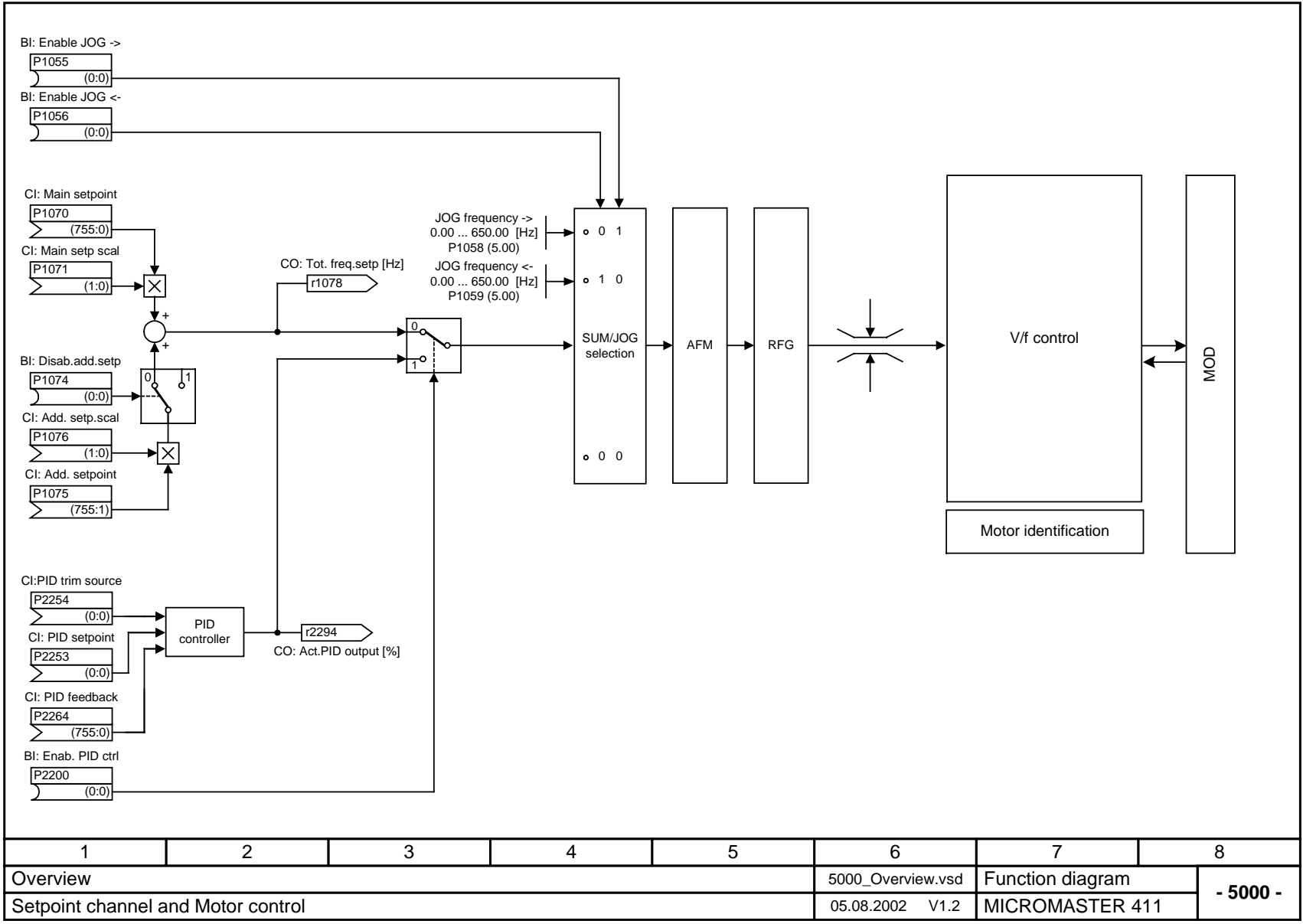


1	2	3	4	5	6	7	8
Technology Functions					4100_SW21.vsd	Function diagram	
Monitoring					05.08.2002 V1.2	MICROMASTER 411	
							<b>- 4100 -</b>

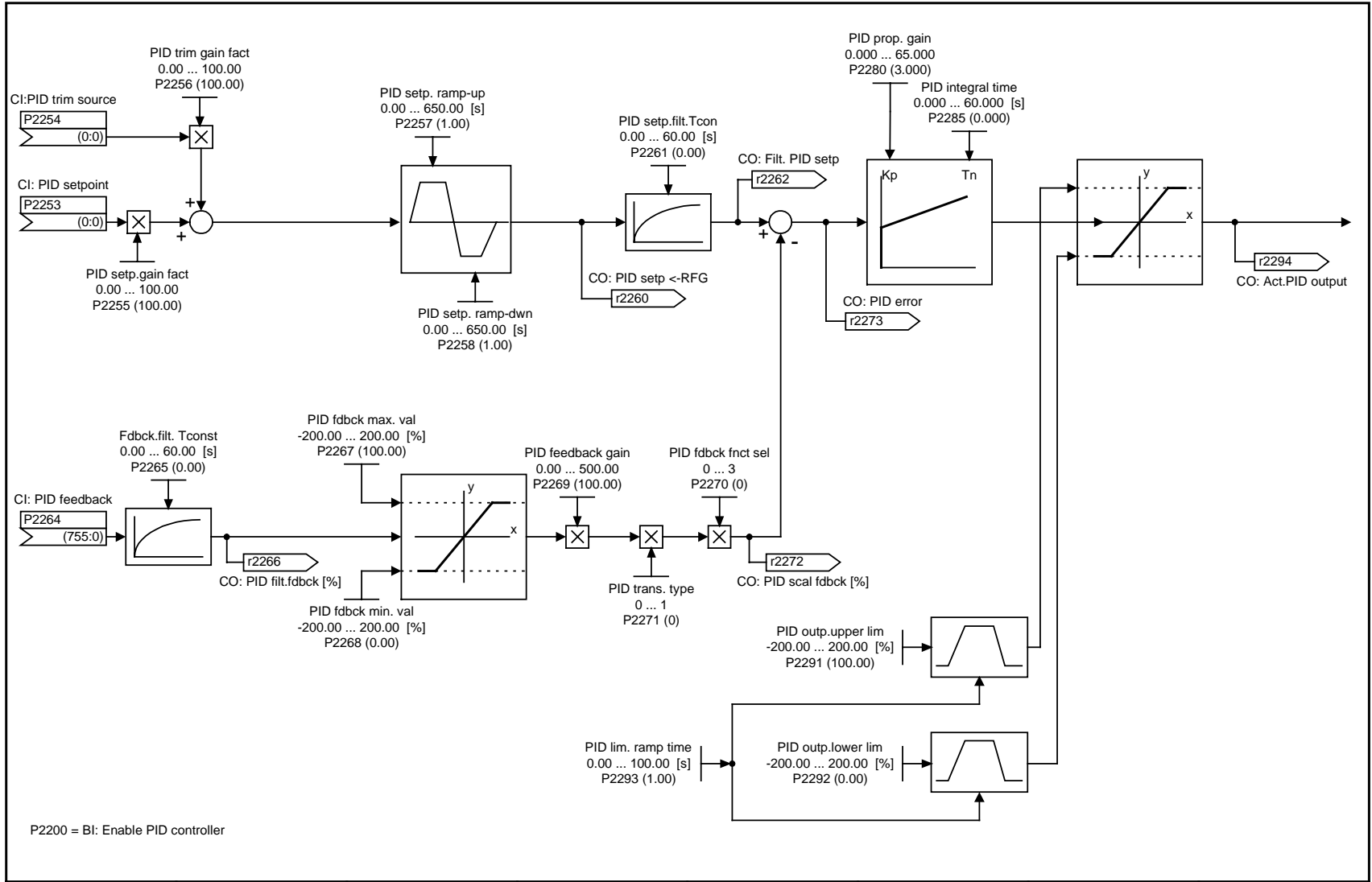




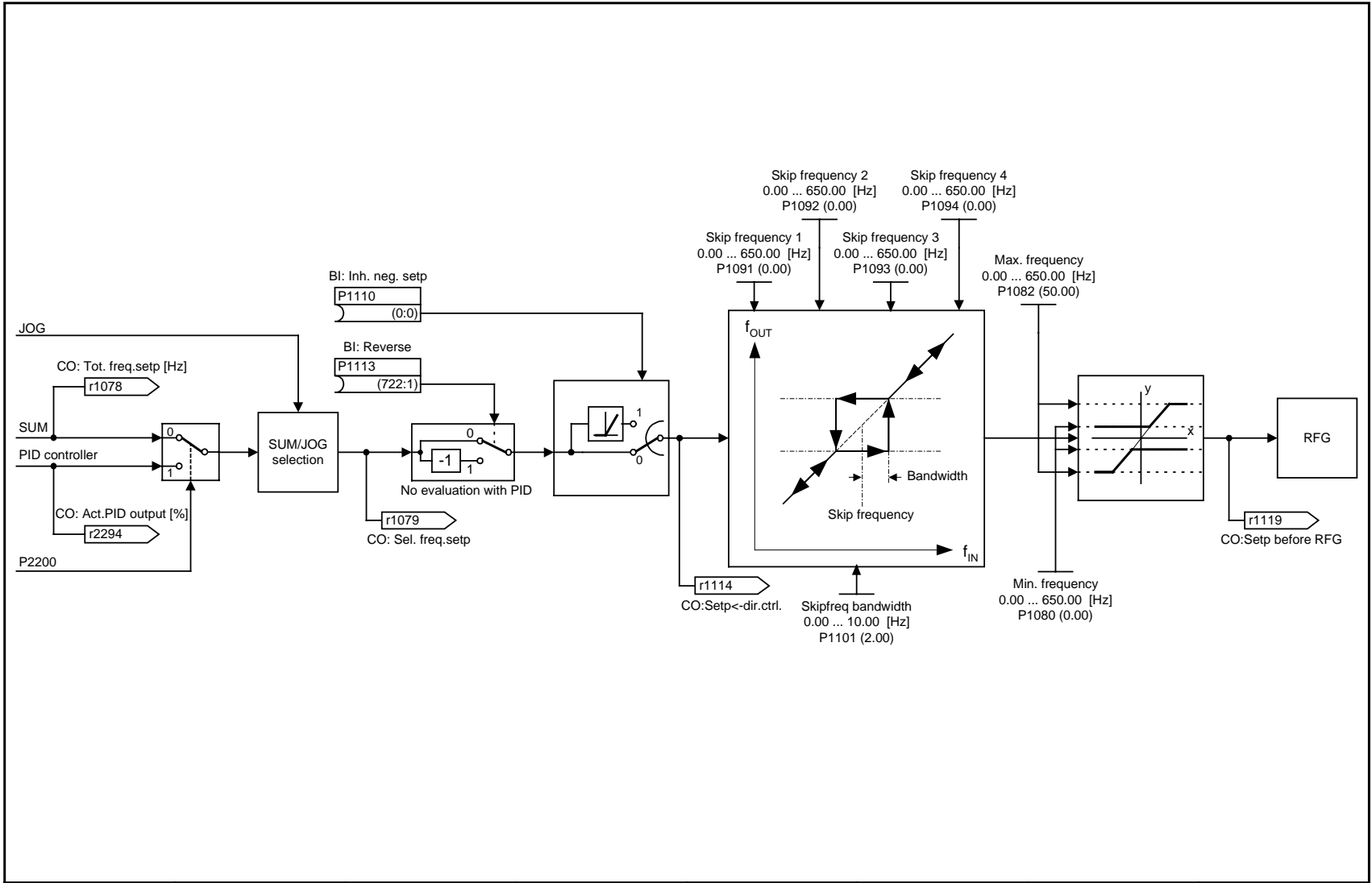
1	2	3	4	5	6	7	8
Technology Functions					4600.vsd	Function diagram	
Vdc_max Control					05.08.2002 V1.2	MICROMASTER 411	
						- 4600 -	



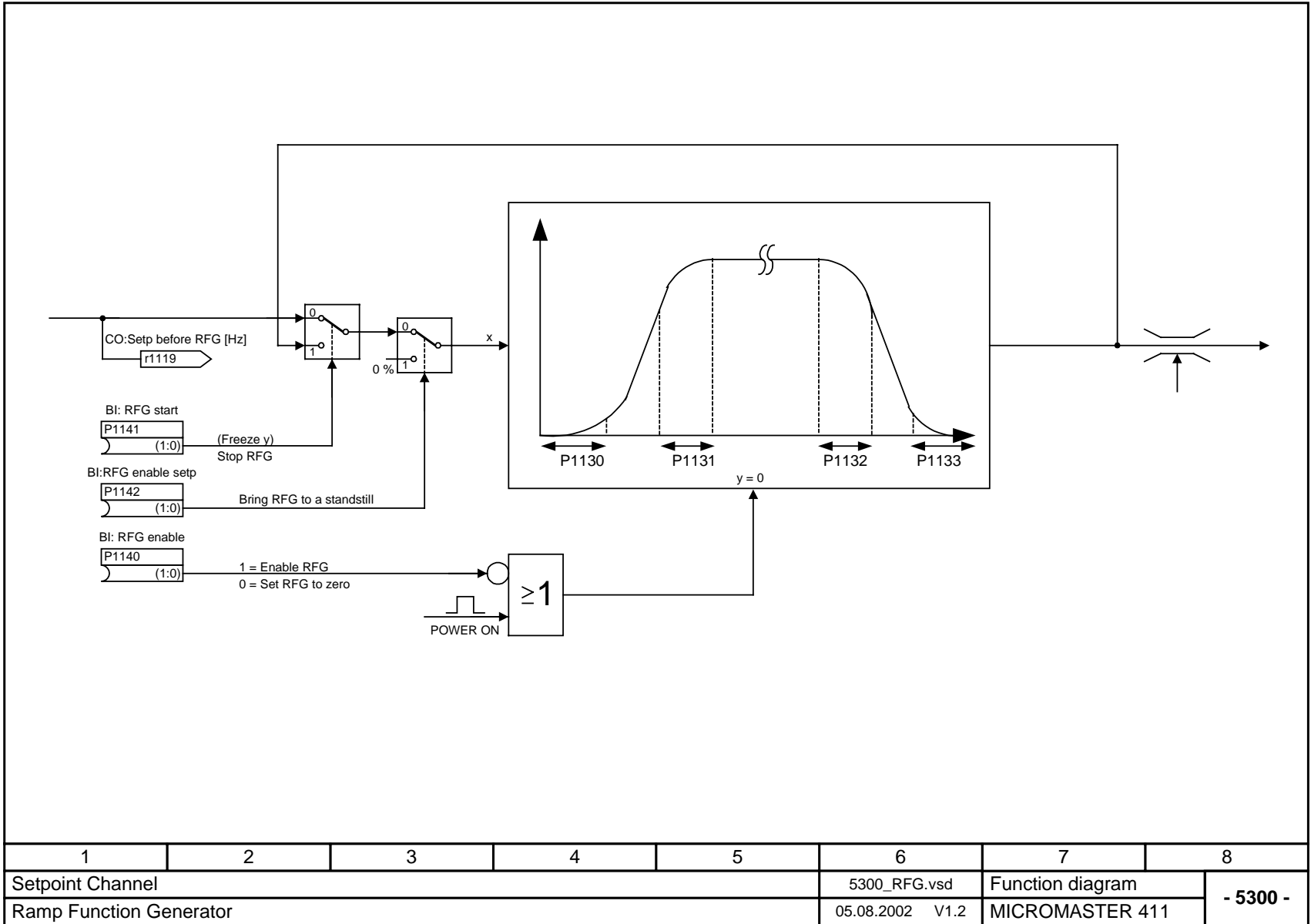
1	2	3	4	5	6	7	8
Overview					5000_Overview.vsd	Function diagram	
Setpoint channel and Motor control					05.08.2002 V1.2	MICROMASTER 411	
- 5000 -							



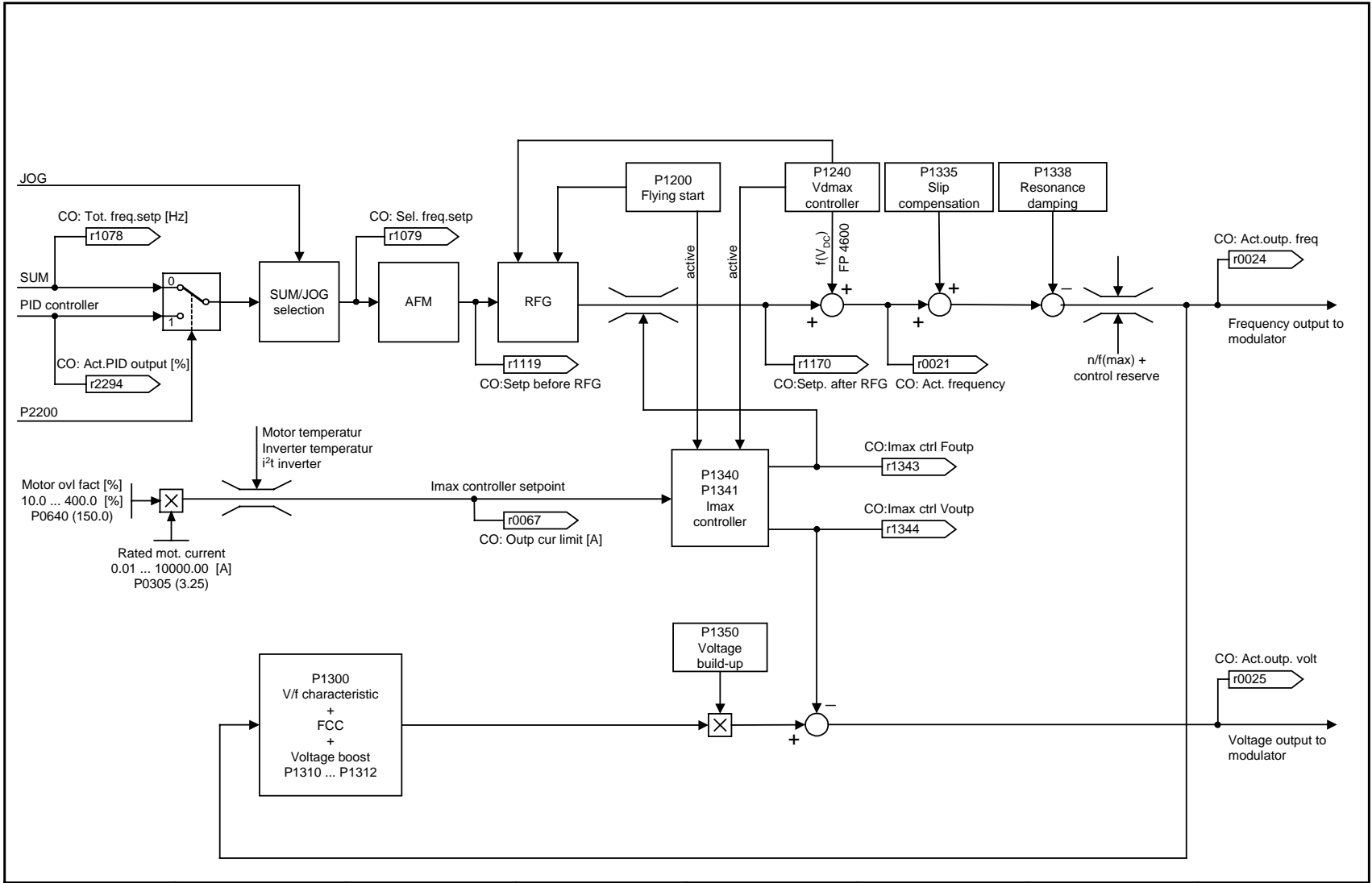
1	2	3	4	5	6	7	8
Setpoint Channel					5100_PID.vsd	Function diagram	
PID controller					05.08.2002 V1.2	MICROMASTER 411	
							<b>- 5100 -</b>



1	2	3	4	5	6	7	8
Setpoint channel					5200_AFM.vsd	Function diagram	
Additional Frequency Modifications (AFM)					05.08.2002 V1.2	MICROMASTER 411	







1	2	3	4	5	6	7	8	
V/f Control					6100_V_f.vsd		Function diagram	- 6100 -
Overview of V/f Control					05.08.2002 V1.2		MICROMASTER 411	


## 3 Faults and Alarms

### 3.1 Fault messages

In the event of a failure, the inverter switches off and a fault code appears on the display.

**NOTE**


To reset the fault code, one of three methods listed below can be used:

1. Cycle the power to the drive.
2. Press the  button on the BOP or AOP.
3. Via Digital Input 3 (default setting)

In the event of a failure, the inverter switches off and a fault code appears on the display.

**NOTE**

To reset the fault code, one of three methods listed below can be used:

1. Cycle the power to the drive.
2. Press the  button on the BOP or AOP.
3. Via Digital Input 3 (default setting)

Fault messages are stored in parameter r0947 under their code number (e.g. F0003 = 3). The associated error value is found in parameter r0949. The value 0 is entered if a fault has no error value. It is furthermore possible to read out the point in time that a fault occurred (r0948) and the number of fault messages (P0952) stored in Parameter r0947.

#### F0001 OverCurrent

**OFF2**

**Possible Causes**

- Motor power (P0307) does not correspond to the inverter power (r0206)
- Motor leads are too long
- Motor lead short circuit
- Earth faults

**Diagnose & Remedy**

Check the following:

- Motor power (P0307) must correspond to inverter power (r0206)
- Cable length limits must not be exceeded
- Motor cable and motor must have no short-circuits or earth faults
- Motor parameters must match the motor in use
- Value of stator resistance (P0350) must be correct
- Motor must not be obstructed or overloaded
- Increase the ramp time
- Reduce the boost level (V/f control: P1311 & P1312, Vector control: P1610 & P1611)

#### F0002 OverVoltage

**OFF2**

**Possible Causes**

- DC-link controller disabled (P1240 = 0)
- DC-link voltage (r0026) exceeds trip level (P2172)
- Overvoltage can be caused either by too high main supply voltage or if motor is in regenerative mode. Regenerative mode can be caused by fast ramp downs or if the motor is driven from an active load.

**Diagnose & Remedy**

Check the following:

- Supply voltage (P0210) must lie within limits indicated on rating plate
- DC-link voltage controller must be enabled (P1240) and parameterized properly
- Ramp-down time (P1121) must match inertia of load
- Required braking power must lie within specified limits

**NOTE**

Higher inertia requires longer ramp times; otherwise, apply braking resistor.

<b>F0003 UnderVoltage</b>	<b>OFF2</b>
<p><b>Possible Causes</b></p> <ul style="list-style-type: none"> <li>➤ Main supply failed</li> <li>➤ Shock load outside specified limits</li> </ul> <p><b>Diagnose &amp; Remedy</b></p> <p>Check the following:</p> <ul style="list-style-type: none"> <li>➤ Supply voltage (P0210) must lie within limits indicated on rating plate</li> <li>➤ Supply must not be susceptible to temporary failures or voltage reductions</li> <li>➤ Enable kinetic buffering (P1240 = 2)</li> </ul>	
<b>F0004 Inverter Over Temperature</b>	<b>OFF2</b>
<p><b>Possible Causes</b></p> <ul style="list-style-type: none"> <li>➤ Ventilation inadequate</li> <li>➤ Ambient temperature is too high</li> </ul> <p><b>Diagnose &amp; Remedy</b></p> <p>Check the following:</p> <ul style="list-style-type: none"> <li>➤ Load conditions and duty cycle must be appropriate</li> <li>➤ Fan must turn when inverter is running</li> <li>➤ Pulse frequency (P1800) must be set to default value</li> <li>➤ Ambient temperature could be higher than specified for the inverter</li> </ul> <p>Additional meaning for MM440 Frame size FX &amp; GX:</p> <p>Fault value = 1: Rectifier overtemperature  = 2: Ambient overtemperature  = 3: EBOX overtemperature</p>	
<b>F0005 Inverter I<sup>2</sup>t</b>	<b>OFF2</b>
<p><b>Possible Causes</b></p> <ul style="list-style-type: none"> <li>➤ Inverter overloaded</li> <li>➤ Duty cycle too demanding</li> <li>➤ Motor power (P0307) exceeds inverter power capability (r0206)</li> </ul> <p><b>Diagnose &amp; Remedy</b></p> <p>Check the following:</p> <ul style="list-style-type: none"> <li>➤ Load duty cycle must lie within specified limits</li> <li>➤ Motor power (P0307) must match inverter power (r0206)</li> </ul>	
<b>F0011 Motor Over Temperature</b>	<b>OFF1</b>
<p><b>Possible Causes</b></p> <p>Motor overloaded</p> <p><b>Diagnose &amp; Remedy</b></p> <p>Check the following:</p> <ul style="list-style-type: none"> <li>➤ Load duty cycle must be correct</li> <li>➤ Motor nominal overtemperatures (P0626-P0628) must be correct</li> <li>➤ Motor temperature warning level (P0604) must match</li> </ul> <p>If P0601 = 0 or 1, check the following:</p> <ul style="list-style-type: none"> <li>➤ Check if name plate data are correct (if not perform quick commissioning)</li> <li>➤ Accurate equivalent circuit data can be found by performing motor identification (P1910=1)</li> <li>➤ Check if motor weight (P0344) is reasonable. Change if necessary</li> <li>➤ Via P0626, P0627, P0628 the standard overtemperatures can be changed, if the motor is not a Siemens standard motor</li> </ul> <p>If P0601 = 2, check the following:</p> <ul style="list-style-type: none"> <li>➤ Check if temperature shown in r0035 is reasonable</li> <li>➤ Check if the sensor is a KTY84 (other sensors are not supported)</li> </ul>	
<b>F0012 Inverter temp. signal lost</b>	<b>OFF2</b>
<p><b>Possible Causes</b></p> <p>Wire breakage of inverter temperature (heatsink) sensor</p>	
<b>F0015 Motor temperature signal lost</b>	<b>OFF2</b>
<p><b>Possible Causes</b></p> <p>Open or short circuit of motor temperature sensor. If signal loss is detected, temperature monitoring switches over to monitoring with the motor thermal model</p>	
<b>F0020 Mains Phase Missing</b>	<b>OFF2</b>
<p><b>Possible Causes</b></p> <p>Fault occurs if one of the three input phases are missed while the pulses are enabled and drive is loaded</p>	

**Diagnose & Remedy**  
 Check the input wiring of the mains phases

**F0021 Earth fault OFF2**

**Possible Causes**  
 Fault occurs if the sum of the phase currents is higher than 5 % of the nominal inverter current

**NOTE**

This fault only occurs on inverters that have 3 current sensors (Frame sizes D to F & FX, GX)

**F0022 Powerstack fault OFF2**

**Possible Causes**  
 That hardware fault (r0947 = 22 and r0949 = 1) caused by the following events:  
 (1) DC-link overcurrent = short circuit of IGBT  
 (2) Short circuit of chopper  
 (3) Earth fault  
 (4) I/O board is not properly inserted  
 > Frame sizes A to C (1),(2),(3),(4)  
 > Frame sizes D to E (1),(2),(4)  
 > Frame size F (2),(4)  
 Since all these faults are assigned to one signal on the power stack, it is not possible to establish which one actually occurred.  
 MM440 Frame size FX & GX:  
 > UCE failure was detected, when r0947 = 22 and fault value r0949 = 12 or 13 or 14, depending on UCE.  
 > I2C bus read out error, when r0947 = 22 and fault value r0949 = 21 (The power has to be switched OFF/ON).

**Diagnose & Remedy**  
 Check the I/O board. It has to be fully pressed home.

**F0023 Output fault OFF2**

**Possible Causes**  
 One motor phase is disconnected

**F0030 Fan has failed OFF2**

**Possible Causes**  
 Fan no longer working

**Diagnose & Remedy**  
 > Fault cannot be masked while options module (AOP or BOP) is connected  
 > Need a new fan

**F0035 Auto restart after n OFF2**

**Possible Causes**  
 Auto restart attempts exceed value of P1211

**F0041 Motor Data Identification Failure OFF2**

**Possible Causes**  
 Motor data identification failed.  
 Fault value = 0: Load missing  
 1: Current limit level reached during identification.  
 2: Identified stator resistance less than 0.1 % or greater than 100 %.  
 3: Identified rotor resistance less than 0.1 % or greater than 100 %.  
 4: Identified stator reactance less than 50 % and greater than 500 %  
 5: Identified main reactance less than 50 % and greater than 500 %  
 6: Identified rotor time constant less than 10 ms or greater than 5 s  
 7: Identified total leakage reactance less than 5 % and greater than 50 %  
 8: Identified stator leakage reactance less than 25 % and greater than 250 %  
 9: Identified rotor leakage inductance less than 25 % and greater than 250 %  
 20: Identified IGBT on-voltage less than 0.5 V or greater than 10 V  
 30: Current controller at voltage limit  
 40: Inconsistency of identified data set, at least one identification failed  
 Percentage values based on the impedance  $Z_b = \sqrt{3} \cdot V_{mot,nom} / I_{mot,nom}$

**Diagnose & Remedy**  
 > Fault value = 0: Check that the motor is connected to the inverter  
 > Fault value = 1-40: Check if motor data in P0304 to P0311 are correct  
 Check what type of motor wiring is required (star, delta).

<b>F0042</b>	<b>Speed Control Optimisation Failure</b>	<b>OFF2</b>
	<p><b>Possible Causes</b>  Speed control optimisation (P1960) failed  Fault value = 0: Time out waiting for stable speed  = 1: Inconsistent readings</p>	
<b>F0051</b>	<b>Parameter EEPROM Fault</b>	<b>OFF2</b>
	<p><b>Possible Causes</b>  Read or write failure while saving non-volatile parameter</p> <p><b>Diagnose &amp; Remedy</b></p> <ul style="list-style-type: none"> <li>➤ Factory Reset and new parameterization</li> <li>➤ Contact Customer Support / Service Department</li> </ul>	
<b>F0052</b>	<b>Power stack Fault</b>	<b>OFF2</b>
	<p><b>Possible Causes</b>  Read failure for power stack information or invalid data</p> <p><b>Diagnose &amp; Remedy</b>  Hardware defect, contact Customer Support / Service Department</p>	
<b>F0053</b>	<b>IO EEPROM Fault</b>	<b>OFF2</b>
	<p><b>Possible Causes</b>  Read failure for IO EEPROM information or invalid data</p> <p><b>Diagnose &amp; Remedy</b></p> <ul style="list-style-type: none"> <li>➤ Check data</li> <li>➤ Change IO board</li> </ul>	
<b>F0054</b>	<b>Wrong IO Board</b>	<b>OFF2</b>
	<p><b>Possible Causes</b></p> <ul style="list-style-type: none"> <li>➤ Wrong IO board is connected</li> <li>➤ No ID detected on IO board, no data</li> </ul> <p><b>Diagnose &amp; Remedy</b></p> <ul style="list-style-type: none"> <li>➤ Check data</li> <li>➤ Change IO board</li> </ul>	
<b>F0060</b>	<b>Asic Timeout</b>	<b>OFF2</b>
	<p><b>Possible Causes</b>  Internal communications failure</p> <p><b>Diagnose &amp; Remedy</b></p> <ul style="list-style-type: none"> <li>➤ If fault persists, change inverter</li> <li>➤ Contact Service Department</li> </ul>	
<b>F0070</b>	<b>CB setpoint fault</b>	<b>OFF2</b>
	<p><b>Possible Causes</b>  No setpoint values from CB (communication board) during telegram off time</p> <p><b>Diagnose &amp; Remedy</b>  Check CB and communication partner</p>	
<b>F0071</b>	<b>USS (BOP-link) setpoint fault</b>	<b>OFF2</b>
	<p><b>Possible Causes</b>  No setpoint values from USS during telegram off time</p> <p><b>Diagnose &amp; Remedy</b>  Check USS master</p>	
<b>F0072</b>	<b>USS (COMM link) setpoint fault</b>	<b>OFF2</b>
	<p><b>Possible Causes</b>  No setpoint values from USS during telegram off time</p> <p><b>Diagnose &amp; Remedy</b>  Check USS master</p>	

<b>F0080</b>	<b>ADC lost input signal</b>	<b>OFF2</b>
	<b>Possible Causes</b> > Broken wire > Signal out of limits	
<b>F0085</b>	<b>External Fault</b>	<b>OFF2</b>
	<b>Possible Causes</b> External fault triggered via for example terminal inputs <b>Diagnose &amp; Remedy</b> Disable for example terminal input for fault trigger	
<b>F0090</b>	<b>Encoder feedback loss</b>	<b>OFF2</b>
	<b>Possible Causes</b> Signal from Encoder lost <b>Diagnose &amp; Remedy</b> > Check encoder fitted. If encoder not fitted, set P0400 = 0 and select SLVC mode (P1300 = 20 or 22) > If encoder fitted, check correct encoder selected (check encoder set-up in P0400). > Check connections between encoder and inverter > Check encoder not faulty (select P1300 = 0, run at fixed speed, check encoder feedback signal in r0061) > Increase encoder loss threshold in P0492	
<b>F0101</b>	<b>Stack Overflow</b>	<b>OFF2</b>
	<b>Possible Causes</b> Software error or processor failure <b>Diagnose &amp; Remedy</b> Run self test routines	
<b>F0221</b>	<b>PID Feedback below min. value</b>	<b>OFF2</b>
	<b>Possible Causes</b> PID Feedback below min. value P2268 <b>Diagnose &amp; Remedy</b> > Change value of P2268 > Adjust feedback gain	
<b>F0222</b>	<b>PID Feedback above max. value</b>	<b>OFF2</b>
	<b>Possible Causes</b> PID feedback above max. value P2267 <b>Diagnose &amp; Remedy</b> > Change value of P2267 > Adjust feedback gain	
<b>F0450</b>	<b>BIST Tests Failure</b>	<b>OFF2</b>
	<b>Possible Causes</b> Fault value = 1: Some power section tests have failed 2: Some control board tests have failed 4: Some functional tests have failed 8: Some IO board tests have failed (MM 420 only) 16: Internal RAM failed on power-up check <b>Diagnose &amp; Remedy</b> Hardware defect, contact Customer Support / Service Department	

**F0452 Belt Failure Detected****OFF2****Possible Causes**

Load conditions on motor indicate belt failure or mechanical fault.

**Diagnose & Remedy**

Check the following:

1. No breakage, seizure or obstruction of drive train.
2. If using an external speed sensor, check for correct function. Check parameters:
  - P2192 (delay time for permitted deviation)
3. If using the torque envelope, check parameters:
  - P2182 (threshold frequency f1)
  - P2183 (threshold frequency f2)
  - P2184 (threshold frequency f3)
  - P2185 (upper torque threshold 1)
  - P2186 (lower torque threshold 1)
  - P2187 (upper torque threshold 2)
  - P2188 (lower torque threshold 2)
  - P2189 (upper torque threshold 3)
  - P2190 (lower torque threshold 3)
  - P2192 (delay time for permitted deviation)

**3.2 Alarm messages**

Alarm messages are stored in parameter r2110 under their code number (e.g. A0503 = 503) and can be read out from there.

**A0501 Current Limit****Possible Causes**

- Motor power (P0307) does not correspond to the inverter power (P0206)
- Motor leads are too long
- Earth faults

**Diagnose & Remedy**

Check the following:

- Motor power (P0307) must correspond to inverter power (r0206)
- Cable length limits must not be exceeded
- Motor cable and motor must have no short-circuits or earth faults
- Motor parameters must match the motor in use
- Value of stator resistance (P0350) must be correct
- Motor must not be obstructed or overloaded
- Increase the ramp-up-time.
- Reduce the boost level (V/f control: P1311 & P1312, Vector control: P1610 & P1611)

**A0502 Overvoltage limit****Possible Causes**

- Overvoltage limit is reached
- This warning can occur during ramp down, if the dc-link controller is disabled (P1240 = 0)

**Diagnose & Remedy**

Check the following:

- Supply voltage (P0210) must lie within limits indicated on rating plate
- DC-link voltage controller must be enabled (P1240) and parameterized properly
- Ramp-down time (P1121) must match inertia of load
- Required braking power must lie within specified limits

**A0503 UnderVoltage Limit****Possible Causes**

- Main supply failed
- Main supply (P0210) and consequently DC-link voltage (r0026) below specified limit (P2172)

**Diagnose & Remedy**

- Supply voltage (P0210) must lie within limits indicated on rating plate
- Supply must not be susceptible to temporary failures or voltage reductions
- Enable kinetic buffering (P1240 = 2)

**A0504 Inverter OverTemperature****Possible Causes**

Warning level of inverter heat-sink temperature (P0614) is exceeded, resulting in pulse frequency reduction and/or output frequency reduction (depending on parameterization in P0610)

**Diagnose & Remedy**

Check the following:

- Load conditions and duty cycle must be appropriate
- Fan must turn when inverter is running
- Pulse frequency (P1800) must be set to default value
- Ambient temperature could be higher than specified for the inverter

**A0505 Inverter I<sup>2</sup>t****Possible Causes**

Warning level (P0294) exceeded, output frequency and/or pulse frequency will be reduced if parameterized (P0290)

**Diagnose & Remedy**

Check the following:

- Load duty cycle must lie within specified limits
- Motor power (P0307) must match inverter power (r0206)

**A0511 Motor OverTemperature****Possible Causes**

- Motor overloaded
- Load duty cycle too high

**Diagnose & Remedy**

Independently of the kind of temperature determination check the following:

- Load duty cycle must be correct
- Motor nominal overtemperatures (P0626-P0628) must be correct
- Motor temperature warning level (P0604) must match

If P0601 = 0 or 1, check the following:

- Check if name plate data are correct (if not perform quick commissioning)
- Accurate equivalent circuit data can be found by performing motor identification (P1910=1)
- Check if motor weight (P0344) is reasonable. Change if necessary
- Via P0626, P0627, P0628 the standard overtemperatures can be changed, if the motor is not a Siemens standard motor

If P0601 = 2, check the following:

- Check if temperature shown in r0035 is reasonable
- Check if the sensor is a KTY84 (other sensors are not supported)

**A0522 I2C read out timeout****Possible Causes**

The cyclic access to the UCE Values and powerstack temperatures via the I2C bus (MM440 Frame size FX & GX) is disturbed

**A0523 Output fault****Possible Causes**

One motor phase is disconnected

**A0535 Braking Resistor Hot****Diagnose & Remedy**

- Increase duty cycle P1237
- Increase ramp down time P1121

**A0541 Motor Data Identification Active****Possible Causes**

Motor data identification (P1910) selected or running

**A0542 Speed Control Optimisation Active****Possible Causes**

Speed Control Optimisation (P1960) is selected or running



**A0590 Encoder feedback loss warning****Possible Causes**

Signal from Encoder lost and Inverter has switched to sensorless vector control

**Diagnose & Remedy**

Stop inverter and then

- Check encoder fitted. If encoder not fitted, set P0400 = 0 and select SLVC mode (P1300 = 20 or 22)
- If encoder fitted, check correct encoder selected (check encoder set-up in P0400).
- Check connections between encoder and inverter
- Check encoder not faulty (select P1300 = 0, run at fixed speed, check encoder feedback signal in r0061)
- Increase encoder loss threshold in P0492

**A0600 RTOS Overrun Warning****A0700 CB warning 1****Possible Causes**

CB (communication board) specific

**Diagnose & Remedy**

See CB user manual

**A0701 CB warning 2****Possible Causes**

CB (communication board) specific

**Diagnose & Remedy**

See CB user manual

**A0702 CB warning 3****Possible Causes**

CB (communication board) specific

**Diagnose & Remedy**

See CB user manual

**A0703 CB warning 4****Possible Causes**

CB (communication board) specific

**Diagnose & Remedy**

See CB user manual

**A0704 CB warning 5****Possible Causes**

CB (communication board) specific

**Diagnose & Remedy**

See CB user manual

**A0705 CB warning 6****Possible Causes**

CB (communication board) specific

**Diagnose & Remedy**

See CB user manual

**A0706 CB warning 7****Possible Causes**

CB (communication board) specific

**Diagnose & Remedy**

See CB user manual

**A0707 CB warning 8****Possible Causes**

CB (communication board) specific

**Diagnose & Remedy**

See CB user manual

**A0708 CB warning 9****Possible Causes**

CB (communication board) specific

**Diagnose & Remedy**

See CB user manual

**A0709 CB warning 10****Possible Causes**

CB (communication board) specific

**Diagnose & Remedy**

See CB user manual

**A0710 CB communication error****Possible Causes**

Communication with CB (communication board) is lost

**Diagnose & Remedy**

Check CB hardware

**A0711 CB configuration error****Possible Causes**

CB (communication board) reports a configuration error.

**Diagnose & Remedy**

Check CB parameters

**A0910 Vdc-max controller de-activated****Possible Causes**

Vdc max controller has been de-activated, since controller is not capable of keeping DC-link voltage (r0026) within limits (P2172).

- Occurs if main supply voltage (P0210) is permanently too high
- Occurs if motor is driven by an active load, causing motor to go into regenerative mode
- Occurs at very high load inertias, when ramping down

**Diagnose & Remedy**

Check the following:

- Input voltage (P0210) must lie within range
- Load must be match

**A0911 Vdc-max controller active****Possible Causes**

Vdc max controller is active; so ramp-down times will be increased automatically to keep DC-link voltage (r0026) within limits (P2172).

**A0912 Vdc-min controller active****Possible Causes**

Vdc min controller will be activated if DC-link voltage (r0026) falls below minimum level (P2172).

The kinetic energy of the motor is used to buffer the DC-link voltage, thus causing deceleration of the drive! So short mains failures do not necessarily lead to an undervoltage trip.

**A0920 ADC parameters not set properly****Possible Causes**

ADC parameters should not be set to identical values, since this would produce illogical results.

Fault value = 0: Parameter settings for output identical

1: Parameter settings for input identical

2: Parameter settings for input do not correspond to ADC type

**A0921 DAC parameters not set properly****Possible Causes**

DAC parameters should not be set to identical values, since this would produce illogical results.

Fault value = 0: Parameter settings for output identical

1: Parameter settings for input identical

2: Parameter settings for output do not correspond to DAC type

**A0922 No load applied to inverter****Possible Causes**

No Load is applied to the inverter.

As a result, some functions may not work as under normal load conditions.

**A0923 Both JOG Left and JOG Right are requested****Possible Causes**

Both JOG right and JOG left (P1055/P1056) have been requested. This freezes the RFG output frequency at its current value.

**A0936 PID Autotuning Active****Possible Causes**

PID Autotuning (P2350) selected or running

**A0952 Belt Failure Warning****Possible Causes**

Load conditions on motor indicate belt failure or mechanical fault.

**Diagnose & Remedy**

Check the following:

1. No breakage, seizure or obstruction of drive train.
2. If using an external speed sensor, check for correct function. Check parameters:
  - P2192 (delay time for permitted deviation)
3. If using the torque envelope, check parameters:
  - P2182 (threshold frequency f1)
  - P2183 (threshold frequency f2)
  - P2184 (threshold frequency f3)
  - P2185 (upper torque threshold 1)
  - P2186 (lower torque threshold 1)
  - P2187 (upper torque threshold 2)
  - P2188 (lower torque threshold 2)
  - P2189 (upper torque threshold 3)
  - P2190 (lower torque threshold 3)
  - P2192 (delay time for permitted deviation)



**Suggestions and/or Corrections**

To  
Siemens AG  
Automation & Drives Group  
SD VM 4  
P.O. Box 3269

D-91050 Erlangen  
Federal Republic of Germany

[Suggestions for technical documentation](#)

**Suggestions  
Corrections**

For Publication/Manual:  
COMBIMASTER 411 & MICROMASTER  
411  
Parameter List

**User Documentation**

**From**

Name:

Company/Service Department

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ / \_\_\_\_\_

Fax: \_\_\_\_\_ / \_\_\_\_\_

Order number: 6SE6400-5CE00-0BP0

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Should you come across any printing errors when reading this publication, please notify us on this sheet.

Suggestions for improvement are also welcome.





Siemens AG  
Automation and Drives Group (A&D)  
Standard Drives (SD) Division  
Postfach 3269, D-91050 Erlangen  
Federal Republic of Germany

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