SIEMENS

MICROMASTER 420

Parameter List Issue 10/06



User Documentation
6SE6400-5BA00-0BP0

Available Documentation for the MICROMASTER 420

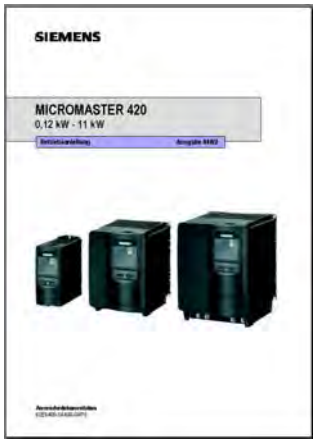
Getting Started Guide

Is for quick commissioning with SDP and BOP.



Operating Instructions

Gives information about features of the MICROMASTER 420, Installation, Commissioning, Control modes, System Parameter structure, Troubleshooting, Specifications and available options of the MICROMASTER 420.



Parameter List

The Parameter List 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.



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MICROMASTER 420

Parameter List
User Documentation

Block Diagram and Terminals

Parameter List

Function Diagrams

Faults and Alarms

Abbreviations

Valid for	Issue 10/06
Inverter Type	*Software Version*
MICROMASTER 420	V1.2

Issue 10/06



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. 6SE6400-5AB00-1AP0.

Information about MICROMASTER 420 is also available from:

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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 420

This Parameter List must only be used together with the Operating Instructions of the MICROMASTER 420. Please pay special attention to the Warnings, Cautions, Notices and Notes contained in these manuals.

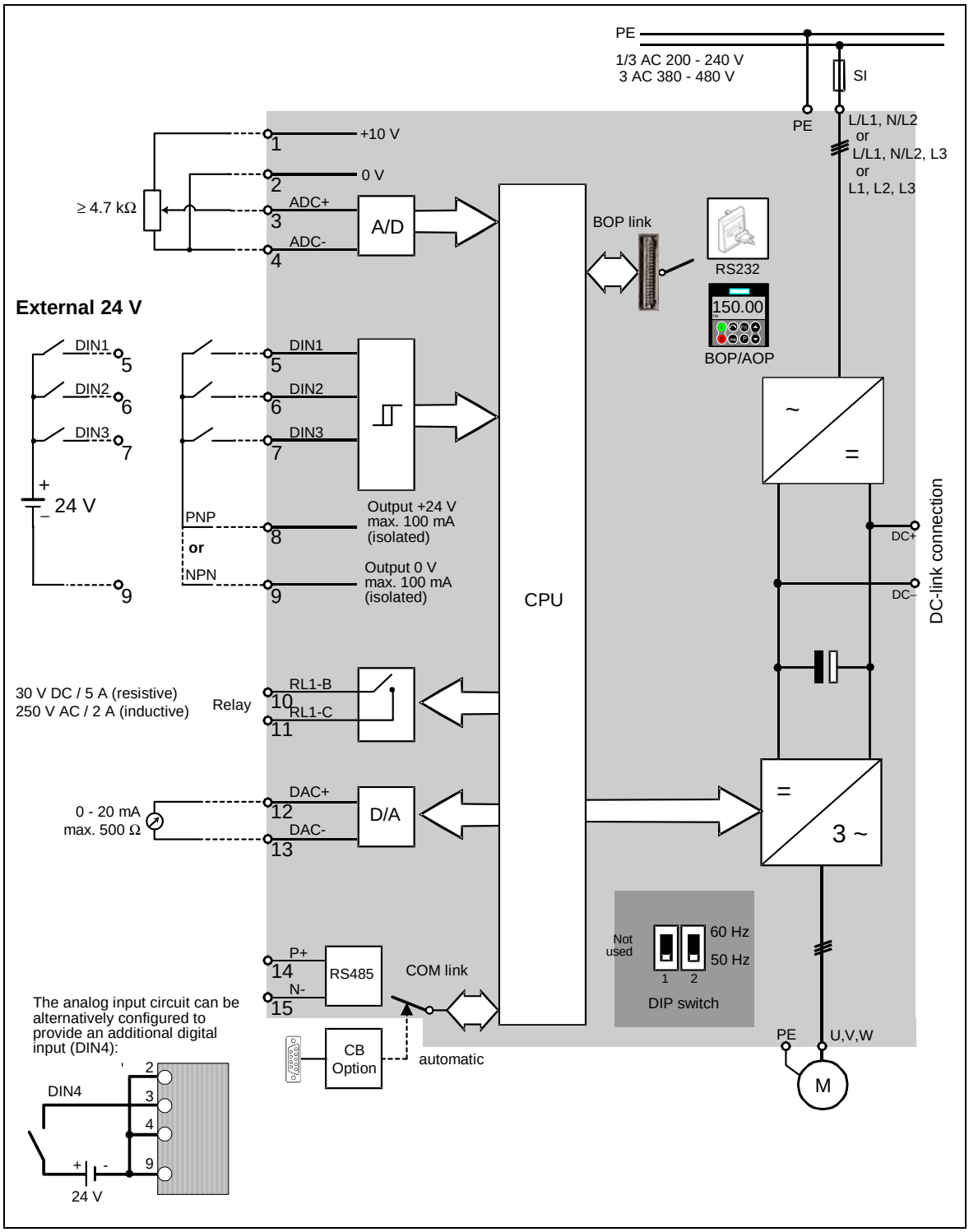
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1 Block Diagram and Terminals

1.1 Block Diagram



1.2 Power Terminals

You can gain access to the mains and motor terminals by removing the front covers.

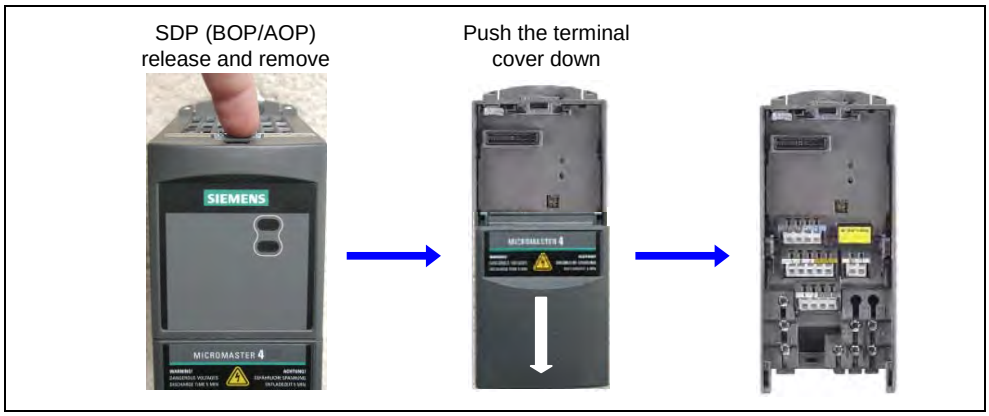


Fig. 1-1 Removing Front Covers

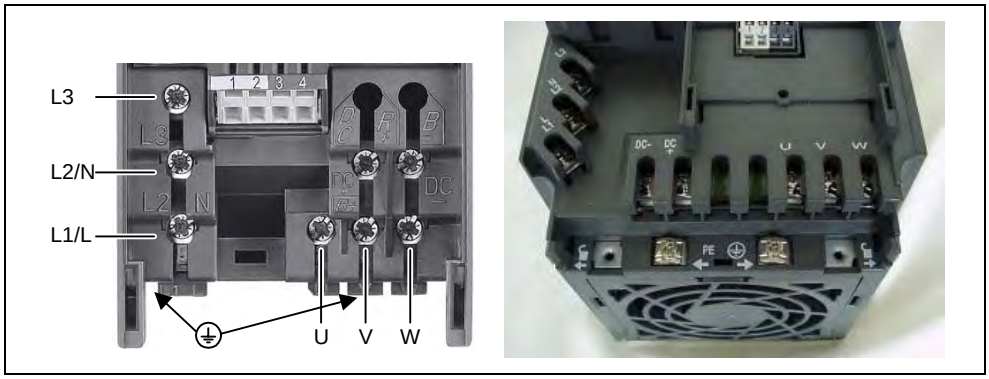
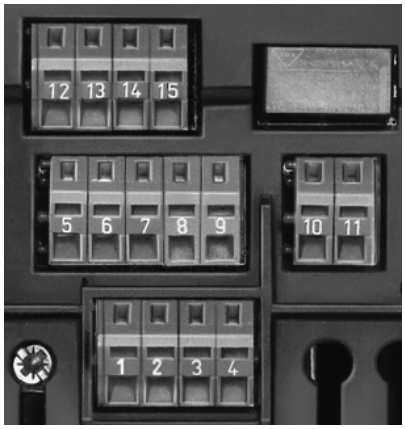


Fig. 1-2 Power Terminals

1.3 Control Terminals

Terminal	Designation	Function
1	-	Output +10 V
2	-	Output 0 V
3	ADC+	Analog input (+)
4	ADC-	Analog input (-)
5	DIN1	Digital input 1
6	DIN2	Digital input 2
7	DIN3	Digital input 3
8	-	Isolated output +24 V / max. 100 mA
9	-	Isolated output 0 V / max. 100 mA
10	RL1-B	Digital output / NO contact
11	RL1-C	Digital output / Changeover contact
12	DAC+	Analog output (+)
13	DAC-	Analog output (-)
14	P+	RS485 port
15	N-	RS485 port



2 Parameters

2.1 Introduction to MICROMASTER System Parameters

The layout of the parameter description is as follows.

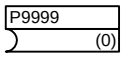
1 Par number [index]	**2 Parameter name**			**9 Min:**	12 Level: **2**
	3 CStat:	**5 Datatype**	**7 Unit:**	**10 Def:**	
	4 P-Group:	**6 active:**	**8 Quick Comm:**	**11 Max:**	
	13	Description:			

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.

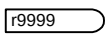
   [index] indicates that the parameter is an indexed parameter and specifies the number of indices available.

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.

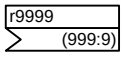
   These abbreviations have the following meanings:

   BI = 

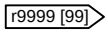
   Binector input, i.e. parameter selects the source of a binary signal

   BO = 

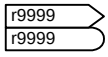
   Binector output, i.e. parameter connects as a binary signal

   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.

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

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. Level 4 parameters are only for service purposes and not visible with BOP/AOP. 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.

Description:	Brief explanation of the parameter function.
Diagram:	Where applicable, diagram to illustrate the effects of parameters on a characteristic curve, for example
Settings:	List of applicable settings. These include Possible settings, Most common settings, Index and Bitfields
Example:	Optional example of the effects of a particular parameter setting.
Dependency:	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.
Warning / Caution / Notice / Note:	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
More details:	Any sources of more detailed information concerning the particular parameter.

Operators

The following operators are used in the parameter list to represent mathematical interrelationships:

Arithmetic operators

+	Addition
-	Subtraction
*	Multiplication
/	Division

Comparison operators

>	Greater than
>=	Greater than / equal to
<	Less than
<=	Less than / equal to

Equivalence operators

==	Equal to
!=	Not equal to

Logical operators

&&	AND logic operation
||	OR logic operation

2.2 Quick commissioning (P0010 = 1)

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

Quick commissioning (P0010 = 1)

Par.-No.	Name	Access level	Cstat
P0100	Europe / North America	1	C
P0300	Select motor type	2	C
P0304	Motor voltage rating	1	C
P0305	Motor current rating	1	C
P0307	Motor power rating	1	C
P0308	Motor cosPhi rating	1	C
P0309	Motor efficiency rating	1	C
P0310	Motor frequency rating	1	C
P0311	Motor speed rating	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:

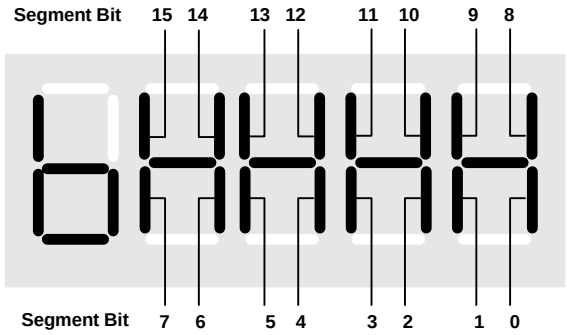
Set P0010 = 30

Set P0970 = 1

Note
The reset process takes approximately 10 seconds to complete.

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.

2.3 Binector Input Parameters

ParNo	Parameter name
P0731	BI: Function of digital output 1
P0800	BI: Download parameter set 0
P0801	BI: Download parameter set 1
P0810	BI: CDS bit 0 (Local / Remote)
P0840	BI: ON/OFF1
P0842	BI: ON reverse/OFF1
P0844	BI: 1. OFF2
P0845	BI: 2. OFF2
P0848	BI: 1. OFF3
P0849	BI: 2. OFF3
P0852	BI: Pulse enable
P1020	BI: Fixed freq. selection Bit 0
P1021	BI: Fixed freq. selection Bit 1
P1022	BI: Fixed freq. selection Bit 2
P1035	BI: Enable MOP (UP-command)
P1036	BI: Enable MOP (DOWN-command)
P1055	BI: Enable JOG right
P1056	BI: Enable JOG left

ParNo	Parameter name
P1074	BI: Disable additional setpoint
P1110	BI: Inhibit neg. freq. setpoint
P1113	BI: Reverse
P1124	BI: Enable JOG ramp times
P1140	BI: RFG enable
P1141	BI: RFG start
P1142	BI: RFG enable setpoint
P1230	BI: Enable DC braking
P2103	BI: 1. Faults acknowledgement
P2104	BI: 2. Faults acknowledgement
P2106	BI: External fault
P2200	BI: Enable PID controller
P2220	BI: Fixed PID setp. select Bit 0
P2221	BI: Fixed PID setp. select Bit 1
P2222	BI: Fixed PID setp. select Bit 2
P2235	BI: Enable PID-MOP (UP-cmd)
P2236	BI: Enable PID-MOP (DOWN-cmd)

2.4 Connector Input Parameters

ParNo	Parameter name
P0771	CI: DAC
P1070	CI: Main setpoint
P1071	CI: Main setpoint scaling
P1075	CI: Additional setpoint
P1076	CI: Additional setpoint scaling
P2016[4]	CI: PZD to BOP link (USS)

ParNo	Parameter name
P2019[4]	CI: PZD to COM link (USS)
P2051[4]	CI: PZD to CB
P2253	CI: PID setpoint
P2254	CI: PID trim source
P2264	CI: PID feedback

2.5 Binector Output Parameters

ParNo	Parameter name
r2032	BO: CtrlWrd1 from BOP link (USS)
r2033	BO: CtrlWrd2 from BOP link (USS)
r2036	BO: CtrlWrd1 from COM link (USS)

ParNo	Parameter name
r2037	BO: CtrlWrd2 from COM link (USS)
r2090	BO: Control word 1 from CB
r2091	BO: Control word 2 from CB

2.6 Connector Output Parameters

ParNo	Parameter name
r0020	CO: Freq. setpoint before RFG
r0021	CO: Act. frequency
r0024	CO: Act. output frequency
r0025	CO: Act. output voltage
r0026	CO: Act. DC-link voltage
r0027	CO: Act. output current
r0034	CO: Motor temperature (i2t)
r0036	CO:Inverter overload utilization
r0037	CO: Inverter temperature [°C]
r0039	CO: Energy consumpt. meter [kWh]
r0067	CO: Act. output current limit
r0071	CO: Max. output voltage
r0078	CO: Act. current Isq
r0084	CO: Act. air gap flux
r0086	CO: Act. active current
r0395	CO: Total stator resistance [%]
r0755	CO: Act. ADC after scal. [4000h]
r0947[8]	CO: Last fault code
r0948[12]	CO: Fault time
r0949[8]	CO: Fault value
r1024	CO: Act. fixed frequency
r1050	CO: Act. Output freq. of the MOP
r1078	CO: Total frequency setpoint

ParNo	Parameter name
r1079	CO: Selected frequency setpoint
r1114	CO: Freq. setp. after dir. ctrl.
r1119	CO: Freq. setpoint before RFG
r1170	CO: Frequency setpoint after RFG
r1242	CO: Switch-on level of Vdc-max
r1315	CO: Total boost voltage
r1337	CO: V/f slip frequency
r1343	CO: Imax controller freq. output
r1344	CO: Imax controller volt. output
r1801	CO: Act. pulse frequency
r2015[4]	CO: PZD from BOP link (USS)
r2018[4]	CO: PZD from COM link (USS)
r2050[4]	CO: PZD from CB
r2110[4]	CO: Warning number
r2224	CO: Act. fixed PID setpoint
r2250	CO: Output setpoint of PID-MOP
r2260	CO: PID setpoint after PID-RFG
r2262	CO: Filtered PID setp. after RFG
r2266	CO: PID filtered feedback
r2272	CO: PID scaled feedback
r2273	CO: PID error
r2294	CO: Act. PID output

2.7 Connector/Binector Output Parameters

ParNo	Parameter name
r0019	CO/BO: BOP control word
r0052	CO/BO: Act. status word 1
r0053	CO/BO: Act. status word 2
r0054	CO/BO: Act. control word 1
r0055	CO/BO: Act. control word 2
r0056	CO/BO: Status of motor control

ParNo	Parameter name
r0722	CO/BO: Binary input values
r0747	CO/BO: State of digital outputs
r0751	CO/BO: Status word of ADC
r0785	CO/BO: Status word of DAC
r1204	CO/BO: Status word:Flying start
r2197	CO/BO: Monitoring word 1

3 Parameter Description

Note

Level 4 Parameters are not visible with BOP or AOP. They are only for service purposes.

3.1 Common parameters

r0000 **Drive display** Level **1**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: ALWAYS

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).

r0002 **Drive state** Level **2**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMMANDS

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.

P0003 **User access level** Level **1**

CStat: CUT **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 1 **Max:** 4

P-Group: ALWAYS **Active:** first confirm **QuickComm.:** No

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.

P0004 **Parameter filter** Level **1**

CStat: CUT **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 0 **Max:** 22

P-Group: ALWAYS **Active:** first confirm **QuickComm.:** No

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 and DAC
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:

The parameters are sub-divided into groups (P-Group) according to their functionality. This increases the transparency and allows a parameter to be quickly searched for. Furthermore, parameter P0004 can be used to control the ability to be visualized for the operator panel.

Value	P-Group	Group	Parameter area
0	ALWAYS	All parameters	
2	INVERTER	Drive inverter parameters	0200 0299
3	MOTOR	Motor parameters	0300 ... 0399 + 0600 0699
7	COMMANDS	Control commands, digital I/O	0700 .... 0749 + 0800 ... 0899
8	TERMINAL	Analog inputs/outputs	0750 0799
10	SETPOINT	Setpoint channel and ramp-function gen.	1000 1199
12	FUNC	Drive inverter functions	1200 1299
13	CONTROL	Motor open-loop/closed-loop control	1300 1799
20	COMM	Communications	2000 2099
21	ALARMS	Faults, warnings, monitoring functions	2100 2199
22	TECH	Technological controller (PID controller)	2200 2399

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

P0005 Display selection

Level **2**

CStat: CUT **Datatype:** U16 **Unit:** - **Min:** 2
P-Group: FUNC **Active:** first confirm **QuickComm.:** No **Def:** 21
Max: 4000

Selects display for parameter r0000 (drive display).

Common Settings:

21 Actual frequency
25 Output voltage
26 DC link voltage
27 Output current

Notice:

These settings refer to read only parameter numbers ("rxxxx").

Details:

See relevant "rxxxx" parameter descriptions.

P0006 Display mode

Level **3**

CStat: CUT **Datatype:** U16 **Unit:** - **Min:** 0
P-Group: FUNC **Active:** first confirm **QuickComm.:** No **Def:** 2
Max: 4

Defines mode of display for r0000 (drive display).

Possible Settings:

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

Note:

- 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.

P0007 Backlight delay time

Level **3**

CStat: CUT **Datatype:** U16 **Unit:** - **Min:** 0
P-Group: FUNC **Active:** first confirm **QuickComm.:** No **Def:** 0
Max: 2000

Defines time period after which the backlight display turns off if no operator keys have been pressed.

Value:

P0007 = 0:
Backlight always on (default state).

P0007 = 1 - 2000:
Number of seconds after which the backlight will turn off.

P0010 **Commissioning parameter** Level **1**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	ALWAYS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	30

Filters parameters so that only those related to a particular functional group are selected.

Possible Settings:

0 Ready
1 Quick commissioning
2 Inverter
29 Download
30 Factory setting

Dependency:

- Reset to 0 for inverter to run.
- P0003 (user access level) also determines access to parameters.

Note:

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 and P3900 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.

P0011 **Lock for user defined parameter** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	FUNC	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	65535

Details:

See parameter P0013 (user defined parameter)

P0012 **Key for user defined parameter** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	FUNC	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	65535

Details:

See parameter P0013 (user defined parameter).

P0013[20] **User defined parameter** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	FUNC	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	65535

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

Instructions for use:

1. Set P0003 = 3 (expert user)
2. Go to P0013 indices 0 to 16 (user list)
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)
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.

P0014[3] Store mode

						Level
CStat:	UT	**Datatype:** U16	**Unit:** -	**Min:**	0	**3**
P-Group:	-	**Active:** first confirm	**QuickComm.:** No	**Def:**	0	
				Max:	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

3.2 Diagnosis parameters

r0018 **Firmware version** Level **1**

Datatype: Float **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: INVERTER

Displays version number of installed firmware.

r0019 **CO/BO: BOP control word** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMMANDS

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.

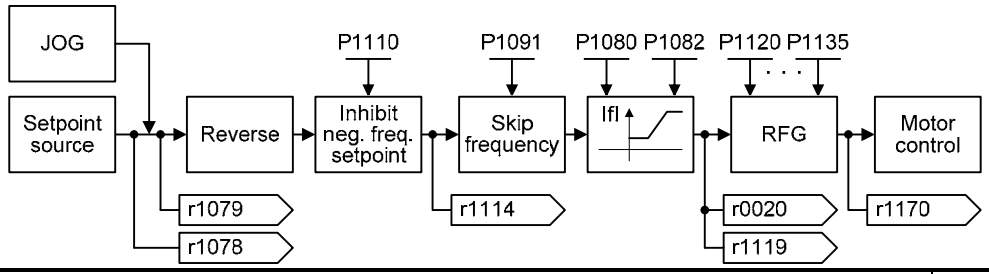
The following functions can be "connected" to individual buttons:
- ON/OFF1,
- OFF2,
- JOG,
- REVERSE,
- INCREASE,
- DECREASE

r0020 **CO: Freq. setpoint before RFG** Level **3**

Datatype: Float **Unit:** Hz **Min:** - **Def:** - **Max:** -

P-Group: CONTROL

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



r0021 **CO: Act. frequency** Level **2**

Datatype: Float **Unit:** Hz **Min:** - **Def:** - **Max:** -

P-Group: CONTROL

Displays actual inverter output frequency (r0021) excluding slip compensation, resonance damping and frequency limitation.

r0022 **Act. rotor speed** Level **3**

Datatype: Float **Unit:** 1/min **Min:** - **Def:** - **Max:** -

P-Group: CONTROL

Displays calculated rotor speed based on inverter output frequency [Hz] x 120 / number of poles.

$$r0022\,[1/min] = r0021[Hz] \cdot \frac{60}{r0313}$$

Note:

This calculation makes no allowance for load-dependent slip.

r0024 **CO: Act. Inv. output frequency** Level **3**

Datatype: Float **Unit:** Hz **Min:** - **Def:** - **Max:** -

P-Group: CONTROL

Displays actual output frequency. Slip compensation, resonance damping and frequency limitation are included.

r0025 **CO: Act. output voltage** Level **2**

Datatype: Float **Unit:** V **Min:** - **Def:** - **Max:** -

P-Group: CONTROL

Displays [rms] voltage applied to motor.

r0026 **CO: Act. DC-link volt.** Level **2**

Datatype: Float **Unit:** V **Min:** - **Def:** - **Max:** -

P-Group: INVERTER

Displays DC-link voltage.

		Mains	
		200 - 240 V	380 - 480 V
$U_{DC_max_trip}$	F0002	410 V	820 V
$U_{DC_min_trip}$	F0003	205 V	410 V
$U_{DC_max_warn}$ $U_{DC_max_ctrl}$	A0502 (P1240)	r1242	
U_{DC_Comp}	(P1236)	0.98 · r1242	

r0027 **CO: Act. output current** Level **2**

Datatype: Float **Unit:** A **Min:** - **Def:** - **Max:** -

P-Group: CONTROL

Displays [rms] value of motor current [A].

r0034 **CO: Motor temperature (i2t)** Level **2**

Datatype: Float **Unit:** % **Min:** - **Def:** - **Max:** -

P-Group: MOTOR

Displays calculated motor temperature (I2t model) as [%] of the maximum permissible value.

Note:

The maximum permissible operating temperature (i2t) of the motor is given, if the parameter r0034 has reached the value of P0614. In this case, the motor will attempt to reduce the motor loading as defined in P0610 (motor I2t temperature reaction).

r0036 **CO:Inverter overload utilization** Level **4**

Datatype: Float **Unit:** % **Min:** - **Def:** - **Max:** -

P-Group: INVERTER

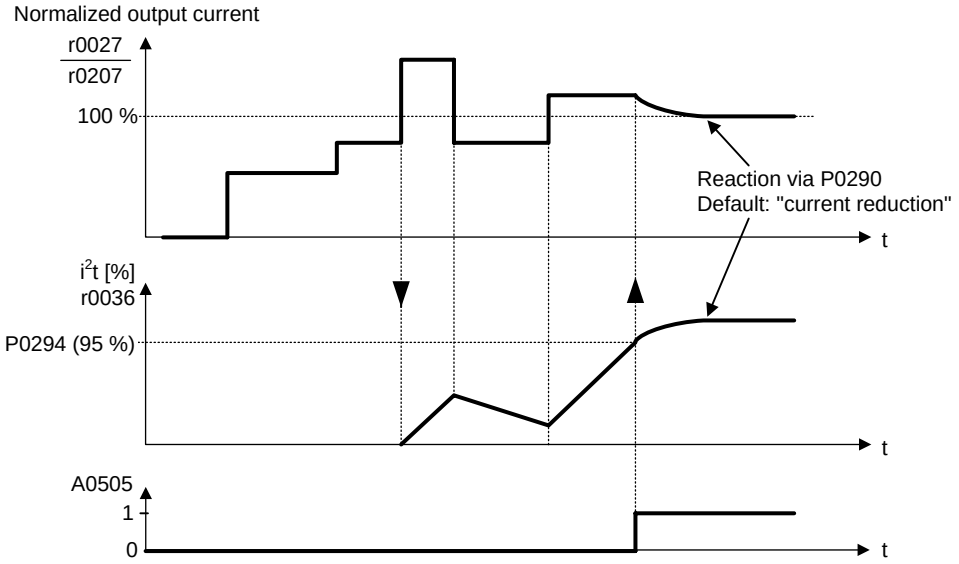
Displays inverter overload utilization calculated via I2t model.

The actual I2t value relative to the max. possible I2t value supplies utilization in [%].

If the current exceeds the threshold for P0294 (inverter I2t overload warning), alarm A0505 (inverter I2t) 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.

Example:



Dependency:

r0036 > 0:
If the nominal current of the inverter is exceeded, utilization will be displayed. Otherwise, 0 % utilization is displayed.

r0037 **CO: Inverter temperature [°C]** Level **3**

Datatype: Float **Unit:** °C **Min:** - **Def:** - **Max:** -

P-Group: INVERTER

Displays internal inverter heatsink temperature.

r0039 **CO: Energy consumpt. meter [kWh]** Level **2**

Datatype: Float **Unit:** kWh **Min:** - **Def:** - **Max:** -

P-Group: INVERTER

Displays electrical energy used by inverter since display was last reset (see P0040 - reset energy consumption meter).

$$r0039 = \int_0^{t_{act}} P_W \cdot dt = \int_0^{t_{act}} \sqrt{3} \cdot u \cdot i \cdot \cos\varphi \cdot dt$$

Dependency:

Value is reset when P0040 = 1 (reset energy consumption meter).

P0040 **Reset energy consumption meter** Level **2**

CStat: CT **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 0 **Max:** 1

P-Group: INVERTER **Active:** first confirm **QuickComm.:** No

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.

r0052	**CO/BO: Act. status word 1**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**2**
	P-Group: COMMANDS			**Max:** -	

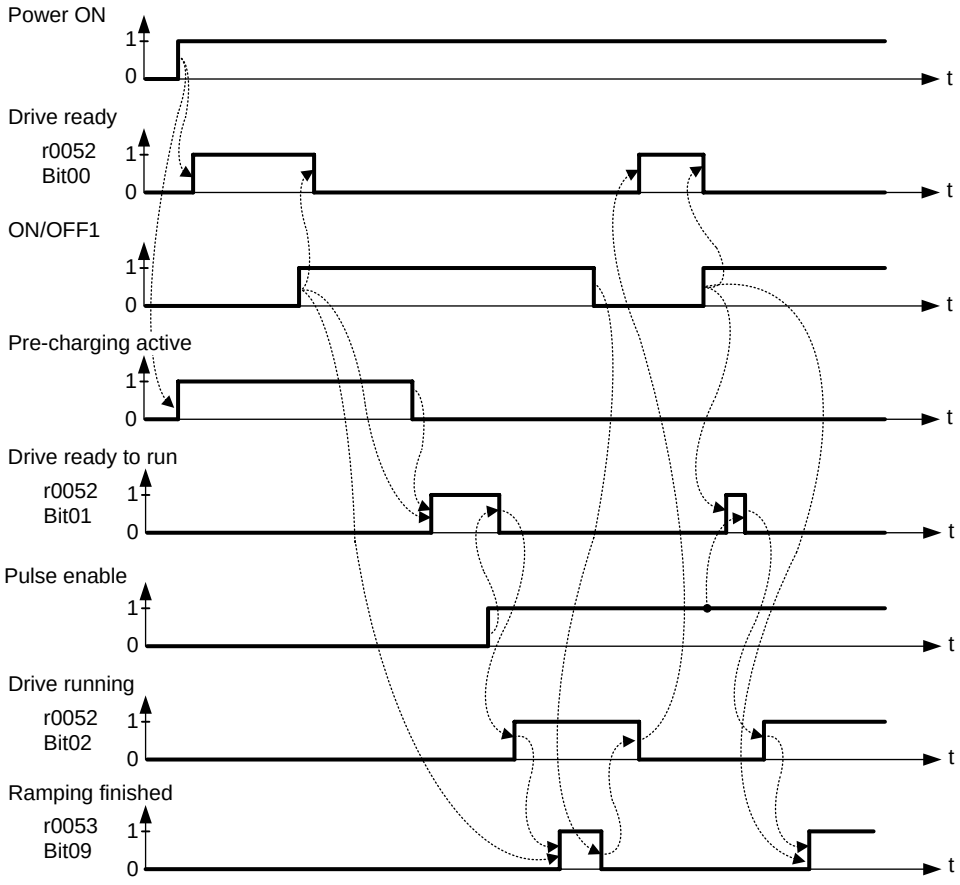
Displays first active status word of inverter (bit format) and can be used to diagnose inverter status.

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

Dependency:

r0052 Bit00 - Bit02:
State-sequence diagram after Power On or ON/OFF1 respectively: ==> see below



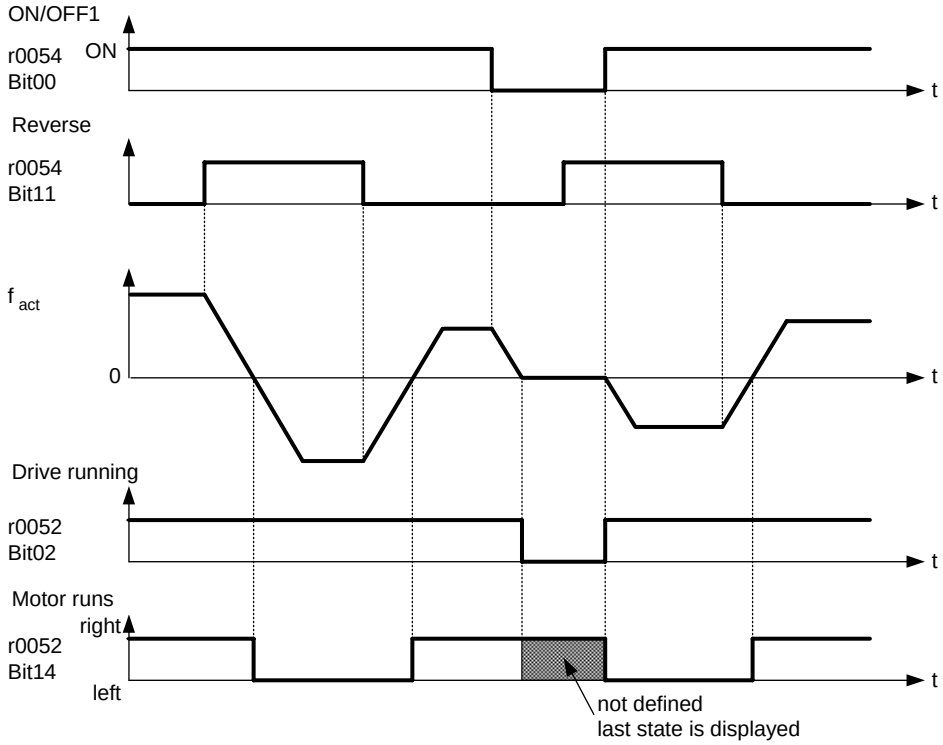
r0052 Bit03 "Drive fault active":
Output of Bit3 (Fault) will be inverted on digital output (Low = Fault, High = No Fault).

r0052 Bit08 "Deviation setpoint / act. value" ==> see parameter P2164

r0052 Bit10 "f_act >= P1082 (f_max)" ==> see parameter P1082

r0052 Bit12 "Motor holding brake active" ==> see parameter P1215

r0052 Bit14 "Motor runs right" ==> see below



Details:

The 7-segment display of the bit-parameters (binary parameters) is explained in the Introduction of the Parameter List.

r0053 CO/BO: Act. status word 2

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

Level **2**

P-Group: COMMANDS

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

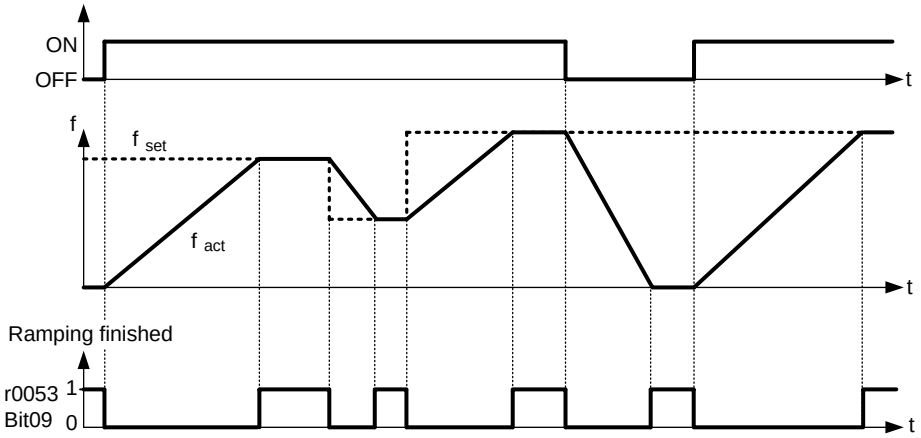
Bitfields:

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

Note:

- r0053 Bit00 ==> see parameter P1233
- r0053 Bit01 ==> see parameter P2167
- r0053 Bit02 ==> see parameter P1080
- r0053 Bit03 ==> see parameter P2170
- r0053 Bit04 ==> see parameter P2155
- r0053 Bit05 ==> see parameter P2155
- r0053 Bit06 ==> see parameter P2150
- r0053 Bit07 ==> see parameter P2172
- r0053 Bit08 ==> see parameter P2172

r0053 Bit09 "Ramping finished" ==> see below



Details:

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

r0054 CO/BO: Act. control word 1

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** - Level **3**

P-Group: COMMANDS

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	Pulses enabled	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.

r0055 CO/BO: Act. control word 2

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** - Level **3**

P-Group: COMMANDS

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

Details:

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

r0056 **CO/BO: Status of motor control** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: CONTROL

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 selected	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
Bit15	KIB (Vdc-min control) active	0	NO	1	YES

Details:

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

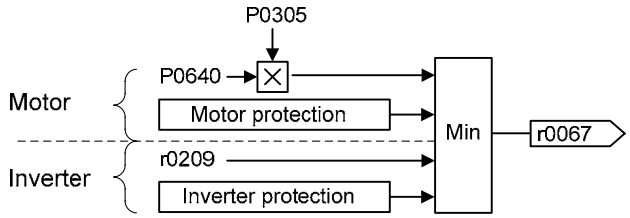
r0067 **CO: Act. output current limit** Level **3**

Datatype: Float **Unit:** A **Min:** - **Def:** - **Max:** -

P-Group: CONTROL

Displays valid maximum output current of inverter.

Parameter r0067 is influenced/determined by the following factors:
- Rated motor current P0305
- Motor overload factor P0640
- Motor protection in dependency of P0610
- r0067 is less than or equal to maximum inverter current r0209
- Inverter protection in dependency of P0290



Note:

A reduction of r0067 may indicate an inverter overload or a motor overload.

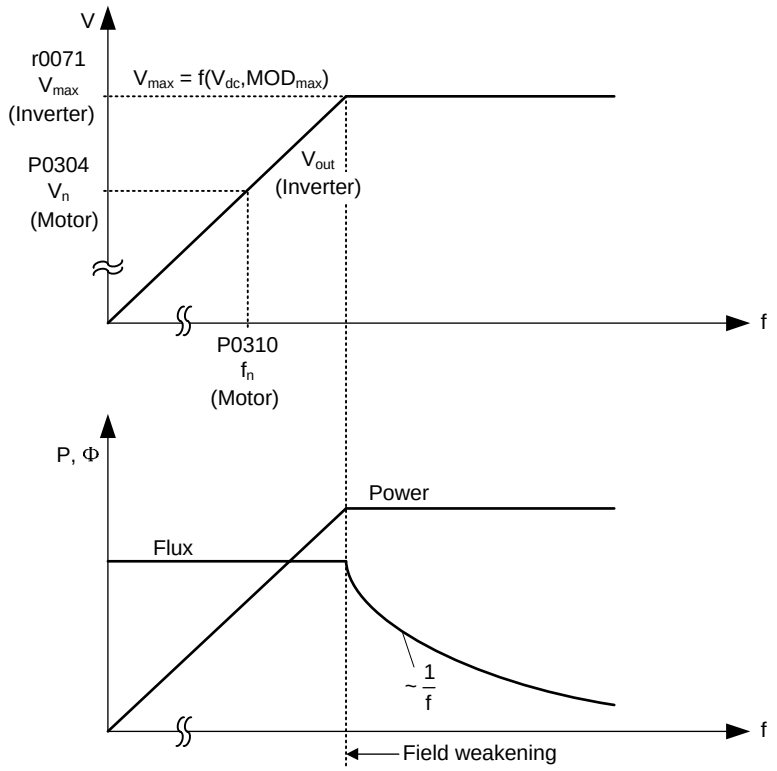
r0071 **CO: Max. output voltage**

Datatype: Float **Unit:** V **Min:** - **Def:** - **Max:** -

Level **3**

P-Group: CONTROL

Displays maximum output voltage.



Dependency:

- The actual maximum output voltage depends on the actual incoming line supply voltage.
- The maximum possible output voltage r0071 of the drive inverter is determined by the DC link voltage r0026 and the maximum modulation depth P1803 in the gating unit.
- The maximum output voltage r0071 is tracked with the DC link voltage so that the highest possible value is always and automatically achieved.
- The output voltage only reaches the calculated maximum value under steady-state conditions at the rated load.
- In the no-load and partial load ranges, lower output voltages r0025 are obtained.

r0078 **CO: Act. current Isq**

Datatype: Float **Unit:** A **Min:** - **Def:** - **Max:** -

Level **3**

P-Group: CONTROL

Displays component of torque generating current.

r0084 **CO: Act. air gap flux**

Datatype: Float **Unit:** % **Min:** - **Def:** - **Max:** -

Level **4**

P-Group: CONTROL

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

r0086 **CO: Act. active current**

Datatype: Float **Unit:** A **Min:** - **Def:** - **Max:** -

Level **3**

P-Group: 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.

3.3 Inverter parameters (HW)

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

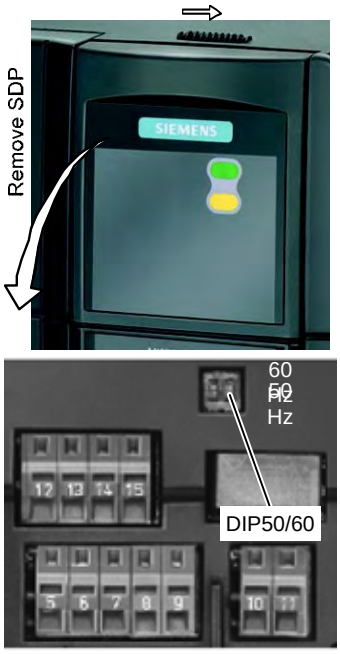
Dependency:

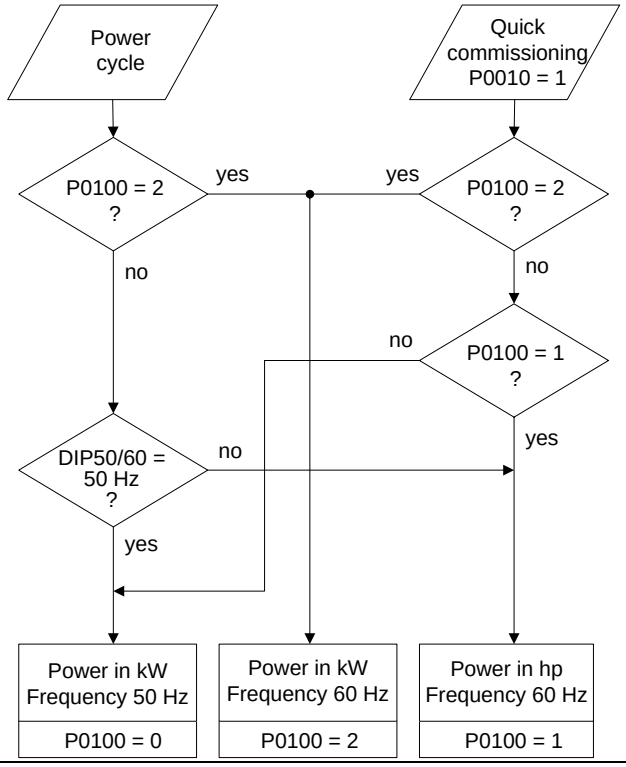
Where:

- Stop drive first (i.e. disable all pulses) before you change this parameter.
- P0100 can only be changed when P0010 = 1 (Commissioning mode) via the respective Commissioing interface (e.g. BOP).
- 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).

Changing P0100 overwrites the settings of the DIP50/60 switch (location shown in the diagram below):

1. Parameter P0100 has an higher priority than the DIP50/60 switch.
2. However, after the inverter is powered-on again and P0100 < 2, the DIP50/60 setting will take priority and overwrite P0100.
3. The DIP50/60 switch does not have any effect, if P0100 = 2.





Notice:

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

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

Equipment system number This parameter has no operation effect.

r0200 **Act. power stack code number**

Datatype: U32 **Unit:** - **Min:** - **Def:** - **Max:** -

Level **3**

P-Group: INVERTER

Identifies hardware variant as shown in table below.

Code-No.	MM420 MLFB	Input Voltage & Frequency	CT Power kW	Internal Filter	Frame Size
1	6SE6420-2UC11-2AAx	1/3AC200-240V +10% -10% 47-63Hz	0,12	no	A
2	6SE6420-2UC12-5AAx	1/3AC200-240V +10% -10% 47-63Hz	0,25	no	A
3	6SE6420-2UC13-7AAx	1/3AC200-240V +10% -10% 47-63Hz	0,37	no	A
4	6SE6420-2UC15-5AAx	1/3AC200-240V +10% -10% 47-63Hz	0,55	no	A
5	6SE6420-2UC17-5AAx	1/3AC200-240V +10% -10% 47-63Hz	0,75	no	A
6	6SE6420-2UC21-1BAx	1/3AC200-240V +10% -10% 47-63Hz	1,1	no	B
7	6SE6420-2UC21-5BAx	1/3AC200-240V +10% -10% 47-63Hz	1,5	no	B
8	6SE6420-2UC22-2BAx	1/3AC200-240V +10% -10% 47-63Hz	2,2	no	B
9	6SE6420-2UC23-0CAx	1/3AC200-240V +10% -10% 47-63Hz	3	no	C
10	6SE6420-2UC24-0CAx	3AC200-240V +10% -10% 47-63Hz	4	no	C
11	6SE6420-2UC25-5CAx	3AC200-240V +10% -10% 47-63Hz	5,5	no	C
12	6SE6420-2AB11-2AAx	1AC200-240V +10% -10% 47-63Hz	0,12	Cl. A	A
13	6SE6420-2AB12-5AAx	1AC200-240V +10% -10% 47-63Hz	0,25	Cl. A	A
14	6SE6420-2AB13-7AAx	1AC200-240V +10% -10% 47-63Hz	0,37	Cl. A	A
15	6SE6420-2AB15-5AAx	1AC200-240V +10% -10% 47-63Hz	0,55	Cl. A	A
16	6SE6420-2AB17-5AAx	1AC200-240V +10% -10% 47-63Hz	0,75	Cl. A	A
17	6SE6420-2AB21-1BAx	1AC200-240V +10% -10% 47-63Hz	1,1	Cl. A	B
18	6SE6420-2AB21-5BAx	1AC200-240V +10% -10% 47-63Hz	1,5	Cl. A	B
19	6SE6420-2AB22-2BAx	1AC200-240V +10% -10% 47-63Hz	2,2	Cl. A	B
20	6SE6420-2AB23-0CAx	1AC200-240V +10% -10% 47-63Hz	3	Cl. A	C
21	6SE6420-2AB23-1CAx	3AC200-240V +10% -10% 47-63Hz	3	Cl. A	C
22	6SE6420-2AB24-0CAx	3AC200-240V +10% -10% 47-63Hz	4	Cl. A	C
23	6SE6420-2AB25-0CAx	3AC200-240V +10% -10% 47-63Hz	5,5	Cl. A	C
24	6SE6420-2UD13-7AAx	3AC380-480V +10% -10% 47-63Hz	0,37	no	A
25	6SE6420-2UD15-5AAx	3AC380-480V +10% -10% 47-63Hz	0,55	no	A
26	6SE6420-2UD17-5AAx	3AC380-480V +10% -10% 47-63Hz	0,75	no	A
27	6SE6420-2UD21-1AAx	3AC380-480V +10% -10% 47-63Hz	1,1	no	A
28	6SE6420-2UD21-5AAx	3AC380-480V +10% -10% 47-63Hz	1,5	no	A
29	6SE6420-2UD22-2BAx	3AC380-480V +10% -10% 47-63Hz	2,2	no	B
30	6SE6420-2UD23-0BAx	3AC380-480V +10% -10% 47-63Hz	3	no	B
31	6SE6420-2UD24-0BAx	3AC380-480V +10% -10% 47-63Hz	4	no	B
32	6SE6420-2UD25-5CAx	3AC380-480V +10% -10% 47-63Hz	5,5	no	C
33	6SE6420-2UD27-5CAx	3AC380-480V +10% -10% 47-63Hz	7,5	no	C
34	6SE6420-2UD31-1CAx	3AC380-480V +10% -10% 47-63Hz	11	no	C
35	6SE6420-2AD22-2BAx	3AC380-480V +10% -10% 47-63Hz	2,2	Cl. A	B
36	6SE6420-2AD23-0BAx	3AC380-480V +10% -10% 47-63Hz	3	Cl. A	B
37	6SE6420-2AD24-0BAx	3AC380-480V +10% -10% 47-63Hz	4	Cl. A	B
38	6SE6420-2AD25-5CAx	3AC380-480V +10% -10% 47-63Hz	5,5	Cl. A	C
39	6SE6420-2AD27-5CAx	3AC380-480V +10% -10% 47-63Hz	7,5	Cl. A	C
40	6SE6420-2AD31-1CAx	3AC380-480V +10% -10% 47-63Hz	11	Cl. A	C

Notice:

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

P0201 **Power stack code number**

CStat: C **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 0 **Max:** 65535

Level **3**

P-Group: INVERTER **Active:** first confirm **QuickComm.:** No

Confirms actual power stack identified.

r0203 **Act. inverter type** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: 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

r0204 **Power stack features** Level **3**

Datatype: U32 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: 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.

r0206 **Rated inverter power [kW] / [hp]** Level **2**

Datatype: Float **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: 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).

$$r0206\,[hp] = 0.75 \cdot r0206\,[kW]$$

r0207[2] **Rated inverter current** Level **2**

Datatype: Float **Unit:** A **Min:** - **Def:** - **Max:** -

P-Group: INVERTER

Displays rated output current of inverter.
r0207[0] : Rated inverter current
r0207[1] : Rated motor current

r0208 **Rated inverter voltage** Level **2**

Datatype: U32 **Unit:** V **Min:** - **Def:** - **Max:** -

P-Group: INVERTER

Displays nominal AC supply voltage of inverter.

Value:

r0208 = 230 : 200 - 240 V +/- 10 %
r0208 = 400 : 380 - 480 V +/- 10 %
r0208 = 575 : 500 - 600 V +/- 10 %

r0209 **Maximum inverter current** Level **2**

Datatype: Float **Unit:** A **Min:** - **Def:** - **Max:** -

P-Group: INVERTER

Displays maximum output current of inverter.

Dependency:

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.

P0210 **Supply voltage** Level **3**

CStat: CT **Datatype:** U16 **Unit:** V **Min:** 0
P-Group: INVERTER **Active:** Immediately **QuickComm.:** No **Def:** 230
Max: 1000

Parameter P0210 defines the supply voltage.

Its default value depends upon the type of inverter. If P0210 does not correspond to the supply voltage, then it must be modified.

When P0210 has been modified, the following thresholds are changed:

Vdc_max switch-on level $= 1.15 \cdot \sqrt{2} \cdot$ P0210

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

Dependency:

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.

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).

Note:

- 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 depending on inverter type and its rating data.

r0231[2] **Max. cable length** Level **3**

Datatype: U16 **Unit:** m **Min:** -
P-Group: INVERTER **Def:** -
Max: -

Indexed parameter to display maximum allowable cable length between inverter and motor.

Index:

r0231[0] : Max. allowed unscreened cable length
r0231[1] : Max. allowed screened cable length

Notice:

For full EMC compliance, the screened cable must not exceed 25 m in length when an EMC filter is fitted.

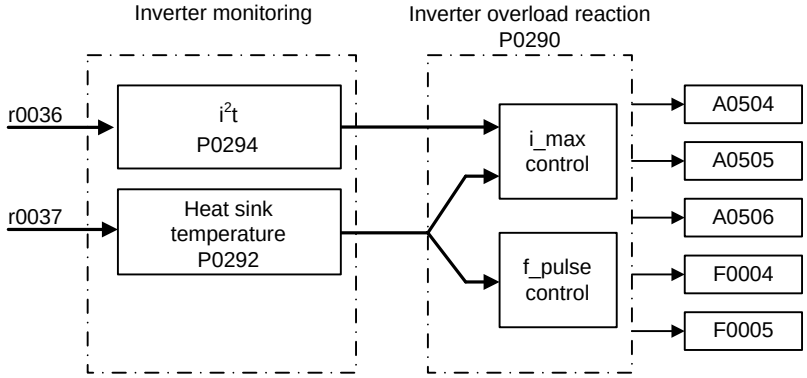
P0290 **Inverter overload reaction** Level **3**

CStat: CT **Datatype:** U16 **Unit:** - **Min:** 0
P-Group: INVERTER **Active:** first confirm **QuickComm.:** No **Def:** 2
Max: 3

Selects reaction of inverter to an internal over-temperature.

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

- heat sink temperature
- inverter I²t



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 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, if the action taken does not sufficiently reduce internal temperature.

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

P0291 **Inverter protection** Level **4**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	INVERTER	**Active:** Immediately	**QuickComm.:** No	**Def:**	1
				Max:	15

Bit 00 for enabling/disabling automatic pulse frequency reduction at output frequencies below 2 Hz. The benefit is to reduce the noises at frequencies below 2 Hz.

Bitfields:

Bit00	Pulse frequency reduced below 2Hz	0 NO	1 YES
Bit03	Enable fan	0 NO	1 YES

Caution:

P0291 Bit 00 = 0:
No automatic pulse frequency is applied at frequencies below 2 Hz. There is a risk of damage to the inverter if DC-braking or greater boost are used respectively.

Details:

See P0290 (inverter overload reaction)

P0292 **Inverter temperature warning** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** °C	**Min:**	0
P-Group:	INVERTER	**Active:** first confirm	**QuickComm.:** No	**Def:**	15
				Max:	25

Defines the temperature difference (in ºC) between the Overtemperature trip threshold and the warning threshold of the inverter. The trip threshold is stored internally by the inverter and cannot be changed by the user.

Temperature warning threshold of inverter T_{warn} :

$$T_{warn} = T_{trip} - P0292 = 110\ °C - P0292$$

If the actual inverter temperature (r0037) exceeds the corresponding threshold, a warning A0504, if the temperature still increases then a fault F0004 will be displayed.

P0294 **Inverter I2t overload warning** Level **4**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	10.0
P-Group:	INVERTER	**Active:** first confirm	**QuickComm.:** No	**Def:**	95.0
				Max:	100.0

Defines the [%] value at which alarm A0505 (inverter I2t) is generated.

Inverter I2t calculation is used to determine a maximum tolerable period for inverter overload. The I2t calculation value is deemed = 100 % when this maximum tolerable period is reached.

Dependency:

That the output current of the inverter has been reduced and that the value of I2t does not exceed 100%.

Note:

P0294 = 100 % corresponds to stationary nominal load.

P0295 **Inverter fan off delay time** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** s	**Min:**	0
P-Group:	TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	3600

Defines inverter fan switch off delay time in seconds after drive has stopped.

Note:

Setting to 0, inverter fan will switch off when the drive stops, that is no delay.

3.4 Motor parameters

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

$x \neq 1, 2, ..., n$: Asynchronous motor

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

Possible Settings:

1 Asynchronous motor
2 Synchronous motor

Dependency:

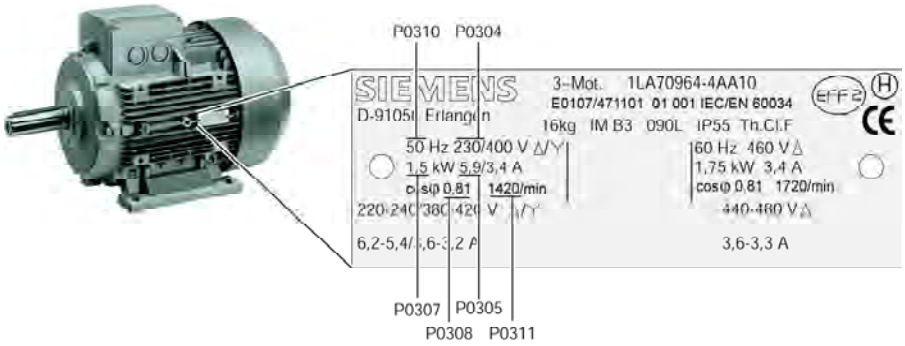
Changeable only when P0010 = 1 (quick commissioning).

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

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

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



Line supply voltage	1 AC 110 V *)	1 AC 230 V	3 AC 230 V	3 AC 400 V	3 AC 500 V
MICROMASTER 410	X	X	-	-	-
MICROMASTER 411	-	-	-	X	-
MICROMASTER 420	-	X	X	X	-
MICROMASTER 430	-	-	-	X	-
MICROMASTER 440	-	X	X	X	X

*) Line supply voltage 1-ph. 110 V AC is stepped-up --> frequency inverter output voltage 3-ph. 230 V AC

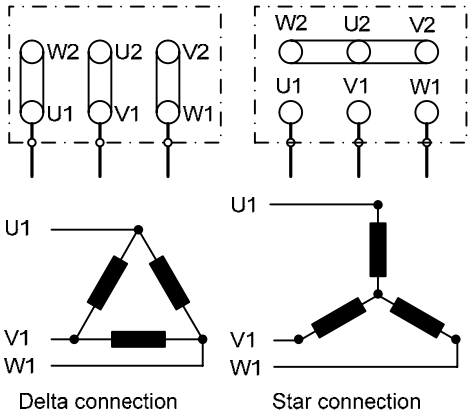
Dependency:

- Changeable only when P0010 = 1 (quick commissioning).
- Default value is depending on inverter type and its rating data.

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.

IEC Motor

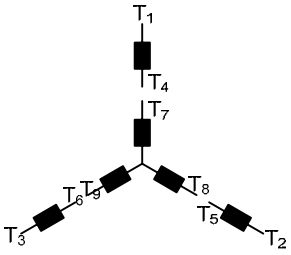


e.g.: Volts 230 V (Delta connection) / 400 V (Star connection)

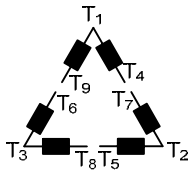
NEMA Motor

Volts	U	V	W	Connected together	Connection
low	T_1-T_7	T_2-T_8	T_3-T_9	T_4-T_5-T_6	Y Y
high	T_1	T_2	T_3	T_1-T_7	T_2-T_8	T_3-T_9	Y

e.g.: Volts 230 V YY (low) / 460 V Y (high)



Volts	U	V	W	Connected together	Connection
low	T_1-T_6-T_7	T_2-T_4-T_8	T_3-T_5-T_9	-	$\Delta\,\Delta$
high	T_1	T_2	T_3	T_4-T_7	T_5-T_8	T_6-T_9	Δ



P0305 Rated motor current

CStat:	C	**Datatype:** Float	**Unit:** A	**Min:**	0.01	Level	
P-Group:	MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Def:**	3.25	**1**	
				Max:	10000.00		

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

Dependency:

- Changeable only when P0010 = 1 (quick commissioning).
- Default value is depending on inverter type and its rating data.
- 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 recommanded that the ratio of P0305 (rated motor current) and r0207 (rated inverter current) should not be lower than:

V/f: $\frac{1}{8} \le \frac{P0305}{r0207}$

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

P0307 **Rated motor power** Level **1**

CStat:	C	**Datatype:** Float	**Unit:** -	**Min:**	0.01
P-Group:	MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Def:**	0.12
				Max:	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).
- Default value is depending on inverter type and its rating data.

P0308 **Rated motor cosPhi** Level **1**

CStat:	C	**Datatype:** Float	**Unit:** -	**Min:**	0.000
P-Group:	MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Def:**	0.000
				Max:	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]).
- Default value is depending on inverter type and its rating data.

- Setting 0 causes internal calculation of value. Calculated value see r0332.

P0309 **Rated motor efficiency** Level **1**

CStat:	C	**Datatype:** Float	**Unit:** %	**Min:**	0.0
P-Group:	MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Def:**	0.0
				Max:	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]).
- Default value is depending on inverter type and its rating data.

- Setting 0 causes internal calculation of value. Calculated value see r0332.

Note:

P0309 = 100 % corresponds to superconducting.

Details:

See diagram in P0304 (rating plate).

P0310 **Rated motor frequency** Level **1**

CStat:	C	**Datatype:** Float	**Unit:** Hz	**Min:**	12.00
P-Group:	MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Def:**	50.00
				Max:	650.00

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)

P0311 **Rated motor speed** Level **1**

CStat:	C	**Datatype:** U16	**Unit:** 1/min	**Min:**	0
P-Group:	MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Def:**	0
				Max:	40000

Nominal motor speed [rpm] from rating plate.

Dependency:

- Changeable only when P0010 = 1 (quick commissioning).
- Setting 0 causes internal calculation of value.
- Slip compensation in V/f control requires rated motor speed for correct operation.
- Pole pair number recalculated automatically if parameter is changed.
- Default value is depending on inverter type and its rating data.

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

Details:

See diagram in P0304 (rating plate)

r0313 **Motor pole pairs** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: MOTOR

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.

$$r0313 = 60 \cdot \frac{P0310}{P0311}$$

P0320 **Motor magnetizing current** Level **3**

CStat: CT **Datatype:** Float **Unit:** % **Min:** 0.0 **Def:** 0.0 **Max:** 99.0

P-Group: MOTOR **Active:** Immediately **QuickComm.:** Yes

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

Dependency:

Setting P0320 = 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.

r0330 **Rated motor slip** Level **3**

Datatype: Float **Unit:** % **Min:** - **Def:** - **Max:** -

P-Group: MOTOR

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

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

r0331 **Rated magnetization current** Level **3**

Datatype: Float **Unit:** A **Min:** - **Def:** - **Max:** -

P-Group: MOTOR

Displays calculated magnetizing current of motor in [A].

r0332 **Rated power factor** Level **3**

Datatype: Float **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: MOTOR

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.

P0335 **Motor cooling** Level **2**

CStat: CT **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 0 **Max:** 1

P-Group: MOTOR **Active:** first confirm **QuickComm.:** Yes

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 leeds 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.

P0340 **Calculation of motor parameters** Level **2**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	MOTOR	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	1

Calculates various motor parameters (see table below). This parameter is required during commissioning to optimize inverter performance.

Possible Settings:

0 No calculation
1 Complete parameterization

Note:

	P0340 = 1
P0344 Motor weight	x
P0346 Magnetization time	x
P0347 Demagnetization time	x
P0350 Stator resistance (line-to-line)	x
P0611 Motor I2t time constant	x
P1253 Vdc-controller output limitation	x
P1316 Boost end frequency	x
P2000 Reference frequency	x
P2002 Reference current	x

P0344 **Motor weight** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** kg	**Min:**	1.0
P-Group:	MOTOR	**Active:** Immediately	**QuickComm.:** No	**Def:**	9.4
				Max:	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 depending on inverter type and its rating data.

P0346 **Magnetization time** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** s	**Min:**	0.000
P-Group:	MOTOR	**Active:** Immediately	**QuickComm.:** No	**Def:**	1.000
				Max:	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:

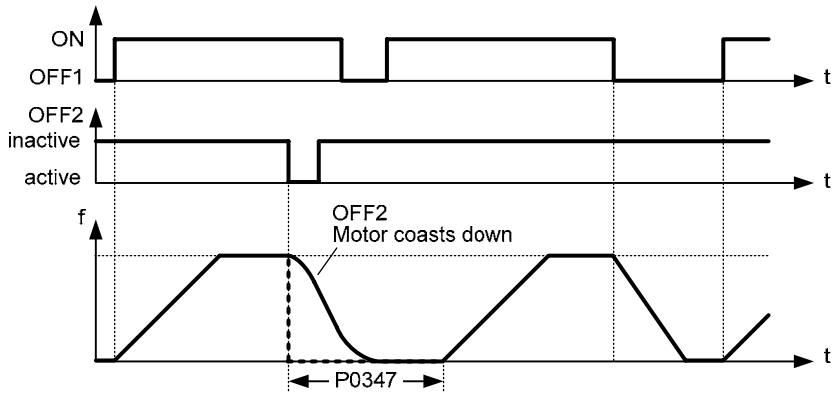
- If boost settings are higher than 100 %, magnetization time may be reduced.
- Default value is depending on inverter type and its rating data.
- An excessive reduction of this time can result in insufficient motor magnetization.

P0347 **Demagnetization time** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** s	**Min:**	0.000
P-Group:	MOTOR	**Active:** Immediately	**QuickComm.:** No	**Def:**	1.000
				Max:	20.000

Defines the de-magnetization time for the connected induction motor.

The de-magnetization time is the time that must expire between powering-down the drive (OFF2 or a drive inverter fault/error) and powering-up again. The drive inverter is prevented from being powered-up again within this time interval. The flux in the induction motor is reduced to a low value during this de-magnetization time.



Note:

- The de-magnetization time is approximately 250% of the rotor time constant (r0384) in seconds.
- The pre-assignment (default value) depends on the drive inverter type and its rated/nominal values.
- It is not active after a normal ramp-down - i.e. after OFF1 or OFF3.
- If this time is excessively shortened, then the drive inverter will be tripped (shut down) due to an overcurrent condition.
- If a synchronous motor is connected, the de-magnetization time should be set to 0.

P0350 **Stator resistance (line-to-line)** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** Ohm	**Min:**	0.00001
P-Group:	MOTOR	**Active:** Immediately	**QuickComm.:** No	**Def:**	4.00000
				Max:	2000.00000

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

$$P0350 = 2 \cdot (R_{Cable} + R_S)$$

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 depending on inverter type and its rating data.

r0370 **Stator resistance [%]** Level **4**

		Datatype: Float	**Unit:** %	**Min:**	-
				Def:	-
P-Group:	MOTOR			**Max:**	-

Displays standardized stator resistance of motor equivalent circuit (phase value) in [%] as a function of the actual stator winding temperature.

Note:

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \quad <=> 100\,\%$$

r0372 **Cable resistance [%]**

Datatype: Float **Unit:** % **Min:** - **Def:** - **Max:** -

P-Group: MOTOR

Level **4**

Displays standardized cable resistance of motor equivalent circuit (phase value)in [%]. It is estimated to be 20 % of the stator resistance.

Note:

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \text{ <=>100 \%}$$

r0373 **Rated stator resistance [%]**

Datatype: Float **Unit:** % **Min:** - **Def:** - **Max:** -

P-Group: MOTOR

Level **4**

Displays the nominal stator resistance of the motor equivalent circuit diagram (phase value) as a [%] at the ambient temperature + temperature rise of the stator winding.

Note:

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \text{ <=>100 \%}$$

r0374 **Rotor resistance [%]**

Datatype: Float **Unit:** % **Min:** - **Def:** - **Max:** -

P-Group: MOTOR

Level **4**

Displays the rotor resistance of the motor equivalent circuit diagram (phase value) as a [%] at the ambient temperature (in the cold state).

Note:

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \text{ <=>100 \%}$$

r0376 **Rated rotor resistance [%]**

Datatype: Float **Unit:** % **Min:** - **Def:** - **Max:** -

P-Group: MOTOR

Level **4**

Displays the nominal rotor resistance of the motor equivalent circuit diagram (phase value) as a [%] at the ambient temperature + temperature rise of the rotor winding.

Note:

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \text{ <=>100 \%}$$

r0377 **Total leakage reactance [%]**

Datatype: Float **Unit:** % **Min:** - **Def:** - **Max:** -

P-Group: MOTOR

Level **4**

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

Note:

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \text{ <=>100 \%}$$

r0382 **Main reactance [%]**

Datatype: Float **Unit:** % **Min:** - **Def:** - **Max:** -

P-Group: MOTOR

Level **4**

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

Note:

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \text{ <=>100 \%}$$

r0384 **Rotor time constant**

Datatype: Float **Unit:** ms **Min:** - **Def:** - **Max:** -

P-Group: MOTOR

Level **3**

Displays calculated rotor time constant [ms].

r0386 **Total leakage time constant** Level **4**

Datatype: Float **Unit:** ms **Min:** - **Def:** - **Max:** -

P-Group: MOTOR

Displays total leakage time constant of motor.

r0395 **CO: Total stator resistance [%]** Level **3**

Datatype: Float **Unit:** % **Min:** - **Def:** - **Max:** -

P-Group: MOTOR

Displays the actual stator resistance (combined stator/cable resistance) of the motor as a [%] as a function of the actual stator winding temperature.

Note:

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \text{ <=>100 \%}$$

P0610 **Motor I2t reaction** Level **3**

CStat: CT **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 2 **Max:** 2

P-Group: MOTOR **Active:** first confirm **QuickComm.:** No

Defines reaction when motor I2t reaches warning threshold.

Possible Settings:

0 Warning, no reaction, no trip
1 Warning, Imax reduction, trip F0011
2 Warning, no reaction, trip F0011

Dependency:

See parameter P0611, P0614.

Note:

P0610 = 1:
If the max. permissible current Imax is reduced, this results in a lower output frequency.

The motor I²t monitoring function is used to protect the motor against overheating. The motor temperature will be dependent on many factors, including the size of the motor, the ambient temperature, the previous history of the motors loading, 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 I²t).

Because most motors are cooled by fans integrated in the motor and running at the motor speed, the speed of the motor is also important. Clearly a motor running with a 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.

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

Thermal Time constant for the motor.

The time until the thermal limit of a motor is reached, is calculated via the thermal time constant. A higher value increases the time at which the motor thermal limit is reached.

The value of P0611 is estimated according to the motor data during quick commissioning or is calculated using P0340 (Calculating of the motor parameters). When the calculation of motor parameters during quick commission is complete the stored value can be replaced by the value given by the motor manufacturer.

Example:

For a 2 pole 1LA7063 motor the value is 8 min (see table). The value for P0611 is calculated as follows:

$$P0611 = 8\,\text{min} \cdot 60\,\frac{\text{s}}{\text{min}} = 480\,\text{s}$$

For Siemens standard motors 1LA7 the thermal time constant values are given in minutes (see following table):

Type	2 pole	4 pole	6 pole	8 pole
1LA7050	13	13	-	-
1LA7053	13	13	-	-
1LA7060	8	11	-	-
1LA7063	8	13	12	-
1LA7070	8	10	12	12
1LA7073	8	10	12	12
1LA7080	8	10	12	12
1LA7083	10	10	12	12
1LA7090	5	9	12	12
1LA7096	6	11	12	14
1LA7106	8	12	12	16
1LA7107	-	12	-	16
1LA7113	14	11	13	12
1LA7130	11	10	13	10
1LA7131	11	-	-	-
1LA7133	-	10	14	10
1LA7134	-	-	16	-
1LA7163	15	19	20	12
1LA7164	15	-	-	14
1LA7166	15	19	20	14

Dependency:

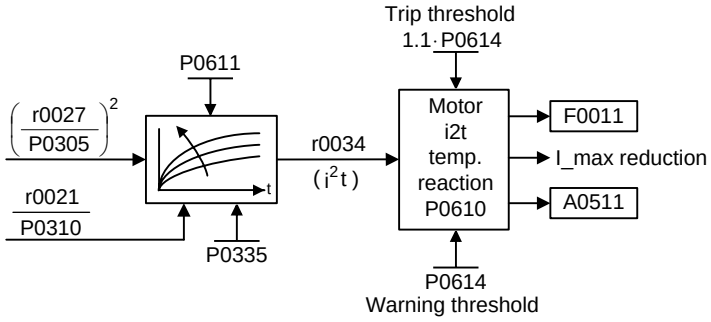
P0611 < 99 s (I2t-calculation inactive):
To activate I2t calculation set P0611 to a value > 99 s.

Note:

Mode of operation of I²t:
The square of the normalized motor current (measured motor current r0027 divided by the rated motor current P0305) weighted with the thermal motor time constant results in the I²t value of the motor. In addition, the output frequency (motor speed) is incorporated in the calculation to take into consideration the cooling effect of the motor fan. If parameter P0335 is changed to a force-ventilated motor, then the calculation is appropriately modified. The I²t value represents a dimension for the temperature rise / temperature of the motor.

If users do not enter parameters such as P0344 (motor weight), then a value, based on a Siemens motor is used. When required, the motor time constant can be changed using P0611, which is the same as overwriting the calculated value.

The I²t value that is obtained is displayed in r0034. If this value reaches the value defined in P0614 (default: 100%), an alarm message A0511 is output and, depending on P0610 a response is initiated or, when a shutdown threshold is reached, a fault is output.



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

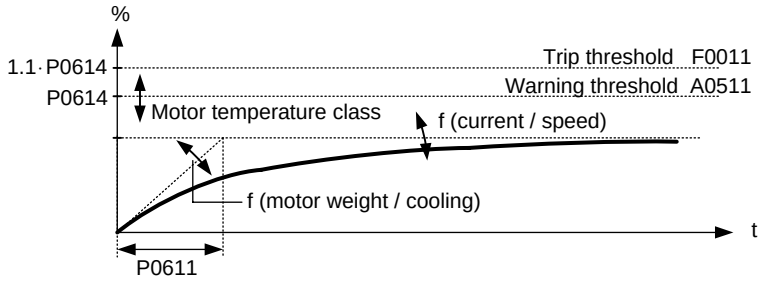
Defines the [%] value at which alarm A0511 (motor overtemperature) is generated.

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 I²t). A motor-I2t-value of P0614 means that the motor has reached its maximum permissible operating temperature. The actual I2t-value is displayed in parameter r0034.

Dependency:

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

$i^2t_{trip}\,[\%] = i^2t_{warn}\,[\%] \cdot 1.1 = P0614 \cdot 1.1$



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

3.5 Command source

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

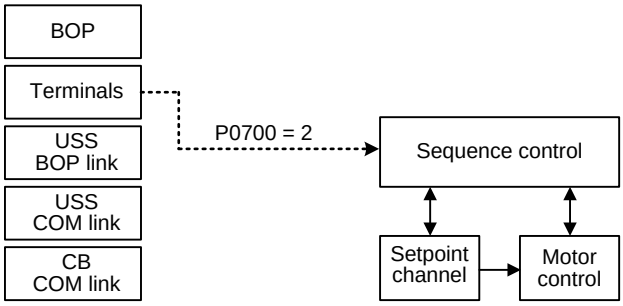
Selects digital command source.

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



Notice:

Setting 4 (USS on BOP link) is also used for STARTER via PC connection kit or AOP control.
Setting 5 (USS on COM link) is used for remote AOP communications via RS485.

Caution:

Be aware, by changing of parameter P0700 all BI parameters are reset to the default value or modified as listed in the table below.

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 = 5**	**P0700 = 6**
P0701	1	0	1	0	0	0
P0702	12	0	12	0	0	0
P0703	9	9	9	9	9	9
P0704	0	0	0	0	0	0
P0705	15	15	15	15	15	15
P0731	52.3	52.3	52.3	52.3	52.3	52.3
P0800	0.0	0.0	0.0	0.0	0.0	0.0
P0801	0.0	0.0	0.0	0.0	0.0	0.0
P0840	722.0	19.0	722.0	2032.0	2036.0	2090.0
P0842	0.0	0.0	0.0	0.0	0.0	0.0
P0844	1.0	19.1	1.0	2032.1	2036.1	2090.1
P0845	19.1	19.1	19.1	19.1	19.1	19.1
P0848	1.0	1.0	1.0	2032.2	2036.2	2090.2
P0849	1.0	1.0	1.0	1.0	1.0	1.0
P0852	1.0	1.0	1.0	2032.3	2036.3	2090.3

	P0700 = 0	**P0700 = 1**	**P0700 = 2**	**P0700 = 4**	**P0700 = 5**	**P0700 = 6**
P1020	0.0	0.0	0.0	0.0	0.0	0.0
P1021	0.0	0.0	0.0	0.0	0.0	0.0
P1022	0.0	0.0	0.0	0.0	0.0	0.0
P1035	19.13	19.13	19.13	2032.13	2036.13	2090.13
P1036	19.14	19.14	19.14	2032.14	2036.14	2090.14
P1055	0.0	19.8	0.0	2032.8	2036.8	2090.8
P1056	0.0	0.0	0.0	2032.9	2036.9	2090.9
P1074	0.0	0.0	0.0	0.0	0.0	0.0
P1110	0.0	0.0	0.0	0.0	0.0	0.0
P1113	722.1	19.11	722.1	2032.11	2036.11	2090.11
P1124	0.0	0.0	0.0	0.0	0.0	0.0
P1140	1.0	1.0	1.0	2032.4	2036.4	2090.4
P1141	1.0	1.0	1.0	2032.5	2036.5	2090.5
P1142	1.0	1.0	1.0	2032.6	2036.6	2090.6
P1230	0.0	0.0	0.0	0.0	0.0	0.0
P2103	722.2	722.2	722.2	722.2	722.2	722.2
P2104	0.0	0.0	0.0	2032.7	2036.7	2090.7
P2106	1.0	1.0	1.0	1.0	1.0	1.0
P2200	0.0	0.0	0.0	0.0	0.0	0.0
P2220	0.0	0.0	0.0	0.0	0.0	0.0
P2221	0.0	0.0	0.0	0.0	0.0	0.0
P2222	0.0	0.0	0.0	0.0	0.0	0.0
P2235	19.13	19.13	19.13	2032.13	2036.13	2090.13
P2236	19.14	19.14	19.14	2032.14	2036.14	2090.14

The following parameters are not overwritten when changing P0700:

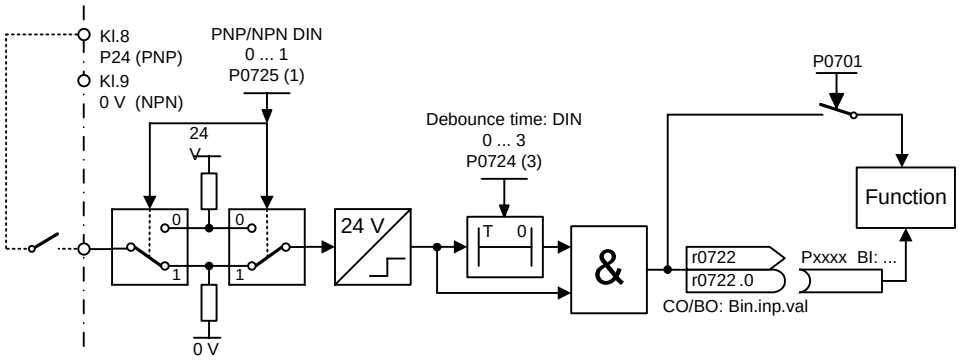
P0810

3.6 Digital inputs

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

Selects function of digital input 1.

DIN channel (e.g. DIN1 - PNP (P0725 = 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.
- To change back the setting 99 in any of the DIN function parameters it is necessary to alter P0700.
- For reversing the drive 2 DINs are necessary : one for ON command and another for Reverse.
- Settings 3 (OFF2) and 4 (OFF3) are low active.

P0702 **Function of digital input 2** Level **2**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	12
				Max:	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).

P0703 **Function of digital input 3** Level **2**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	9
				Max:	99

Selects function of digital input 3.

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).

P0704	Function of digital input 4			Min:	0	Level
	CStat: CT	Datatype: U16	Unit: -	Def:	0	2
	P-Group: COMMANDS	Active: first confirm	QuickComm.: No	Max:	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 frequency)
14 MOP down (decrease frequency)
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).

P0719[2] **Selection of cmd. & freq. setp.** Level **3**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	67

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
7	Cmd = BICO parameter	Setpoint = Analog 2 setp
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
17	Cmd = BOP	Setpoint = Analog 2 setp
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
47	Cmd = USS on BOP link	Setpoint = Analog 2 setp
50	Cmd = USS on COM link	Setpoint = BICO parameter
51	Cmd = USS on COM link	Setpoint = MOP setpoint
52	Cmd = USS on COM link	Setpoint = Analog setpoint
53	Cmd = USS on COM link	Setpoint = Fixed frequency
54	Cmd = USS on COM link	Setpoint = USS on BOP link
55	Cmd = USS on COM link	Setpoint = USS on COM link
57	Cmd = USS on COM link	Setpoint = Analog 2 setp
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
67	Cmd = CB on COM link	Setpoint = Analog 2 setp

Index:

P0719[0] : 1st Control source (Remote)
P0719[1] : 2nd Control source (Local)

Note:

Using parameter P0719, it is possible to select the command or setpoint sources without changing the BICO connections (this is contrary to P0700 / P1000). However, it is not possible to change the complete connection table (refer to P0700 and P1000). Using P0719, depending on the value, only the BICO parameters listed in the following table are internally overwritten - this means that these BICO parameters are inactive.

Command source:

	P0719 =				
	0 ... 9	10 ... 19	40 ... 49	50 ... 59	60 ... 69
P0840	X	–	–	–	–
P0844	X	–	–	–	–
P0848	X	X	–	–	–
P0852	X	X	–	–	–
P1035	X	–	–	–	–
P1036	X	X	–	–	–
P1055	X	–	–	–	–
P1056	X	X	–	–	–
P1113	X	–	–	–	–
P1140	X	X	–	–	–
P1141	X	X	–	–	–
P1142	X	X	–	–	–
P1143	X	X	–	–	–

Setpoint source:

	P0719 =	
	0, 10, 20, 40, 50, 60	all other values
P1070	X	–

X = BICO parameter active

– = BICO parameter inactive

BICO connections made previously remain unchanged.

r0720 Number of digital inputs

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

Level **3**

P-Group: COMMANDS

Displays number of digital inputs.

r0722 CO/BO: Binary input values

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

Level **2**

P-Group: 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
```

Note:

Segment is lit when signal is active.

P0724 Debounce time for digital inputs

CStat: CT **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 3 **Max:** 3

Level **3**

P-Group: COMMANDS **Active:** Immediately **QuickComm.:** No

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

P0725	PNP / NPN digital inputs			Min: 0	Level
	CStat: CT	Datatype: U16	Unit: -	Def: 1	3
	P-Group: COMMANDS	Active: Immediately	QuickComm.: No	Max: 1	

Switches between active high (PNP) and active low (NPN). This is valid for all digital inputs simultaneously.

The following is valid by using the internal supply:

Possible Settings:

0 NPN mode ==> low active
1 PNP mode ==> high active

Value:

NPN: Terminals 5/6/7 must be connected via terminal 9 (0 V).
PNP: Terminals 5/6/7 must be connected via terminal 8 (24 V).

3.7 Digital outputs

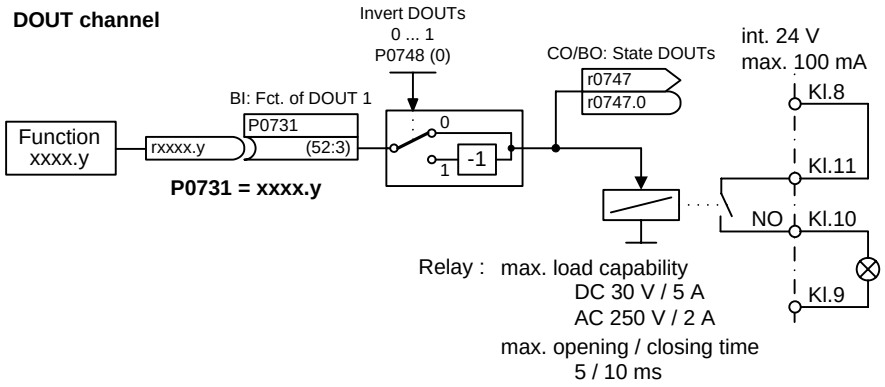
r0730	Number of digital outputs			Min: -	Level
		Datatype: U16	Unit: -	Def: -	3
	P-Group: COMMANDS			Max: -	

Displays number of digital outputs (relays).

P0731 **BI: Function of digital output 1** Level **2**

CStat:	CUT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	52:3
				Max:	4000:0

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

Details:

Display functions ==> see parameter r0052, r0053
Motor holding brake ==> see parameter P1215
DC brake ==> see parameter P1232, P1233

r0747 **CO/BO: State of digital outputs** Level **3**

		Datatype: U16	**Unit:** -	**Min:**	-
P-Group:	COMMANDS			**Def:**	-
				Max:	-

Displays status of digital outputs (also includes inversion of digital outputs via P0748).

Bitfields:

```
Bit00   Digital output 1 energized                0  NO         1  YES
```

Dependency:

Bit 0 = 0 :
Relay de-energized / contacts open

Bit 0 = 1 :
Relay energized / contacts closed

P0748 **Invert digital outputs** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	1

Defines high and low states of relay for a given function.

Bitfields:

```
Bit00   Invert digital output 1                   0  NO         1  YES
```

3.8 Analog inputs

r0750	**Number of ADCs**	**Min:** -		Level
	Datatype: U16 **Unit:** -	**Def:** -		**3**
	P-Group: TERMINAL	**Max:** -		

Displays number of analog inputs available.

r0751	**CO/BO: Status word of ADC**	**Min:** -		Level
	Datatype: U16 **Unit:** -	**Def:** -		**3**
	P-Group: TERMINAL	**Max:** -		

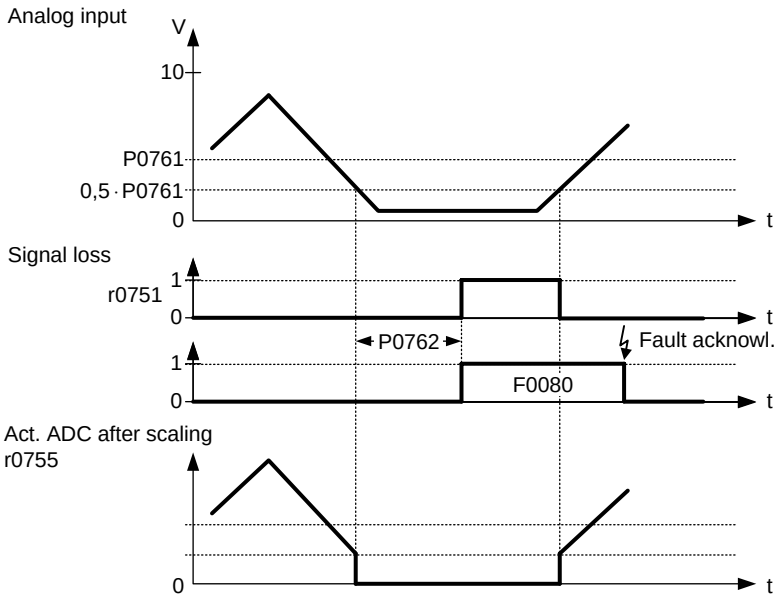
Displays status of analog input.

Bitfields:

```
Bit00   Signal lost on ADC 1                    0  NO        1  YES
```

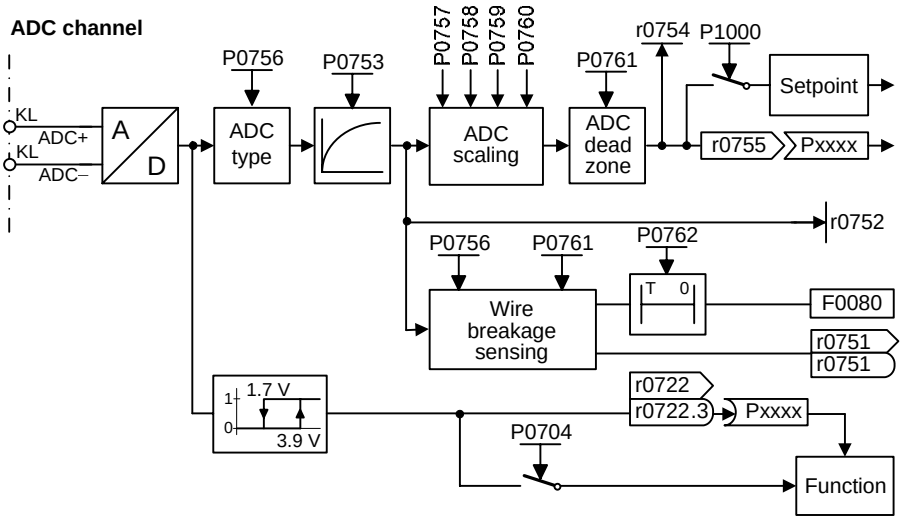
Dependency:

The following limitations/secondary conditions apply for the wire breakage monitoring:
- For P0756, the monitoring must be activated
- Width of the ADC deadzone P0761 > 0
- Wire breakage / signal loss F0080 is detected if the ADC input quantity is less than 0.5 * P0761.



r0752	**Act. input of ADC [V]**	**Min:** -		Level
	Datatype: Float **Unit:** -	**Def:** -		**2**
	P-Group: TERMINAL	**Max:** -		

Displays smoothed analog input value in volts before the characteristic block.



P0753	**Smooth time ADC**			**Min:**	0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:**	3	**3**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:**	10000	

Defines filter time (PT1 filter) in [ms] for analog input.

Note:

Increasing this time (smooth) reduces jitter but slows down response to the analog input.

P0753 = 0 : No filtering

r0754	**Act. ADC value after scaling [%]**			**Min:**	-	Level
		Datatype: Float	**Unit:** %	**Def:**	-	**2**
	P-Group: TERMINAL			**Max:**	-	

Shows smoothed value of analog input in [%] after scaling block.

Dependency:

P0757 to P0760 define range (ADC scaling).

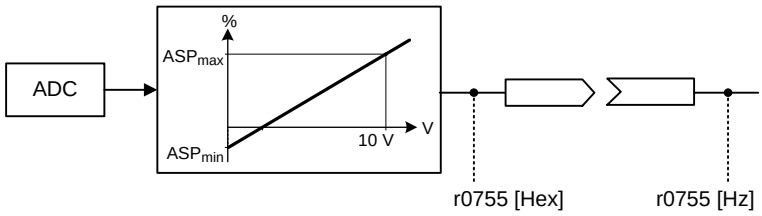
r0755	**CO: Act. ADC after scal. [4000h]**			**Min:**	-	Level
		Datatype: I16	**Unit:** -	**Def:**	-	**2**
	P-Group: TERMINAL			**Max:**	-	

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.

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:



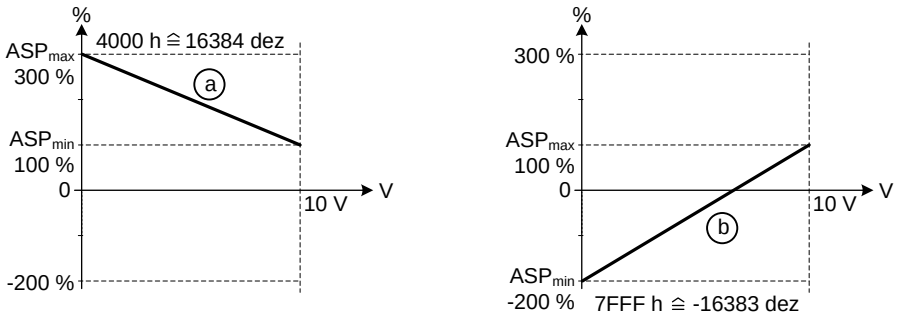
$$\text{r0755 [Hz]} = \frac{\text{r0755 [Hex]}}{\text{4000 [Hex]}} \cdot \text{P2000} \cdot \frac{\max\left(|\text{ASP}_{max}|, |\text{ASP}_{min}|\right)}{100\%}$$

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.

$$4000\,\text{h} = \max\left(|\text{ASP}_{max}|, |\text{ASP}_{min}|\right)$$



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)

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

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.

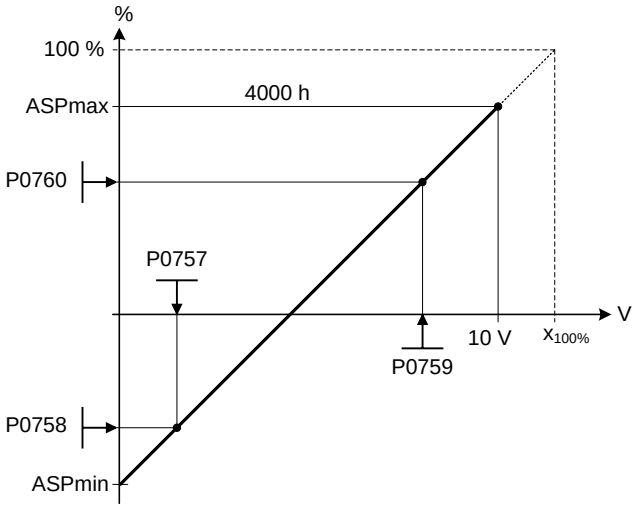
Details:

See P0757 to P0760 (ADC scaling).

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

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

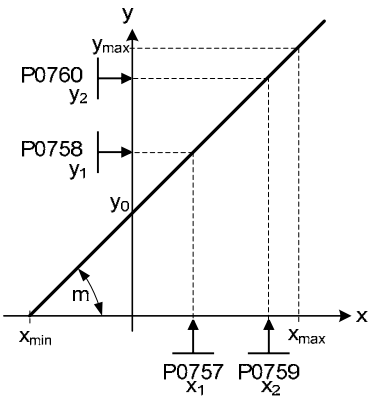
The transformation between these two forms is given by:

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

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.

P0758	**Value y1 of ADC scaling**			**Min:**	-99999.9	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	0.0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:**	99999.9	

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

Dependency:

Affects P2000 to 2002 (reference frequency, voltage, current) depending on which setpoint is to be generated.

P0759	**Value x2 of ADC scaling [V]**			**Min:**	0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** V	**Def:**	10	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:**	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.

P0760	**Value y2 of ADC scaling**			**Min:**	-99999.9	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	100.0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:**	99999.9	

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

Dependency:

Affects P2000 to 2002 (reference frequency, voltage, current) depending on which setpoint is to be generated.

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

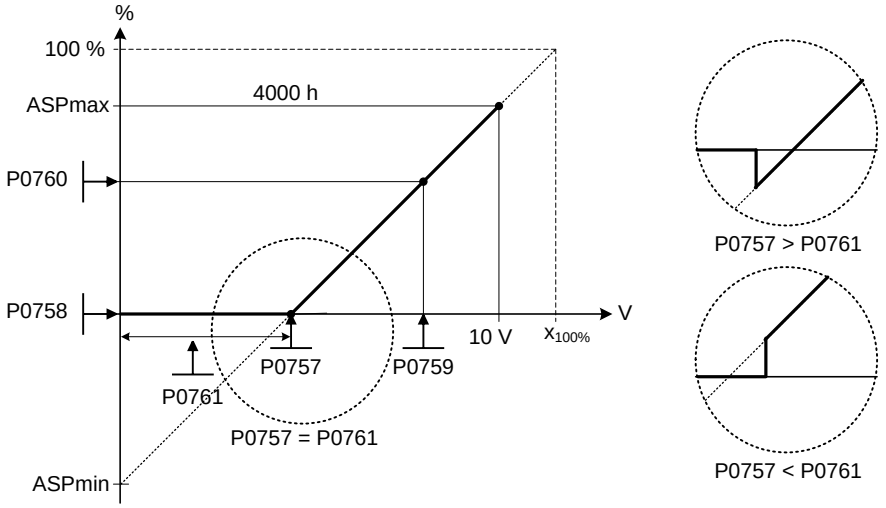
Defines width of deadband on analog input. The diagrams below explain its use.

Example:

The below example produces a 2 to 10 V analog input 0 to 50 Hz (ADC value 2 to 10 V, 0 to 50 Hz):

- P2000 = 50 Hz
- P0759 = 8 V P0760 = 75 %
- P0757 = 2 V P0758 = 0 %
- P0761 = 2 V
- P0756 = 0 or 1

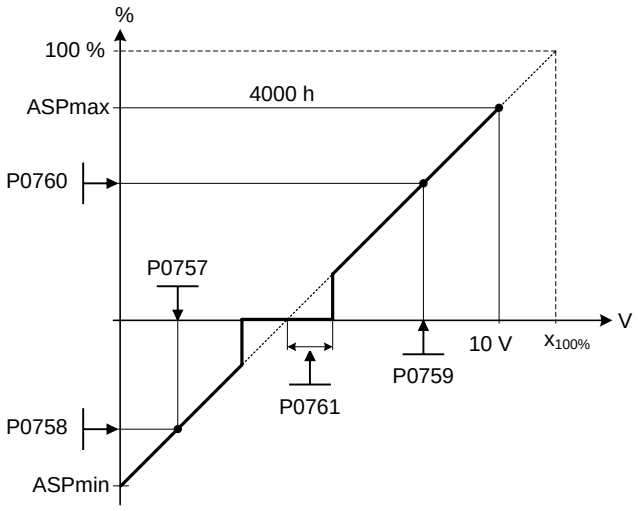
P0761 > 0 and (0 < P0758 < P0760 or 0 > P0758 > P0760)



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, ADC value 0 to 10 V, -50 to +50 Hz):

- P2000 = 50 Hz
- P0759 = 8 V P0760 = 75 %
- P0757 = 2 V P0758 = -75 %
- P0761 = 0.1 V
- P0756 = 0 or 1

P0761 > 0 and P0758 < 0 < P0760



Note:

P0761[x] = 0 : No deadband active.

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.

P0762 Delay for loss of signal action

						Level
CStat:	CUT	**Datatype:** U16	**Unit:** ms	**Min:**	0	**3**
P-Group:	TERMINAL	**Active:** Immediately	**QuickComm.:** No	**Def:**	10	
				Max:	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).

3.9 Analog outputs

r0770 **Number of DACs** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: TERMINAL

Displays number of analog outputs available.

P0771 **CI: DAC** Level **2**

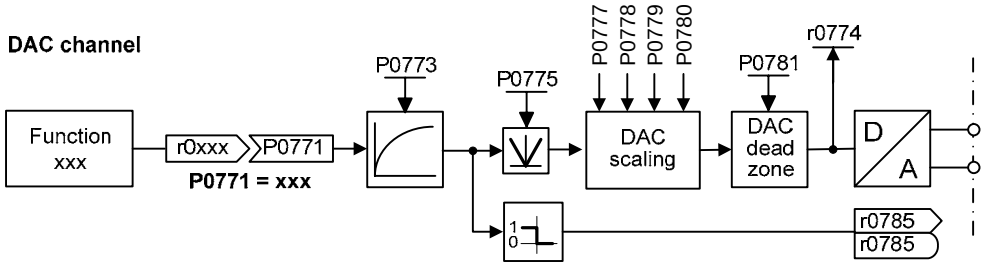
CStat: CUT **Datatype:** U32 **Unit:** - **Min:** 0:0 **Def:** 21:0 **Max:** 4000:0

P-Group: TERMINAL **Active:** first confirm **QuickComm.:** No

Defines function of the 0 - 20 mA analog output.

Common Settings:

21 CO: Act. frequency (scaled to P2000)
24 CO: Act. output frequency (scaled to P2000)
25 CO: Act. output voltage (scaled to P2001)
26 CO: Act. filtered DC-link volt. (scaled to P2001)
27 CO: Act. output current (scaled to P2002)



P0773 **Smooth time DAC** Level **2**

CStat: CUT **Datatype:** U16 **Unit:** ms **Min:** 0 **Def:** 2 **Max:** 1000

P-Group: TERMINAL **Active:** first confirm **QuickComm.:** No

Defines smoothing time [ms] for analog output signal. This parameter enables smoothing for DAC using a PT1 filter.

Dependency:

P0773 = 0: Deactivates filter.

r0774 **Act. DAC value [mA]** Level **2**

Datatype: Float **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: TERMINAL

Shows value of analog output in [mA] after filtering and scaling.

P0775 **Permit absolute value** Level **2**

CStat: CT **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 0 **Max:** 1

P-Group: TERMINAL **Active:** first confirm **QuickComm.:** No

Decides if the absolute value of the analog output is used. If enabled, this parameter will take the absolute value of the value to be outputed. If the value was originally negative then the corresponding bit in r0785 is set, otherwise it is cleared.

Possible Settings:

0 OFF
1 ON

P0776 **Type of DAC** Level **2**

CStat: CT **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 0 **Max:** 0

P-Group: TERMINAL **Active:** first confirm **QuickComm.:** No

Defines type of analog output.

Possible Settings:

0 Current output

Note:

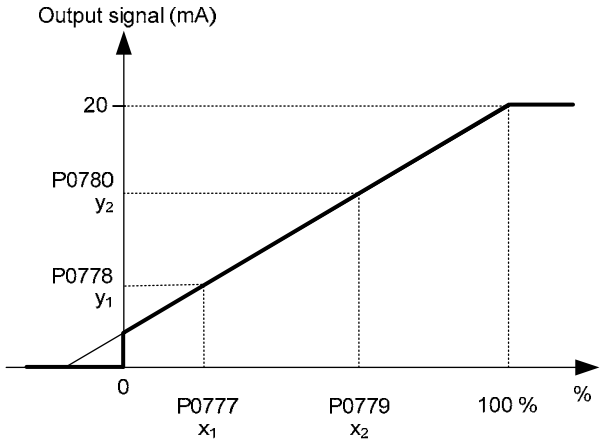
The analog output is designed as a current output with a range of 0...20 mA.

For a voltage output with a range of 0...10 V an external resistor of 500 Ohms has to be connected at the terminals (12/13).

P0777	**Value x1 of DAC scaling**			**Min:**	-99999.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	0.0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:**	99999.0	

Defines x1 output characteristic in [%]. Scaling block is responsible for adjustment of output value defined in P0771 (DAC connector input).

Parameters of DAC scaling block (P0777 ... P0781) work as follows:



Where:
Points P1 (x1, y1) and P2 (x2, y2) can be chosen freely.

Example:
The default values of the scaling block provides a scaling of:
P1: 0.0 % = 0 mA
P2: 100.0 % = 20 mA

Dependency:
Affects P2000 to P2002 (referency frequency, voltage, current) depending on which setpoint is to be generated.

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

$$\frac{y - P0778}{x - P0777} = \frac{P0780 - P0778}{P0779 - P0777}$$

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

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

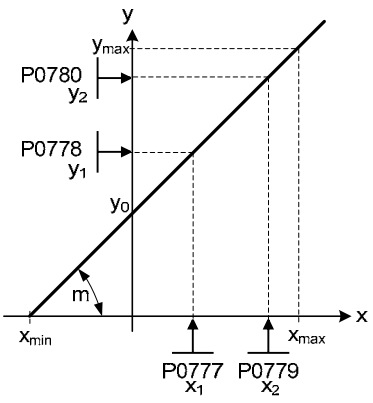
The transformation between these two forms is given by:

$$m = \frac{P0780 - P0778}{P0779 - P0777} \qquad y_0 = \frac{P0778 \cdot P0779 - P0777 \cdot P0780}{P0779 - P0777} \leq \left| 200\,\% \right|$$

For scaling of the input the value of y_max and x_min has to be determined. This is done by the following equations:

$$x_{min} = \frac{P0780 \cdot P0777 - P0778 \cdot P0779}{P0780 - P0778}$$

$$y_{max} = (x_{max} - x_{min}) \cdot \frac{P0780 - P0778}{P0779 - P0777}$$



P0778 **Value y1 of DAC scaling** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit: -**	**Min:**	0
P-Group:	TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	20

Defines y1 of output characteristic.

P0779 **Value x2 of DAC scaling** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	-99999.0
P-Group:	TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Def:**	100.0
				Max:	99999.0

Defines x2 of output characteristic in [%].

Dependency:

Affects P2000 to P2002 (referency frequency, voltage, current) depending on which setpoint is to be generated.

P0780 **Value y2 of DAC scaling** Level **2**

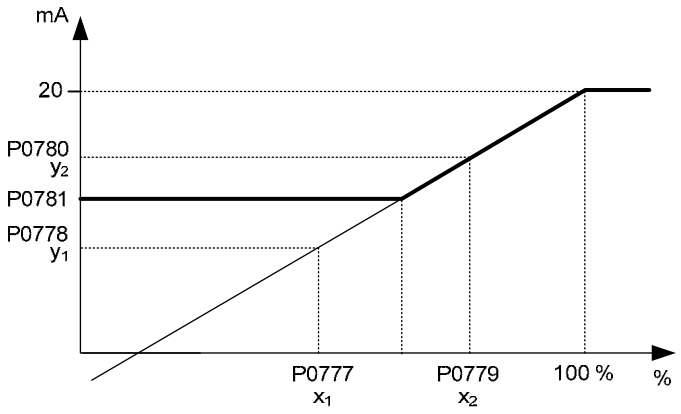
CStat:	CUT	**Datatype:** Float	**Unit:** -	**Min:**	0
P-Group:	TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Def:**	20
				Max:	20

Defines y2 of output characteristic.

P0781 **Width of DAC deadband** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** -	**Min:**	0
P-Group:	TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	20

Sets width of dead-band in [mA] for analog output.



r0785 **CO/BO: Status word of DAC** Level **2**

		Datatype: U16	**Unit:** -	**Min:**	-
P-Group:	TERMINAL			**Def:**	-
				Max:	-

Displays status of analog output. Bit 0 indicates that the value of analog output 1 is negative.

Bitfields:

```
Bit00   Analog output 1 -ve                    0  NO         1  YES
```

3.10 BICO command parameters

P0800 **BI: Download parameter set 0** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	4000:0

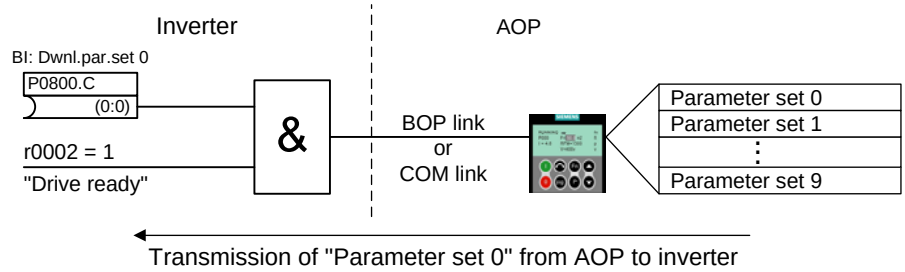
Defines source of command to start download of parameter set 0 from attached AOP.

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)

Dependency:

1. The parameter set 0 can only be downloaded in conjunction with the AOP
2. Establish communications between the frequency inverter and AOP
3. The frequency inverter must be selected using the AOP if the AOP is connected at the COM link interface (RS485)
4. Select the frequency inverter state "Ready" (r0002 = 1)
5. Signal from P0800:
   0 = Do not download.
   1 = Start to download parameter set 0 from the AOP.



P0801 **BI: Download parameter set 1** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	4000:0

Defines sources of command to start download of parameter set 1 from attached AOP.

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)

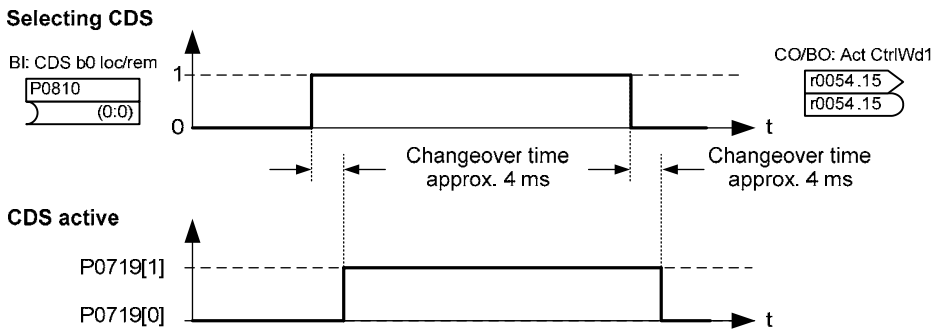
Note:

See parameter P0800

P0810 **BI: CDS bit 0 (Local / Remote)** Level **2**

CStat:	CUT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	4095:0

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



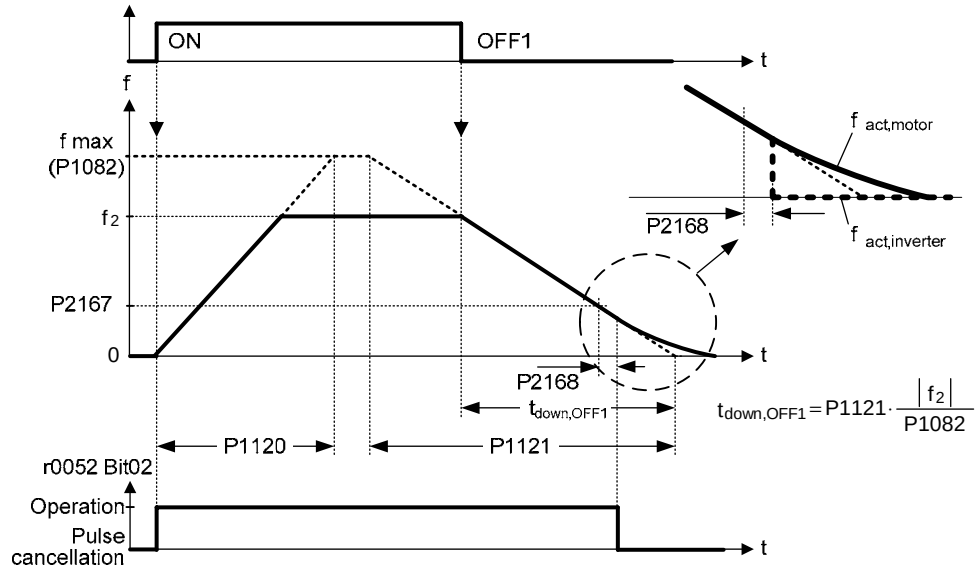
Common Settings:

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)

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



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 < 10. See parameter P0719 (Selection of command/setpoint source).

Note:

- OFF1 means a ramp stop down to 0 using P1121.
- OFF1 is low active.
- For the priority of all soft commands, the following applies: OFF2, OFF3, OFF1

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

Allows ON/OFF1 reverse command source to be selected using BICO.

Normally in this case at a positive frequency setpoint, it is getting approached ccw (negative frequency setpoint) 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

Details:

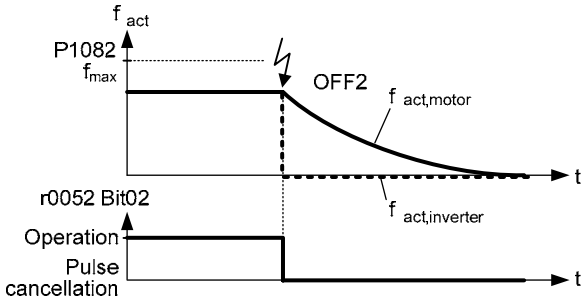
See parameter P0840.

P0844 **BI: 1. OFF2** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	1:0
				Max:	4000:0

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



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 < 10. See parameter P0719 (Selection of command/setpoint source).

Note:

- OFF2 means an immediate pulse inhibit; the motor coasts down.
- OFF2 is low active.
- The following applies for the priority of all of the OFF commands: OFF2, OFF3, OFF1

P0845 **BI: 2. OFF2** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	19:1
				Max:	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. If one of the digital inputs is selected for OFF2, the inverter will not run unless the digital input is active.

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

Details:

See parameter P0844.

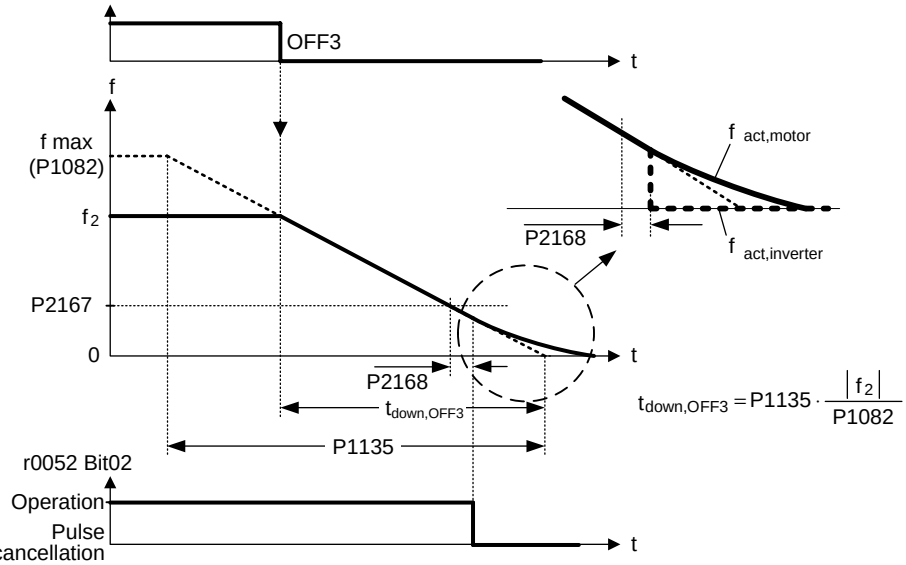
P0848 **BI: 1. OFF3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	1:0
				Max:	4000:0

Level **3**

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



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 < 10. See parameter P0719 (Selection of command/setpoint source).

Note:

- OFF3 means fast ramp-down to 0 Hz through P1135.
- OFF3 is low-active.
- Priority of all OFF commands: OFF2, OFF3, OFF1

P0849 **BI: 2. OFF3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	1:0
				Max:	4000:0

Level **3**

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

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).

Details:

See parameter P0848.

P0852	BI: Pulse enabling			Min:	0:0	Level
	CStat: CT	Datatype: U32	Unit: -	Def:	1:0	3
	P-Group: COMMANDS	Active: first confirm	QuickComm.: No	Max:	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 < 10. See parameter P0719 (Selection of command/setpoint source).

3.11 Communication parameters

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

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

There are two ways to set the bus address:
- via DIP switches on the PROFIBUS module
- 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.

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

Specifies the interfaces which can be used to change parameters.

This parameter allows the user to easily protect the inverter from unauthorized modification of parameters.
Annotation: Parameter P0927 is not password protected.

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:

Bits 0, 1, 2 and 3 set:
The default setting allows parameters to be changed via any interface. If all bits are set, the parameter is displayed on BOP as follows:



Bits 0, 1, 2 and 3 reset:
This setting allows no parameters to be modified via any interface with the exception of P0003 and P0927. If all bits are reset, the parameter is displayed on BOP as follows:



Details:

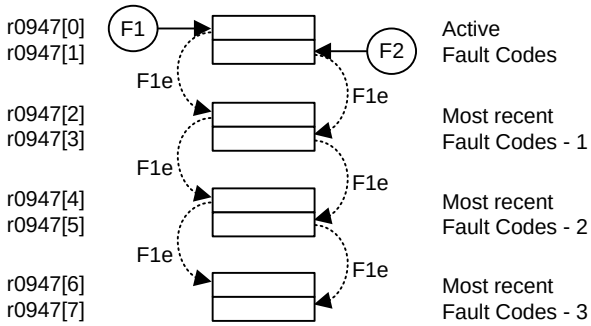
The seven-segment display is explained in the "Introduction to MICROMASTER System Parameters" in this handbook.

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

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"

r0948[12] **CO: Fault time**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

Level **3**

P-Group: ALARMS

Time stamp to indicate when the fault has occurred.

Index:

r0948[0] : Recent fault trip --, time stamp
r0948[1] : Recent fault trip --, time stamp
r0948[2] : Recent fault trip --, time stamp
r0948[3] : Recent fault trip -1, time stamp
r0948[4] : Recent fault trip -1, time stamp
r0948[5] : Recent fault trip -1, time stamp
r0948[6] : Recent fault trip -2, time stamp
r0948[7] : Recent fault trip -2, time stamp
r0948[8] : Recent fault trip -2, time stamp
r0948[9] : Recent fault trip -3, time stamp
r0948[10] : Recent fault trip -3, time stamp
r0948[11] : Recent fault trip -3, time stamp

Details:

Parameter r2114 (runtime counter) is a possible source of the time stamp. When using the runtime counter, the time is entered into the first two indices of the fault trip (shutdown) essentially the same as for r2114.

Time stamp when using r2114 (Refer to parameter r2114):

r0948[0] : Last fault trip --, system time, seconds, upper word
r0948[1] : Last fault trip --, system time, seconds, lower word
r0948[2] : 0
r0948[3] : Last fault trip --, system time, seconds, upper word
r0948[4] : Last fault trip --, system time, seconds, lower word
r0948[5] : 0
r0948[6] : Last fault trip --, system time, seconds, upper word
r0948[7] : Last fault trip --, system time, seconds, lower word
r0948[8] : 0
r0948[9] : Last fault trip --, system time, seconds, upper word
r0948[10] : Last fault trip --, system time, seconds, lower word
r0948[11] : 0

Parameter P2115 (AOP real-time clock) is an additional possible source of the time stamp. When using the real-time counter, instead of the system runtime r2114[0] and r2114[1], the value of the real-time clock P2115[0] to P2115[2] is read-in.

If the contents of parameter P2115 = 0, then the system assumes that there was no synchronization with the real time. In this case, if there is a fault, values are transferred from parameter r2114 into parameter P0948. If the contents of parameter P2115 are not equal to zero, then a synchronization with real time has taken place. In this case, if there is a fault, the values from parameter P2115 are transferred into parameter P0948.

Time stamp when using P2115 (Refer to parameter P2115 (AOP real-time clock)):

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

r0949[8] **CO: Fault value**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

Level **3**

P-Group: ALARMS

Displays drive fault values. It is for service purposes and indicate the type of fault reported. The values 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

P0952 **Total number of faults** Level **3**

CStat: CUT **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 0 **Max:** 8

P-Group: ALARMS **Active:** first confirm **QuickComm.:** No

Displays number of faults stored in r0947 (last fault code).

Dependency:

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

r0964[5] **Firmware version data** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: 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	

r0965 **Profibus profile** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

Identification of profile number and version for PROFIDrive.

r0967 **Control word 1** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

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   Pulses enabled                       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
```

r0968 **Status word 1** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

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

P0970 **Factory reset** Level **1**

CStat: C **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 0

P-Group: PAR_RESET **Active:** first confirm **QuickComm.:** No **Max:** 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

P0971 **Transfer data from RAM to EEPROM** Level **3**

CStat: CUT **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 0

P-Group: COMM **Active:** first confirm **QuickComm.:** No **Max:** 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.

The storage from RAM to EEPROM is accomplished via P0971. The communications are reset, if the transfer was successful. During the reset process communications will be interrupted. This creates the following conditions:

- PLC (e.g. SIMATIC S7) enters Stop mode
- Starter automatically recovers communications once they are re-established.
- Drivemonitor is displayed "NC" (not connected) in the status line or "drive busy".
- BOP displays "busy"

After completion of the transfer process, the communication between the inverter and the PC-tools (e.g. Starter) or BOP is automatically re-established.

3.12 Setpoint source

P1000	Selection of frequency setpoint			Min:	0	Level
	CStat: CT	Datatype: U16	Unit: -	Def:	2	1
	P-Group: SETPOINT	Active: first confirm	QuickComm.: Yes	Max:	66	

Selects frequency setpoint source.
The selection of settings is detailed in the following table of possible settings, in which the Main setpoint is given by the least significant digit (right-hand position) and the Additional setpoint is given by the most significant digit (left-hand position).

Possible Settings:

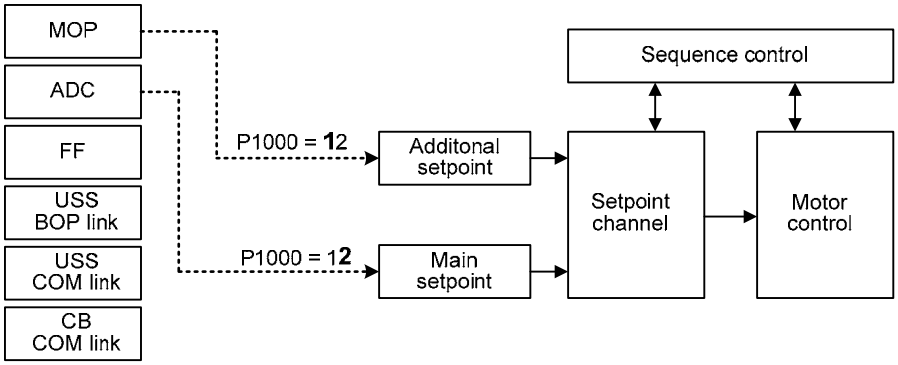
0	No main setpoint		
1	MOP setpoint		
2	Analog setpoint		
3	Fixed frequency		
4	USS on BOP link		
5	USS on COM link		
6	CB on COM link		
10	No main setpoint	+	MOP setpoint
11	MOP setpoint	+	MOP setpoint
12	Analog setpoint	+	MOP setpoint
13	Fixed frequency	+	MOP setpoint
14	USS on BOP link	+	MOP setpoint
15	USS on COM link	+	MOP setpoint
16	CB on COM link	+	MOP setpoint
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
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
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
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
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

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



Caution:

Be aware, by changing of parameter P1000 all BICO parameters (see table below) are modified.

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 = 5	y = 6	
P1000 = xy	x = 0	0.0	1050.0	755.0	1024.0	2015.1	2018.1	2050.1	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	2018.1	2050.1	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	2018.1	2050.1	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	755.0	1024.0	2015.1	2018.1	2050.1	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	2018.1	2050.1	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 = 5	0.0	1050.0	755.0	1024.0	2015.1	2018.1		P1070
		1.0	1.0	1.0	1.0	1.0	1.0		P1071
		2018.1	2018.1	2018.1	2018.1	2018.1	2018.1		P1075
		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	P1070
		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	P1075
		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

3.13 Fixed frequencies

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

Defines fixed frequency setpoint 1.

There are three options available for selection of the 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:

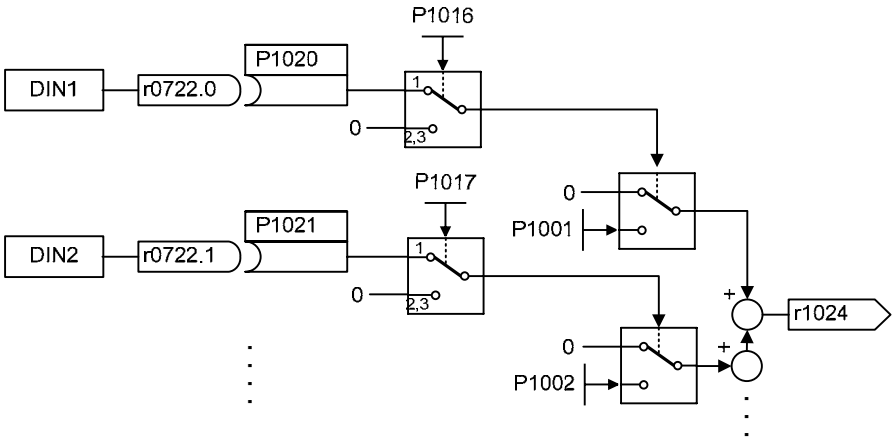
Example:

Binary coded selection :

		DIN3	**DIN2**	**DIN1**
0 Hz	FF0	0	0	0
P1001	FF1	0	0	**1**
P1002	FF2	0	**1**	0
P1003	FF3	0	**1**	**1**
P1004	FF4	**1**	0	0
P1005	FF5	**1**	0	**1**
P1006	FF6	**1**	**1**	0
P1007	FF7	**1**	**1**	**1**

Direct selection of FF P1001 via DIN 1:

P0701 = 15 or P0701 = 99, P1020 = 722.0, P1016 = 1
P0702 = 15 or P0702 = 99, P1021 = 722.1, P1017 = 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.

P1002 **Fixed frequency 2** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	-650.00
P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:**	5.00
				Max:	650.00

Defines fixed frequency setpoint 2.

Details:

See parameter P1001 (fixed frequency 1).

P1003 **Fixed frequency 3** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	-650.00
P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:**	10.00
				Max:	650.00

Defines fixed frequency setpoint 3.

Details:

See parameter P1001 (fixed frequency 1).

P1004 **Fixed frequency 4** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	-650.00
P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:**	15.00
				Max:	650.00

Defines fixed frequency setpoint 4.

Details:

See parameter P1001 (fixed frequency 1).

P1005 **Fixed frequency 5** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	-650.00
P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:**	20.00
				Max:	650.00

Defines fixed frequency setpoint 5.

Details:

See parameter P1001 (fixed frequency 1).

P1006 **Fixed frequency 6** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	-650.00
P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:**	25.00
				Max:	650.00

Defines fixed frequency setpoint 6.

Details:

See parameter P1001 (fixed frequency 1).

P1007 **Fixed frequency 7** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	-650.00
P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:**	30.00
				Max:	650.00

Defines fixed frequency setpoint 7.

Details:

See parameter P1001 (fixed frequency 1).

P1016 **Fixed frequency mode - Bit 0** Level **3**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	1
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Def:**	1
				Max:	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.

P1017 **Fixed frequency mode - Bit 1** Level **3**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	1
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Def:**	1
				Max:	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.

P1018 **Fixed frequency mode - Bit 2** Level **3**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	1
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Def:**	1
				Max:	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.

P1020 **BI: Fixed freq. selection Bit 0** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	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)

P1021 **BI: Fixed freq. selection Bit 1** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	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

P1022 **BI: Fixed freq. selection Bit 2** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	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

r1024 **CO: Act. fixed frequency** Level **3**

		Datatype: Float	**Unit:** Hz	**Min:**	-
				Def:	-
P-Group:	SETPOINT			**Max:**	-

Displays sum total of selected fixed frequencies.

3.14 Motorized potentiometer (MOP)

P1031 **Setpoint memory of the MOP** Level **2**

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:**	0
				Max:	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).

P1032 **Inhibit negative MOP setpoints** Level **2**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Def:**	1
				Max:	1

This parameter suppresses negative setpoints of the MOP output r1050.

Possible Settings:

0 Neg. MOP setpoint is allowed
1 Neg. MOP setpoint inhibited

Note:

The reversing functions (e.g. BOP-Reverse button if P0700 = 1) are not affected by the settings of P1032. Use P1110 to fully prevent change of direction in setpoint channel.

P1035 **BI: Enable MOP (UP-command)** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	19:13
				Max:	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

P1036 **BI: Enable MOP (DOWN-command)** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	19:14
				Max:	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

P1040 **Setpoint of the MOP** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	-650.00
P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:**	5.00
				Max:	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.

For BOP/AOP control P1040 must be greater than the min. frequency P1080.

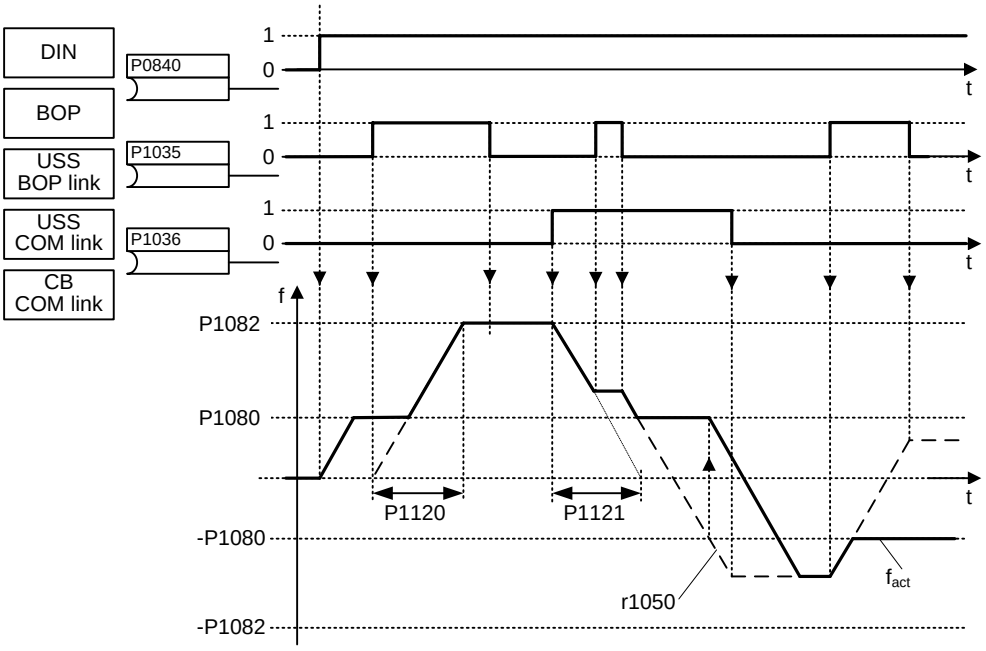
r1050 **CO: Act. Output freq. of the MOP**

Datatype: Float **Unit:** Hz **Min:** - **Def:** - **Max:** -

Level **3**

P-Group: SETPOINT

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



Possible parameter settings for the selection of MOP:

	Selection	MOP up	MOP down
DIN	P0719 = 0, P0700 = 2, P1000 = 1 or P0719 = 1, P0700 = 2	P0702 = 13 (DIN2)	P0703 = 14 (DIN3)
BOP	P0719 = 0, P0700 = 1, P1000 = 1 or P0719 = 1, P0700 = 1 or P0719 = 11	UP button	DOWN button
USS on BOP link (AOP)	P0719 = 0, P0700 = 4, P1000 = 1 or P0719 = 1, P0700 = 4 or P0719 = 41	USS control word r2032 Bit13	USS control word r2032 Bit14
USS on COM link	P0719 = 0, P0700 = 5, P1000 = 1 or P0719 = 1, P0700 = 5 or P0719 = 51	USS control word r2036 Bit13	USS control word r2036 Bit14
CB	P0719 = 0, P0700 = 6, P1000 = 1 or P0719 = 1, P0700 = 6 or P0719 = 61	CB control word r2090 Bit13	CB control word r2090 Bit14

3.15 JOG

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

Defines source of JOG right.

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

Dependency:

Active only when P0719 < 10. See parameter P0719 (Selection of command/setpoint source).

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

Defines source of JOG left.

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

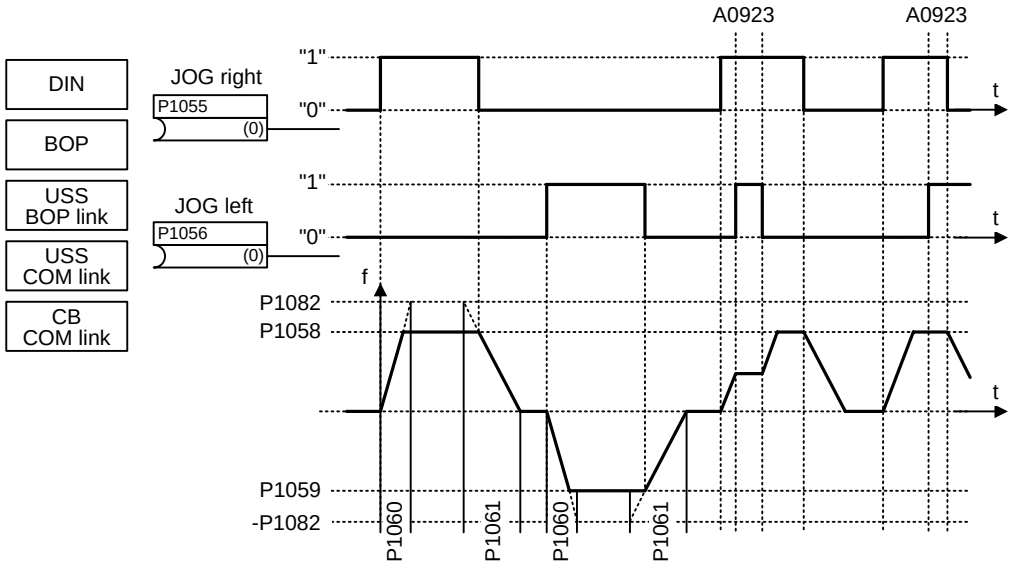
Dependency:

Active only when P0719 < 10. See parameter P0719 (Selection of command/setpoint source).

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

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

If JOG clockwise (jogging clockwise) or JOG counter-clockwise is selected, the speed is increased until the value, set in P1058 is reached.



Dependency:

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

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

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

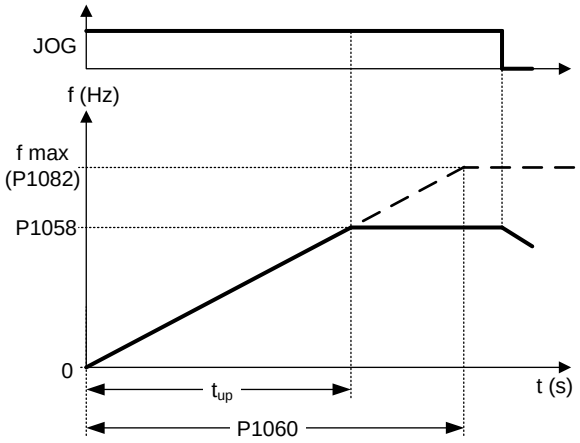
Dependency:

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

P1060 **JOG ramp-up time** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** s	**Min:**	0.00
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Def:**	10.00
				Max:	650.00

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



$$t_{up} = \frac{P1058}{P1082} \cdot P1060$$

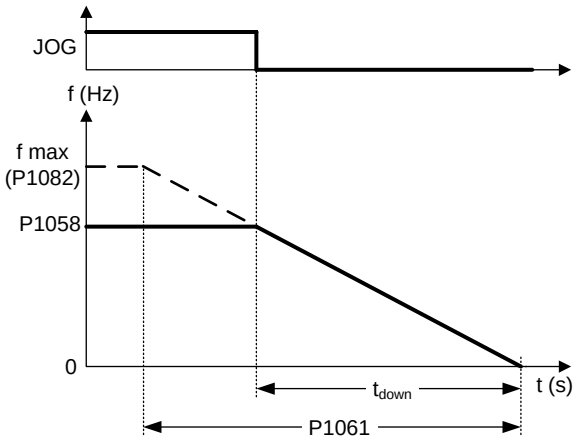
Notice:

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

P1061 **JOG ramp-down time** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** s	**Min:**	0.00
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Def:**	10.00
				Max:	650.00

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



$$t_{down} = \frac{P1058}{P1082} \cdot P1061$$

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

3.16 Setpoint channel

P1070 **CI: Main setpoint** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Def:**	755:0
				Max:	4000:0

Defines source of main setpoint.

Common Settings:

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

P1071 **CI: Main setpoint scaling** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Def:**	1:0
				Max:	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

P1074 **BI: Disable additional setpoint** Level **3**

CStat:	CUT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	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)

P1075 **CI: Additional setpoint** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	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

P1076 **CI: Additional setpoint scaling** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Def:**	1:0
				Max:	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

r1078 **CO: Total frequency setpoint** Level **3**

		Datatype: Float	**Unit:** Hz	**Min:**	-
				Def:	-
P-Group:	SETPOINT			**Max:**	-

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

r1079 **CO: Selected frequency setpoint** Level **3**

		Datatype: Float	**Unit:** Hz	**Min:**	-
				Def:	-
P-Group:	SETPOINT			**Max:**	-

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.

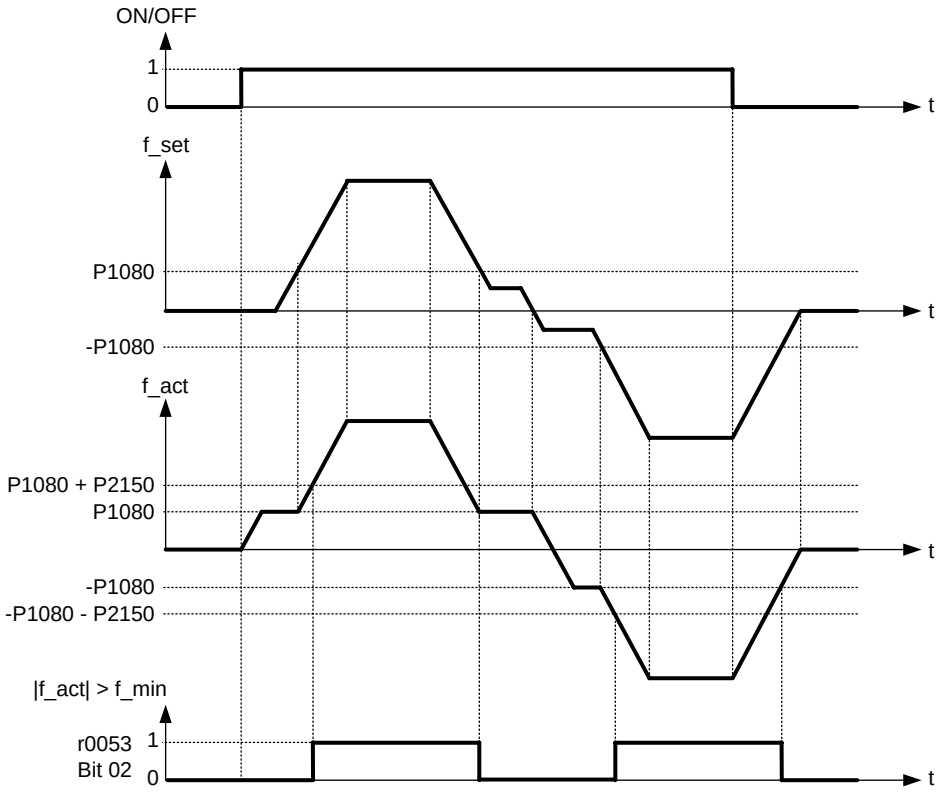
P1080	**Min. frequency**			**Min:**	0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	0.00	**1**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** Yes	**Max:**	650.00	

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.

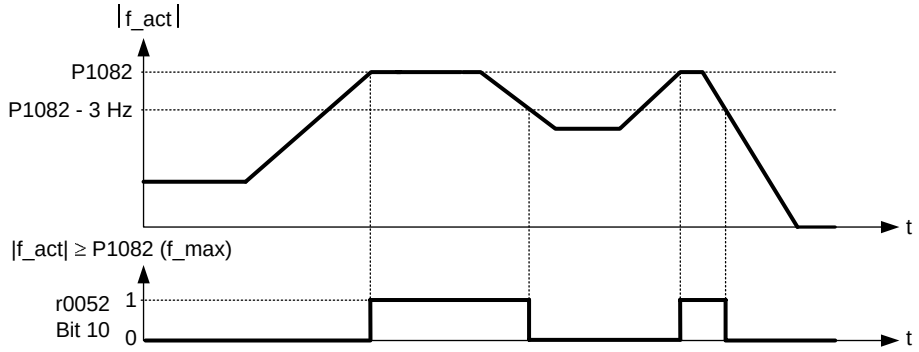
Under certain conditions (e.g. ramping, current limiting), motor can run below minimum frequency.

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

Sets maximum motor frequency [Hz] at which motor will run irrespective of the frequency setpoint. The value set here is valid for both clockwise and anticlockwise rotation.

Futhermore, the monitoring function |f_act| >= P1082 (r0052 Bit10, see example below) is affected by this parameter.

Example:



Dependency:

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

	P1800			
	2 kHz	4 kHz	6 kHz	8 - 16 kHz
f_{max} P1082	0 - 133.3 Hz	0 - 266.6 Hz	0 - 400 Hz	0 - 650 Hz

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

- $p1335 \neq 0$ (Slip compensation active) :

$$fmax(p1335) = fmax + fslip,max = p1082 + \frac{p1336}{100} \cdot \frac{r0330}{100} \cdot p0310$$

- $p1200 \neq 0$ (Flying restart active) :

$$fmax(p1200) = fmax + 2 \cdot fslip,nom = p1082 + 2 \cdot \frac{r0330}{100} \cdot p0310$$

Note:

When using the setpoint source

- Analog Input
- USS
- CB (e.g. PROFIBUS)

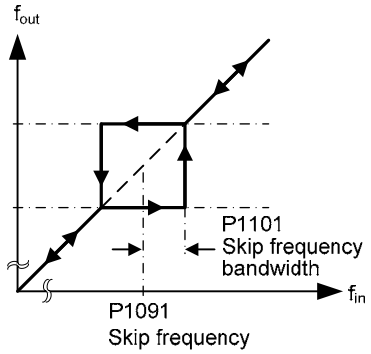
The setpoint frequency (in Hz) is cyclically calculated using a percentage value (e.g. for the analog input r0754) or a hexadecimal value (e.g. for the USS r2018[1]) and the reference frequency P2000.

If for example P1082 = 80 Hz, P2000 = 50 Hz and the analog input is parameterised with P0757 = 0 V, P0758 = 0 %, P0759 = 10 V, P0760 = 100 %, a setpoint frequency of 50 Hz will be applied at 10 V of the analog input.

P1091 **Skip frequency 1** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	0.00
P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.00
				Max:	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).

P1092 **Skip frequency 2** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	0.00
P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.00
				Max:	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).

P1093 **Skip frequency 3** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	0.00
P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.00
				Max:	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).

P1094 **Skip frequency 4** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	0.00
P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.00
				Max:	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).

P1101 **Skip frequency bandwidth** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	0.00
P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:**	2.00
				Max:	10.00

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

Details:

See P1091 (skip frequency 1).

P1110 **BI: Inhibit neg. freq. setpoint** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	4000:0

This parameter suppresses negative setpoints. Therefore, modification of the motor direction is inhibited to the setpoint channel.

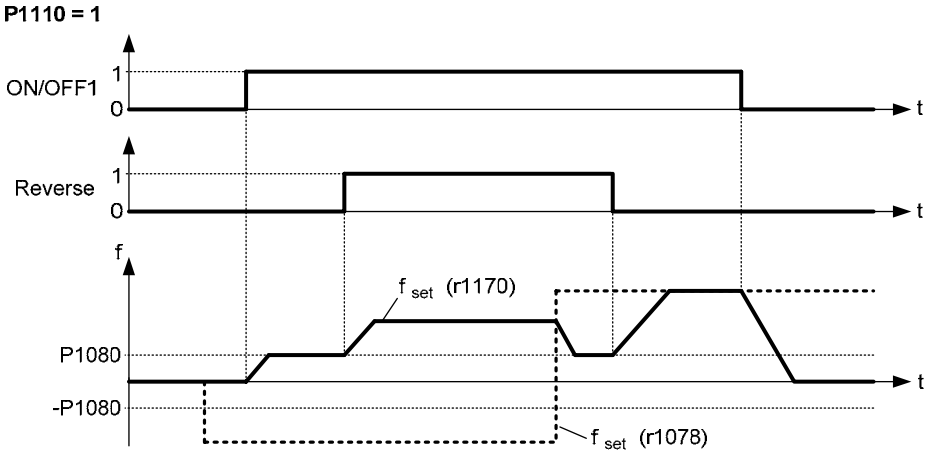
Common Settings:

0 = Disabled
1 = Enabled

Notice:

Where

- If a min. frequency (P1080) and a negative setpoint are given, the motor is accelerated by a positive value in relationship to the min. frequency.
- This function does not disable the "reverse command functions" (e.g. Reverse, ON left); rather, a reverse command causes motor to run in the positive direction only, as described above.



P1113	BI: Reverse				Min:	0:0	Level
	CStat:	CT	Datatype: U32	Unit: -	Def:	722:1	3
	P-Group:	COMMANDS	Active: first confirm	QuickComm.: No	Max:	4000:0	

Defines source of reverse 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)
19.B = Reverse via BOP

Dependency:

Active only when P0719 < 10. See parameter P0719 (Selection of command/setpoint source).

Note:

P1113: =: 0 → Reverse disabled via AOP/BOP Reverse key.

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

Displays setpoint frequency after change of direction.

3.17 Ramp-function generator

r1119 **CO: Freq. setpoint before RFG** Level **3**

Datatype: Float **Unit:** Hz **Min:** - **Def:** - **Max:** -

P-Group: SETPOINT

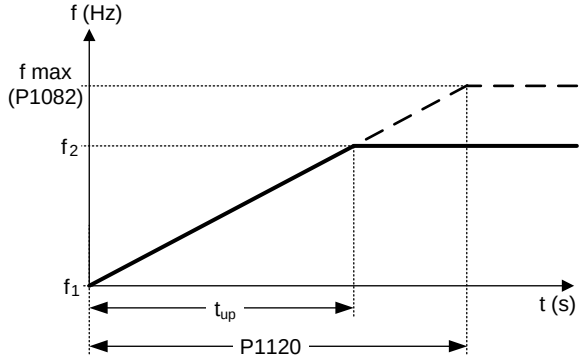
Displays output frequency after modification by other functions, e.g.:
- P1110 BI: Inhibit neg. freq. setpoint,
- P1091 - P1094 skip frequencies,
- P1080 Min. frequency,
- P1082 Max. frequency,
- limitations,
- etc.

P1120 **Ramp-up time** Level **1**

CStat: CUT **Datatype:** Float **Unit:** s **Min:** 0.00 **Def:** 10.00 **Max:** 650.00

P-Group: SETPOINT **Active:** first confirm **QuickComm.:** Yes

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



$$t_{up} = \frac{|f_2 - f_1|}{P1082} \cdot P1120$$

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:

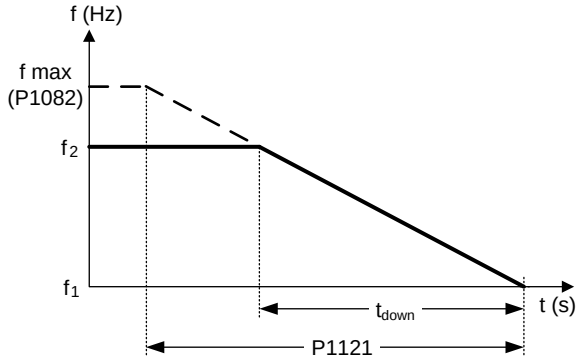
Ramp times will be used as follows:
- P1060 / P1061 : JOG mode is active
- P1120 / P1121 : Normal mode (ON/OFF) is active
- P1060 / P1061 : Normal mode (ON/OFF) and P1124 is active

P1121 **Ramp-down time** Level **1**

CStat: CUT **Datatype:** Float **Unit:** s **Min:** 0.00 **Def:** 10.00 **Max:** 650.00

P-Group: SETPOINT **Active:** first confirm **QuickComm.:** Yes

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



$$t_{down} = \frac{|f_2 - f_1|}{P1082} \cdot P1121$$

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

P1124 **BI: Enable JOG ramp times** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	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:

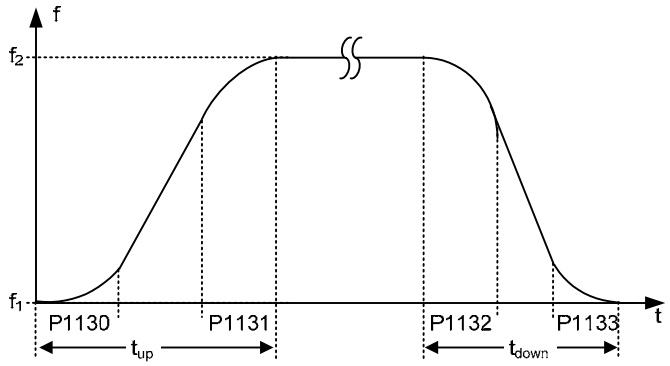
P1124 does not have any impact when JOG mode is selected. In this case, jog ramp times (P1060, P1061) will be used all the time.

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

P1130 **Ramp-up initial rounding time** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** s	**Min:**	0.00
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Def:**	0.00
				Max:	40.00

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



where:

for $\frac{f_2 - f_1}{P1082} \cdot P1120 \geq \frac{1}{2}(P1130 + P1131)$

$$t_{up} = \frac{1}{2}(P1130 + P1131) + \frac{f_2 - f_1}{P1082} \cdot P1120$$

for $\frac{f_2 - f_1}{P1082} \cdot P1121 \geq \frac{1}{2}(P1132 + P1133)$

$$t_{down} = \frac{1}{2}(P1132 + P1133) + \frac{f_2 - f_1}{P1082} \cdot P1121$$

Note:

- If short or zero ramp times (P1120, P1121 < P1130, P1131, P1132, P1133) are set, the total ramp up time (t_up) or ramp down time (t_down) will not depend on P1130.
- See equations above for valid conditions to calculate t_up and t_down.
- Rounding times are recommended, since they prevent an abrupt response, thus avoiding detrimental effects on the mechanics.
- Rounding times are not recommended when analog inputs are used, since they would result in overshoot/undershoot in the inverter response.

P1131 **Ramp-up final rounding time** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** s	**Min:**	0.00
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Def:**	0.00
				Max:	40.00

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

Details:

See parameter P1130.

P1132 **Ramp-down initial rounding time** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** s	**Min:**	0.00
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Def:**	0.00
				Max:	40.00

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

Details:

See parameter P1130.

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

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

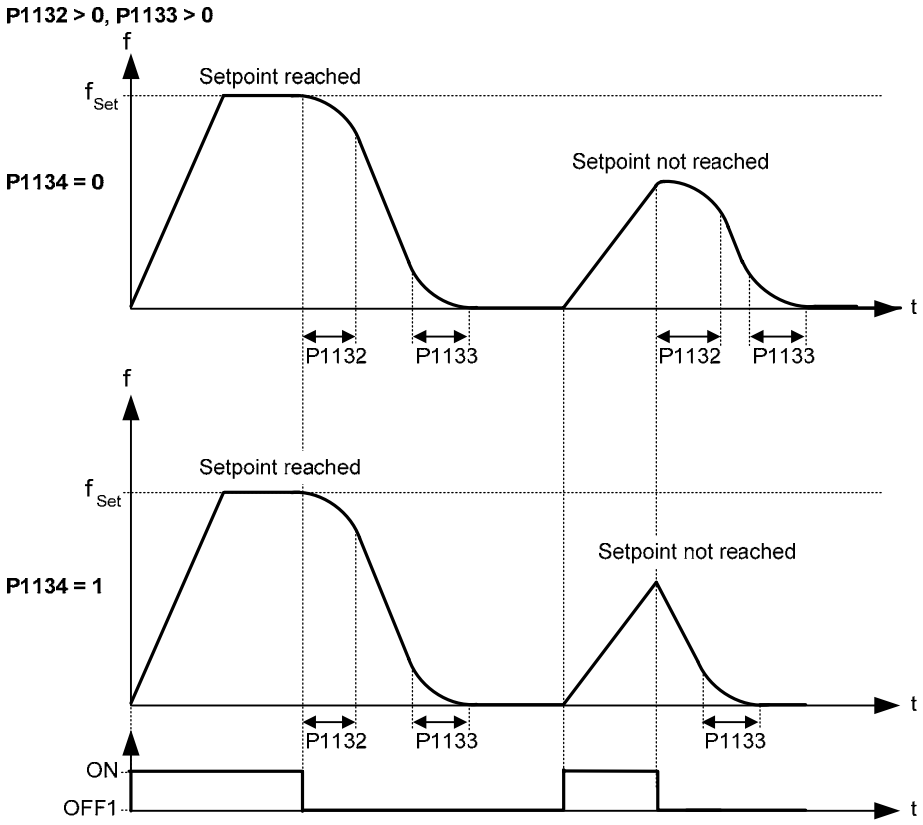
Details:

See parameter P1130.

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

Defines the smoothing which is active by setpoint modifications during acceleration or deceleration (e.g. new setpoint, OFF1, OFF3, REV).

This smoothing is applied, if the motor is ramped-up or ramped-down and
- P1134 = 0,
- P1132 > 0, P1133 > 0 and
- the setpoint is not yet reached.



Possible Settings:

0 Continuous smoothing
1 Discontinuous smoothing

Dependency:

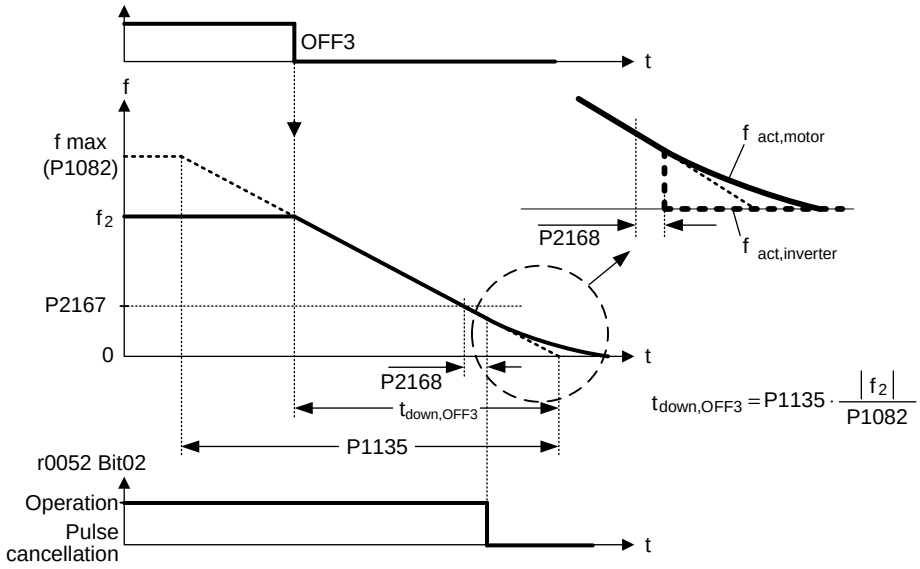
No effect until P1132 (Ramp-down initial rounding time) or P1133 (Ramp-down final rounding time) > 0 s.

P1135 **OFF3 ramp-down time**

CStat:	CUT	**Datatype:** Float	**Unit:** s	**Min:**	0.00
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** Yes	**Def:**	5.00
				Max:	650.00

Level **2**

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.

P1140 **BI: RFG enable**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	1:0
				Max:	4000:0

Level **3**

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

P1141 **BI: RFG start**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	1:0
				Max:	4000:0

Level **3**

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

P1142 **BI: RFG enable setpoint**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	1:0
				Max:	4000:0

Level **3**

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

r1170 **CO: Frequency setpoint after RFG**

		Datatype: Float	**Unit:** Hz	**Min:**	-
P-Group:	SETPOINT			**Def:**	-
				Max:	-

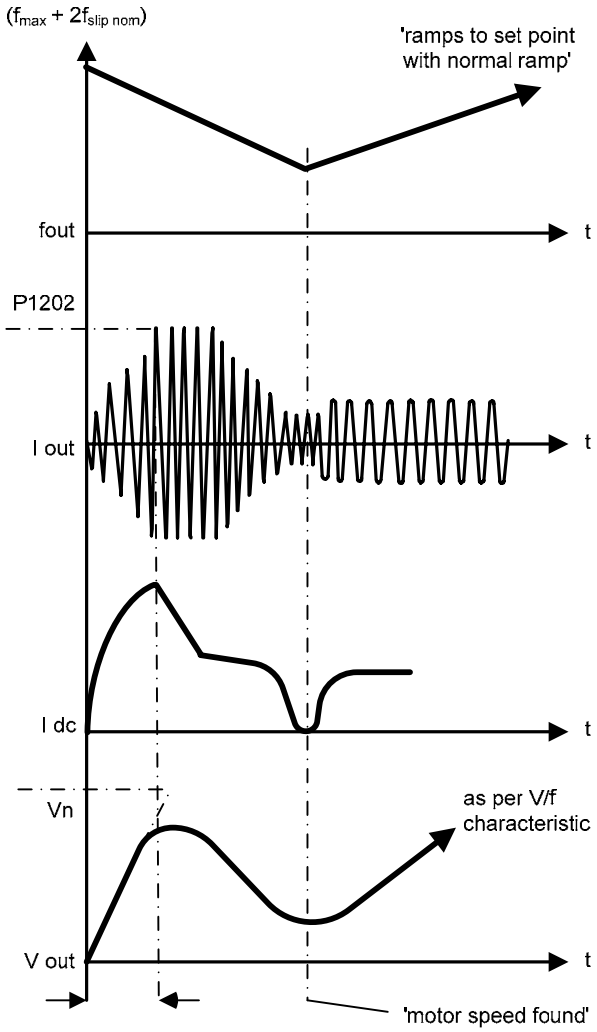
Level **3**

Displays overall frequency setpoint after ramp generator.

3.18 Flying restart

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

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

Defines search current used for flying start. Value is in [%] based on rated motor current (P0305).

Note:

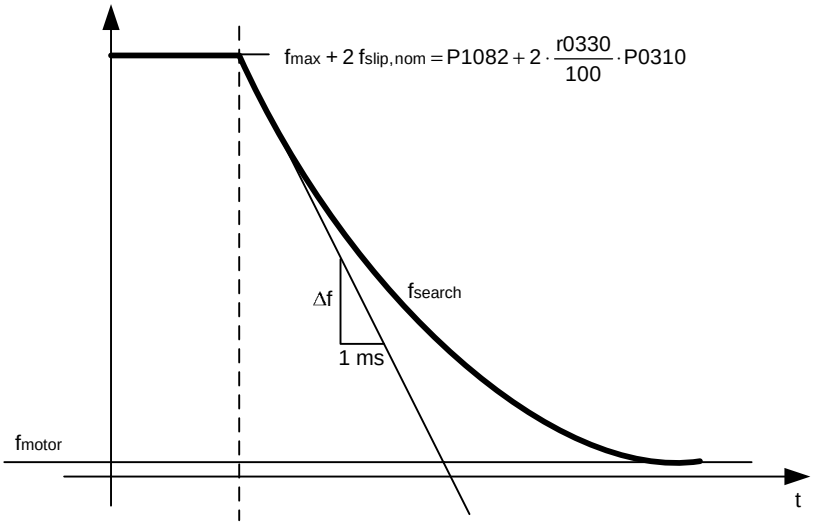
- If the search current is reduced, the flying restart behavior can be improved if the system inertia is not very high.

P1203 **Search rate: Flying start** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** %	**Min:**	10
P-Group:	FUNC	**Active:** first confirm	**QuickComm.:** No	**Def:**	100
				Max:	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.

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



$$P1203[\%] = \frac{\Delta t\,[ms]}{\Delta f\,[Hz]} \cdot \frac{f_{slip,nom}\,[Hz]}{1[ms]} \cdot 2\,[\%] \quad \Rightarrow \quad \Delta f = \frac{2\,[\%]}{P1203[\%]} \cdot \frac{r0330}{100} \cdot P0310$$

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.

r1204 **CO/BO: Status word:Flying start** Level **3**

		Datatype: U16	**Unit:** -	**Min:**	-
P-Group:	FUNC			**Def:**	-
				Max:	-

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
Bit08	Flying start active	0	NO	1	YES
Bit09	Flying start selected	0	NO	1	YES

3.19 Automatic restart

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

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 in 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 bronwout. 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 bronwout. 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	ON always active (permanent)				ON in no-voltage condition	
	Fault F0003 on		All other faults on		All faults on	No faults on
	Blackout	Brownout	Blackout	Brownout	Blackout	Blackout
0	–	–	–	–	–	–
1	Fault acknowl.	–	Fault acknowl.	–	Fault acknowl.	–
2	Fault acknowl. + restart	–	–	–	–	Restart
3	Fault acknowl. + restart	Fault acknowl. + restart	Fault acknowl. + restart	Fault acknowl. + restart	Fault acknowl. + restart	–
4	Fault acknowl. + restart	Fault acknowl. + restart	–	–	–	–
5	Fault acknowl. + restart	–	Fault acknowl. + restart	–	Fault acknowl. + restart	Restart
6	Fault acknowl. + restart	Fault acknowl. + restart	Fault acknowl. + restart	Fault acknowl. + restart	Fault acknowl. + restart	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).

P1211 **Number of restart attempts** Level **3**

CStat: CUT **Datatype:** U16 **Unit:** - **Min:** 0
P-Group: FUNC **Active:** first confirm **QuickComm.:** No **Def:** 3
Max: 10

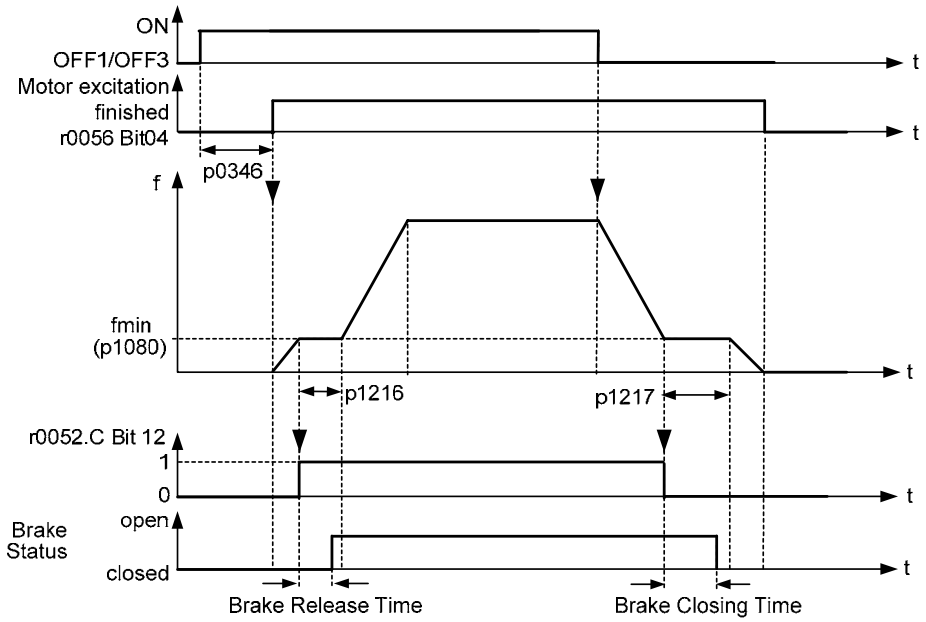
Specifies number of times inverter will attempt to restart if automatic restart P1210 is activated.

3.20 Motor holding brake

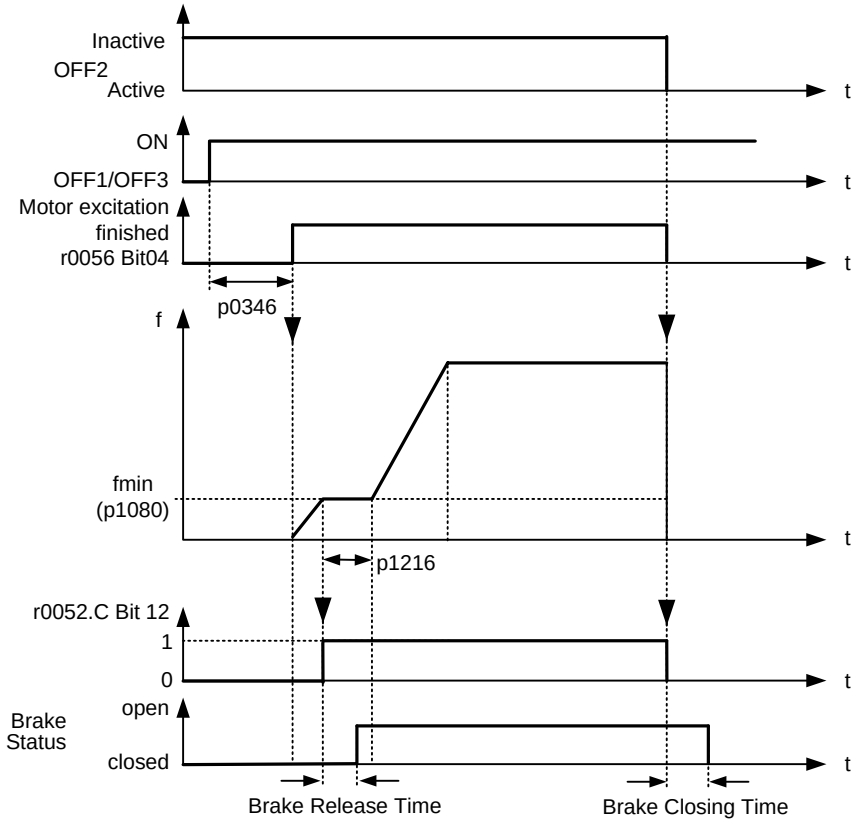
P1215	Holding brake enable				Min: 0	Level
	CStat: T	Datatype: U16	Unit: -		Def: 0	2
	P-Group: FUNC	Active: first confirm	QuickComm.: No		Max: 1	

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

Caution:

1. To activate the motor holding brake, in addition to parameter P1215 = 1, the status signal r0052 bit 12 "motor holding brake active" must be output via a digital output. The user must also select the signal - e.g. in parameter P0731.

2. If the motor holding brake is controlled by the drive inverter, then for potentially hazardous loads (e.g. suspended/hanging loads for crane applications) the drive inverter may not be conditioned unless the load has been secured. Before commissioning, potentially hazardous loads can be secured as follows:
   - lower the load to the floor, or
   - during commissioning or after replacing the drive inverter, prevent the drive inverter from controlling the motor holding brake. Only then should STARTER be used to carry-out a quick commissioning or a parameter download, etc. The motor holding brake terminals can then be re-used (for the motor holding brake, in this case, it is not permissible to parameterize the system so that the digital output P0748 is inverted).

3. In order to hold the motor against the mechanical brake at a certain frequency, it is important that the min. frequency P1080 approximately corresponds to the slip frequency.
   - If the value is selected to be too high, then the current drawn can be too high so that the drive inverter trips (shuts down) due to an overcurrent condition.
   - For a low value, it is possible that the torque cannot be established to hold the load.

4. It is not permissible to use the motor holding brake as operating brake as generally it is only designed and dimensioned for a limited number of emergency braking operations.

Note:

Parameter settings:
- To open/close, a digital output controls the motor holding brake at point 1/2 (refer to the diagram). In this case, as prerequisite, the motor holding brake P1215 must be activated as well as the motor holding brake selected at the digital output.
- Brake opening time P1216 greater than/equal to the time for the holding brake to open.
- Brake delay time P1217 greater than/equal to the time to close the holding brake.
- Select the minimum frequency P1080 so that it acts like weight equalization.
- A typical value of the minimum frequency P1080 for the motor holding brake is the slip frequency of the motor r0330. The rated slip frequency can be calculated using the following formula:

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

The following closed-loop control parameters should be observed in conjunction with the motor holding brake:
- P1310, P1311, P1333, P1335 for U/f

P1216 Holding brake release delay

						Level
CStat:	T	**Datatype:** Float	**Unit:** s	**Min:**	0.0	**2**
P-Group:	FUNC	**Active:** first confirm	**QuickComm.:** No	**Def:**	1.0	
				Max:	20.0	

Defines the brake opening time of the motor holding brake (MHB).

When the motor holding brake (P1215) is activated, then the setpoint enable is delayed by the selected time. The time that it takes to open the mechanical brake is subject to certain fluctuations. This is the reason that the drive inverter applies the min. frequency P1080 to the motor during this time. This means that the brake can reliably open before the motor starts.

P1216 ≥ Release time of the brake + relay opening time(s)

Details:

See parameter P1215.

P1217 Holding time after ramp down

						Level
CStat:	T	**Datatype:** Float	**Unit:** s	**Min:**	0.0	**2**
P-Group:	FUNC	**Active:** first confirm	**QuickComm.:** No	**Def:**	1.0	
				Max:	20.0	

Defines the brake delay time of the motor holding brake (MHB).

When the motor holding brake (P1215) is activated, after an off command, the pulse inhibit is delayed by this selected time. The time that it takes to open the mechanical brake is subject to certain fluctuations. This means that after braking to the min. frequency P1080, the motor is held at the minimum frequency for this time. This means that the brake can reliably close before the motor is switched into a no-current condition.

P1217 ≥ Application time of the brake + relay closing time

Details:

See parameter P1215.

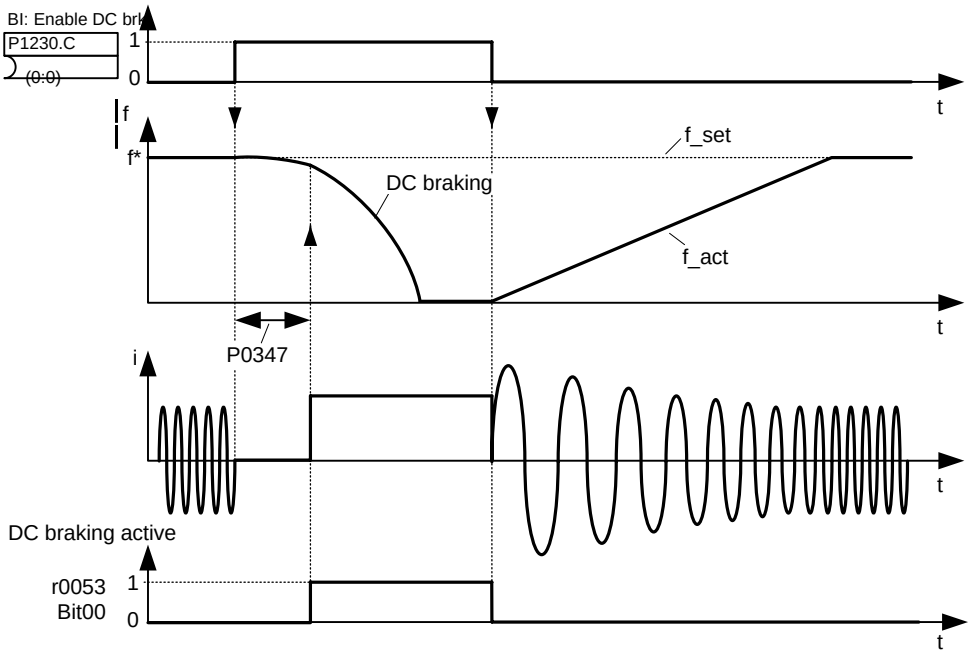
3.21 DC braking

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



Note: DC brake can be applied in drive states r0002 = 1, 4, 5

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:

With the DC braking, the kinetic energy of the motor is converted into heat in the motor. The drive could overheat if the remains in this status for an exessive period of time !

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

Notice:

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

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

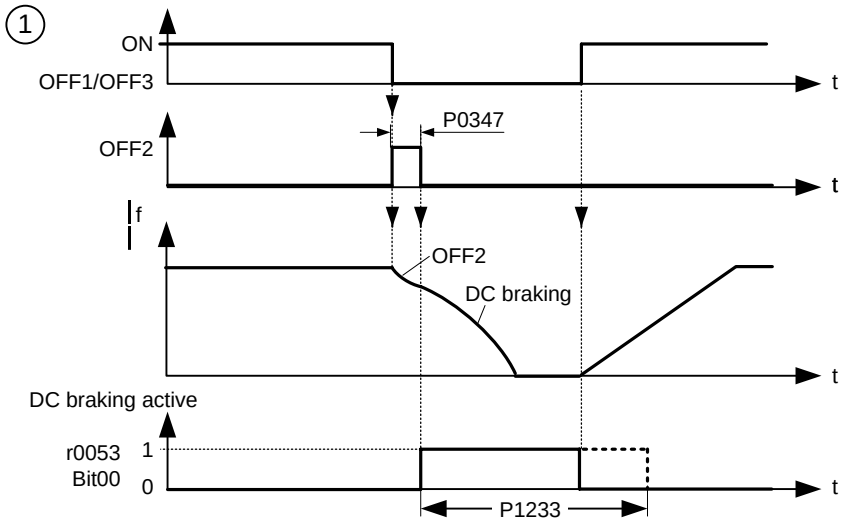
Defines level of DC current in [%] relative to rated motor current (P0305).

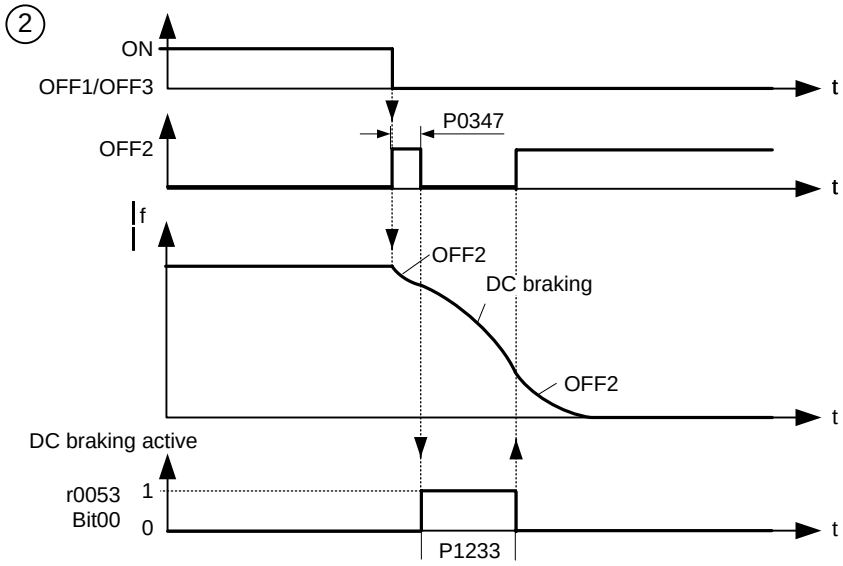
$$r0027_{DC-Brake}[A] \approx \frac{1}{\sqrt{2}} \cdot P0305 \cdot \frac{P1232}{100\,\%}$$

The current of the DC-braking is limited by r0067.

P1233	**Duration of DC braking**				**Min:**	0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s		**Def:**	0.00	**2**
	P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No		**Max:**	250.00	

Defines duration for which DC injection braking is to be active following an OFF1 or OFF3 command. Setting this parameter between 0.01 and 250.00 sets the time duration (in seconds) of the DC injection starting with the OFF1 or OFF3 command.





The DC current, that is impressed during time P1233, is specified by parameter P1232.

Value:

P1233 = 0.00 :
Not active following OFF1 / OFF3.

P1233 = 0.01 - 250.00 :
Active for the specified duration.

Caution:

With the DC braking, the kinetic energy of the motor is converted into heat in the motor. The drive could overheat if the remains in this status for an exessive period of time !

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

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.

3.22 Compound braking

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

Defines DC level superimposed on AC waveform after exeeding DC-link voltage threshold of compound braking. The value is entered in [%] relative to rated motor current (P0305).

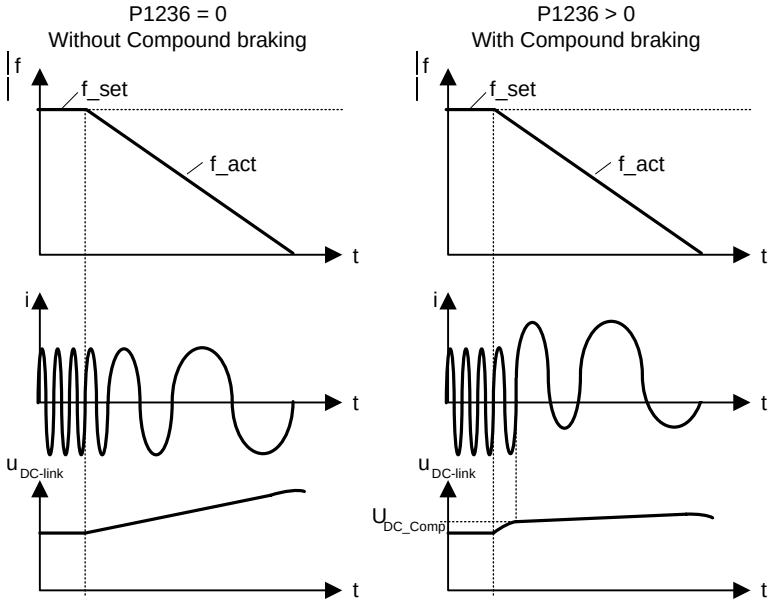
If P1254 = 0 :

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

otherwise :

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

The Compound Brake is an overlay of the DC brake function with regenerative braking (effective braking at the ramp) after OFF1 or OFF3. This enables braking with controlled motor frequency and a minimum of energy returned to the motor. Through optimization of the ramp-down time and the compound braking an efficient braking without additional HW components is possible.



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). It will be active with OFF1/OFF3 and at regenerating conditions.

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 paticularly with high values of compound braking.

3.23 Vdc controller

P1240 **Configuration of Vdc controller** Level **3**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	FUNC	**Active:** Immediately	**QuickComm.:** No	**Def:**	1
				Max:	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

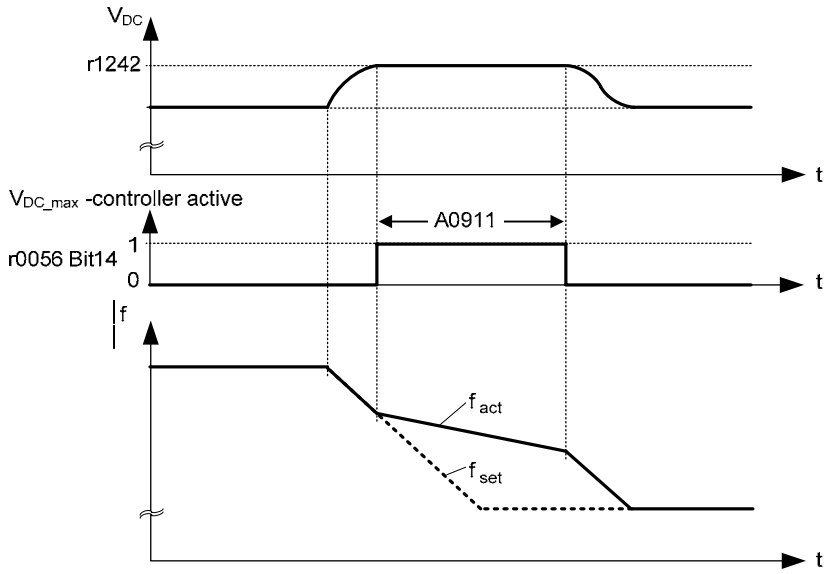
Note:

Vdc max controller automatically increases ramp-down times to keep the DC-link voltage (r0026) within limits (r1242).

r1242 **CO: Switch-on level of Vdc-max** Level **3**

		Datatype: Float	**Unit:** V	**Min:**	-
P-Group:	FUNC			**Def:**	-
				Max:	-

Displays switch-on level of Vdc max controller.



Following equation is only valid, if P1254 = 0 :

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

otherwise :

r1242 is internally calculated

Note:

Parameter r1242 (switch-in threshold) is determined by each power cycle, when precharging of the DC-link is finished.

P1243 **Dynamic factor of Vdc-max** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** %	**Min:**	10
P-Group:	FUNC	**Active:** Immediately	**QuickComm.:** No	**Def:**	100
				Max:	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.

P1250 **Gain of Vdc-controller** Level **4**

CStat:	CUT	**Datatype:** Float	**Unit:** -	**Min:**	0.00
P-Group:	FUNC	**Active:** Immediately	**QuickComm.:** No	**Def:**	1.00
				Max:	10.00

Enters gain for Vdc controller.

P1251 **Integration time Vdc-controller** Level **4**

CStat:	CUT	**Datatype:** Float	**Unit:** ms	**Min:**	0.1
P-Group:	FUNC	**Active:** Immediately	**QuickComm.:** No	**Def:**	40.0
				Max:	1000.0

Enters integral time constant for Vdc controller.

P1252 **Differential time Vdc-controller** Level **4**

CStat:	CUT	**Datatype:** Float	**Unit:** ms	**Min:**	0.0
P-Group:	FUNC	**Active:** Immediately	**QuickComm.:** No	**Def:**	1.0
				Max:	1000.0

Enters differential time constant for Vdc controller.

P1253 **Vdc-controller output limitation** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	0.00
P-Group:	FUNC	**Active:** Immediately	**QuickComm.:** No	**Def:**	10.00
				Max:	600.00

Limits maximum effect of Vdc max controller.

P1254 **Auto detect Vdc switch-on levels** Level **3**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	FUNC	**Active:** Immediately	**QuickComm.:** No	**Def:**	1
				Max:	1

Enables/disables auto-detection of switch-on levels for Vdc control functionalities.

Following switch-on levels are calculated
- Switch-on level compound brake
- Switch-on level Vdc_max controller r1242

Possible Settings:
0 Disabled
1 Enabled

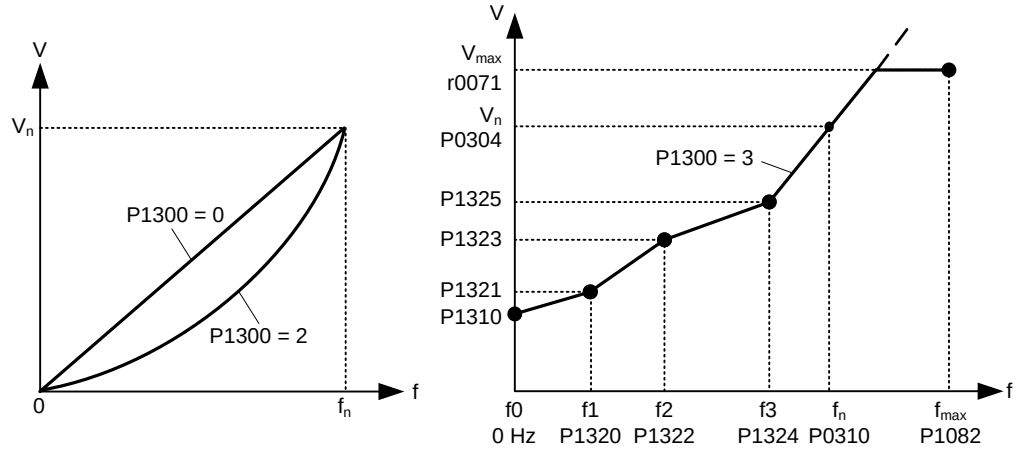
Note:
The switch-on thresholds are only calculated during the start-up of the inverter after connection to the mains. An online-adaption is not performed during operation. This means that modification of P1254 does not immediately take effect and variations in the mains are also not initially taken into account.

P1254 = 0 (Automatic Detection disabled):
The above thresholds are calculated via P0210, if automatic detection is disabled.

3.24 Control mode

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

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.	Parameter name	Level	V/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	CO: U/f Slip limit	2	x	x	x	x
P1338	Resonance damping gain V/f	3	x	x	x	x
P1340	Imax freq. 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 voltage ctrl. integral time	3	x	x	x	x
P1350	Voltage soft start	3	x	x	x	x

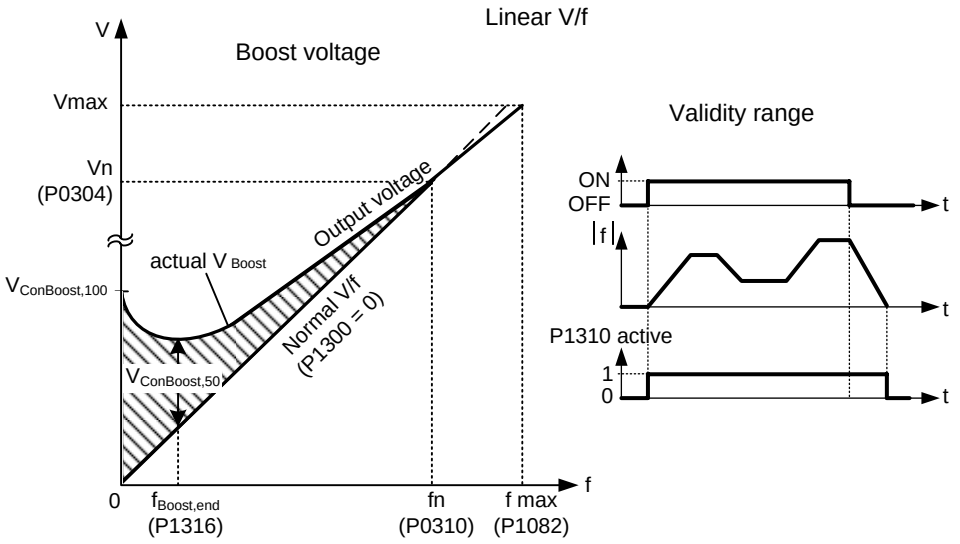
3.25 V/f control parameters

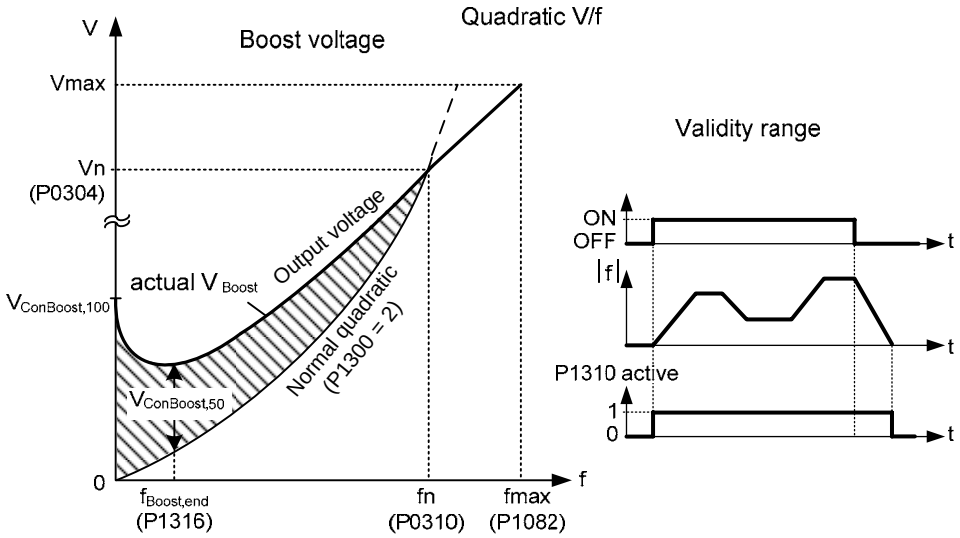
P1310	**Continuous boost**			**Min:**	0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	50.0	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	250.0	

P1310 causes a voltage boost depending on the output frequency (see diagran). 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.

To compensate these effects, 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

$$V_{ConBoost,100} = P0305 \cdot P0350 \cdot \frac{P1310}{100}$$

$$V_{ConBoost,50} = \frac{V_{ConBoost,100}}{2}$$

Note:

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

- 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

- The total boost is limited by following equation:

$$\sum V_{Boost} \leq 3 \cdot R_s \cdot I_{Mot} = 3 \cdot P0305 \cdot P0350$$

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

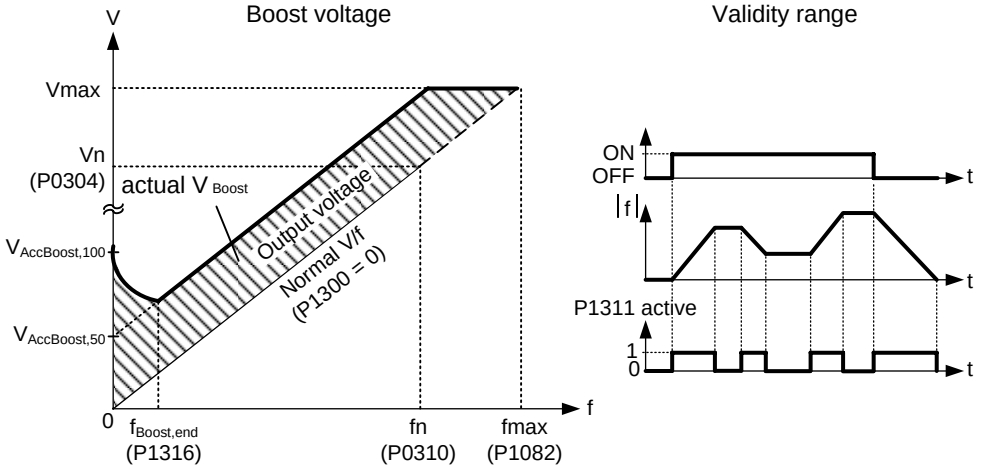
$$\frac{\sum V_{Boost}}{P0305 \cdot P0350} \leq \frac{P0640}{100}$$

P1311 Acceleration boost

						Level
CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	0.0	**2**
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.0	
				Max:	250.0	

P1311 will only produce boost during ramping, and is therefore useful for additional torque during acceleration and deceleration. Contrary to P1312, that is only active when an ON command is given, p1311 is active after each acceleration resp. deceleration. The boost is active, if P1311 > 0 resp. if the conditiones given below are fulfilled.

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



where voltage values are given

$$V_{AccBoost,100} = P0305 \cdot P0350 \cdot \frac{P1311}{100}$$

$$V_{AccBoost,50} = \frac{V_{AccBoost,100}}{2}$$

Note:

See parameter P1310

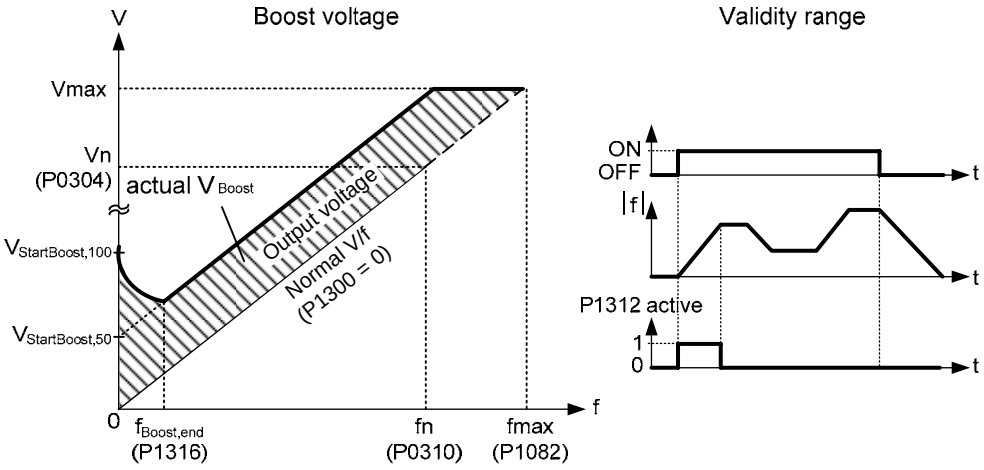
P1312 **Starting boost** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	0.0
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.0
				Max:	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

$$V_{StartBoost,100} = P0305 \cdot P0350 \cdot \frac{P1312}{100}$$

$$V_{StartBoost,50} = \frac{V_{StartBoost,100}}{2}$$

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.

Note:

See parameter P1310

r1315 **CO: Total boost voltage** Level **4**

		Datatype: Float	**Unit:** V	**Min:**	-
P-Group:	CONTROL			**Def:**	-
				Max:	-

Displays total value of voltage boost (in volts).

P1316 **Boost end frequency** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	0.0
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:**	20.0
				Max:	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:

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

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 depending on inverter type and its rating data.

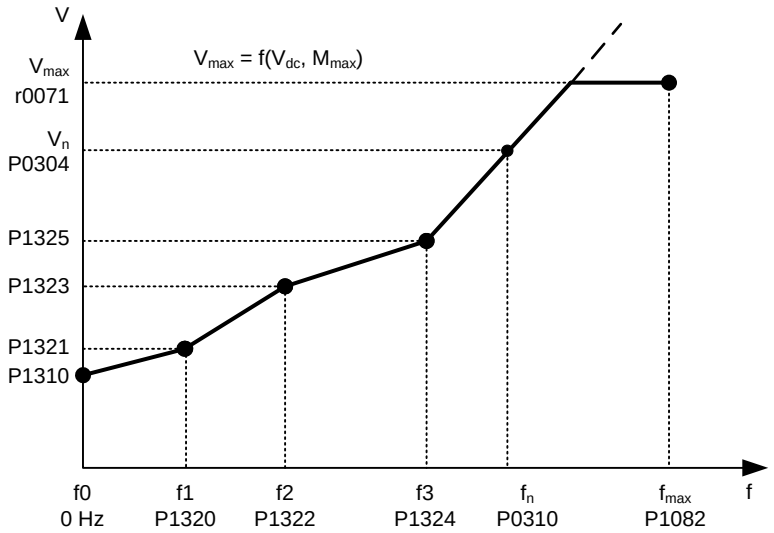
Details:

See diagram in P1310 (continuous boost).

P1320 **Programmable V/f freq. coord. 1** Level **3**

CStat:	CT	**Datatype:** Float	**Unit:** Hz	**Min:**	0.00
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.00
				Max:	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.

P1321 **Programmable V/f volt. coord. 1** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** V	**Min:**	0.0
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.0
				Max:	3000.0

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

P1322 **Programmable V/f freq. coord. 2** Level **3**

CStat:	CT	**Datatype:** Float	**Unit:** Hz	**Min:**	0.00
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.00
				Max:	650.00

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

P1323 **Programmable V/f volt. coord. 2** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** V	**Min:**	0.0
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.0
				Max:	3000.0

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

P1324 **Programmable V/f freq. coord. 3** Level **3**

CStat:	CT	**Datatype:** Float	**Unit:** Hz	**Min:**	0.00
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.00
				Max:	650.00

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

P1325 **Programmable V/f volt. coord. 3** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** V	**Min:**	0.0
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.0
				Max:	3000.0

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

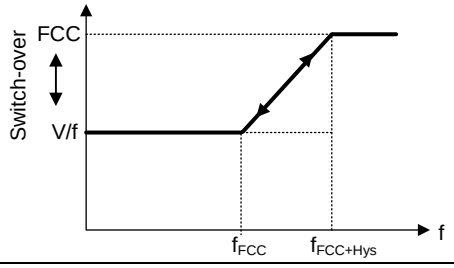
P1333	**Start frequency for FCC**			**Min:**	0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	10.0	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	100.0	

Defines the FCC starting frequency as a percentage of the rated motor frequency (P0310).

When FCC is activated using P1300 = 1, then as a function of the FCC starting frequency plus hysteresis and the actual frequency, a changeover is made with a continuous transition between the linear V/f characteristic (P1300 = 0) and FCC (refer to the diagram).

$$f_{FCC} = \frac{P0310}{100} \cdot P1333$$

$$f_{FCC+Hys} = \frac{P0310}{100} \cdot (P1333 + 6\%)$$



Notice:

- A value that is excessively low can result in instability.
- The constant voltage boost P1310 is continuously de-activated - essentially the same as when switching-in FCC.
- Contrary, the voltage boosts P1311 and P1312 remain active over the complete frequency range.

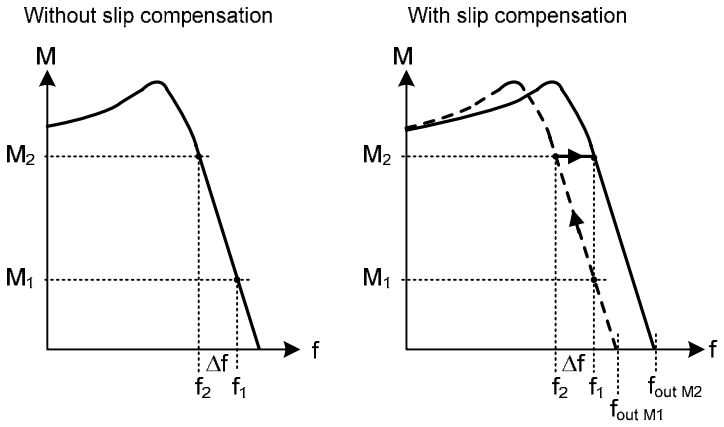
3.25.1 Slip compensation

P1335	Slip compensation				Min:	0.0	Level
	CStat: CUT	Datatype: Float	Unit: %		Def:	0.0	2
	P-Group: CONTROL	Active: Immediately	QuickComm.: No		Max:	600.0	

Dynamically adjusts output frequency of inverter so that motor speed is kept constant independent of motor load.

In the V/f-control, the motor speed will always be less than the command speed due to the slip speed. For a given speed command, the speed will drop as load is increased. The speed regulation of drive can be improved by the technique known as slip compensation.

Increasing the load from M1 to M2 (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.



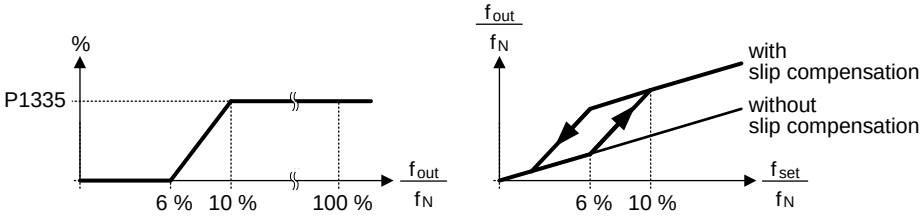
Value:

P1335 = 0 % :
Slip compensation disabled.

P1335 = 50 % - 70 % :
Full slip compensation at cold motor (partial load).

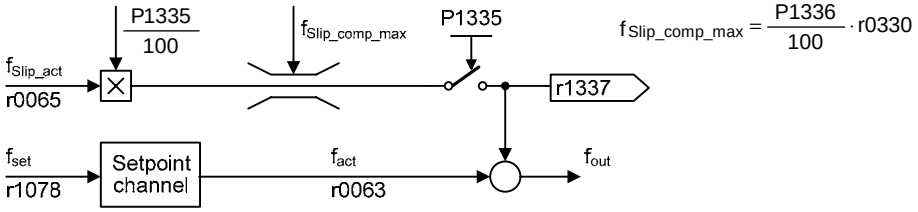
P1335 = 100 % :
Full slip compensation at warm motor (full load).

Range of slip compensation :



Notice:

The applied value of the slip compensation (scaled by P1335) is limited by following equation:



P1336	Slip limit				Min:	0	Level
	CStat:	CUT	Datatype: U16	Unit: %	Def:	250	2
	P-Group:	CONTROL	Active: Immediately	QuickComm.: No	Max:	600	

Compensation slip limit in [%] relative to r0330 (rated motor slip), which is added to frequency setpoint.

Dependency:
Slip compensation (P1335) active.

r1337	CO: V/f slip frequency				Min:	-	Level
			Datatype: Float	Unit: %	Def:	-	3
	P-Group:	CONTROL			Max:	-	

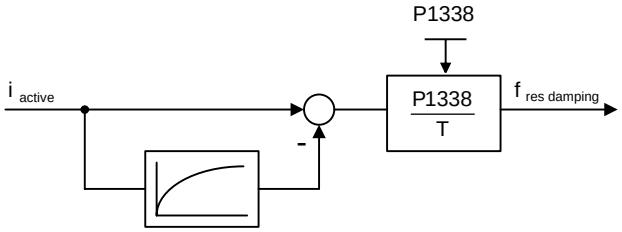
Displays actual compensated motor slip as [%]

Dependency:
Slip compensation (P1335) active.

3.25.2 Resonance damping

P1338	Resonance damping gain V/f				Min:	0.00	Level
	CStat:	CUT	Datatype: Float	Unit: -	Def:	0.00	3
	P-Group:	CONTROL	Active: Immediately	QuickComm.: No	Max:	10.00	

Defines resonance damping gain for V/f. Here, di/dt of the acitve 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 damping function is used to dampen oscillations in the active current. These especially occur when rotating field motors are operating under no-load conditions. The parameter is not used to optimize the stabilizing behavior.
- In the V/f control modes (refer to P1300), the resonance damping controller is activate in a range from approximately 5 % up to 70 % of the rated motor frequency (P0310).
- An excessively high value results in instability (positive feedback).

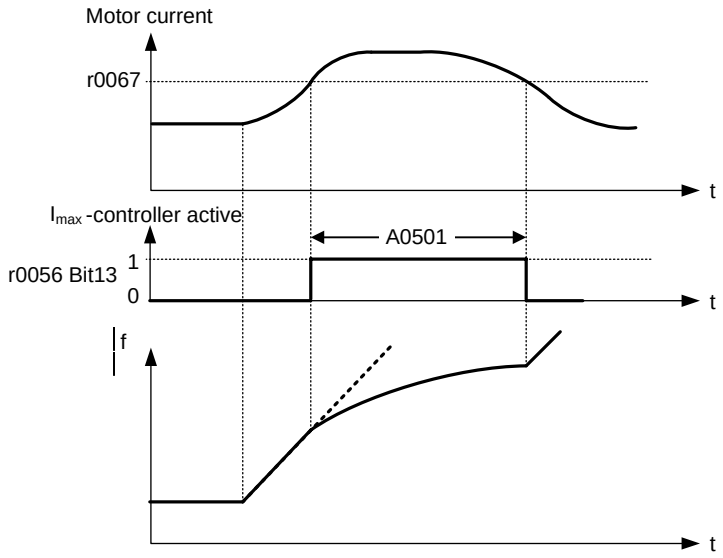
3.25.3 Imax controller

P1340 **Imax controller prop. gain** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** -	**Min:**	0.000
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.000
				Max:	0.499

Proportional gain of the I_max frequency 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.



P1341 **Imax controller integral time** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** s	**Min:**	0.000
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.300
				Max:	50.000

Integral time constant of the I_max controller.

P1341 = 0 :
I_max 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.

r1343 **CO: Imax controller freq. output** Level **3**

		Datatype: Float	**Unit:** Hz	**Min:**	-
				Def:	-
P-Group:	CONTROL			**Max:**	-

Displays effective frequency limitation.

Dependency:
If I_max controller not in operation, parameter normally shows max. frequency P1082.

r1344 **CO: Imax controller volt. output** Level **3**

		Datatype: Float	**Unit:** V	**Min:**	-
				Def:	-
P-Group:	CONTROL			**Max:**	-

Displays amount by which the I_max controller is reducing the inverter output voltage.

P1349	Resonance damping limit				Min:	80.0	Level
	CStat: CUT	Datatype: Float	Unit: %		Def:	80.0	3
	P-Group: CONTROL	Active: Immediately	QuickComm.: No		Max:	100.0	

Defines the upper limit at which resonance damping is active for V/f.

Note:

The resonance circuit damps oscillations of the active current which frequently occur during no-load operation (see P1338).

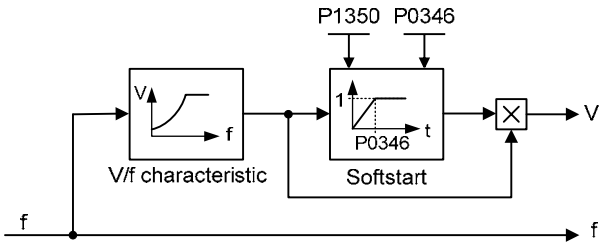
The limit is defined as a percentage of rated motor frequency (P0310). There is a 5% band below the upper limit through which the gain decreases in a linear fashion from full gain to zero gain.

3.25.4 Soft starting

P1350	Voltage soft start				Min:	0	Level
	CStat: CUT	Datatype: U16	Unit: -		Def:	0	3
	P-Group: CONTROL	Active: first confirm	QuickComm.: No		Max:	1	

Selecting the soft starting function.

With soft starting, the flux in the motor is established with some delay. This ensures that the motor only rotates in the required direction of rotation even with existing residual magnetism. When activated, at powered-on, the output voltage is ramped-up to the value of the characteristic voltage within the magnetizing time P0346.



Possible Settings:

0 OFF
1 ON

Note:

The settings for this parameter bring benefits and drawbacks:

- P1350 = 0: (jump to boost voltage)
  Benefit: flux is built up quickly
  Drawback: motor may move
- P1350 = 1: (smooth voltage build-up)
  Benefit: motor less likely to move
  Drawback: flux build-up takes longer

3.26 Inverter parameters (Modulator)

P1800 **Pulse frequency** Level **2**

CStat:	CUT	**Datatype:** U16	**Unit:** kHz	**Min:**	2
P-Group:	INVERTER	**Active:** Immediately	**QuickComm.:** No	**Def:**	4
				Max:	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).
- see derating in P1082
- P1800 > 30 * P0310

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 manuall 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).

r1801 **CO: Act. pulse frequency** Level **3**

		Datatype: U16	**Unit:** kHz	**Min:**	-
P-Group:	INVERTER			**Def:**	-
				Max:	-

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).

P1802 **Modulator mode** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	INVERTER	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	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 frequencies.
- 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.

P1803 **Max. modulation** Level **4**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	20.0
P-Group:	INVERTER	**Active:** Immediately	**QuickComm.:** No	**Def:**	106.0
				Max:	150.0

Sets maximum modulation index.

Note:
- P1803 = 100 % : Limit for over-control (for ideal inverter without switching delay).

P1820 **Reverse output phase sequence** Level **2**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	INVERTER	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	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)

3.27 Motor data identification

P1910 **Select motor data identification** Level **2**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Def:**	0
				Max:	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:

- In order to that the motor identification routine supplies the correct data, before selecting, fast commissioning should be carried-out.
- If the motor data identification routine is activated (e.g. P1910 = 1), then at the next ON command, the measuring operation is started and alarm A0541 is generated. After the measurement is completed, both P1910 and the alarm are reset.

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.

r1912 **Identified stator resistance** Level **2**

		Datatype: Float	**Unit:** Ohm	**Min:**	-
P-Group:	MOTOR			**Def:**	-
				Max:	-

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.

3.28 Reference parameters

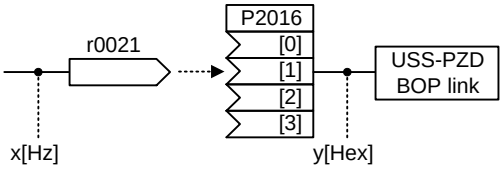
P2000	**Reference frequency**			**Min:**	1.00	Level
	CStat: CT	**Datatype:** Float	**Unit:** Hz	**Def:**	50.00	**2**
	P-Group: COMM	**Active:** first confirm	**QuickComm.:** No	**Max:**	650.00	

Parameter P2000 represents the reference frequency for frequency values which are displayed/transferred as a percentage or a hexadecimal value. Where:

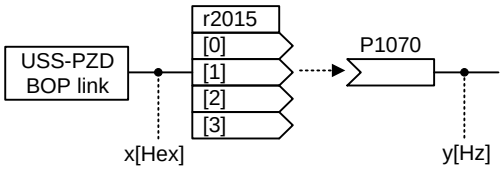
- hexadecimal 4000 H ==> P2000 (e.g.: USS-PZD)
- percentage 100 % ==> P2000 (e.g.: ADC)

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.



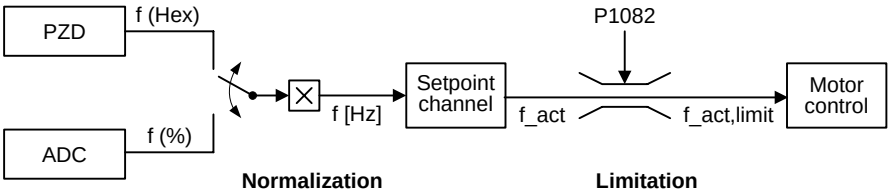
$$y[Hex] = \frac{r0021[Hz]}{P2000[Hz]} \cdot 4000[Hex]$$



$$y[Hz] = \frac{r2015[1]}{4000[Hex]} \cdot P2000$$

Caution:

Parameter P2000 represents the reference frequency of the above mentioned interfaces. A maximum frequency setpoint of 2*P2000 can be applied via the corresponding interface. Unlike parameter P1082 (Max. Frequency) this limits the inverter frequency internally independent of the reference frequency. By modification of P2000 it will also adapt the parameter to the new settings.



$$f[Hz] = \frac{f(Hex)}{4000(Hex)} \cdot P2000 = \frac{f(\%)}{100\,\%} \cdot P2000$$

$$f_act,limit = \min(P1082, f_act)$$

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 precentage. 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

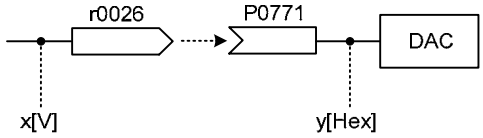
P2001	Reference voltage				Min:	10	Level
	CStat:	CT	Datatype: U16	Unit: V	Def:	1000	3
	P-Group:	COMM	Active: first confirm	QuickComm.: No	Max:	2000	

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.



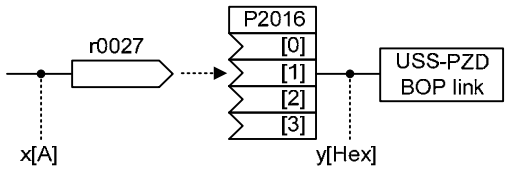
$$y[\text{Hex}] = \frac{r0026[\text{V}]}{P2001[\text{V}]} \cdot 4000[\text{Hex}]$$

P2002	Reference current				Min:	0.10	Level
	CStat:	CT	Datatype: Float	Unit: A	Def:	0.10	3
	P-Group:	COMM	Active: first confirm	QuickComm.: No	Max:	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.



$$y[\text{Hex}] = \frac{r0027[\text{A}]}{P2002[\text{A}]} \cdot 4000[\text{Hex}]$$

3.29 Communication parameters (USS, CB)

P2009[2] **USS denormalization**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	COMM	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	1

Level **3**

Enables denormalization for USS.

Possible Settings:

0 Disabled
1 Enabled

Index:

P2009[0] : Serial interface COM link
P2009[1] : Serial interface BOP link

Note:

If denormalization is 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) if this is a frequency. Denormalization (P2009 = 1) only works for frequencies and is intended for backwards compatibility with MM3.

P2010[2] **USS baudrate**

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	3
P-Group:	COMM	**Active:** first confirm	**QuickComm.:** No	**Def:**	6
				Max:	9

Level **2**

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

P2011[2] **USS address**

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	COMM	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	31

Level **2**

Sets unique address for inverter.

Index:

P2011[0] : Serial interface COM link
P2011[1] : Serial interface BOP link

Note:

You can connect up to a further 30 inverters via the serial link (i.e. 31 inverters in total) and control them with the USS serial bus protocol.

P2012[2]	**USS PZD length**				**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -		**Def:** 2	**3**
	P-Group: COMM	**Active:** first confirm	**QuickComm.:** No		**Max:** 4	

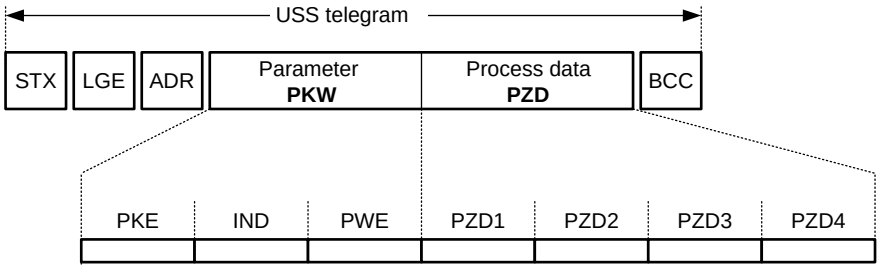
Defines the number of 16-bit words in PZD part of USS telegram.

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.



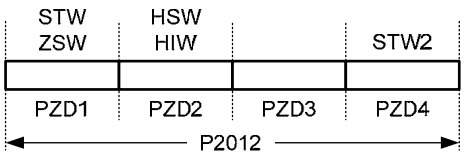
STX	Start of text	PKE	Parameter ID
LGE	Length	IND	Sub-index
ADR	Address	PWE	Parameter value
PKW	Parameter ID value		
PZD	Process data		
BCC	Block check character		

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:

- control word and main setpoint or
- status word and actual value.

Restrictions:

- If the above serial interface controls the inverter (P0700 or P0719) then the 1st control word must be transferred in the 1st PZD-word.
- If the setpoint source is selected via P1000 or P0719, then the main setpoint must be transfered in the 2nd PZD-word,
- When P2012 is greater than or equal to 4 the additional control word (2nd control word) must transferred in the 4th PZD-word, if the serial interface controls the inverter (P0700 or P0719).



STW	Control word	HSW	Main setpoint
ZSW	Status word	HIW	Main actual value
PZD	Process data		

P2013[2] USS PKW length

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	COMM	**Active:** first confirm	**QuickComm.:** No	**Def:**	127
				Max:	127

Level **3**

Defines the number of 16-bit words in PKW part of USS telegram.

The PKW part consists of the PKE part (1. word), IND part (2. word) resp. PWE part (3. - n. word). In contrary to the IND and PKE part, the PWE part 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

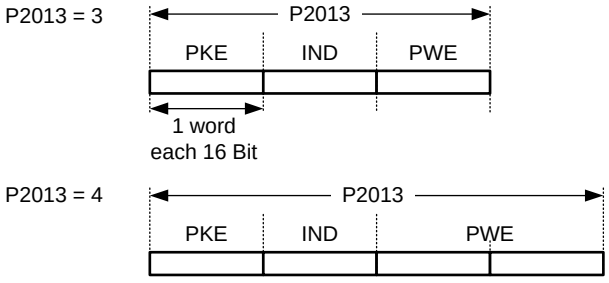
Example:

	Data type		
	U16 (16 Bit)	U32 (32 Bit)	Float (32 Bit)
P2013 = 3	X	Parameter access fault	Parameter access fault
P2013 = 4	X	X	X
P2013 = 127	X	X	X

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 to 3 or 4 determines the length of the PKW (3 = three words and 4 = four words). When P2013 set to 127 automatically adjusts the length of the PKW words are required.



PKE Parameter ID
IND Sub-index
PWE Parameter value

If a fixed PKW length is selected only one parameter value can be transferred. In the case of indexed parameter, you must use the variable PKW length if you wish to have the values of all indices transferred in a single telegram. In selecting the fixed PKW length, it is important to ensure the value in question can be transferred using this PKW length.

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

P2014[2] **USS telegram off time** Level **3**

CStat:	CT	**Datatype:** U16	**Unit:** ms	**Min:**	0
P-Group:	COMM	**Active:** Immediately	**QuickComm.:** No	**Def:**	0
				Max:	65535

Defines the telegram failure time for the serial interfaces with USS protocol.

The telegram failure time defines the time within which a valid telegram must have been received. If a valid telegram is not received within the specified time, the drive inverter outputs fault F0070.

Index:

P2014[0] : Serial interface COM link
P2014[1] : Serial interface BOP link

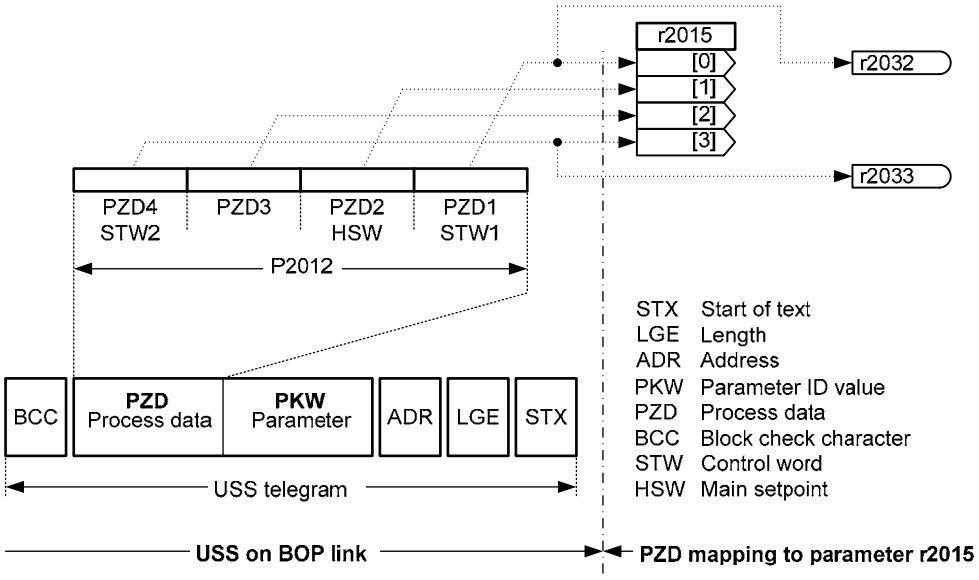
Notice:

By default (time set to 0), no fault is generated (i.e. watchdog disabled).

r2015[4] **CO: PZD from BOP link (USS)** Level **3**

		Datatype: U16	**Unit:** -	**Min:**	-
P-Group:	COMM			**Def:**	-
				Max:	-

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.

Restrictions:

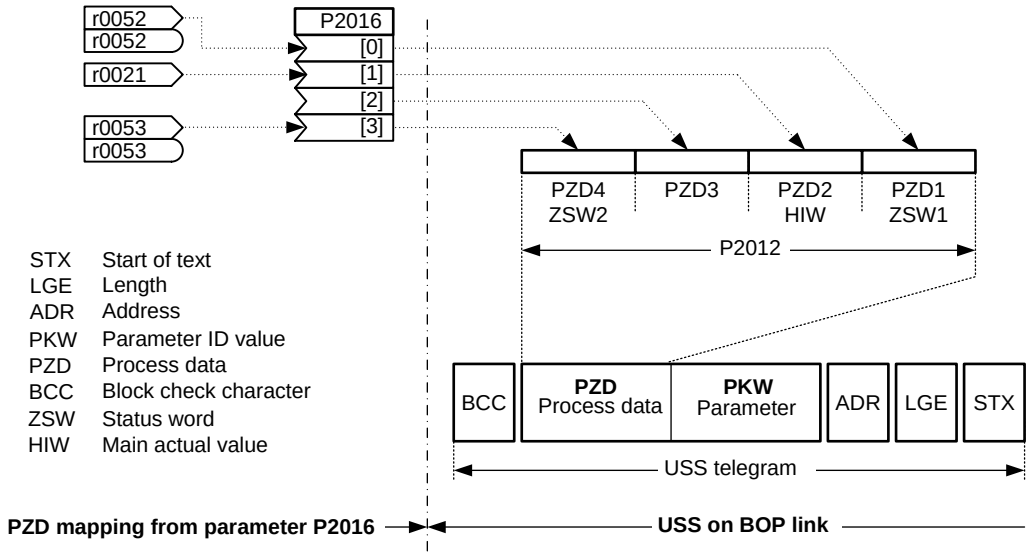
- If the above serial interface controls the inverter (P0700 or P0719) then the 1st control word must be transferred in the 1st PZD-word.
- If the setpoint source is selected via P1000 or P0719, then the main setpoint must be transfered in the 2nd PZD-word,
- When P2012 is equal to 4 the additional control word (2nd control word) must transferred in the 4th PZD-word, if the above serial interface controls the inverter (P0700 or P0719).

P2016[4] **CI: PZD to BOP link (USS)**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMM	**Active:** Immediately	**QuickComm.:** No	**Def:**	52:0
				Max:	4000:0

Level **3**

Selects signals (process data PZD) to be transmitted to serial interface via USS on BOP link



Index:

P2016[0] : Transmitted word 0
P2016[1] : Transmitted word 1
P2016[2] : Transmitted word 2
P2016[3] : Transmitted word 3

Example:

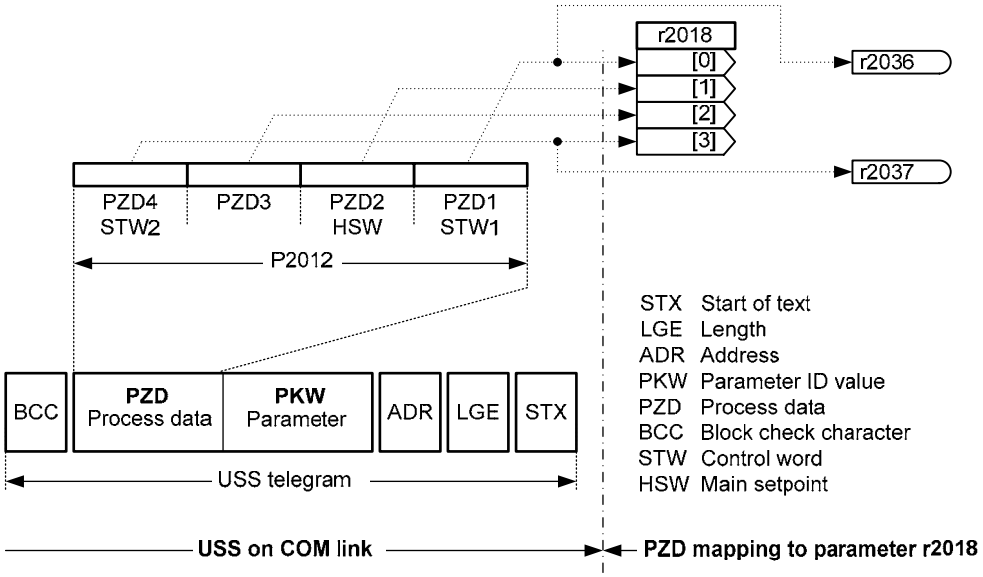
P2016[0] = 52.0 (default). In this case, the value of r0052[0] (CO/BO: Status word) is transmitted as 1st PZD to the BOP link.

Note:

If r0052 not indexed, display does not show an index (".0").

r2018[4]	CO: PZD from COM link (USS)			Min: -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: COMM			**Max:** -	

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.

Restrictions:

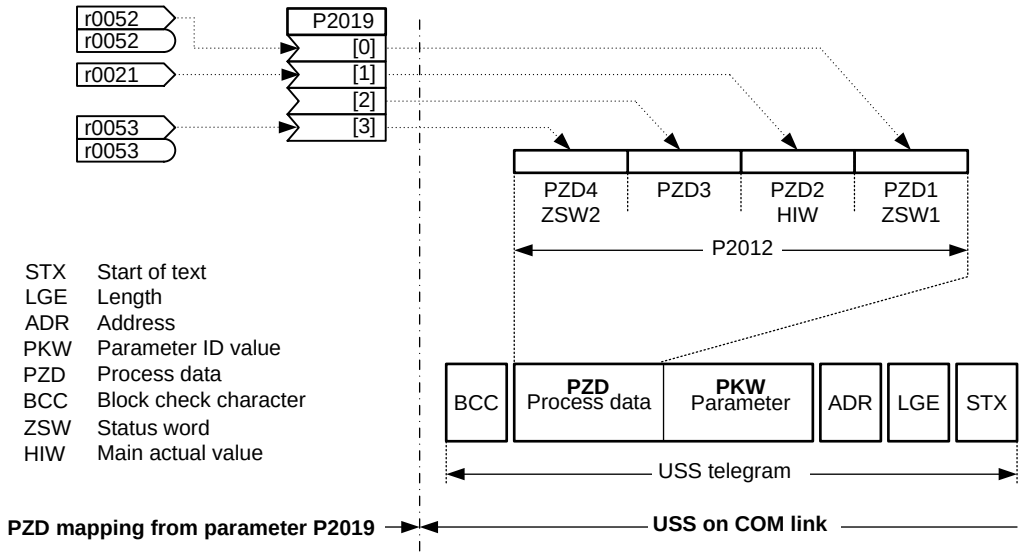
- If the above serial interface controls the inverter (P0700 or P0719) then the 1st control word must be transferred in the 1st PZD-word.
- If the setpoint source is selected via P1000 or P0719, then the main setpoint must be transfered in the 2nd PZD-word,
- When P2012 is equal to 4 the additional control word (2nd control word) must transferred in the 4th PZD-word, if the above serial interface controls the inverter (P0700 or P0719).

P2019[4] **CI: PZD to COM link (USS)**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMM	**Active:** Immediately	**QuickComm.:** No	**Def:**	52:0
				Max:	4000:0

Level **3**

Selects signals (process data PZD) to be transmitted to serial interface 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

Details:

See P2016 (PZD to BOP link)

r2024[2] **USS error-free telegrams**

		Datatype: U16	**Unit:** -	**Min:**	-
P-Group:	COMM			**Def:**	-
				Max:	-

Level **3**

Displays number of error-free USS telegrams received.

Index:

r2024[0] : Serial interface COM link
r2024[1] : Serial interface BOP link

r2025[2] **USS rejected telegrams**

		Datatype: U16	**Unit:** -	**Min:**	-
P-Group:	COMM			**Def:**	-
				Max:	-

Level **3**

Displays the number of rejected USS telegrams. The sum of all USS errors (r2026 - r2031) is displayed in parameter r2025.

The following monitoring mechanisms have been implemented

- when a telegram is received, then initially, the correct start of a telegram (start interval + STX) must be identified and then the length must be evaluated (LGE). If the length does not correspond to the selected value for a fixed telegram or it does not have a valid value for a variable telegram length, the telegram is rejected.
- the appropriate times are monitored before and while receiving telegrams.
- the block check character (BCC) is generated while the telegram is received and after the complete telegram has been read-in, this is compared with the received BCC. If these do not match, then the telegram is not evaluated.
- if a character frame error or a parity error has not occurred in any of the received characters, then the node number (ADR) of the received telegram can be evaluated.
- the telegram is rejected if the address byte (ADR) does not correspond to the node number (for slave) or the expected slave node number (for the master).

Index:

r2025[0] : Serial interface COM link
r2025[1] : Serial interface BOP link

r2026[2] **USS character frame error**

		Datatype: U16	**Unit:** -	**Min:**	-
P-Group:	COMM			**Def:**	-
				Max:	-

Level **3**

Displays number of USS character frame errors.

Index:

r2026[0] : Serial interface COM link
r2026[1] : Serial interface BOP link

r2027[2] **USS overrun error** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

Displays number of USS telegrams with overrun error.

Index:
r2027[0] : Serial interface COM link
r2027[1] : Serial interface BOP link

r2028[2] **USS parity error** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

Displays number of USS telegrams with parity error.

Index:
r2028[0] : Serial interface COM link
r2028[1] : Serial interface BOP link

r2029[2] **USS start not identified** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

Displays number of USS telegrams with unidentified start.

Index:
r2029[0] : Serial interface COM link
r2029[1] : Serial interface BOP link

r2030[2] **USS BCC error** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

Displays number of USS telegrams with BCC error.

Index:
r2030[0] : Serial interface COM link
r2030[1] : Serial interface BOP link

r2031[2] **USS length error** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

Displays number of USS telegrams with incorrect length.

Index:
r2031[0] : Serial interface COM link
r2031[1] : Serial interface BOP link

r2032 **BO: CtrlWrd1 from BOP link (USS)** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

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	Pulses enabled	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

r2033 **BO: CtrlWrd2 from BOP link (USS)** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

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

Dependency:

P0700 = 4 (USS on BOP link) and P0719 = 0 (Cmd / Setpoint = BICO parameter).

r2036 **BO: CtrlWrd1 from COM link (USS)** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

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	Pulses enabled	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 r2033 (control word 2 from BOP link).

r2037 **BO: CtrlWrd2 from COM link (USS)** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

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

Details:

See r2033 (control word 2 from BOP link).

P2040 **CB telegram off time** Level **3**

CStat: CT **Datatype:** U16 **Unit:** ms **Min:** 0 **Def:** 20 **Max:** 65535

P-Group: COMM **Active:** Immediately **QuickComm.:** No

Defines time after which a fault will be generated (F0070) if no telegram is received via the link.

The telegramm off time defines the time, within which a valid telegram must be received. If no valid telegram is received within that time, the inverter trips with F0070.

Dependency:

Setting 0 = watchdog disabled

P2041[5] **CB parameter** Level **3**

CStat: CT **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 0 **Max:** 65535

P-Group: COMM **Active:** first confirm **QuickComm.:** No

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:

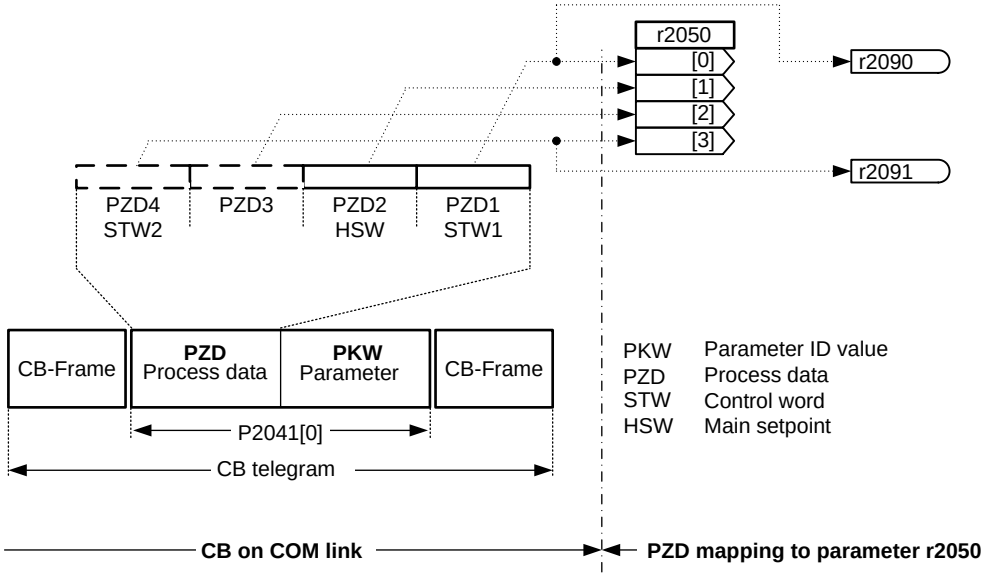
See relevant communication board manual for protocol definition and appropriate settings.

r2050[4] **CO: PZD from CB** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

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.

Restrictions:

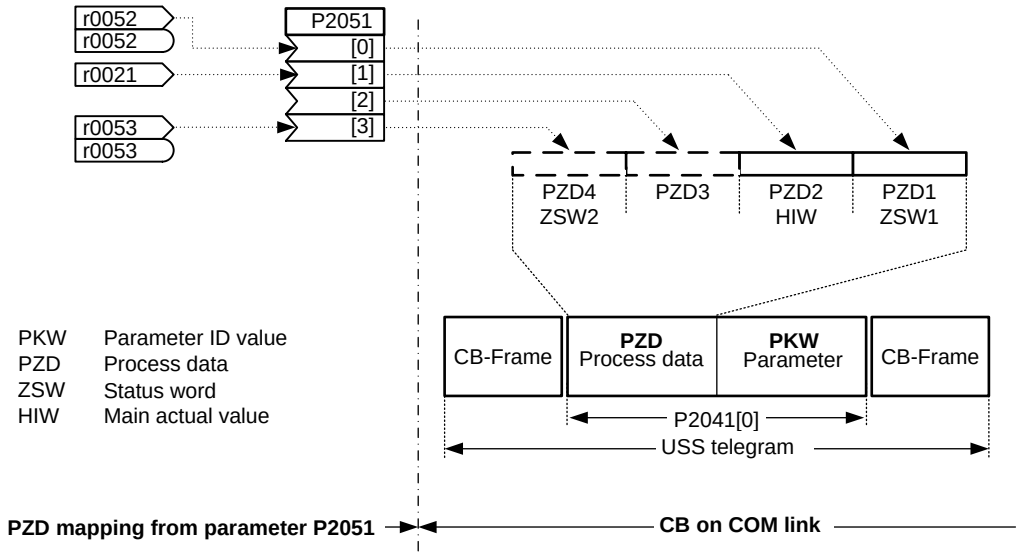
- If the above serial interface controls the inverter (P0700 or P0719) then the 1st control word must be transferred in the 1st PZD-word.
- If the setpoint source is selected via P1000 or P0719, then the main setpoint must be transfered in the 2nd PZD-word,
- When P2012 is equal to 4 the additional control word (2nd control word) must transferred in the 4th PZD-word, if the above serial interface controls the inverter (P0700 or P0719).

P2051[4] **CI: PZD to CB**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMM	**Active:** Immediately	**QuickComm.:** No	**Def:**	52:0
				Max:	4000:0

Level **3**

Selects signals (process data PZD) to be transmitted via CB on COM link



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

r2053[5] **CB identification**

		Datatype: U16	**Unit:** -	**Min:**	-
P-Group:	COMM			**Def:**	-
				Max:	-

Level **3**

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)

r2054[7] **CB diagnosis**

		Datatype: U16	**Unit:** -	**Min:**	-
P-Group:	COMM			**Def:**	-
				Max:	-

Level **3**

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.

r2090 **BO: Control word 1 from CB** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

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	Pulses enabled	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 relevant communication board manual for protocol definition and appropriate settings.

r2091 **BO: Control word 2 from CB** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: COMM

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

Details:

See relevant communication board manual for protocol definition and appropriate settings.

3.30 Faults, Alarms, Monitoring

P2100[3] Alarm number selection — Level **3**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	ALARMS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	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.

P2101[3] Stop reaction value — Level **3**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	ALARMS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	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).

P2103 BI: 1. Faults acknowledgement — Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	722:2
				Max:	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)

P2104 BI: 2. Faults acknowledgement — Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	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)

P2106 BI: External fault — Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	1:0
				Max:	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)

r2110[4] **CO: Warning number** Level **2**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: ALARMS

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:

- Indices 0 and 1 are not stored.
- 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.

P2111 **Total number of warnings** Level **3**

CStat: CUT **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 0 **Max:** 4

P-Group: ALARMS **Active:** first confirm **QuickComm.:** No

Displays number of warning (up to 4) since last reset. Set to 0 to reset the warning history.

r2114[2] **Run time counter** Level **3**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: ALARMS

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.

When AOP is not connected, the time in this parameter is used by r0948 to indicate when a fault has occured.

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.

P2115[3] **AOP real time clock**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	ALARMS	**Active:** Immediately	**QuickComm.:** No	**Def:**	0
				Max:	65535

Level **3**

Displays AOP real time.

All of the frequency inverters have an internal time generator function which is used to time-stamp and log erroneous conditions. Therefore there is no battery-buffered real-time clock (RTC). The frequency inverters can support a software-controlled RTC where the RTC must be set from the AOP or via an interface. When using the AOP, this synchronization is automatic. When a serial interface is used, a task must be sent from the higher-level control to write into the parameter. If the AOP is withdrawn during operation, or if the bus is interrupted, then the real-time clock runs further using the runtime counter. The real-time clock is reset to zero only after power off.

The time is stored in a word array parameter P2115. This parameter number is common to all invertes. Inverters not supporting this feature would respond with parameter not recognised - a Master will ignore this. The time will be set by USS Protocol standard word array parameter write telegrams.

Within the AOP, while it is acting as a USS Master, at each tick of the heartbeat, the list of available USS Slaves will be flagged with a time update request. As the Master runs around the list of USS slaves on its next USS update cycle, if there are no higher priority tasks to perform, and the slave still has its time update flag set, then an array parameter write telegram will be issued, containing the current time. The request for that slave is cancelled if the slave responds correctly. The AOP will not need to read the time from the slave.

Time is maintained in a word array parameter and encoded as follows - the same format will be used in fault report logs.

Index	High Byte (MSB)	Low Byte (LSB)
0	Seconds (0 - 59)	Minutes (0 - 59)
1	Hours (0 - 23)	Days (1 - 31)
2	Month (1 - 12)	Years (00 - 250)

Time is measured from Jan 1st 2000. Values are in binary form.

Index:

P2115[0] : Real Time, Seconds+Minutes
P2115[1] : Real Time, Hours+Days
P2115[2] : Real Time, Month+Year

Example:

P2115[0] = 13625
P2115[1] = 2579
P2115[2] = 516

The conversion into binary quantities (U16) results in the following bit pattern:
Seconds + minutes:

- High byte (MSB) = 00110101 corresponding to the number 53, i.e. seconds 53
- Low byte (LSB) = 00111001 corresponding to the number 57, i.e. minutes 57

Hours + days:

- High byte (MSB) = 00001010 corresponding to the number 10, i.e. hours 10
- Low byte (LSB) = 00010011 corresponding to the number 19, i.e. days 19

Months + year:

- High byte (MSB) = 00000010 corresponding to the number 2, i.e. months 2
- Low byte (LSB) = 00000100 corresponding to the number 4, i.e. years 4

This means that the real time displayed in P2115 is 19.02.2004, 10:57:53.

P2120 **Indication counter**

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	ALARMS	**Active:** Immediately	**QuickComm.:** No	**Def:**	0
				Max:	65535

Level **4**

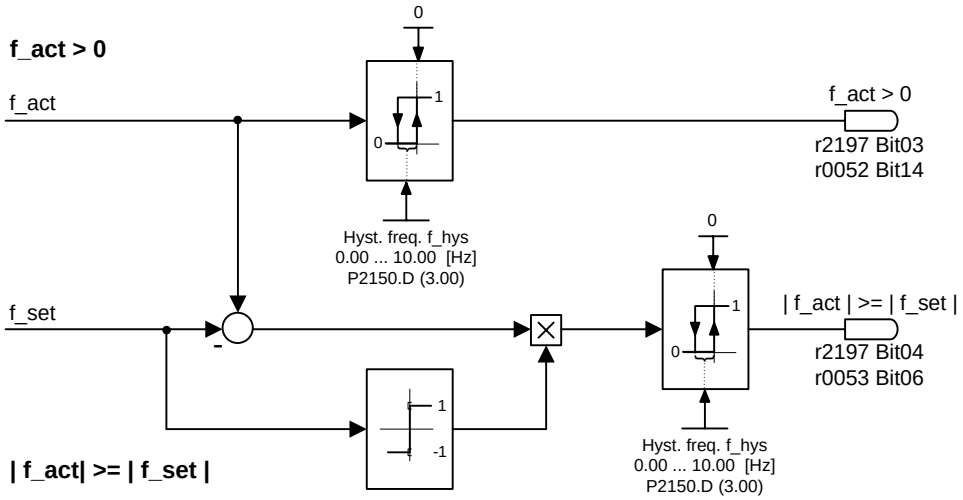
Indicates total number of alarm events. This parameter is incremented whenever an alarm event occurs. It also gets incremented when a warning is cleared or faults are cleared.

This parameter is used by the PC tools.

P2150 **Hysteresis frequency f_hys** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	0.00
P-Group:	ALARMS	**Active:** Immediately	**QuickComm.:** No	**Def:**	3.00
				Max:	10.00

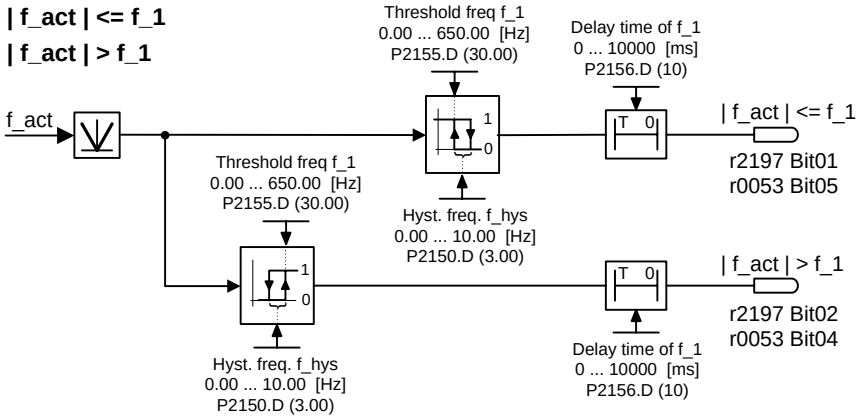
Defines hysteresis level applied for comparing frequency and speed to threshold as illustrated in the diagram below.



P2155 **Threshold frequency f_1** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	0.00
P-Group:	ALARMS	**Active:** Immediately	**QuickComm.:** No	**Def:**	30.00
				Max:	650.00

Sets a threshold for comparing actual frequency or frequency to threshold values f_1. This threshold controls status bits 4 and 5 in status word 2 (r0053).



P2156 **Delay time of threshold freq f_1** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** ms	**Min:**	0
P-Group:	ALARMS	**Active:** Immediately	**QuickComm.:** No	**Def:**	10
				Max:	10000

Sets delay time prior to threshold frequency f_1 comparison (P2155).

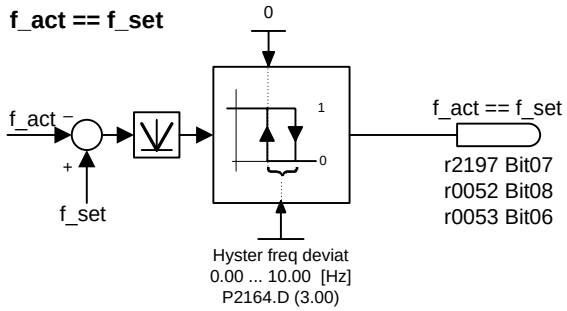
Details:

See diagram in P2155 (threshold frequency f_1)

P2164 **Hysteresis frequency deviation** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	0.00
P-Group:	ALARMS	**Active:** Immediately	**QuickComm.:** No	**Def:**	3.00
				Max:	10.00

Hysteresis frequency for detecting permitted deviation (from setpoint). This frequency controls bit 8 in status word 1 (r0052) and bit 6 in status word 2 (r0053).



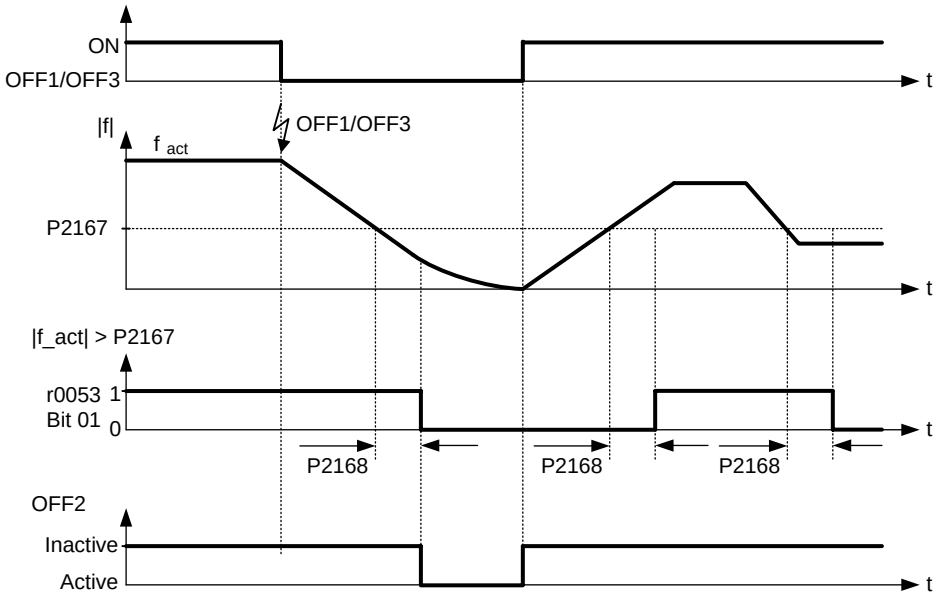
P2167 **Switch-off frequency f_off** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Min:**	0.00
P-Group:	ALARMS	**Active:** Immediately	**QuickComm.:** No	**Def:**	1.00
				Max:	10.00

Defines the threshold of the monitoring function |f_act| <= P2167 (f_off).

P2167 influences following functions:
- If the actual frequency falls below this threshold and the time delay has expired, bit 1 in status word 2 (r0053) is reset.
- If a OFF1 or OFF3 was applied and bit 1 is reset the inverter will disable the pulse (OFF2).

Restriction:
- The monitoring function |f_act| <= P2167 (f_off) is not updated and pulses are not disabled, if motor holding brake (MHB, P1215 = 1) is enabled.



P2168 **Delay time T_off** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** ms	**Min:**	0
P-Group:	ALARMS	**Active:** Immediately	**QuickComm.:** No	**Def:**	10
				Max:	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.

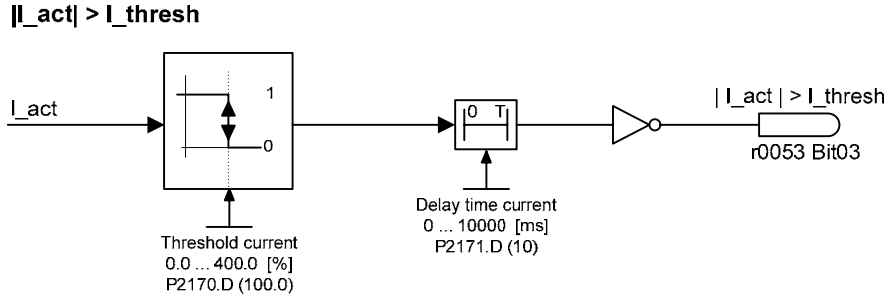
Details:

See diagram in P2167 (switch-off frequency)

P2170 **Threshold current I_thresh** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	0.0
P-Group:	ALARMS	**Active:** Immediately	**QuickComm.:** No	**Def:**	100.0
				Max:	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).

P2171 **Delay time current** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** ms	**Min:**	0
P-Group:	ALARMS	**Active:** Immediately	**QuickComm.:** No	**Def:**	10
				Max:	10000

Defines delay time prior to activation of current comparison.

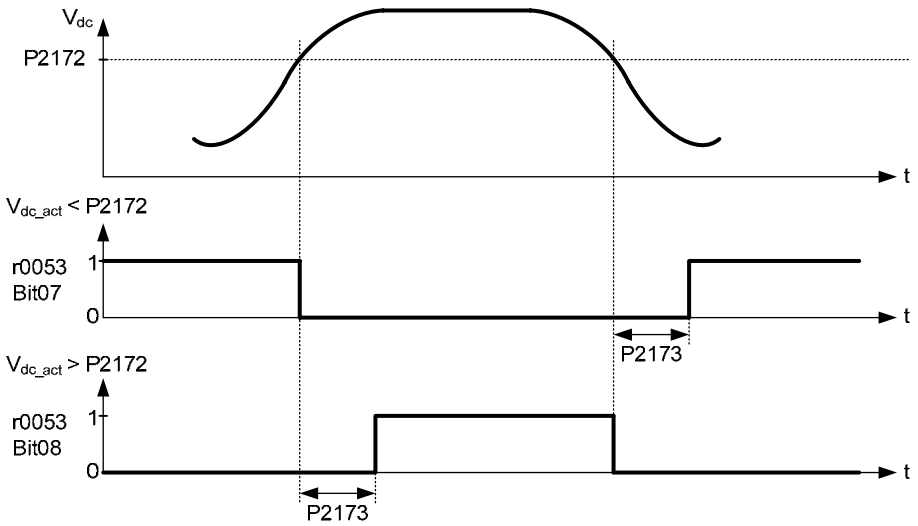
Details:

See diagram in P2170 (threshold current I_thresh)

P2172 **Threshold DC-link voltage** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** V	**Min:**	0
P-Group:	ALARMS	**Active:** Immediately	**QuickComm.:** No	**Def:**	800
				Max:	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).
Changing this threshold does not change the threshold of F0002 (Overvoltage).

P2173 **Delay time DC-link voltage** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** ms	**Min:**	0
P-Group:	ALARMS	**Active:** Immediately	**QuickComm.:** No	**Def:**	10
				Max:	10000

Defines delay time prior to activation of threshold comparison.

Details:

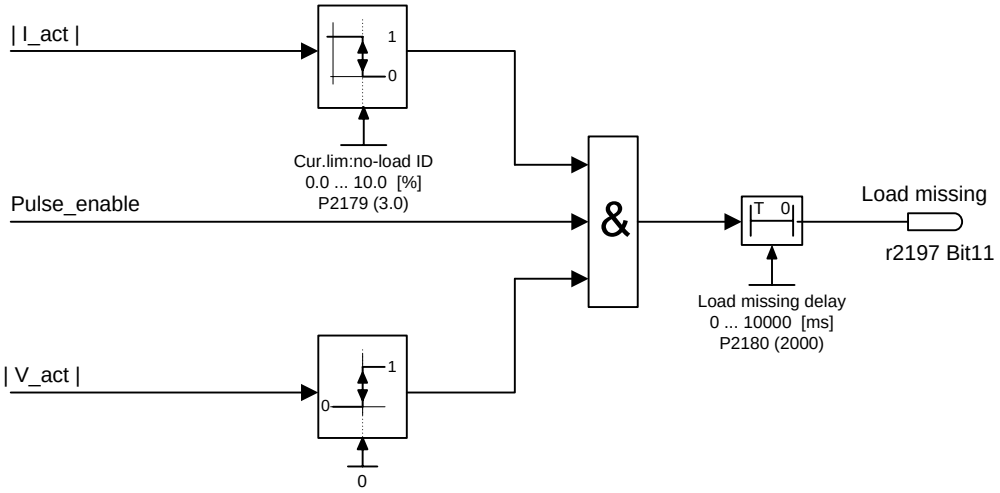
See diagram in P2172 (threshold DC-link voltage)

P2179 **Current limit for no load ident.** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	0.0
P-Group:	ALARMS	**Active:** Immediately	**QuickComm.:** No	**Def:**	3.0
				Max:	10.0

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.
- 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.

P2180 **Delay time for load missing** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** ms	**Min:**	0
P-Group:	ALARMS	**Active:** Immediately	**QuickComm.:** No	**Def:**	2000
				Max:	10000

Delay time to identify that the current is less than the threshold defined in P2179.

Details:

See diagram in P2179 (current limit for no load identification).

r2197 **CO/BO: Monitoring word 1** Level **2**

		Datatype: U16	**Unit:** -	**Min:**	-
P-Group:	ALARMS			**Def:**	-
				Max:	-

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   Load missing                             0  NO        1  YES
```

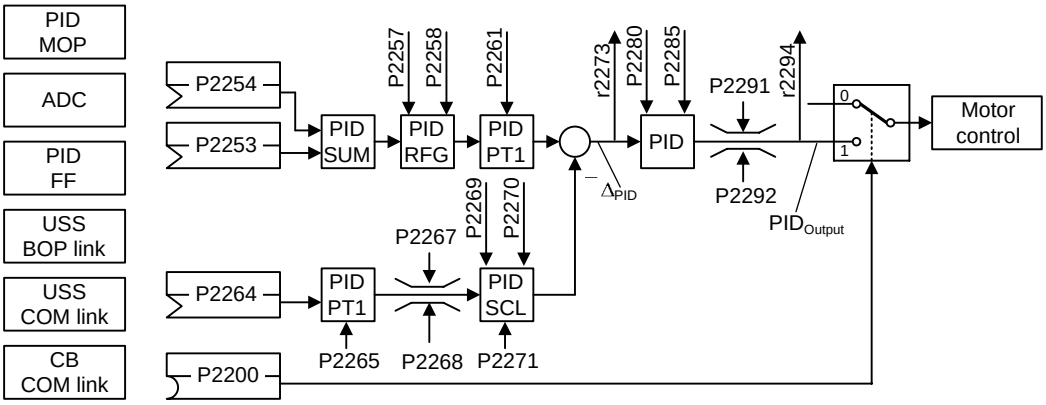
3.31 Technology controller (PID controller)

P2200	BI: Enable PID controller			Min:	0:0	Level
	CStat: CUT	Datatype: U32	Unit: -	Def:	0:0	2
	P-Group: TECH	Active: first confirm	QuickComm.: No	Max:	4000:0	

Allows user to enable/disable the PID controller.

P2200 settings :

0 : PID controller de-activated
1 : PID controller permanently activated
BICO parameters : PID controller event-controlled, de-activated/activated



Common Settings:

Parameter	Parameter text	Setting	Meaning
P2200	BI: Enable PID controller	0	PID controller de-activated
		1.0	PID controller always active
		722.x	Digital input x
		BICO	BICO parameter
P2253	CI: PID setpoint	2224	Fixed PID setpoint (PID-FF)
		2250	PID-MOP
		2015.1	USS on BOP link
		2019.1	USS on COM link
		2050.1	CB on COM link
P2264	CI: PID feedback	755.0	Analog input

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 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.

Changes in parameter P2200 are only activated on the next ON command!

P2201 **Fixed PID setpoint 1**

						Level
CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	-200.00	**2**
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.00	
				Max:	200.00	

Defines Fixed PID Setpoint 1

There are three options available for selection of the PID fixed setpoints:
1. Direct selection
2. Direct selection + ON command
3. Binary coded selection + ON command

1. Direct selection (P0701 - P0706 = 15):
   - In this mode of operation, 1 digital input selects one PID fixed setpoint.
   - If several inputs are active together, the selected setpoints are summed.
   - E.g.: PID-FF1 + PID-FF2 + PID-FF3.

2. Direct selection + ON command (P0701 - P0706 = 16):
   - In this mode of operation the PID fixed setpoints are combined with an ON command.
   - Description as for 1), except that this type of selection issues an ON command concurrent with any setpoint selection.
   - If several inputs are active together, the selected setpoints are summed.
   - E.g.: PID-FF1 + PID-FF2 + PID-FF3.

3. Binary coded selection + ON command (P0701 - P0706 = 17):
   - Using this method to select the fixed PID setpoint (FF-PID) allows you to choose up to 8 different PID setpoints.
   - The setpoints are selected according to the following table:

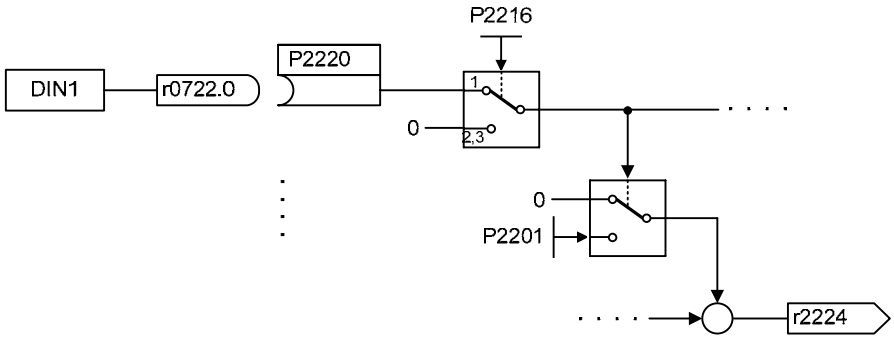
Example:

Binary coded selection :

		DIN3	DIN2	DIN1
0 %	PID - FF0	0	0	0
P2201	PID - FF1	0	0	1
P2202	PID - FF2	0	1	0
P2203	PID - FF3	0	1	1
P2204	PID - FF4	1	0	0
P2205	PID - FF5	1	0	1
P2206	PID - FF6	1	1	0
P2207	PID - FF7	1	1	1

Direct selection of PID-FF1 P2201 via DIN 1:

P0701 = 15
or
P0701 = 99, P2220 = 722.0, P2216 = 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

P2202 **Fixed PID setpoint 2** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	-200.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	10.00
				Max:	200.00

Defines Fixed PID Setpoint 2

Details:
See P2201 (Fixed PID Setpoint 1).

P2203 **Fixed PID setpoint 3** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	-200.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	20.00
				Max:	200.00

Defines Fixed PID Setpoint 3

Details:
See P2201 fixed PID setpoint 1 (FF-PID 1).

P2204 **Fixed PID setpoint 4** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	-200.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	30.00
				Max:	200.00

Defines Fixed PID Setpoint 4

Details:
See P2201 (Fixed PID Setpoint 1).

P2205 **Fixed PID setpoint 5** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	-200.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	40.00
				Max:	200.00

Defines Fixed PID Setpoint 5

Details:
See P2201 (Fixed PID Setpoint 1).

P2206 **Fixed PID setpoint 6** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	-200.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	50.00
				Max:	200.00

Defines Fixed PID Setpoint 6

Details:
See P2201 (Fixed PID Setpoint 1).

P2207 **Fixed PID setpoint 7** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	-200.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	60.00
				Max:	200.00

Defines Fixed PID Setpoint 7

Details:
See P2201 (Fixed PID Setpoint 1).

P2216 **Fixed PID setpoint mode - Bit 0** Level **3**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	1
P-Group:	TECH	**Active:** first confirm	**QuickComm.:** No	**Def:**	1
				Max:	3

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

P2217 **Fixed PID setpoint mode - Bit 1** Level **3**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	1
P-Group:	TECH	**Active:** first confirm	**QuickComm.:** No	**Def:**	1
				Max:	3

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

P2218 **Fixed PID setpoint mode - Bit 2** Level **3**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	1
P-Group:	TECH	**Active:** first confirm	**QuickComm.:** No	**Def:**	1
				Max:	3

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

P2220 **BI: Fixed PID setp. select Bit 0** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	4000:0

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)

P2221 **BI: Fixed PID setp. select Bit 1** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	4000:0

Defines command source of fixed PID setpoint selection Bit 1.

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)

P2222 **BI: Fixed PID setp. select Bit 2** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	4000:0

Defines command source of fixed PID setpoint selection Bit 2

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)

r2224 **CO: Act. fixed PID setpoint** Level **2**

		Datatype: Float	**Unit:** %	**Min:**	-
				Def:	-
P-Group:	TECH			**Max:**	-

Displays total output of PID fixed setpoint selection.

Note:

r2224 = 100 % corresponds to 4000 hex

P2231 **Setpoint memory of PID-MOP** Level **2**

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	0
				Max:	1

Setpoint memory

Possible Settings:

0 PID-MOP setpoint will not be stored
1 PID-MOP setpoint will be stored (P2240 is updated)

Dependency:

If 0 selected, setpoint returns to value set in P2240 (setpoint of PID-MOP) after an OFF command.

If 1 is selected, active setpoint is "remembered" and P2240 updated with current value.

Details:

See P2240 (setpoint of PID-MOP)

P2232 **Inhibit neg. PID-MOP setpoints** Level **2**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	TECH	**Active:** first confirm	**QuickComm.:** No	**Def:**	1
				Max:	1

This parameter suppresses negative setpoints of the PID-MOP output r2250.

Possible Settings:

0 Neg. PID-MOP setpoint is allowed
1 Neg. PID-MOP setpoint inhibited

Note:

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.

P2235 **BI: Enable PID-MOP (UP-cmd)** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	19:13
				Max:	4000:0

Defines source of UP 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)
19.D = Keypad UP button

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)

P2236 **BI: Enable PID-MOP (DOWN-cmd)** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	19:14
				Max:	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 button

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)

P2240 **Setpoint of PID-MOP** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	-200.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	10.00
				Max:	200.00

Setpoint of the motor potentiometer.

Allows user to set a digital PID setpoint in [%].

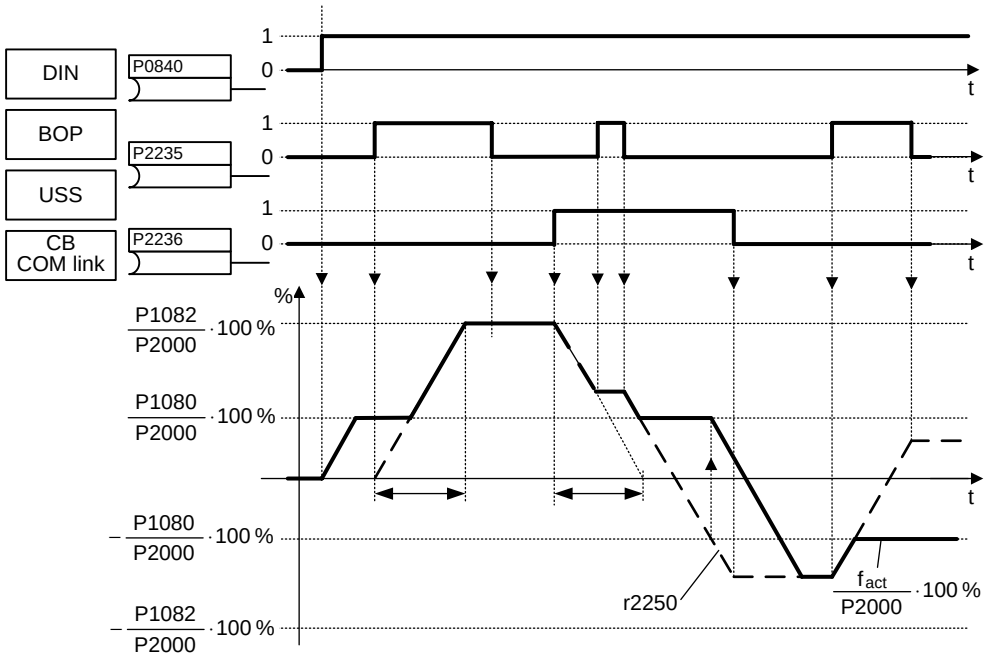
Note:

P2240 = 100 % corresponds to 4000 hex

r2250 **CO: Output setpoint of PID-MOP** Level **2**

		Datatype: Float	**Unit:** %	**Min:**	-
P-Group:	TECH			**Def:**	-
				Max:	-

Displays output setpoint of motor potentiometer in [%].



Note:

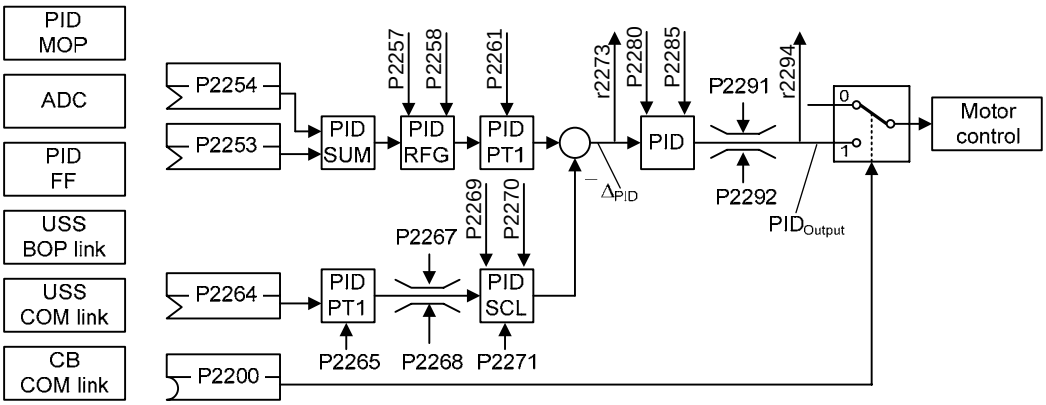
r2250 = 100 % corresponds to 4000 hex

P2253 **CI: PID setpoint**

CStat:	CUT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	TECH	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	4000:0

Level **2**

Defines setpoint source for PID setpoint input.



Common Settings:

Parameter	Parameter text	Setting	Meaning
P2200	BI: Enable PID controller	0	PID controller de-activated
		1.0	PID controller always active
		722.x	Digital input x
		BICO	BICO parameter
P2253	CI: PID setpoint	2224	Fixed PID setpoint (PID-FF)
		2250	PID-MOP
		2015.1	USS on BOP link
		2019.1	USS on COM link
		2050.1	CB on COM link
P2264	CI: PID feedback	755.0	Analog input

P2254 **CI: PID trim source**

CStat:	CUT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	TECH	**Active:** first confirm	**QuickComm.:** No	**Def:**	0:0
				Max:	4000:0

Level **3**

Selects trim source for PID setpoint. This signal is multiplied by the trim gain and added to the PID setpoint.

Common Settings:

See parameter P2253

P2255 **PID setpoint gain factor**

CStat:	CUT	**Datatype:** Float	**Unit:** -	**Min:**	0.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	100.00
				Max:	100.00

Level **3**

Gain factor for PID setpoint. The PID setpoint input is multiplied by this gain factor to produce a suitable ratio between setpoint and trim.

P2256 **PID trim gain factor**

CStat:	CUT	**Datatype:** Float	**Unit:** -	**Min:**	0.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	100.00
				Max:	100.00

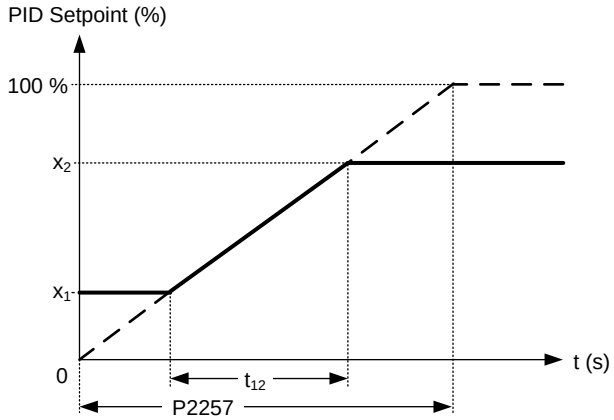
Level **3**

Gain factor for PID trim. This gain factor scales the trim signal, which is added to the main PID setpoint.

P2257 **Ramp-up time for PID setpoint** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** s	**Min:**	0.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	1.00
				Max:	650.00

Sets the ramp-up time for the PID setpoint.



$$t_{12} = \frac{|x_2 - x_1|}{100\%} \cdot P2257$$

Dependency:

P2200 = 1 (PID control is enabled) disables 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.

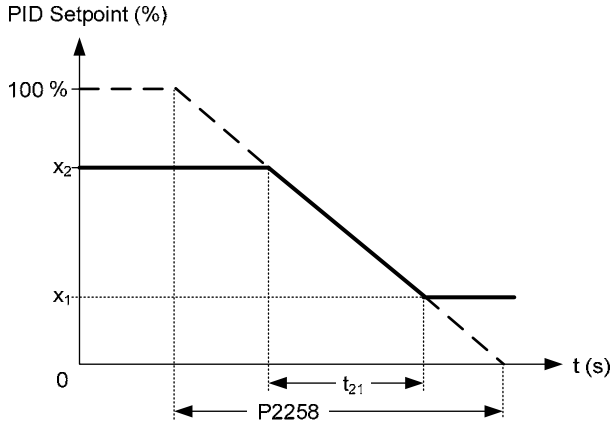
Notice:

Setting the ramp-up time too short may cause the inverter to trip, on overcurrent for example.

P2258 **Ramp-down time for PID setpoint** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** s	**Min:**	0.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	1.00
				Max:	650.00

Sets ramp-down time for PID setpoint.



$$t_{21} = \frac{|x_1 - x_2|}{100\%} \cdot P2258$$

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).

r2260 **CO: PID setpoint after PID-RFG** Level **2**

		Datatype: Float	**Unit:** %	**Min:**	-
				Def:	-
P-Group:	TECH			**Max:**	-

Displays total active PID setpoint after PID-RFG in [%].

Note:

r2260 = 100 % corresponds to 4000 hex

P2261 **PID setpoint filter timeconstant** Level **3**

CStat: CUT **Datatype:** Float **Unit:** s **Min:** 0.00
P-Group: TECH **Active:** Immediately **QuickComm.:** No **Def:** 0.00
Max: 60.00

Sets a time constant for smoothing the PID setpoint.

Note:
0 = no smoothing

r2262 **CO: Filtered PID setp. after RFG** Level **3**

Datatype: Float **Unit:** % **Min:** -
Def: -
P-Group: TECH **Max:** -

Displays the filtered PID setpoint after the PID ramp-function generator (PID_HLG) as percentage. Parameter r2262 is obtained from the filtered parameter r2260 that is filtered using the PT1 filter with time constant P2261.

Note:
r2262 = 100 % corresponds to 4000 hex

P2264 **CI: PID feedback** Level **2**

CStat: CUT **Datatype:** U32 **Unit:** - **Min:** 0:0
P-Group: TECH **Active:** first confirm **QuickComm.:** No **Def:** 755:0
Max: 4000:0

Selects the source of the PID feedback signal.

Common Settings:

Parameter	Parameter text	Setting	Meaning
P2200	BI: Enable PID controller	0	PID controller de-activated
		1.0	PID controller always active
		722.x	Digital input x
		BICO	BICO parameter
P2253	CI: PID setpoint	2224	Fixed PID setpoint (PID-FF)
		2250	PID-MOP
		2015.1	USS on BOP link
		2019.1	USS on COM link
		2050.1	CB on COM link
P2264	CI: PID feedback	755.0	Analog input

Note:
When analog input is selected, offset and gain can be implemented using parameters P0756 to P0760.

P2265 **PID feedback filter timeconstant** Level **2**

CStat: CUT **Datatype:** Float **Unit:** s **Min:** 0.00
P-Group: TECH **Active:** Immediately **QuickComm.:** No **Def:** 0.00
Max: 60.00

Defines time constant for PID feedback filter.

r2266 **CO: PID filtered feedback** Level **2**

Datatype: Float **Unit:** % **Min:** -
Def: -
P-Group: TECH **Max:** -

Displays PID feedback signal in [%].

Note:
r2266 = 100 % corresponds to 4000 hex

P2267 **Max. value for PID feedback** Level **3**

CStat: CUT **Datatype:** Float **Unit:** % **Min:** -200.00
P-Group: TECH **Active:** Immediately **QuickComm.:** No **Def:** 100.00
Max: 200.00

Sets the upper limit for the value of the feedback signal in [%].

Note:
- P2267 = 100 % corresponds to 4000 hex
- When PID is enabled (P2200 = 1) and the signal rises above this value, the inverter will trip with F0222 .

P2268 **Min. value for PID feedback** Level **3**

CStat: CUT **Datatype:** Float **Unit:** % **Min:** -200.00
P-Group: TECH **Active:** Immediately **QuickComm.:** No **Def:** 0.00
Max: 200.00

Sets lower limit for value of feedback signal in [%].

Note:
- P2268 = 100 % corresponds to 4000 hex
- When PID is enabled (P2200 = 1) and the signal rises below this value, the inverter will trip with F0221.

P2269 **Gain applied to PID feedback** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** -	**Min:**	0.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	100.00
				Max:	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.

P2270 **PID feedback function selector** Level **3**

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	0
				Max:	3

Applies mathematical functions to the PID feedback signal, allowing multiplication of the result by P2269 (gain applied to PID feedback).

Possible Settings:

0 Disabled
1 Square root (root(x))
2 Square (x*x)
3 Cube (x*x*x)

P2271 **PID transducer type** Level **2**

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	0
				Max:	1

Allows the user to select the transducer type for the PID feedback signal.

Possible Settings:

0 Disabled
1 Inversion of PID feedback signal

Notice:

It is essential that you select the correct tranducer 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.

r2272 **CO: PID scaled feedback** Level **2**

		Datatype: Float	**Unit:** %	**Min:**	-
P-Group:	TECH			**Def:**	-
				Max:	-

Displays PID scaled feedback signal in [%].

Note:

r2272 = 100 % corresponds to 4000 hex

r2273 **CO: PID error** Level **2**

		Datatype: Float	**Unit:** %	**Min:**	-
P-Group:	TECH			**Def:**	-
				Max:	-

Displays PID error (difference) signal between setpoint and feedback signals in [%].

Note:

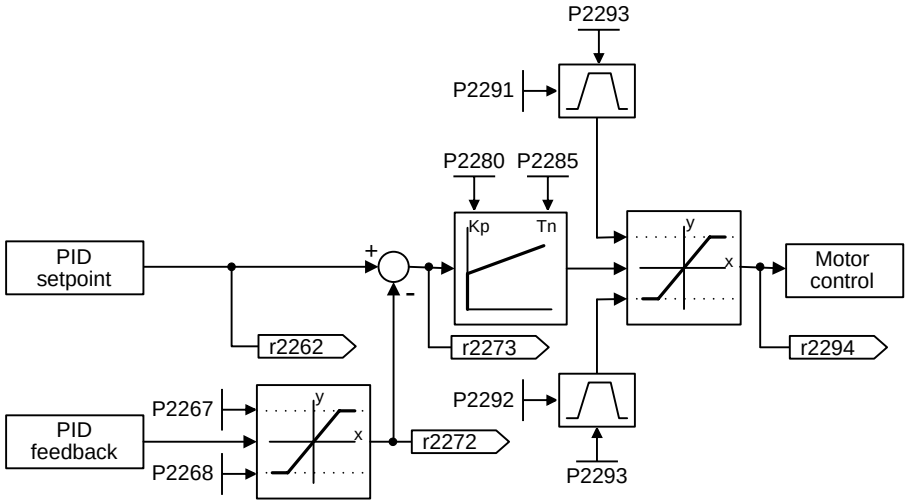
r2273 = 100 % corresponds to 4000 hex

P2280 **PID proportional gain** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** -	**Min:**	0.000
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	3.000
				Max:	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.

P2285 **PID integral time** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** s	**Min:**	0.000
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.000
				Max:	60.000

Sets integral time constant for PID controller.

Details:

See P2280 (PID proportional gain).

P2291 **PID output upper limit** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	-200.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	100.00
				Max:	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)).

P2292 **PID output lower limit** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	-200.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	0.00
				Max:	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

P2293 **Ramp-up /-down time of PID limit** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** s	**Min:**	0.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	1.00
				Max:	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).

r2294 **CO: Act. PID output** Level **2**

		Datatype: Float	**Unit:** %	**Min:**	-
				Def:	-
P-Group:	TECH			**Max:**	-

Displays PID output in [%]

Note:

r2294 = 100 % corresponds to 4000 hex

3.32 Inverter parameters

P3900 **End of quick commissioning** Level **1**

CStat:	C	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	QUICK	**Active:** first confirm	**QuickComm.:** Yes	**Def:**	0
				Max:	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 (see parameter P0340, setting P0340 = 1).

P3950 **Access of hidden parameters** Level **4**

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	ALWAYS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	255

Accesses special parameters for development (expert only) and factory functionality (calibration parameter).

r3954[13] **CM version and GUI ID** Level **4**

		Datatype: U16	**Unit:** -	**Min:**	-
				Def:	-
P-Group:	-			**Max:**	-

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

P3980 **Commissioning command selection** Level **4**

CStat:	T	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	-	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	67

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
7	Cmd = BICO parameter	Setpoint = Analog 2 setp
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
17	Cmd = BOP	Setpoint = Analog 2 setp
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
47	Cmd = USS on BOP link	Setpoint = Analog 2 setp
50	Cmd = USS on COM link	Setpoint = BICO parameter
51	Cmd = USS on COM link	Setpoint = MOP setpoint
52	Cmd = USS on COM link	Setpoint = Analog setpoint
53	Cmd = USS on COM link	Setpoint = Fixed frequency
54	Cmd = USS on COM link	Setpoint = USS on BOP link
55	Cmd = USS on COM link	Setpoint = USS on COM link
57	Cmd = USS on COM link	Setpoint = Analog 2 setp
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
67	Cmd = CB on COM link	Setpoint = Analog 2 setp

P3981 **Reset active fault** Level **4**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	ALARMS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	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 r0947 (last fault code)

r3986[2] **Number of parameters** Level **4**

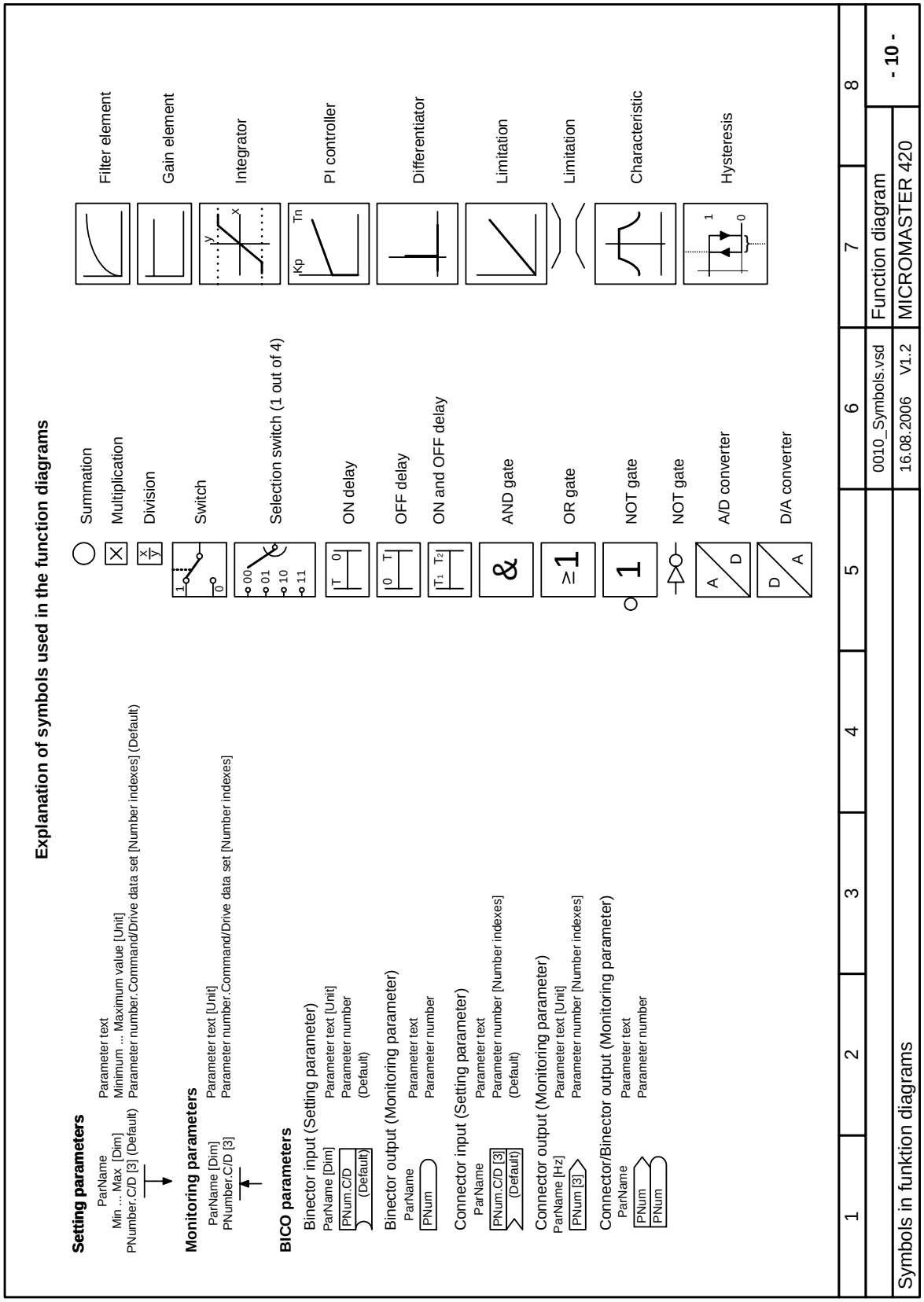
		Datatype: U16	**Unit:** -	**Min:**	-
P-Group:	-			**Def:**	-
				Max:	-

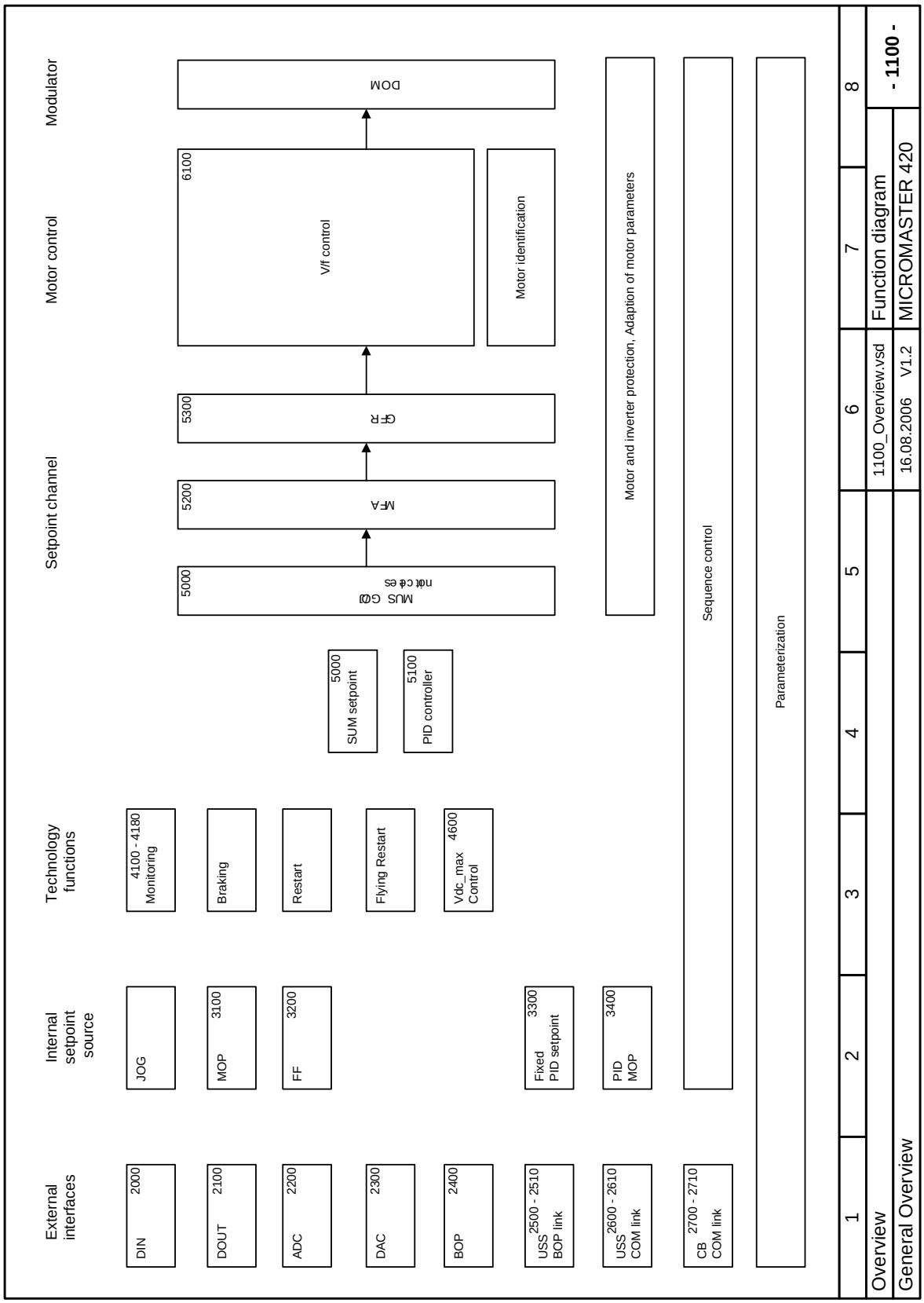
Number of parameters on the drive

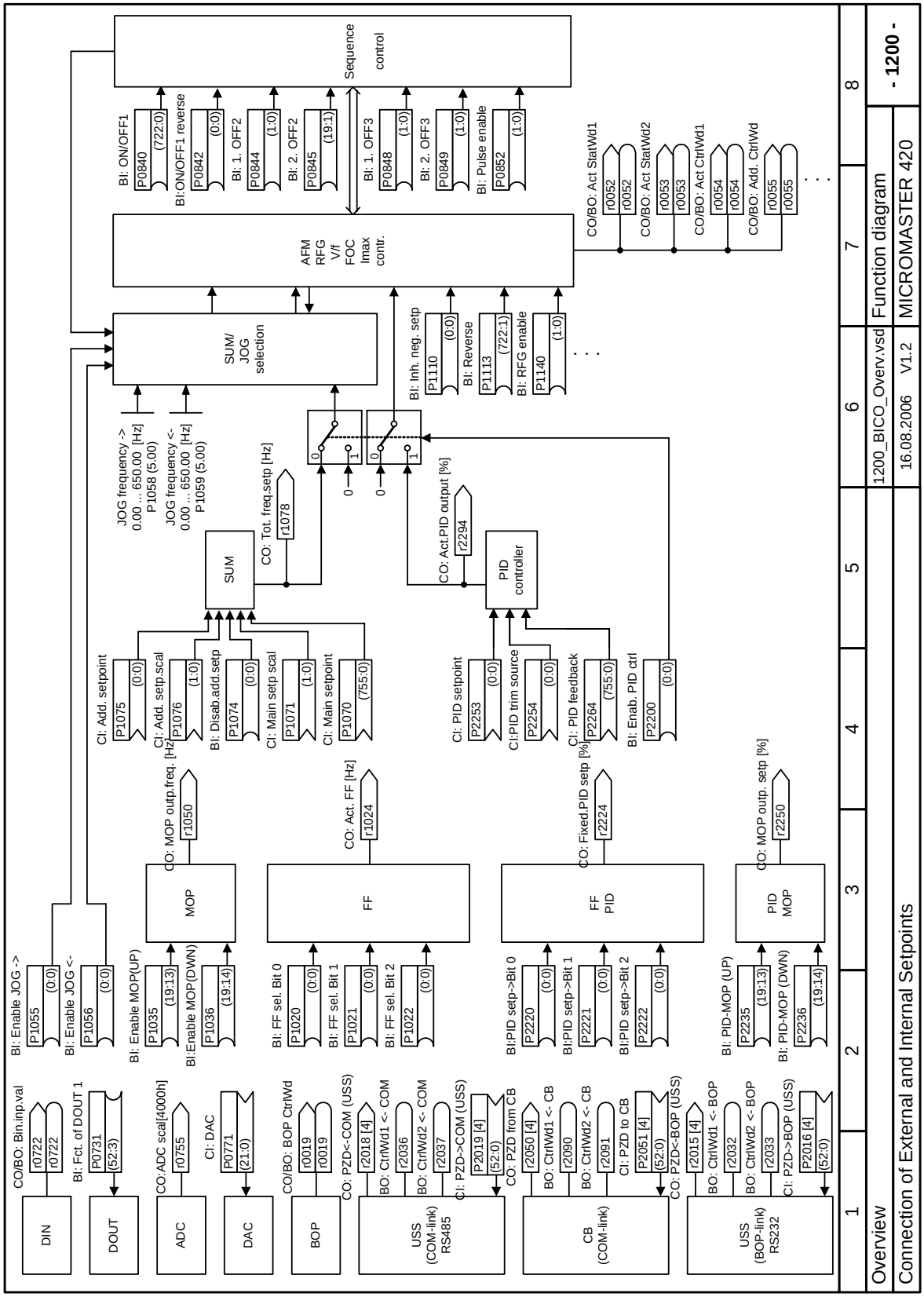
Index:

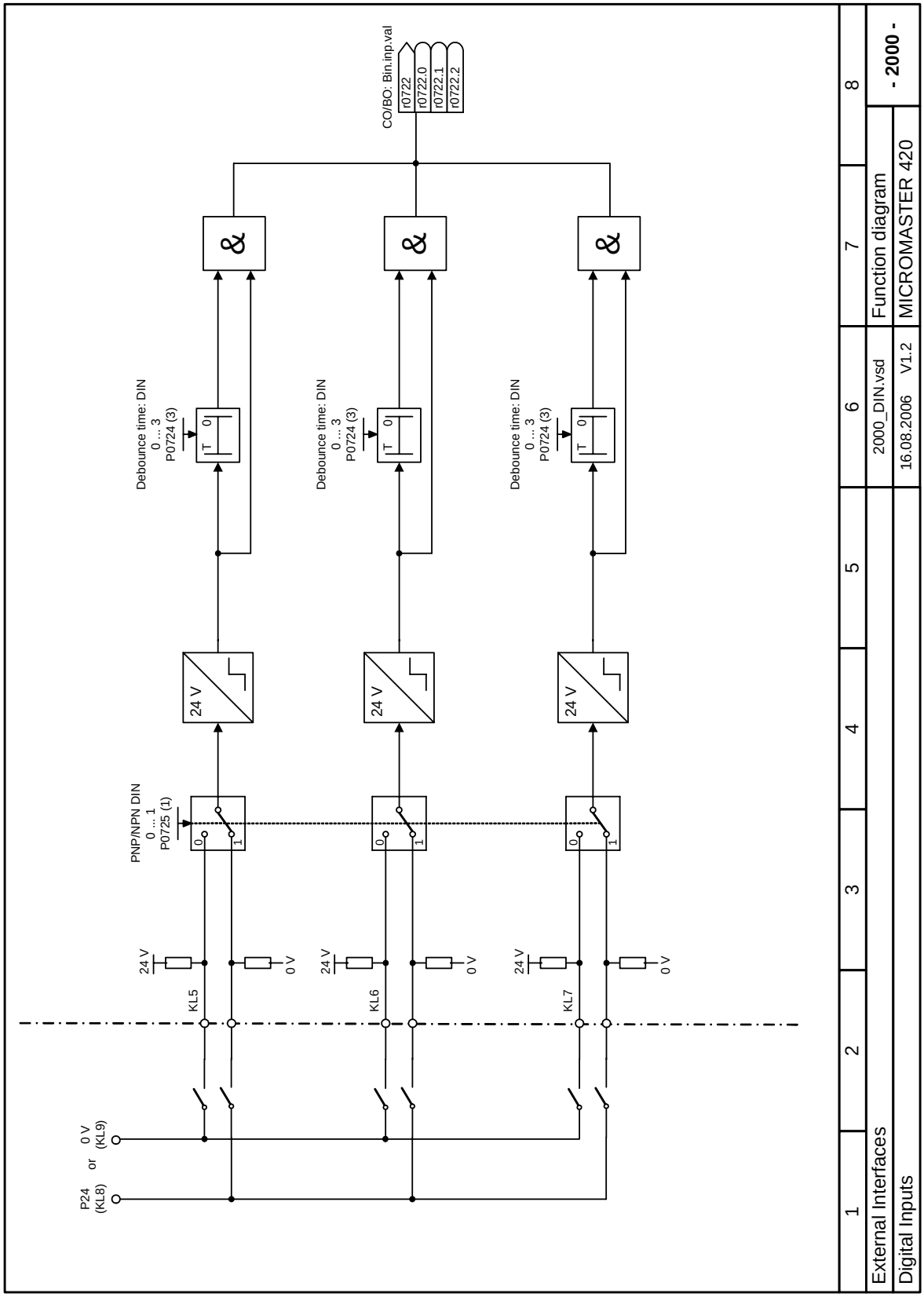
r3986[0] : Read only
r3986[1] : Read & write

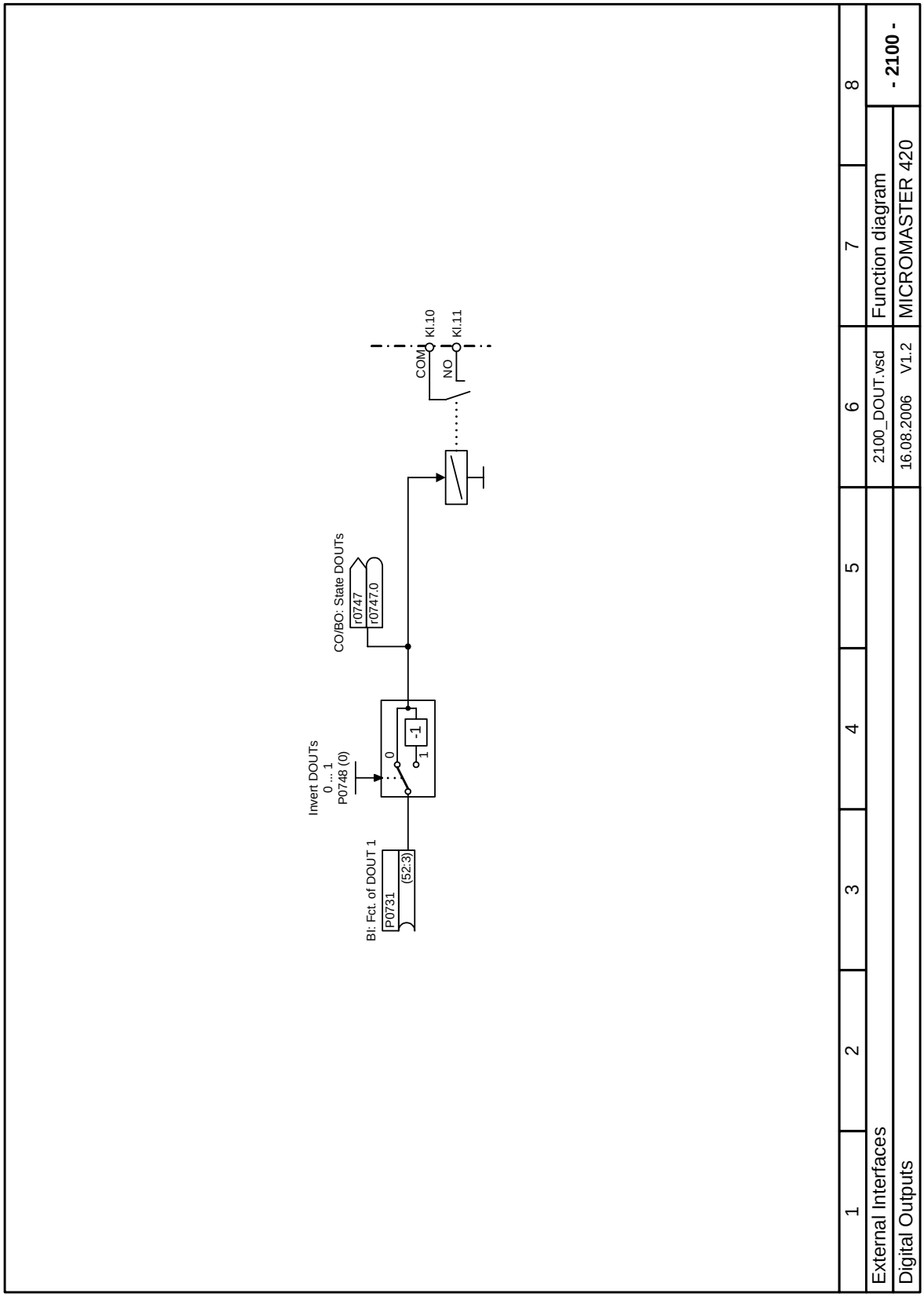
4 Function Diagrams

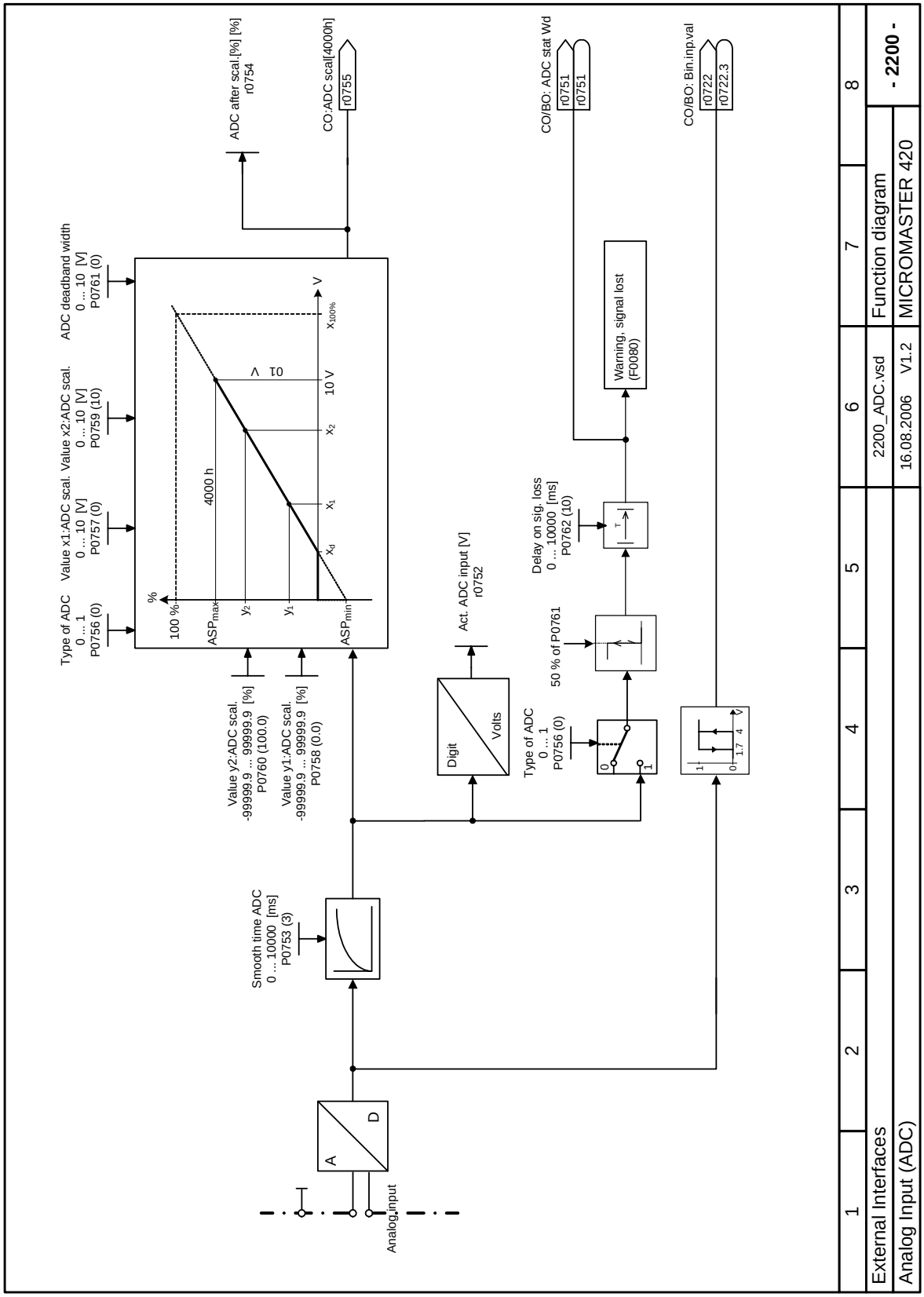


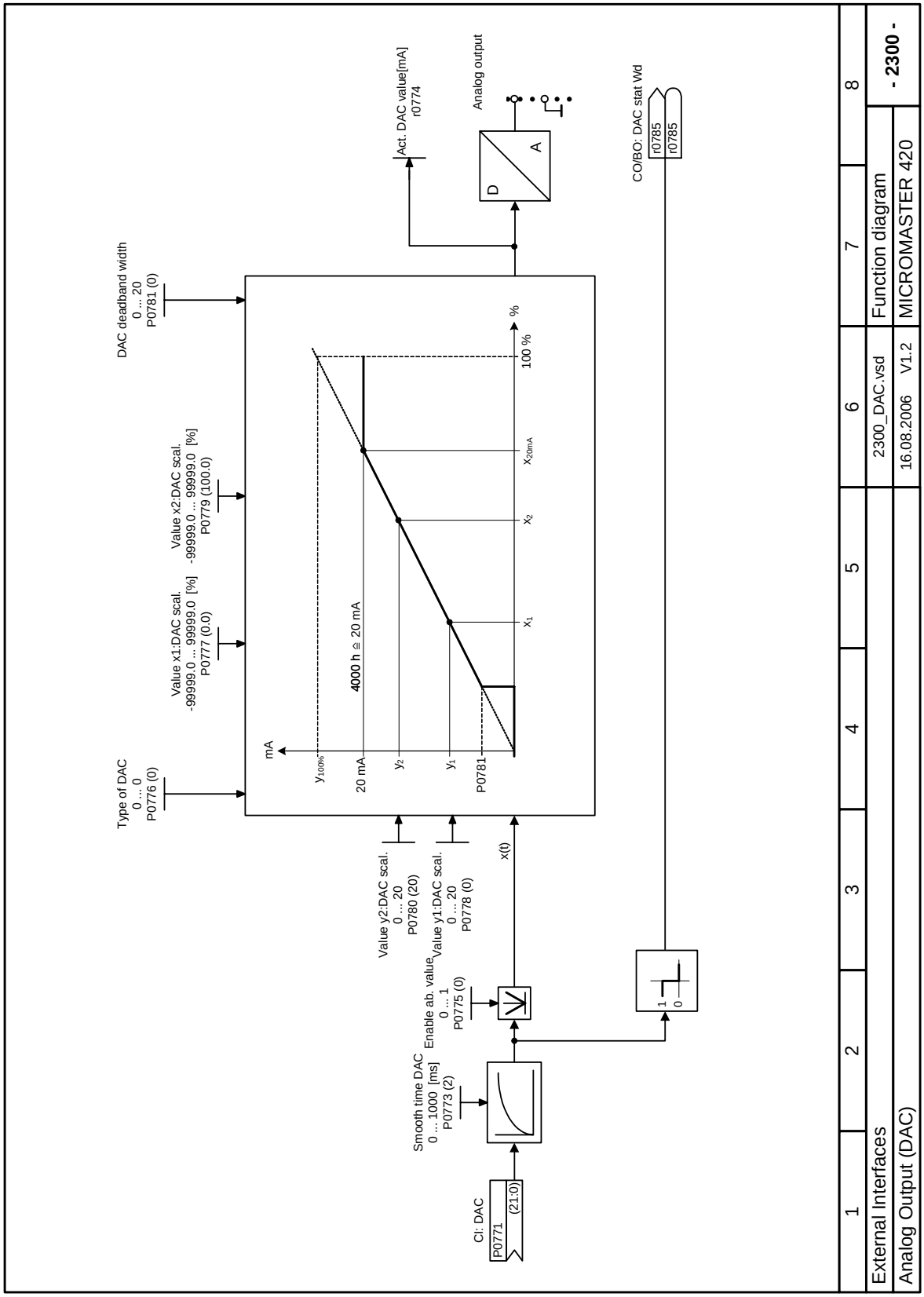

External interfaces
Internal setpoint source
Technology functions
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BOP 2400
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USS COM link 2600 - 2610
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PID MOP 3400
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5000 MUS GCD
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5300 QFR
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MICROMASTER 420
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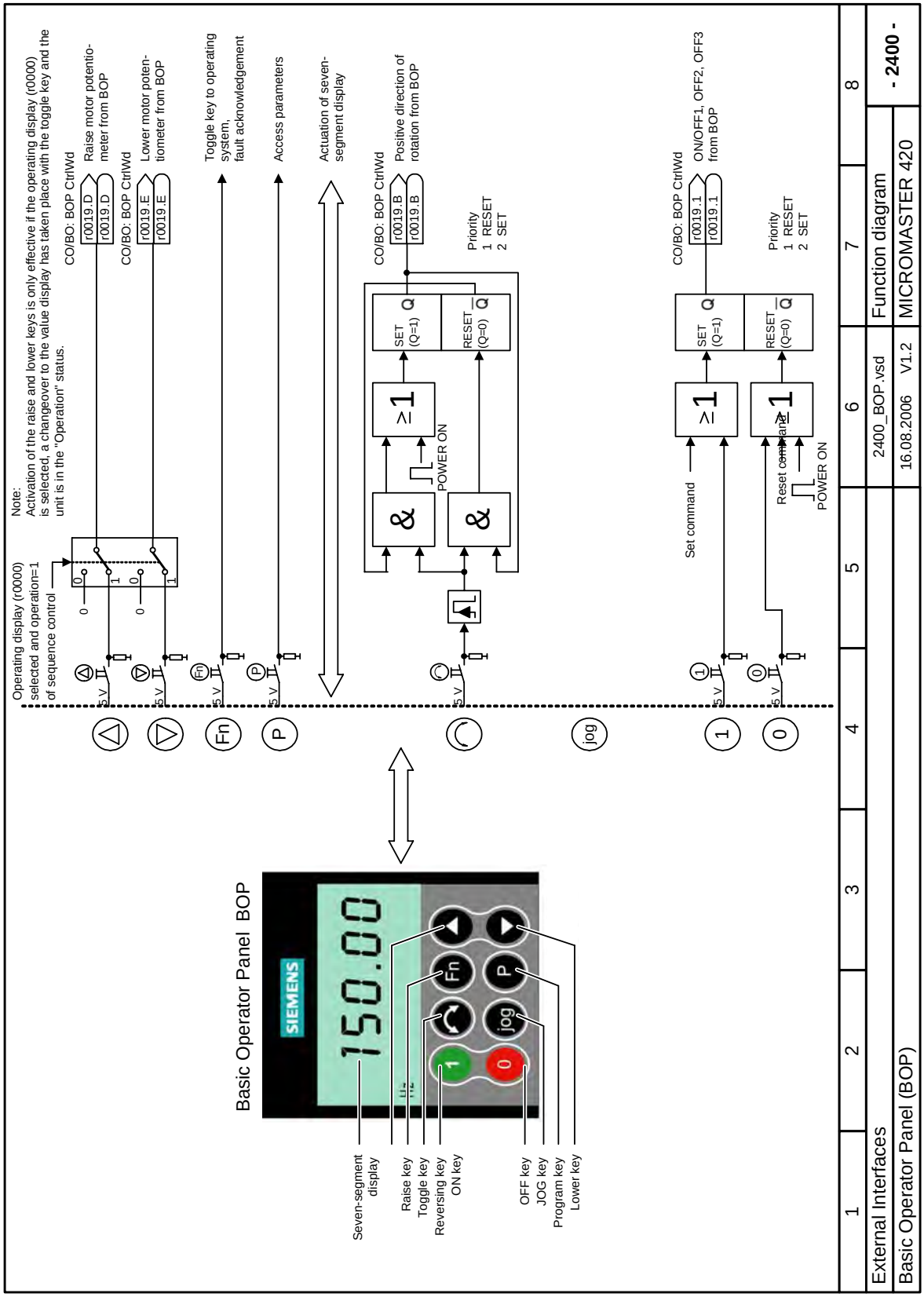

Overview
Connection of External and Internal Setpoints
1200_BICO_Overv.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 1200 -
DIN
DOUT
ADC
DAC
BOP
USS (COM-link) RS485
CB (COM-link)
USS (BOP-link) RS232
MOP
FF
FF PID
PID MOP
SUM
SUM/ JOG selection
PID controller
AFM RFG V/f FOC Imax contr.
Sequence control
JOG frequency -> 0.00 ... 650.00 [Hz] P1058 (5.00)
JOG frequency <- 0.00 ... 650.00 [Hz] P1059 (5.00)
CO: Tot. freq.setp [Hz] r1078
CO: Act.PID output [%] r2294
BI: Enable JOG -> P1055 (0:0)
BI: Enable JOG <- P1056 (0:0)
BI: Enable MOP(UP) P1035 (19:13)
BI:Enable MOP(DWN) P1036 (19:14)
CO: MOP outp.freq. [Hz] r1050
BI: FF sel. Bit 0 P1020 (0:0)
BI: FF sel. Bit 1 P1021 (0:0)
BI: FF sel. Bit 2 P1022 (0:0)
CO: Act. FF [Hz] r1024
BI:PID setp->Bit 0 P2220 (0:0)
BI:PID setp->Bit 1 P2221 (0:0)
BI:PID setp->Bit 2 P2222 (0:0)
CO: Fixed.PID setp [%] r2224
BI: PID-MOP (UP) P2235 (19:13)
BI: PID-MOP (DWN) P2236 (19:14)
CO: MOP outp. setp [%] r2250
CI: Add. setpoint P1075 (0:0)
CI: Add. setp.scal [Hz] P1076 (1:0)
BI: Disab.add.setp P1074 (0:0)
CI: Main setp scal P1071 (1:0)
CI: Main setpoint P1070 (755:0)
CI: PID setpoint P2253 (0:0)
CI:PID trim source P2254 (0:0)
CI: PID feedback P2264 (755:0)
BI: Enab. PID ctrl P2200 (0:0)
BI: Inh. neg. setp P1110 (0:0)
BI: Reverse P1113 (722:1)
BI: RFG enable P1140 (1:0)
BI: ON/OFF1 P0840 (722:0)
BI:ON/OFF1 reverse P0842 (0:0)
BI: 1. OFF2 P0844 (1:0)
BI: 2. OFF2 P0845 (19:1)
BI: 1. OFF3 P0848 (1:0)
BI: 2. OFF3 P0849 (1:0)
BI: Pulse enable P0852 (1:0)
CO/BO: Act StatWd1 r0052 r0052
CO/BO: Act StatWd2 r0053 r0053
CO/BO: Act CtrlWd1 r0054 r0054
CO/BO: Add. CtrlWd r0055 r0055
CO/BO: Bin.inp.val r0722 r0722
BI: Fct. of DOUT 1 P0731 (52:3)
CO:ADC scal[4000h] r0755
CI: DAC P0771 (21:0)
CO/BO: BOP CtrlWd r0019 r0019
CO: PZD<-COM (USS) r2018 [4]
BO: CtrlWd1 <- COM r2036
BO: CtrlWd2 <- COM r2037
CI: PZD->COM (USS) P2019 [4] (52:0)
CO: PZD from CB r2050 [4]
BO: CtrlWd1 <- CB r2090
BO: CtrlWd2 <- CB r2091
CI: PZD to CB P2051 [4] (52:0)
CO: PZD<BOP (USS) r2015 [4]
BO: CtrlWd1 <- BOP r2032
BO: CtrlWd2 <- BOP r2033
CI: PZD->BOP (USS) P2016 [4] (52:0)
1 2 3 4 5 6 7 8

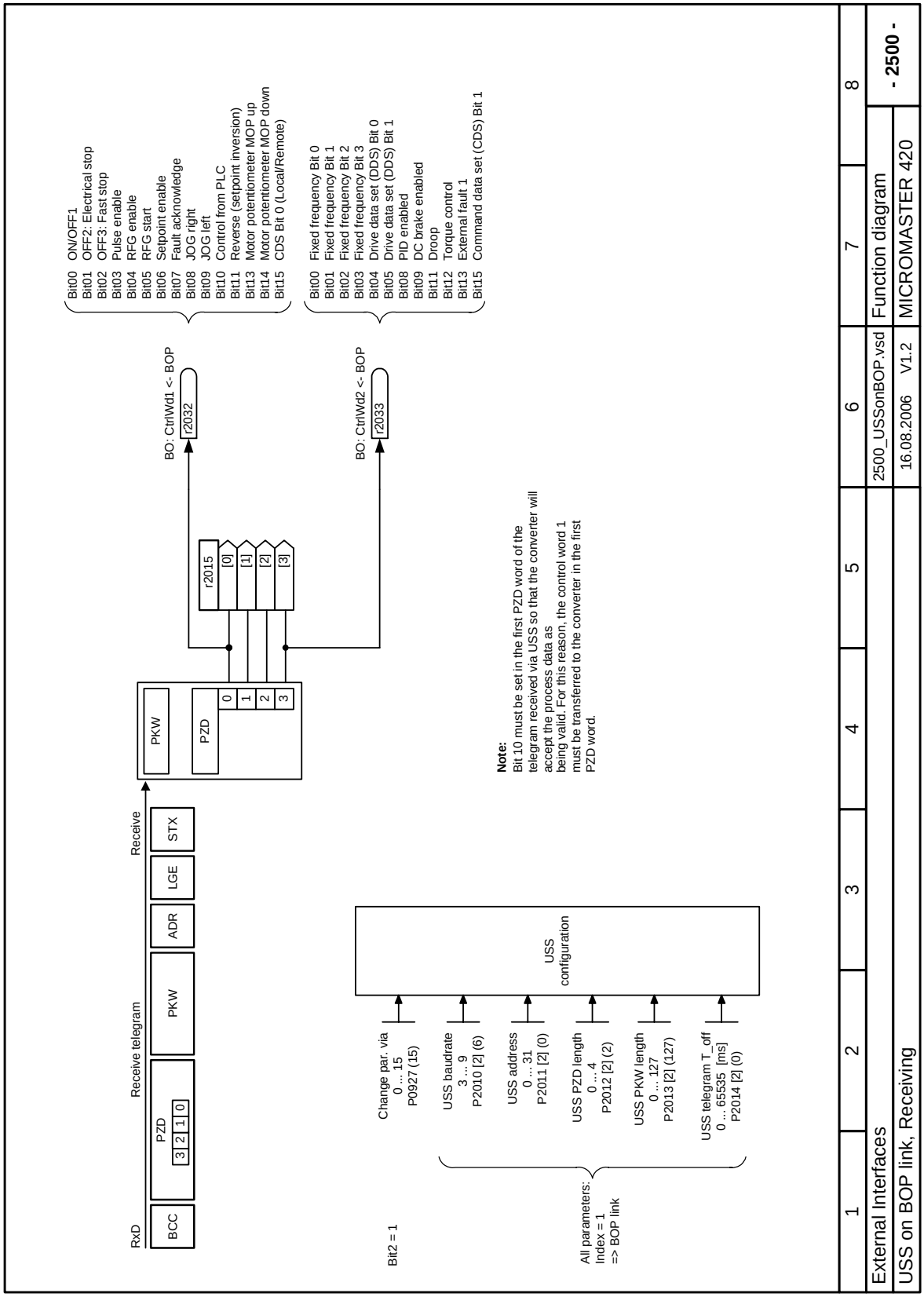

CO/BO: Bin.inp.val
r0722
r0722.0
r0722.1
r0722.2
&
Debounce time: DIN
0 ... 3
P0724 (3)
T 0
24 V
PNP/NPN DIN
0 ... 1
P0725 (1)
0
1
24 V
0 V
KL5
KL6
KL7
P24
(KL8)
or
0 V
(KL9)
1
2
3
4
5
6
7
8
External Interfaces
Digital Inputs
2000_DIN.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 2000 -

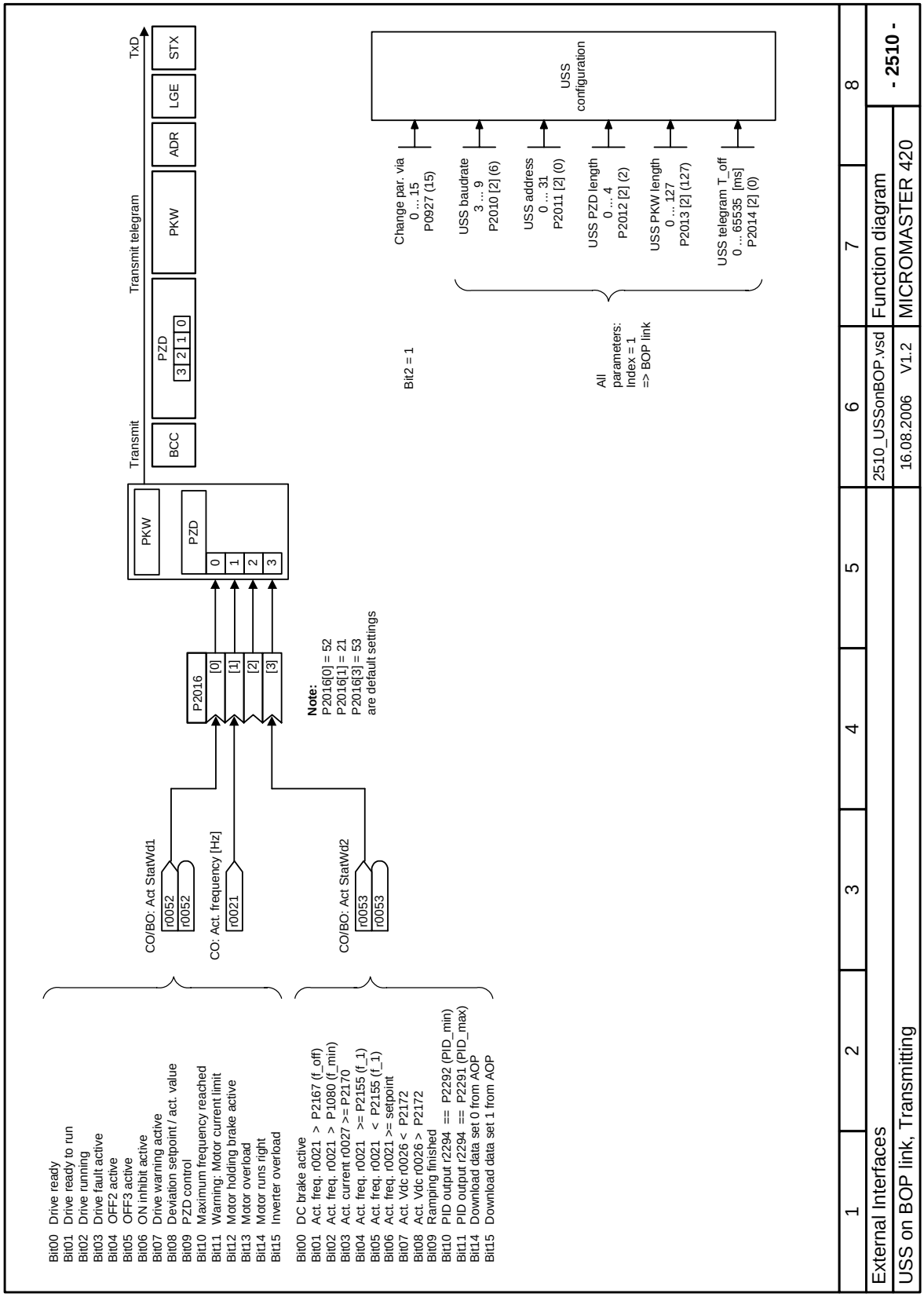

COM
KI.10
NO
KI.11
CO/BO: State DOUTs
r0747
r0747.0
Invert DOUTs
0 ... 1
P0748 (0)
0
1
-1
Bi: Fct. of DOUT 1
P0731
(52:3)
1
2
3
4
5
6
7
8
External Interfaces
Digital Outputs
2100_DOUT.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 2100 -

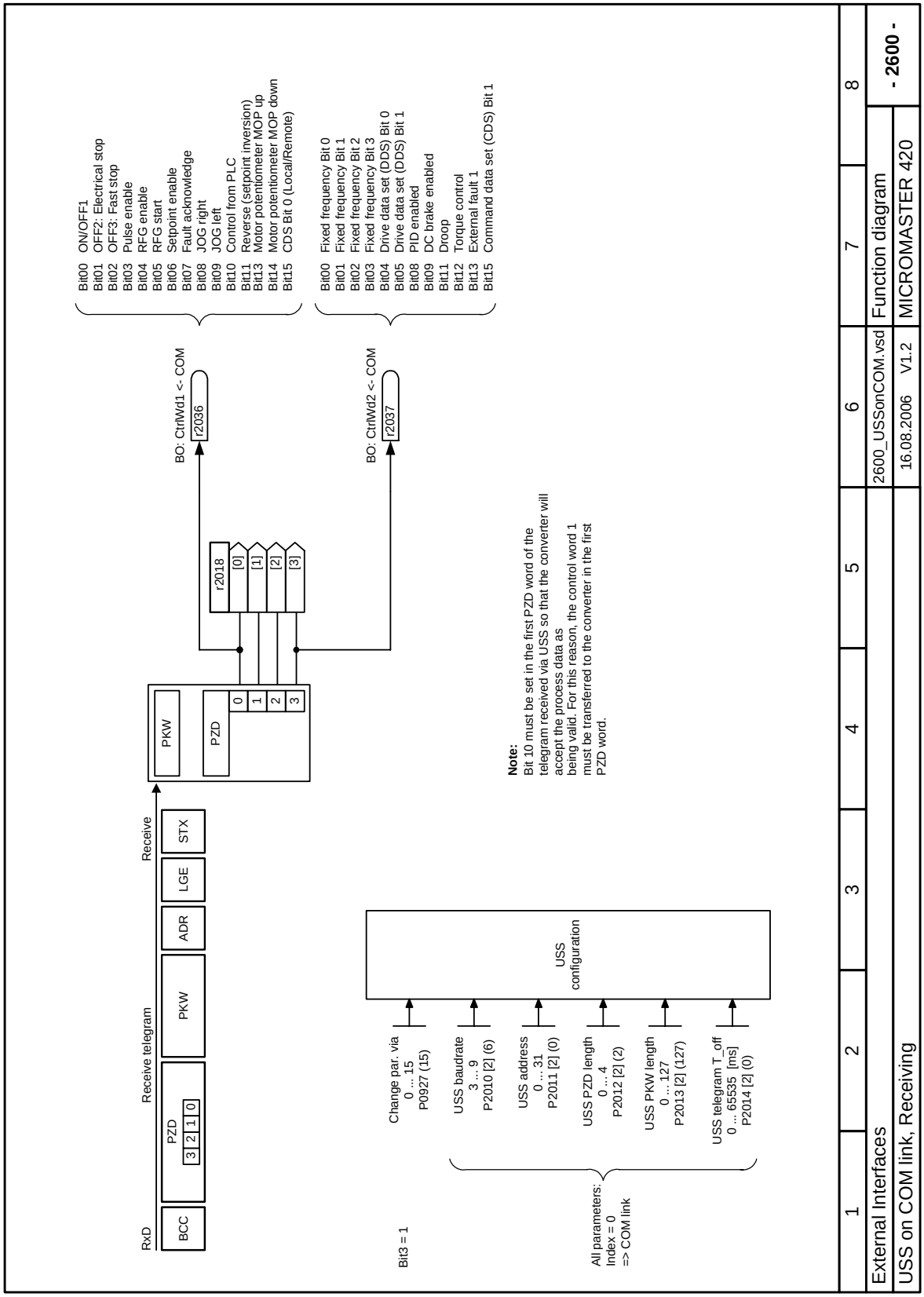

ADC after scal.[%] [%]
r0754
CO:ADC scal[4000h]
r0755
CO/BO: ADC stat Wd
r0751
r0751
CO/BO: Bin.inp.val
r0722
r0722.3
ADC deadband width
0 ... 10 [V]
P0761 (0)
Value x2:ADC scal.
0 ... 10 [V]
P0759 (10)
Value x1:ADC scal.
0 ... 10 [V]
P0757 (0)
Type of ADC
0 ... 1
P0756 (0)
4000 h
10 V
V
%
100 %
ASPmax
ASPmin
Warning, signal lost
(F0080)
Delay on sig. loss
0 ... 10000 [ms]
P0762 (10)
Act. ADC input [V]
r0752
Digit
Volts
50 % of P0761
Type of ADC
0 ... 1
P0756 (0)
Value y2:ADC scal.
-99999.9 ... 99999.9 [%]
P0760 (100.0)
Value y1:ADC scal.
-99999.9 ... 99999.9 [%]
P0758 (0.0)
Smooth time ADC
0 ... 10000 [ms]
P0753 (3)
A
D
Analog input
1
2
3
4
5
6
7
8
External Interfaces
Analog Input (ADC)
2200_ADC.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 2200 -

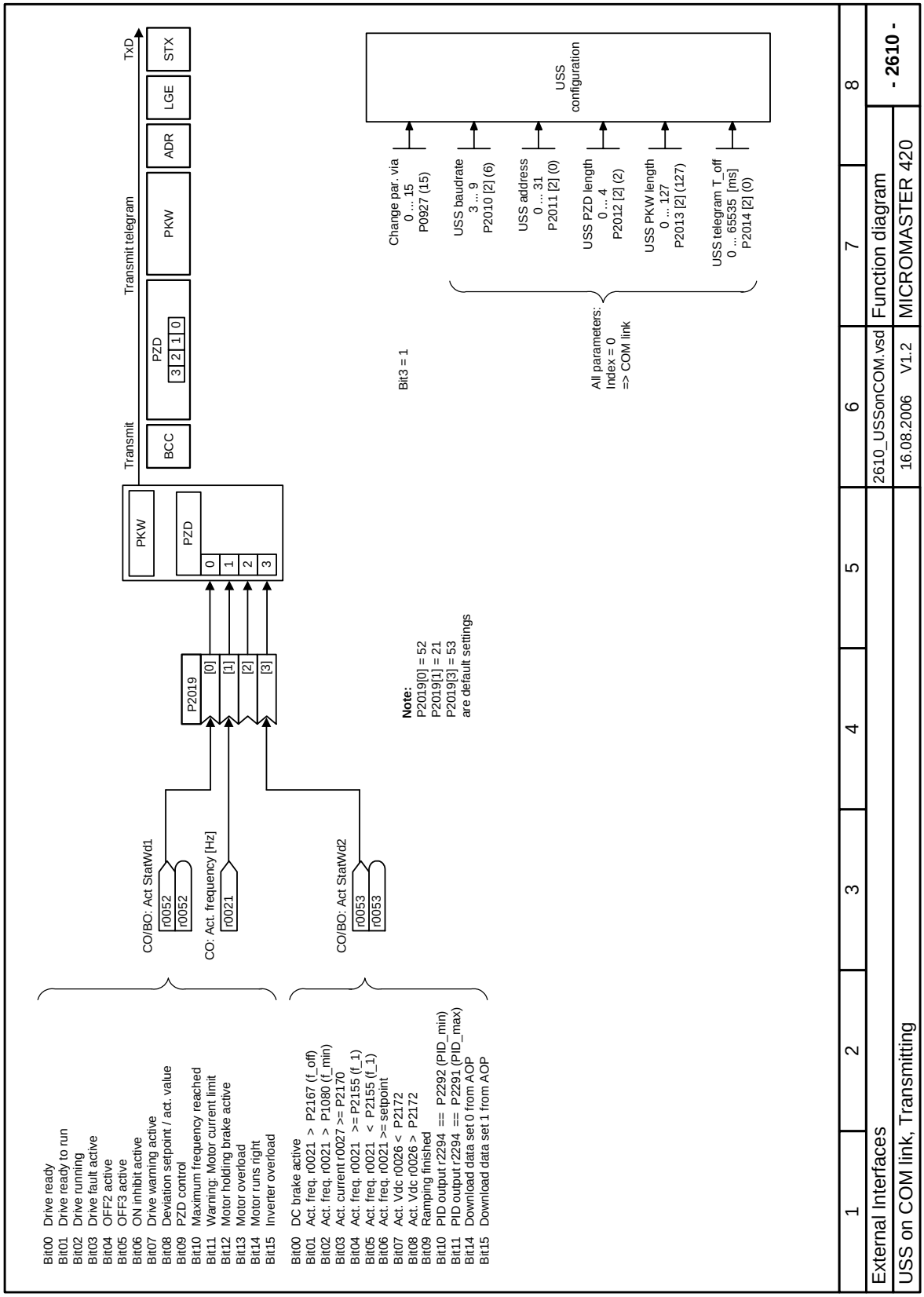

Act. DAC value[mA]
r0774
Analog output
CO/BO: DAC stat Wd
r0785
r0785
DAC deadband width
0 ... 20
P0781 (0)
Value x2:DAC scal.
-99999.0 ... 99999.0 [%]
P0779 (100.0)
Value x1:DAC scal.
-99999.0 ... 99999.0 [%]
P0777 (0.0)
Type of DAC
0 ... 0
P0776 (0)
mA
%
100 %
4000 h ≙ 20 mA
20 mA
P0781
Value y2:DAC scal.
0 ... 20
P0780 (20)
Value y1:DAC scal.
0 ... 20
P0778 (0)
x(t)
Enable ab. value
0 ... 1
P0775 (0)
Smooth time DAC
0 ... 1000 [ms]
P0773 (2)
CI: DAC
P0771
(21:0)
1
2
3
4
5
6
7
8
External Interfaces
Analog Output (DAC)
2300_DAC.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 2300 -

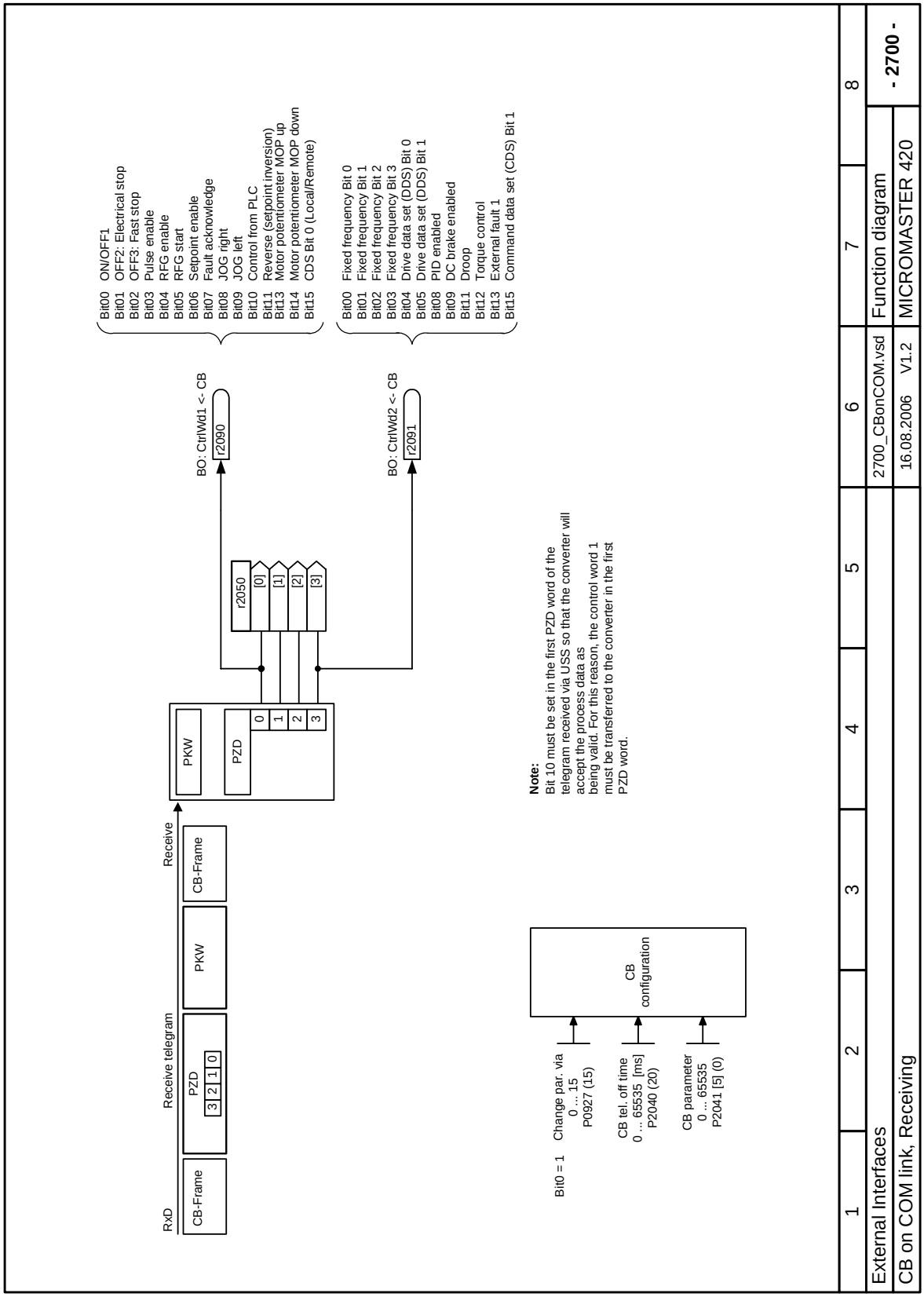

Note:
Activation of the raise and lower keys is only effective if the operating display (r0000) is selected, a changeover to the value display has taken place with the toggle key and the unit is in the "Operation" status.
Operating display (r0000) selected and operation=1 of sequence control
CO/BO: BOP CtrlWd
r0019.D
Raise motor potentio-meter from BOP
CO/BO: BOP CtrlWd
r0019.E
Lower motor poten-tiometer from BOP
Toggle key to operating system, fault acknowledgement
Access parameters
Actuation of seven-segment display
CO/BO: BOP CtrlWd
r0019.B
Positive direction of rotation from BOP
Priority
1 RESET
2 SET
SET (Q=1)
RESET (Q=0)
POWER ON
CO/BO: BOP CtrlWd
r0019.1
ON/OFF1, OFF2, OFF3 from BOP
Priority
1 RESET
2 SET
Set command
Reset command
POWER ON
jog
Basic Operator Panel BOP
SIEMENS
150.00
Seven-segment display
Raise key
Toggle key
Reversing key
ON key
OFF key
JOG key
Program key
Lower key
1 2 3 4 5 6 7 8
External Interfaces
Basic Operator Panel (BOP)
2400_BOP.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 2400 -

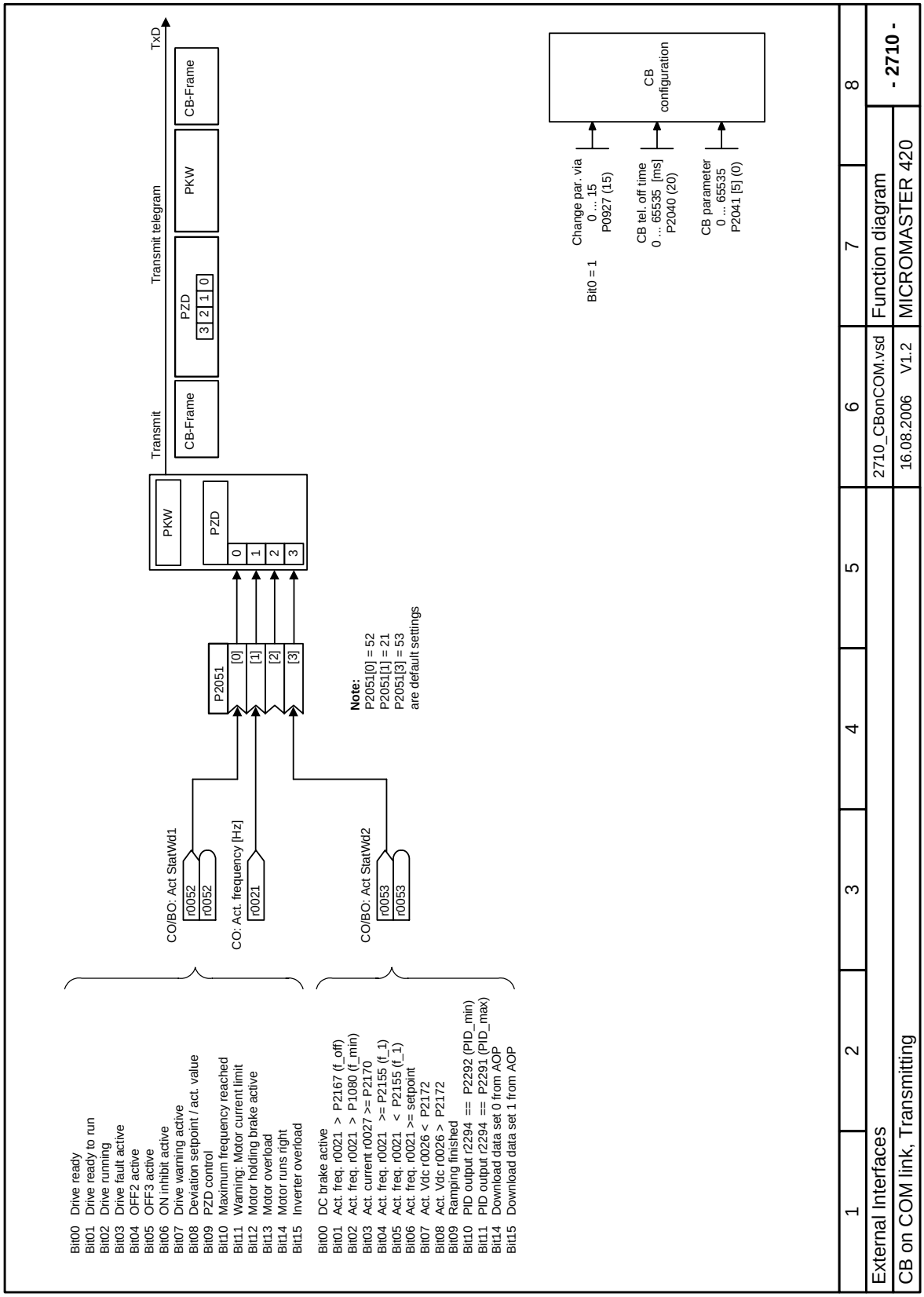

RxD
BCC
PZD
3 2 1 0
PKW
ADR
LGE
STX
Receive telegram
Receive
PKW
PZD
0
1
2
3
r2015
[0]
[1]
[2]
[3]
BO: CtrlWd1 <- BOP
r2032
BO: CtrlWd2 <- BOP
r2033
Bit00 ON/OFF1
Bit01 OFF2: Electrical stop
Bit02 OFF3: Fast stop
Bit03 Pulse enable
Bit04 RFG enable
Bit05 RFG start
Bit06 Setpoint enable
Bit07 Fault acknowledge
Bit08 JOG right
Bit09 JOG left
Bit10 Control from PLC
Bit11 Reverse (setpoint inversion)
Bit13 Motor potentiometer MOP up
Bit14 Motor potentiometer MOP down
Bit15 CDS Bit 0 (Local/Remote)
Bit00 Fixed frequency Bit 0
Bit01 Fixed frequency Bit 1
Bit02 Fixed frequency Bit 2
Bit03 Fixed frequency Bit 3
Bit04 Drive data set (DDS) Bit 0
Bit05 Drive data set (DDS) Bit 1
Bit08 PID enabled
Bit09 DC brake enabled
Bit11 Droop
Bit12 Torque control
Bit13 External fault 1
Bit15 Command data set (CDS) Bit 1
Note:
Bit 10 must be set in the first PZD word of the telegram received via USS so that the converter will accept the process data as being valid. For this reason, the control word 1 must be transferred to the converter in the first PZD word.
Bit2 = 1
All parameters:
Index = 1
=> BOP link
Change par. via
0 ... 15
P0927 (15)
USS baudrate
3 ... 9
P2010 [2] (6)
USS address
0 ... 31
P2011 [2] (0)
USS PZD length
0 ... 4
P2012 [2] (2)
USS PKW length
0 ... 127
P2013 [2] (127)
USS telegram T_off
0 ... 65535 [ms]
P2014 [2] (0)
USS configuration
1
2
3
4
5
6
7
8
External Interfaces
2500_USSonBOP.vsd
Function diagram
- 2500 -
USS on BOP link, Receiving
16.08.2006 V1.2
MICROMASTER 420

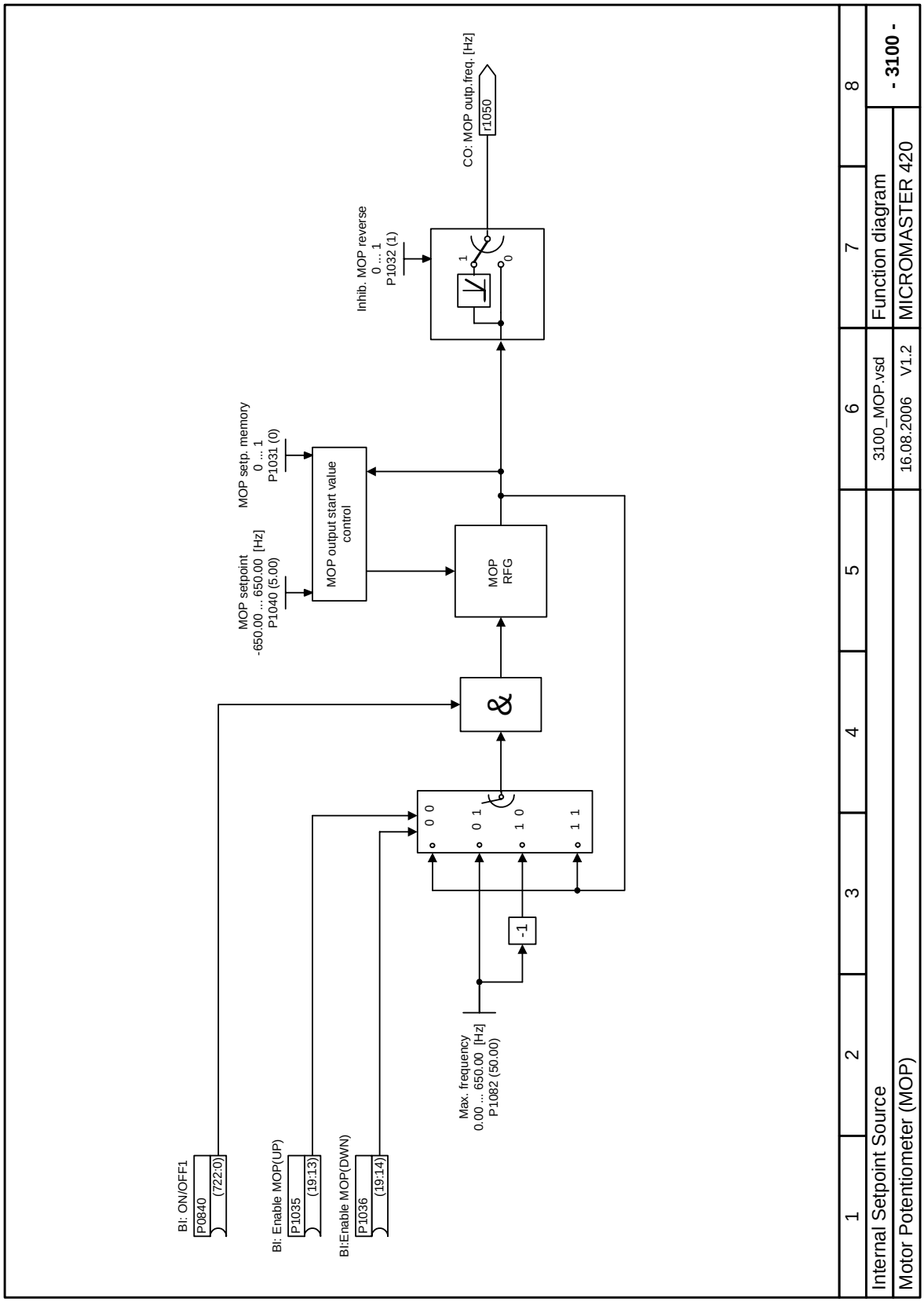

TxD
Transmit telegram
Transmit
STX
LGE
ADR
PKW
PZD
BCC
3 2 1 0
PKW
PZD
0
1
2
3
P2016
[0]
[1]
[2]
[3]
CO/BO: Act StatWd1
r0052
r0052
CO: Act. frequency [Hz]
r0021
CO/BO: Act StatWd2
r0053
r0053
Note:
P2016[0] = 52
P2016[1] = 21
P2016[3] = 53
are default settings
Bit00 Drive ready
Bit01 Drive ready to run
Bit02 Drive running
Bit03 Drive fault active
Bit04 OFF2 active
Bit05 OFF3 active
Bit06 ON inhibit active
Bit07 Drive warning active
Bit08 Deviation setpoint / act. value
Bit09 PZD control
Bit10 Maximum frequency reached
Bit11 Warning: Motor current limit
Bit12 Motor holding brake active
Bit13 Motor overload
Bit14 Motor runs right
Bit15 Inverter overload
Bit00 DC brake active
Bit01 Act. freq. r0021 > P2167 (f_off)
Bit02 Act. freq. r0021 > P1080 (f_min)
Bit03 Act. current r0027 >= P2170
Bit04 Act. freq. r0021 >= P2155 (f_1)
Bit05 Act. freq. r0021 < P2155 (f_1)
Bit06 Act. freq. r0021 >= setpoint
Bit07 Act. Vdc r0026 < P2172
Bit08 Act. Vdc r0026 > P2172
Bit09 Ramping finished
Bit10 PID output r2294 == P2292 (PID_min)
Bit11 PID output r2294 == P2291 (PID_max)
Bit14 Download data set 0 from AOP
Bit15 Download data set 1 from AOP
Bit2 = 1
All parameters: Index = 1 => BOP link
USS configuration
Change par. via 0 ... 15 P0927 (15)
USS baudrate 3 ... 9 P2010 [2] (6)
USS address 0 ... 31 P2011 [2] (0)
USS PZD length 0 ... 4 P2012 [2] (2)
USS PKW length 0 ... 127 P2013 [2] (127)
USS telegram T_off 0 ... 65535 [ms] P2014 [2] (0)
1
2
3
4
5
6
7
8
External Interfaces
2510_USSonBOP.vsd
Function diagram
- 2510 -
USS on BOP link, Transmitting
16.08.2006 V1.2
MICROMASTER 420

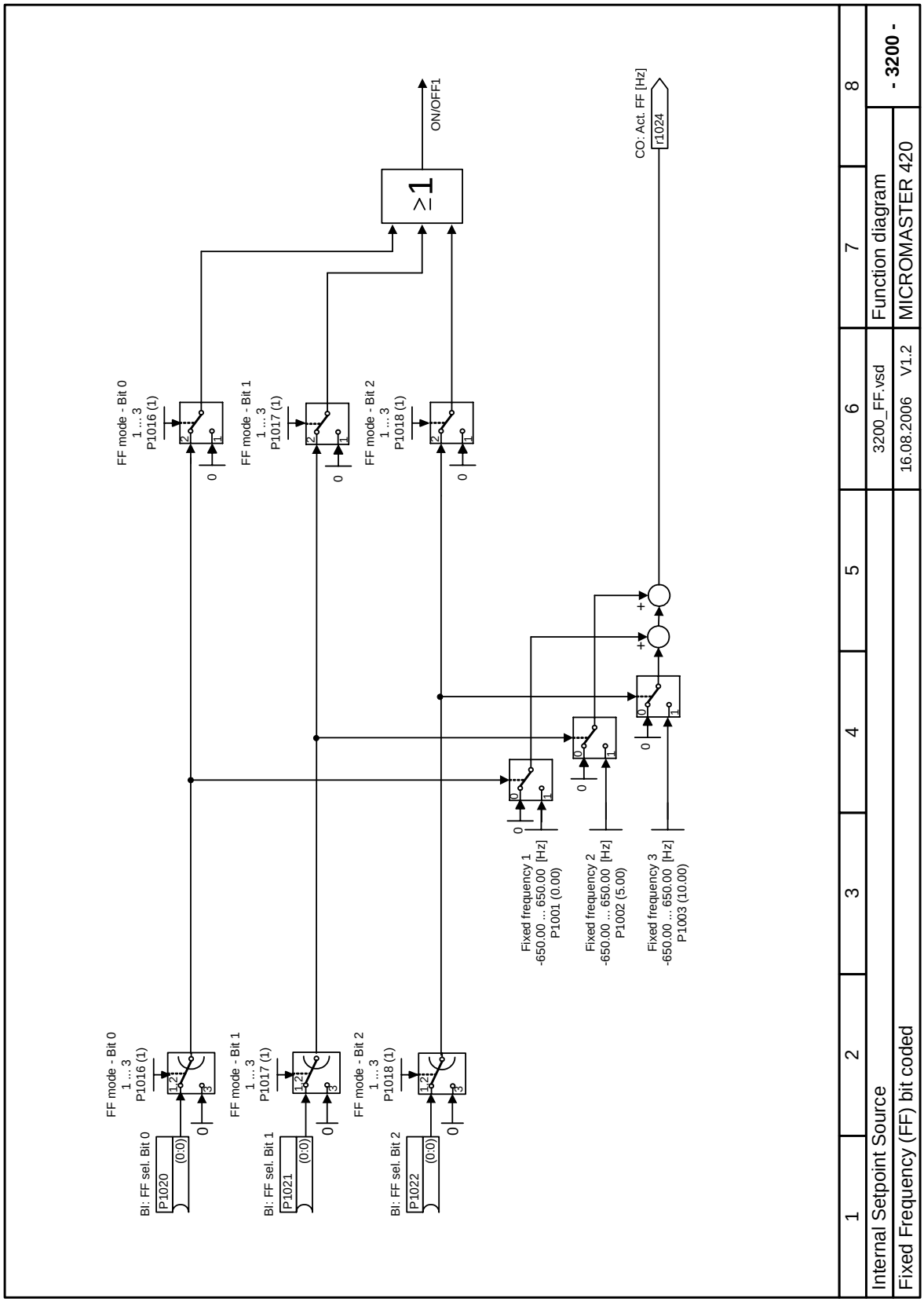

Bit00 ON/OFF1
Bit01 OFF2: Electrical stop
Bit02 OFF3: Fast stop
Bit03 Pulse enable
Bit04 RFG enable
Bit05 RFG start
Bit06 Setpoint enable
Bit07 Fault acknowledge
Bit08 JOG right
Bit09 JOG left
Bit10 Control from PLC
Bit11 Reverse (setpoint inversion)
Bit13 Motor potentiometer MOP up
Bit14 Motor potentiometer MOP down
Bit15 CDS Bit 0 (Local/Remote)
Bit00 Fixed frequency Bit 0
Bit01 Fixed frequency Bit 1
Bit02 Fixed frequency Bit 2
Bit03 Fixed frequency Bit 3
Bit04 Drive data set (DDS) Bit 0
Bit05 Drive data set (DDS) Bit 1
Bit08 PID enabled
Bit09 DC brake enabled
Bit11 Droop
Bit12 Torque control
Bit13 External fault 1
Bit15 Command data set (CDS) Bit 1
BO: CtrlWd1 <- COM
r2036
BO: CtrlWd2 <- COM
r2037
r2018
[0]
[1]
[2]
[3]
PKW
PZD
0
1
2
3
RxD
BCC
PZD
3 2 1 0
PKW
ADR
LGE
STX
Receive telegram
Receive
Bit3 = 1
Change par. via
0 ... 15
P0927 (15)
USS baudrate
3 ... 9
P2010 [2] (6)
USS address
0 ... 31
P2011 [2] (0)
USS PZD length
0 ... 4
P2012 [2] (2)
USS PKW length
0 ... 127
P2013 [2] (127)
USS telegram T_off
0 ... 65535 [ms]
P2014 [2] (0)
USS configuration
All parameters:
Index = 0
=> COM link
Note:
Bit 10 must be set in the first PZD word of the telegram received via USS so that the converter will accept the process data as being valid. For this reason, the control word 1 must be transferred to the converter in the first PZD word.
1
2
3
4
5
6
7
8
External Interfaces
2600_USSonCOM.vsd
Function diagram
- 2600 -
USS on COM link, Receiving
16.08.2006 V1.2
MICROMASTER 420

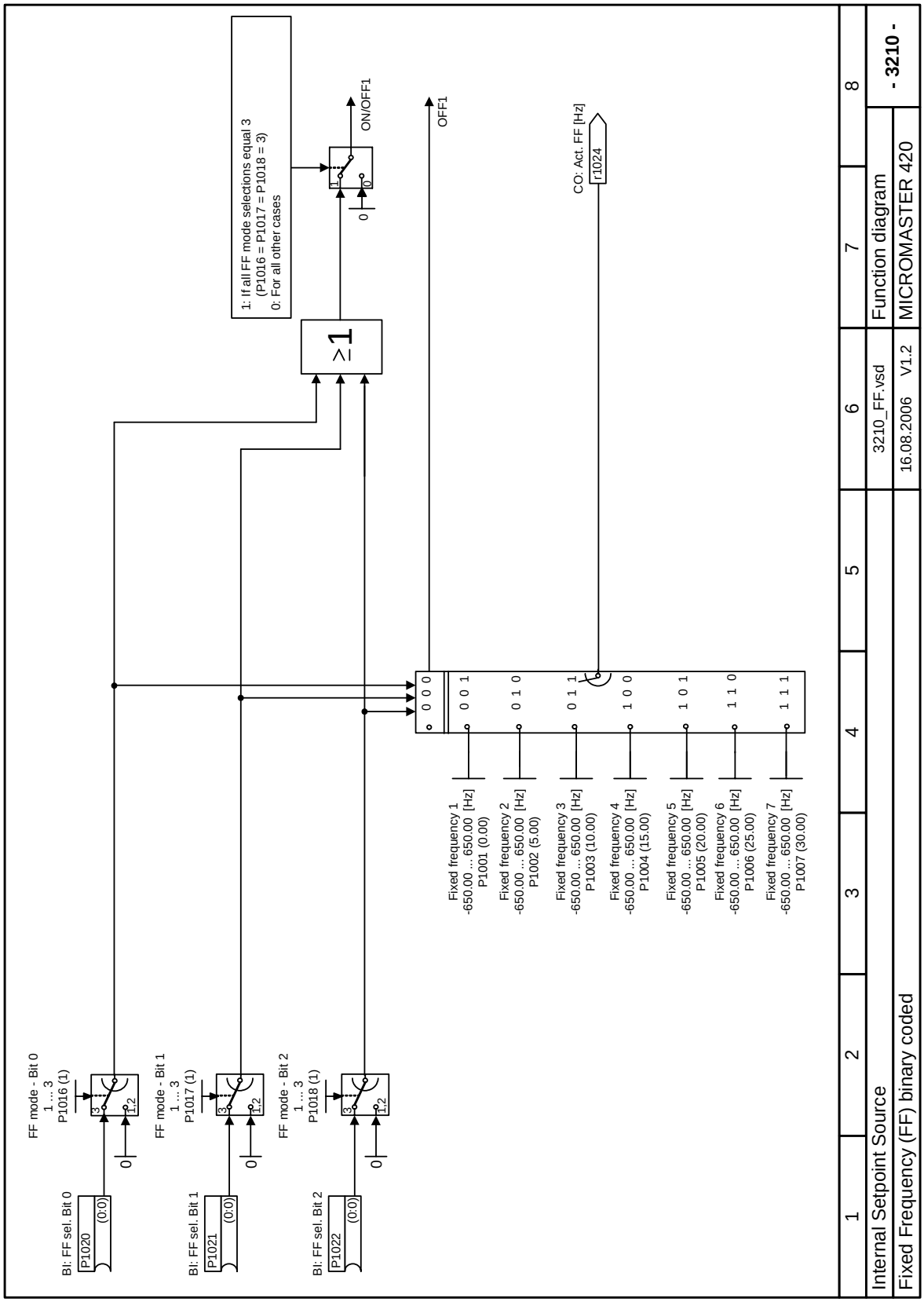

TxD
Transmit telegram
Transmit
STX
LGE
ADR
PKW
PZD
BCC
3 2 1 0
PKW
PZD
0
1
2
3
P2019
[0]
[1]
[2]
[3]
CO/BO: Act StatWd1
r0052
r0052
CO: Act. frequency [Hz]
r0021
CO/BO: Act StatWd2
r0053
r0053
Bit3 = 1
Change par. via
0 ... 15
P0927 (15)
USS baudrate
3 ... 9
P2010 [2] (6)
USS address
0 ... 31
P2011 [2] (0)
USS PZD length
0 ... 4
P2012 [2] (2)
USS PKW length
0 ... 127
P2013 [2] (127)
USS telegram T_off
0 ... 65535 [ms]
P2014 [2] (0)
USS
configuration
All parameters:
Index = 0
=> COM link
Note:
P2019[0] = 52
P2019[1] = 21
P2019[3] = 53
are default settings
Bit00 Drive ready
Bit01 Drive ready to run
Bit02 Drive running
Bit03 Drive fault active
Bit04 OFF2 active
Bit05 OFF3 active
Bit06 ON inhibit active
Bit07 Drive warning active
Bit08 Deviation setpoint / act. value
Bit09 PZD control
Bit10 Maximum frequency reached
Bit11 Warning: Motor current limit
Bit12 Motor holding brake active
Bit13 Motor overload
Bit14 Motor runs right
Bit15 Inverter overload
Bit00 DC brake active
Bit01 Act. freq. r0021 > P2167 (f_off)
Bit02 Act. freq. r0021 > P1080 (f_min)
Bit03 Act. current r0027 >= P2170
Bit04 Act. freq. r0021 >= P2155 (f_1)
Bit05 Act. freq. r0021 < P2155 (f_1)
Bit06 Act. freq. r0021 >= setpoint
Bit07 Act. Vdc r0026 < P2172
Bit08 Act. Vdc r0026 > P2172
Bit09 Ramping finished
Bit10 PID output r2294 == P2292 (PID_min)
Bit11 PID output r2294 == P2291 (PID_max)
Bit14 Download data set 0 from AOP
Bit15 Download data set 1 from AOP
1
2
3
4
5
6
7
8
External Interfaces
2610_USSonCOM.vsd
Function diagram
- 2610 -
USS on COM link, Transmitting
16.08.2006 V1.2
MICROMASTER 420

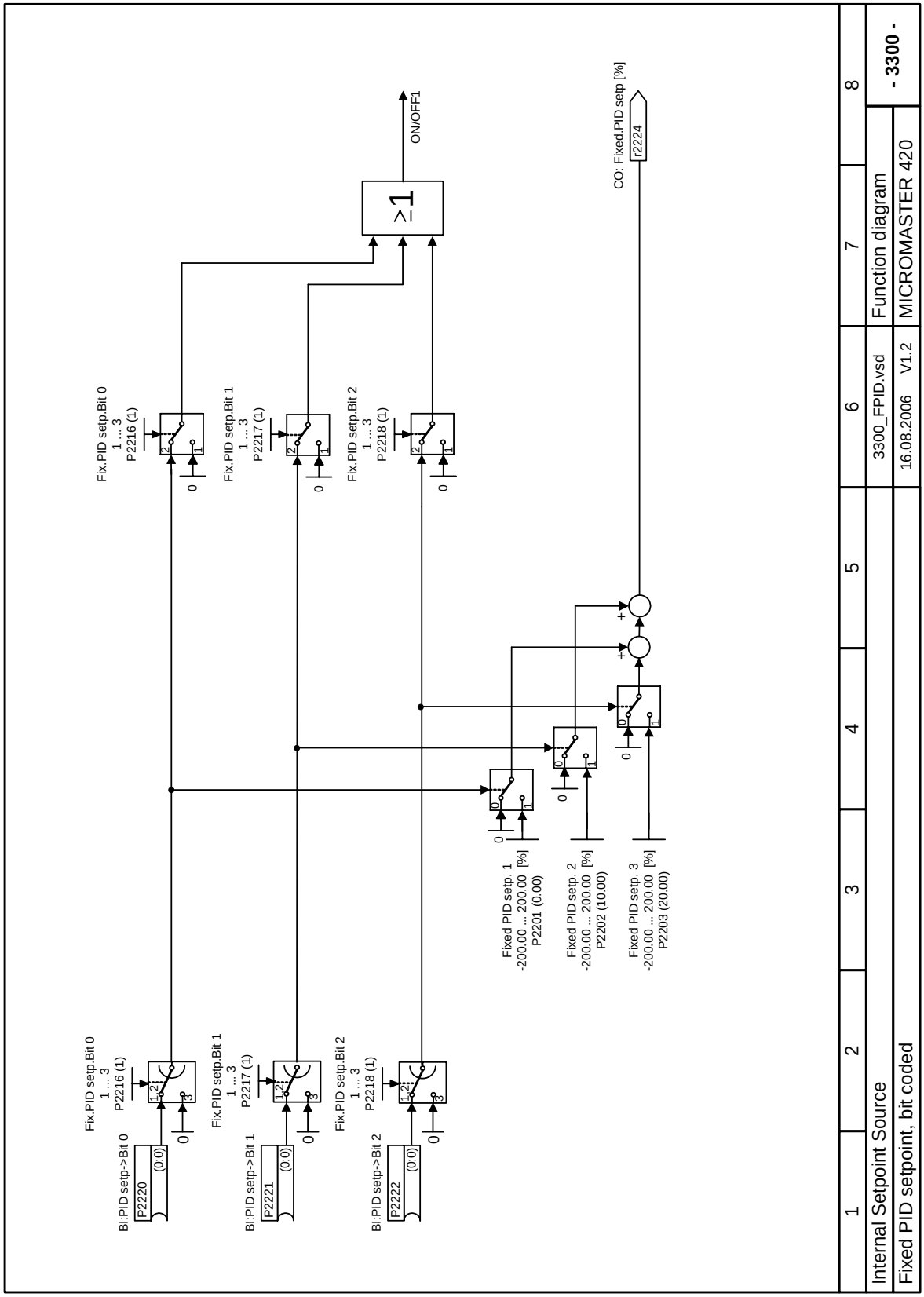

Bit00 ON/OFF1
Bit01 OFF2: Electrical stop
Bit02 OFF3: Fast stop
Bit03 Pulse enable
Bit04 RFG enable
Bit05 RFG start
Bit06 Setpoint enable
Bit07 Fault acknowledge
Bit08 JOG right
Bit09 JOG left
Bit10 Control from PLC
Bit11 Reverse (setpoint inversion)
Bit13 Motor potentiometer MOP up
Bit14 Motor potentiometer MOP down
Bit15 CDS Bit 0 (Local/Remote)
Bit00 Fixed frequency Bit 0
Bit01 Fixed frequency Bit 1
Bit02 Fixed frequency Bit 2
Bit03 Fixed frequency Bit 3
Bit04 Drive data set (DDS) Bit 0
Bit05 Drive data set (DDS) Bit 1
Bit08 PID enabled
Bit09 DC brake enabled
Bit11 Droop
Bit12 Torque control
Bit13 External fault 1
Bit15 Command data set (CDS) Bit 1
BO: CtrlWd1 <- CB
r2090
BO: CtrlWd2 <- CB
r2091
r2050
[0]
[1]
[2]
[3]
PKW
PZD
0
1
2
3
RxD
Receive
CB-Frame
Receive telegram
PZD
3 2 1 0
PKW
CB-Frame
Note:
Bit 10 must be set in the first PZD word of the telegram received via USS so that the converter will accept the process data as being valid. For this reason, the control word 1 must be transferred to the converter in the first PZD word.
Bit0 = 1
Change par. via 0 ... 15 P0927 (15)
CB tel. off time 0 ... 65535 [ms] P2040 (20)
CB parameter 0 ... 65535 P2041 [5] (0)
CB configuration
1
2
3
4
5
6
7
8
External Interfaces
CB on COM link, Receiving
2700_CBonCOM.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 2700 -

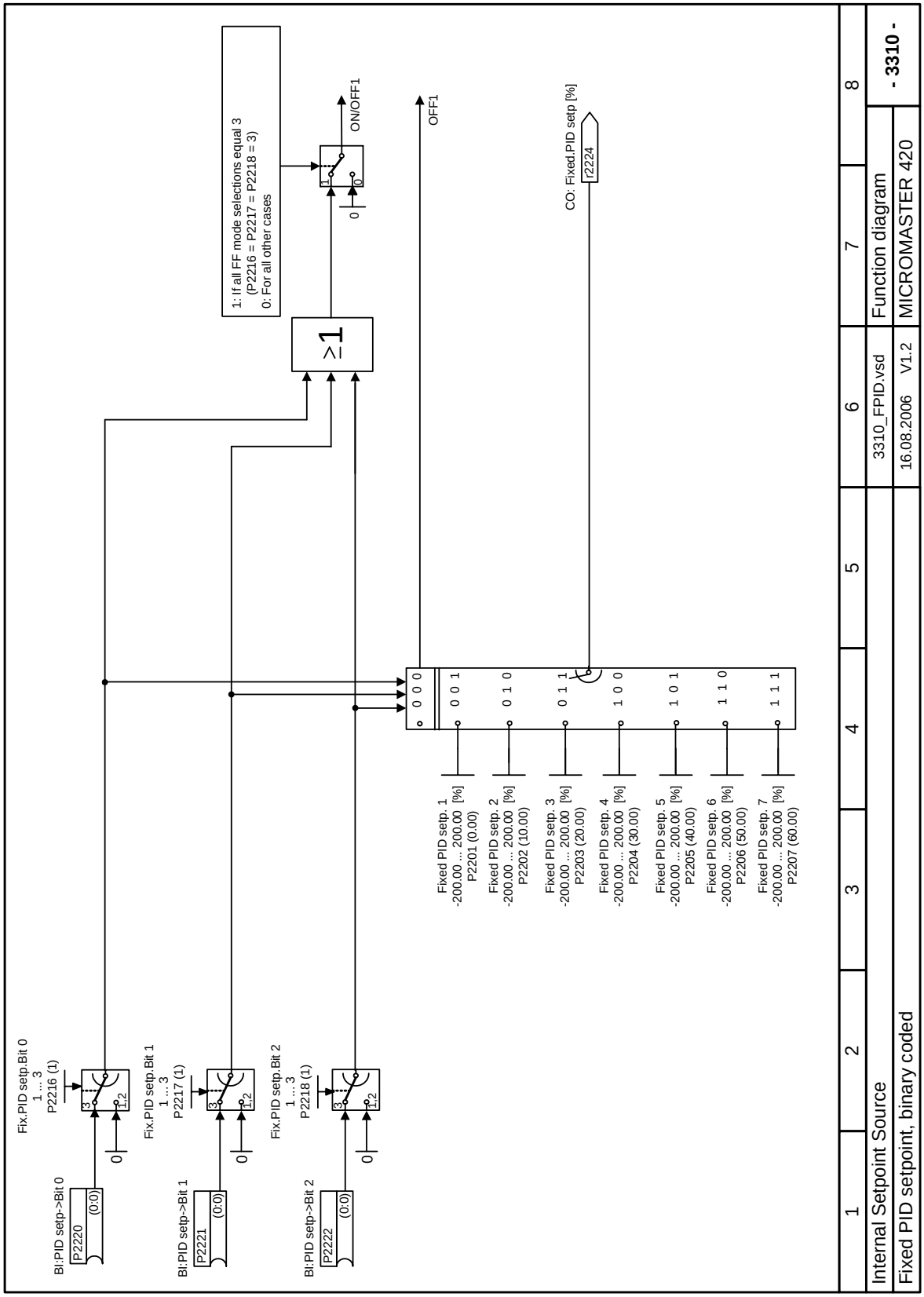

Bit00 Drive ready
Bit01 Drive ready to run
Bit02 Drive running
Bit03 Drive fault active
Bit04 OFF2 active
Bit05 OFF3 active
Bit06 ON inhibit active
Bit07 Drive warning active
Bit08 Deviation setpoint / act. value
Bit09 PZD control
Bit10 Maximum frequency reached
Bit11 Warning: Motor current limit
Bit12 Motor holding brake active
Bit13 Motor overload
Bit14 Motor runs right
Bit15 Inverter overload
Bit00 DC brake active
Bit01 Act. freq. r0021 > P2167 (f_off)
Bit02 Act. freq. r0021 > P1080 (f_min)
Bit03 Act. current r0027 >= P2170
Bit04 Act. freq. r0021 >= P2155 (f_1)
Bit05 Act. freq. r0021 < P2155 (f_1)
Bit06 Act. freq. r0021 >= setpoint
Bit07 Act. Vdc r0026 < P2172
Bit08 Act. Vdc r0026 > P2172
Bit09 Ramping finished
Bit10 PID output r2294 == P2292 (PID_min)
Bit11 PID output r2294 == P2291 (PID_max)
Bit14 Download data set 0 from AOP
Bit15 Download data set 1 from AOP
CO/BO: Act StatWd1
r0052
r0052
CO: Act. frequency [Hz]
r0021
CO/BO: Act StatWd2
r0053
r0053
P2051
[0]
[1]
[2]
[3]
Note:
P2051[0] = 52
P2051[1] = 21
P2051[3] = 53
are default settings
PKW
PZD
0
1
2
3
Transmit
Transmit telegram
TxD
CB-Frame
PZD
3 2 1 0
PKW
CB-Frame
Change par. via
0 ... 15
P0927 (15)
Bit0 = 1
CB tel. off time
0 ... 65535 [ms]
P2040 (20)
CB parameter
0 ... 65535
P2041 [5] (0)
CB
configuration
1
2
3
4
5
6
7
8
External Interfaces
2710_CBonCOM.vsd
Function diagram
- 2710 -
CB on COM link, Transmitting
16.08.2006 V1.2
MICROMASTER 420

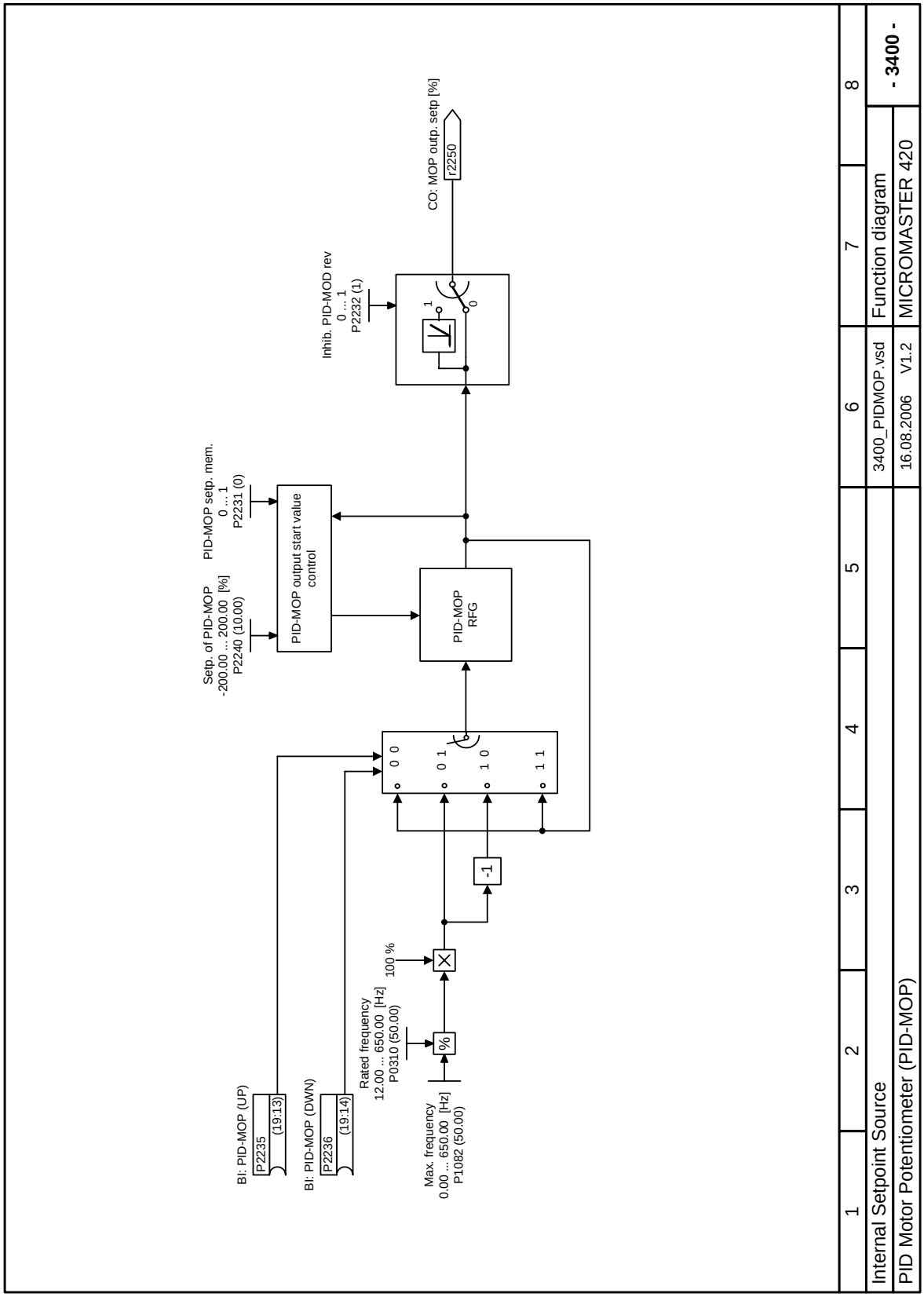

BI: ON/OFF1
P0840 (722:0)
BI: Enable MOP(UP)
P1035 (19:13)
BI:Enable MOP(DWN)
P1036 (19:14)
Max. frequency
0.00 ... 650.00 [Hz]
P1082 (50.00)
-1
0 0
0 1
1 0
1 1
&
MOP setpoint
-650.00 ... 650.00 [Hz]
P1040 (5.00)
MOP setp. memory
0 ... 1
P1031 (0)
MOP output start value control
MOP RFG
Inhib. MOP reverse
0 ... 1
P1032 (1)
1
0
CO: MOP outp.freq. [Hz]
r1050
1
2
3
4
5
6
7
8
Internal Setpoint Source
Motor Potentiometer (MOP)
3100_MOP.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 3100 -

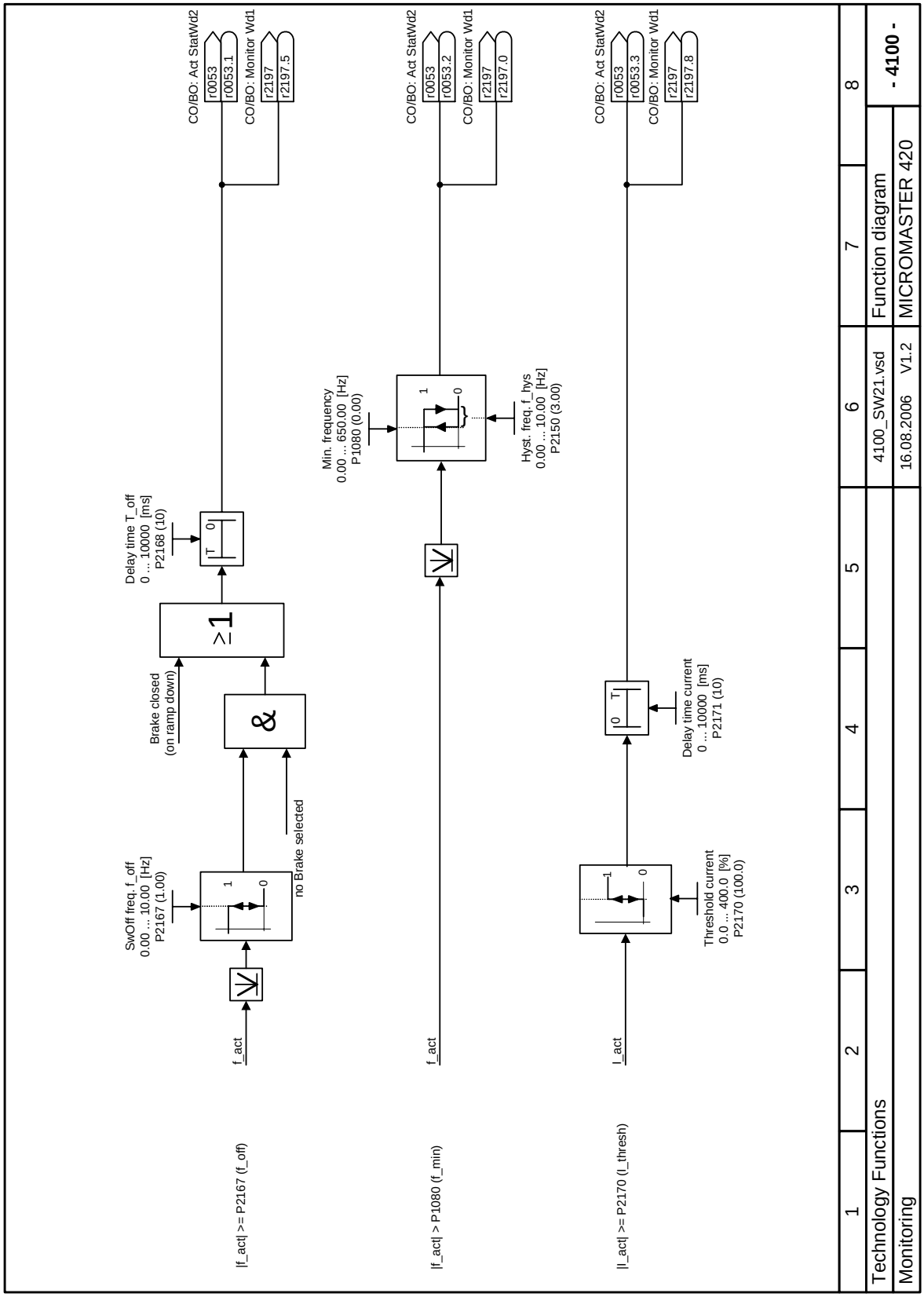

1
2
3
4
5
6
7
8
Internal Setpoint Source
Fixed Frequency (FF) bit coded
3200_FF.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 3200 -
FF mode - Bit 0
1 ... 3
P1016 (1)
FF mode - Bit 1
1 ... 3
P1017 (1)
FF mode - Bit 2
1 ... 3
P1018 (1)
Bi: FF sel. Bit 0
P1020
(0:0)
Bi: FF sel. Bit 1
P1021
(0:0)
Bi: FF sel. Bit 2
P1022
(0:0)
≥1
ON/OFF1
CO: Act. FF [Hz]
r1024
Fixed frequency 1
-650.00 ... 650.00 [Hz]
P1001 (0.00)
Fixed frequency 2
-650.00 ... 650.00 [Hz]
P1002 (5.00)
Fixed frequency 3
-650.00 ... 650.00 [Hz]
P1003 (10.00)

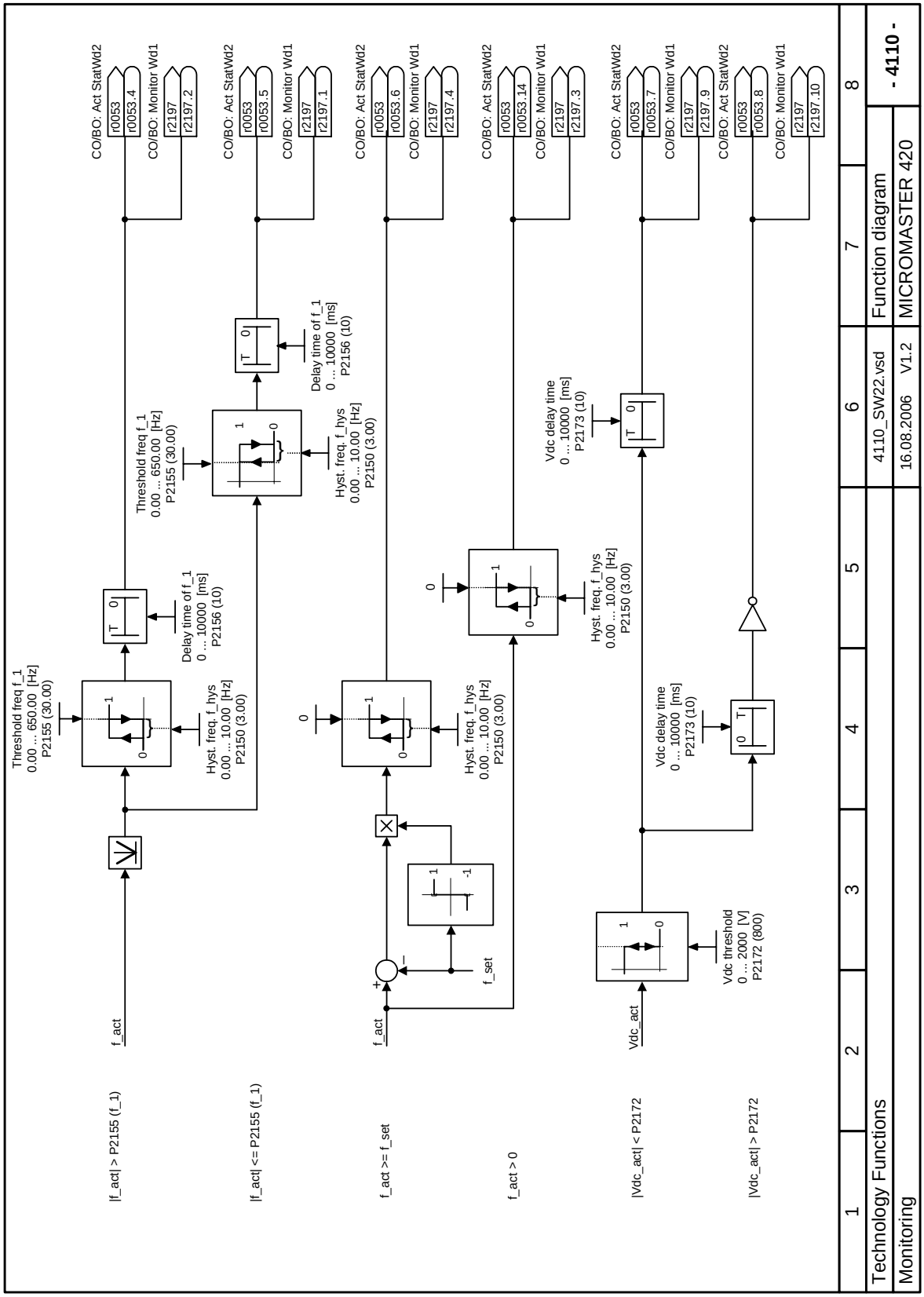

1: If all FF mode selections equal 3
(P1016 = P1017 = P1018 = 3)
0: For all other cases
ON/OFF1
OFF1
CO: Act. FF [Hz]
r1024
≥1
FF mode - Bit 0
1 ... 3
P1016 (1)
FF mode - Bit 1
1 ... 3
P1017 (1)
FF mode - Bit 2
1 ... 3
P1018 (1)
BI: FF sel. Bit 0
P1020
(0:0)
BI: FF sel. Bit 1
P1021
(0:0)
BI: FF sel. Bit 2
P1022
(0:0)
0 0 0
0 0 1
0 1 0
0 1 1
1 0 0
1 0 1
1 1 0
1 1 1
Fixed frequency 1
-650.00 ... 650.00 [Hz]
P1001 (0.00)
Fixed frequency 2
-650.00 ... 650.00 [Hz]
P1002 (5.00)
Fixed frequency 3
-650.00 ... 650.00 [Hz]
P1003 (10.00)
Fixed frequency 4
-650.00 ... 650.00 [Hz]
P1004 (15.00)
Fixed frequency 5
-650.00 ... 650.00 [Hz]
P1005 (20.00)
Fixed frequency 6
-650.00 ... 650.00 [Hz]
P1006 (25.00)
Fixed frequency 7
-650.00 ... 650.00 [Hz]
P1007 (30.00)
1 2 3 4 5 6 7 8
Internal Setpoint Source
3210_FF.vsd
Function diagram
- 3210 -
Fixed Frequency (FF) binary coded
16.08.2006 V1.2
MICROMASTER 420

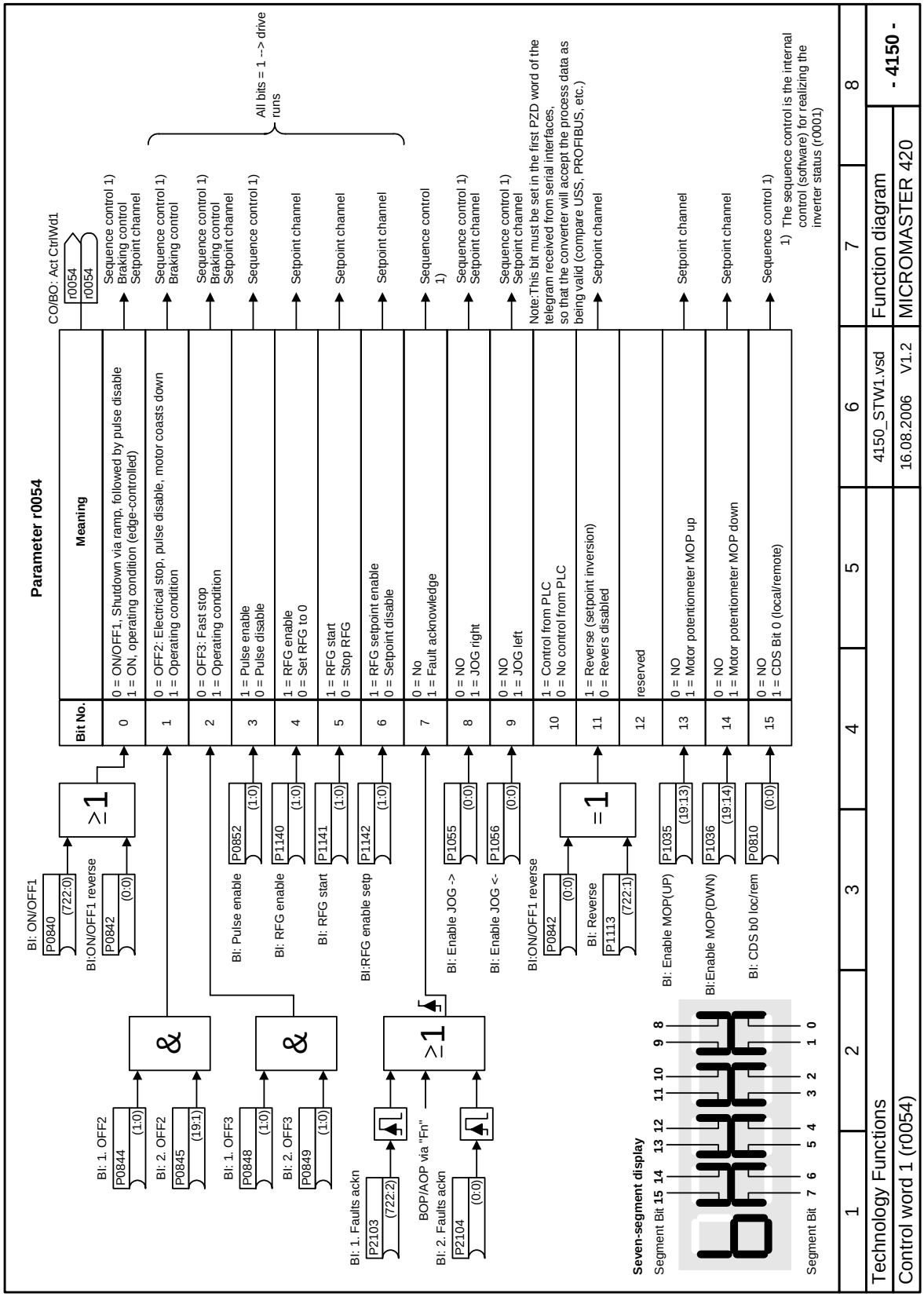

Fix.PID setp.Bit 0
1 ... 3
P2216 (1)
Fix.PID setp.Bit 1
1 ... 3
P2217 (1)
Fix.PID setp.Bit 2
1 ... 3
P2218 (1)
Bl:PID setp->Bit 0
P2220
(0:0)
Bl:PID setp->Bit 1
P2221
(0:0)
Bl:PID setp->Bit 2
P2222
(0:0)
≥1
ON/OFF1
CO: Fixed.PID setp [%]
r2224
Fixed PID setp. 1
-200.00 ... 200.00 [%]
P2201 (0.00)
Fixed PID setp. 2
-200.00 ... 200.00 [%]
P2202 (10.00)
Fixed PID setp. 3
-200.00 ... 200.00 [%]
P2203 (20.00)
1
2
3
4
5
6
7
8
Internal Setpoint Source
3300_FPID.vsd
Function diagram
- 3300 -
Fixed PID setpoint, bit coded
16.08.2006 V1.2
MICROMASTER 420

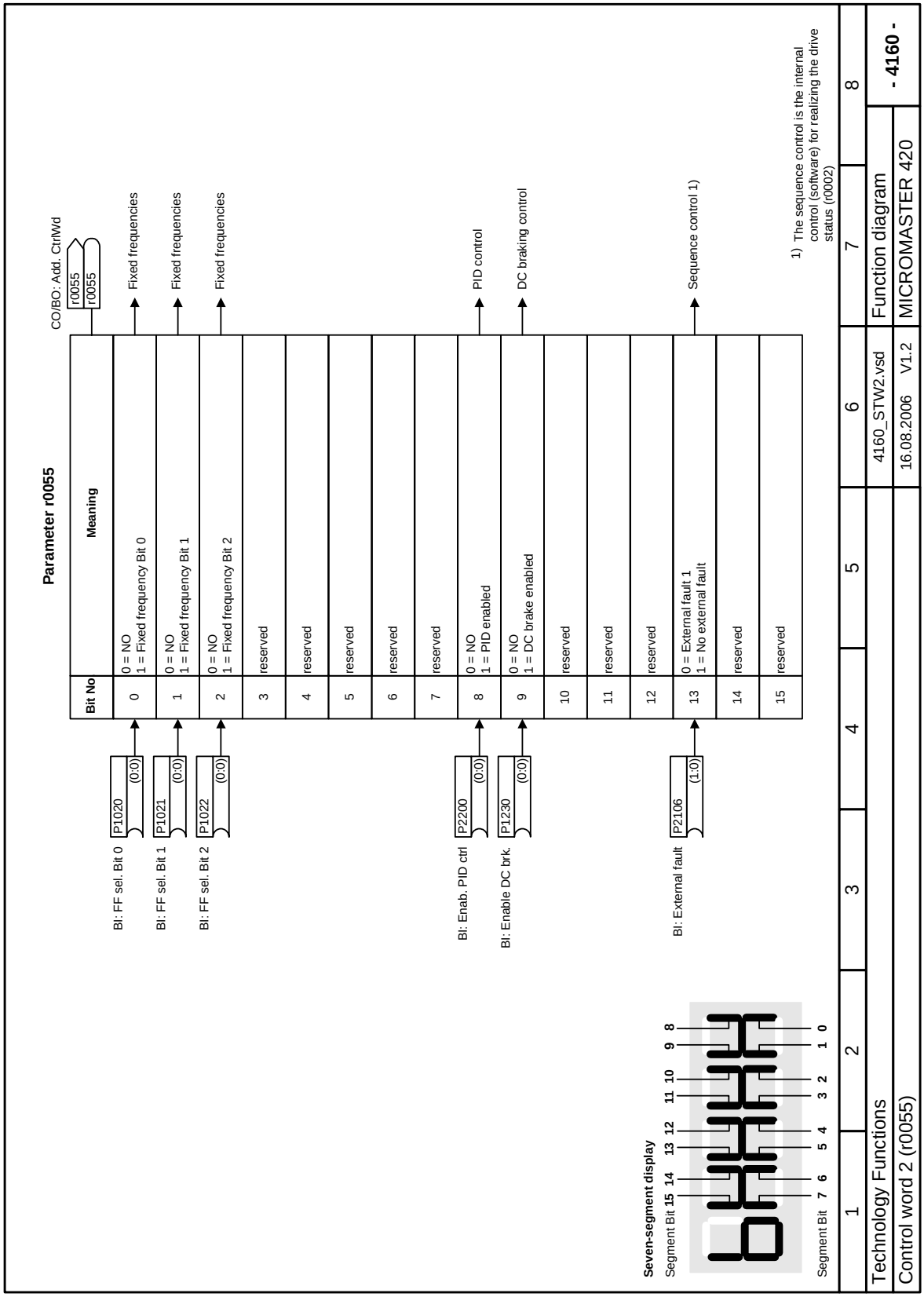

Fix.PID setp.Bit 0
1 ... 3
P2216 (1)
Fix.PID setp.Bit 1
1 ... 3
P2217 (1)
Fix.PID setp.Bit 2
1 ... 3
P2218 (1)
BI:PID setp->Bit 0
P2220 (0:0)
BI:PID setp->Bit 1
P2221 (0:0)
BI:PID setp->Bit 2
P2222 (0:0)
1: If all FF mode selections equal 3
(P2216 = P2217 = P2218 = 3)
0: For all other cases
≥1
ON/OFF1
OFF1
CO: Fixed.PID setp [%]
r2224
0 0 0
0 0 1
0 1 0
0 1 1
1 0 0
1 0 1
1 1 0
1 1 1
Fixed PID setp. 1
-200.00 ... 200.00 [%]
P2201 (0.00)
Fixed PID setp. 2
-200.00 ... 200.00 [%]
P2202 (10.00)
Fixed PID setp. 3
-200.00 ... 200.00 [%]
P2203 (20.00)
Fixed PID setp. 4
-200.00 ... 200.00 [%]
P2204 (30.00)
Fixed PID setp. 5
-200.00 ... 200.00 [%]
P2205 (40.00)
Fixed PID setp. 6
-200.00 ... 200.00 [%]
P2206 (50.00)
Fixed PID setp. 7
-200.00 ... 200.00 [%]
P2207 (60.00)
1 2 3 4 5 6 7 8
Internal Setpoint Source
Fixed PID setpoint, binary coded
3310_FPID.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 3310 -

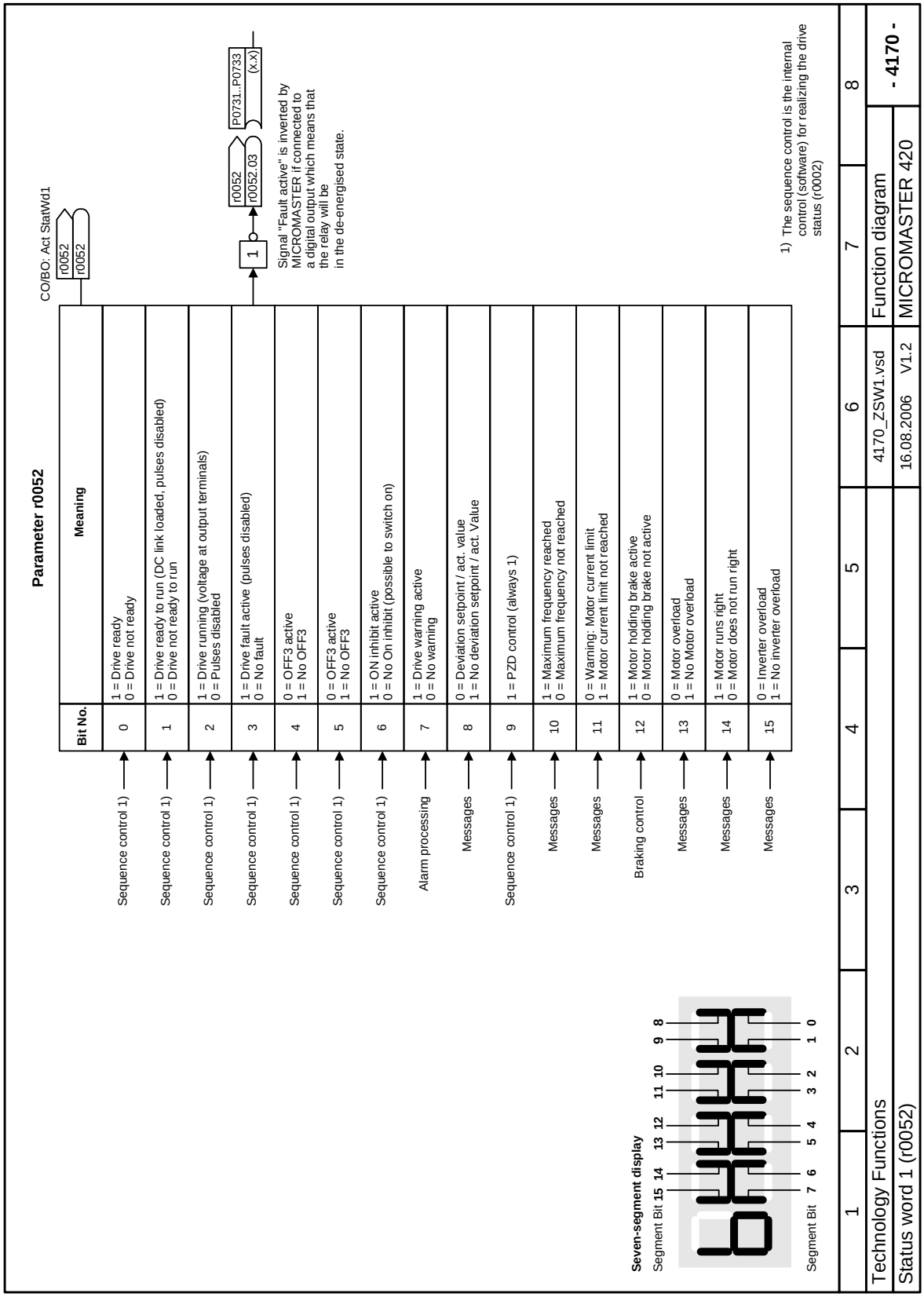

CO: MOP outp. setp [%]
r2250
Inhib. PID-MOD rev
0 ... 1
P2232 (1)
PID-MOP setp. mem.
0 ... 1
P2231 (0)
Setp. of PID-MOP
-200.00 ... 200.00 [%]
P2240 (10.00)
PID-MOP output start value control
PID-MOP RFG
BI: PID-MOP (UP)
P2235
(19:13)
BI: PID-MOP (DWN)
P2236
(19:14)
Rated frequency
12.00 ... 650.00 [Hz]
P0310 (50.00)
100 %
Max. frequency
0.00 ... 650.00 [Hz]
P1082 (50.00)
-1
0 0
0 1
1 0
1 1
1
2
3
4
5
6
7
8
Internal Setpoint Source
PID Motor Potentiometer (PID-MOP)
3400_PIDMOP.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 3400 -

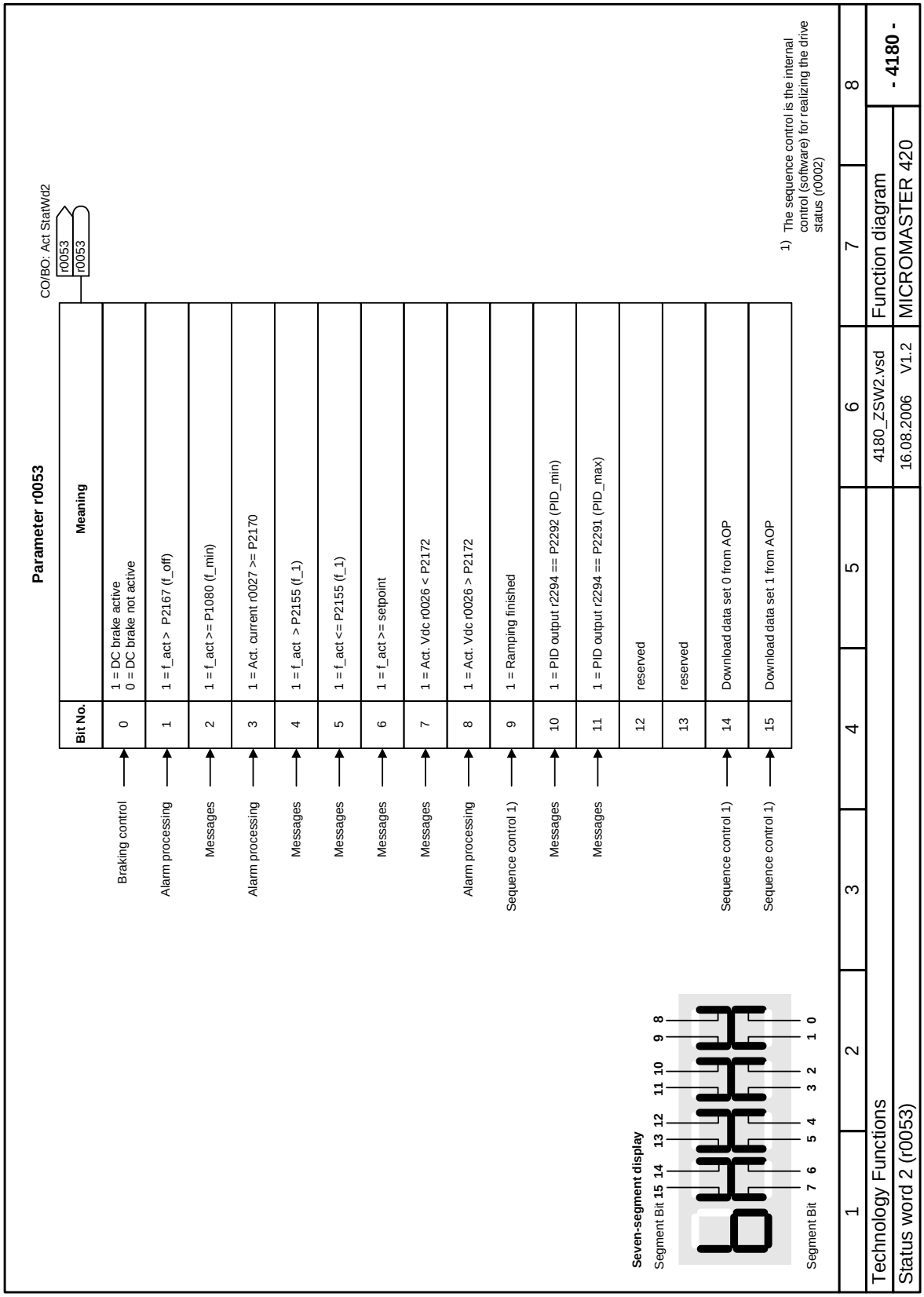

CO/BO: Act StatWd2
r0053
r0053.1
CO/BO: Monitor Wd1
r2197
r2197.5
Delay time T_off
0 ... 10000 [ms]
P2168 (10)
Brake closed
(on ramp down)
SwOff freq. f_off
0.00 ... 10.00 [Hz]
P2167 (1.00)
no Brake selected
f_act
|f_act| >= P2167 (f_off)
CO/BO: Act StatWd2
r0053
r0053.2
CO/BO: Monitor Wd1
r2197
r2197.0
Min. frequency
0.00 ... 650.00 [Hz]
P1080 (0.00)
Hyst. freq. f_hys
0.00 ... 10.00 [Hz]
P2150 (3.00)
f_act
|f_act| > P1080 (f_min)
CO/BO: Act StatWd2
r0053
r0053.3
CO/BO: Monitor Wd1
r2197
r2197.8
Delay time current
0 ... 10000 [ms]
P2171 (10)
Threshold current
0.0 ... 400.0 [%]
P2170 (100.0)
I_act
|I_act| >= P2170 (I_thresh)
1 2 3 4 5 6 7 8
Technology Functions
Monitoring
4100_SW21.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 4100 -

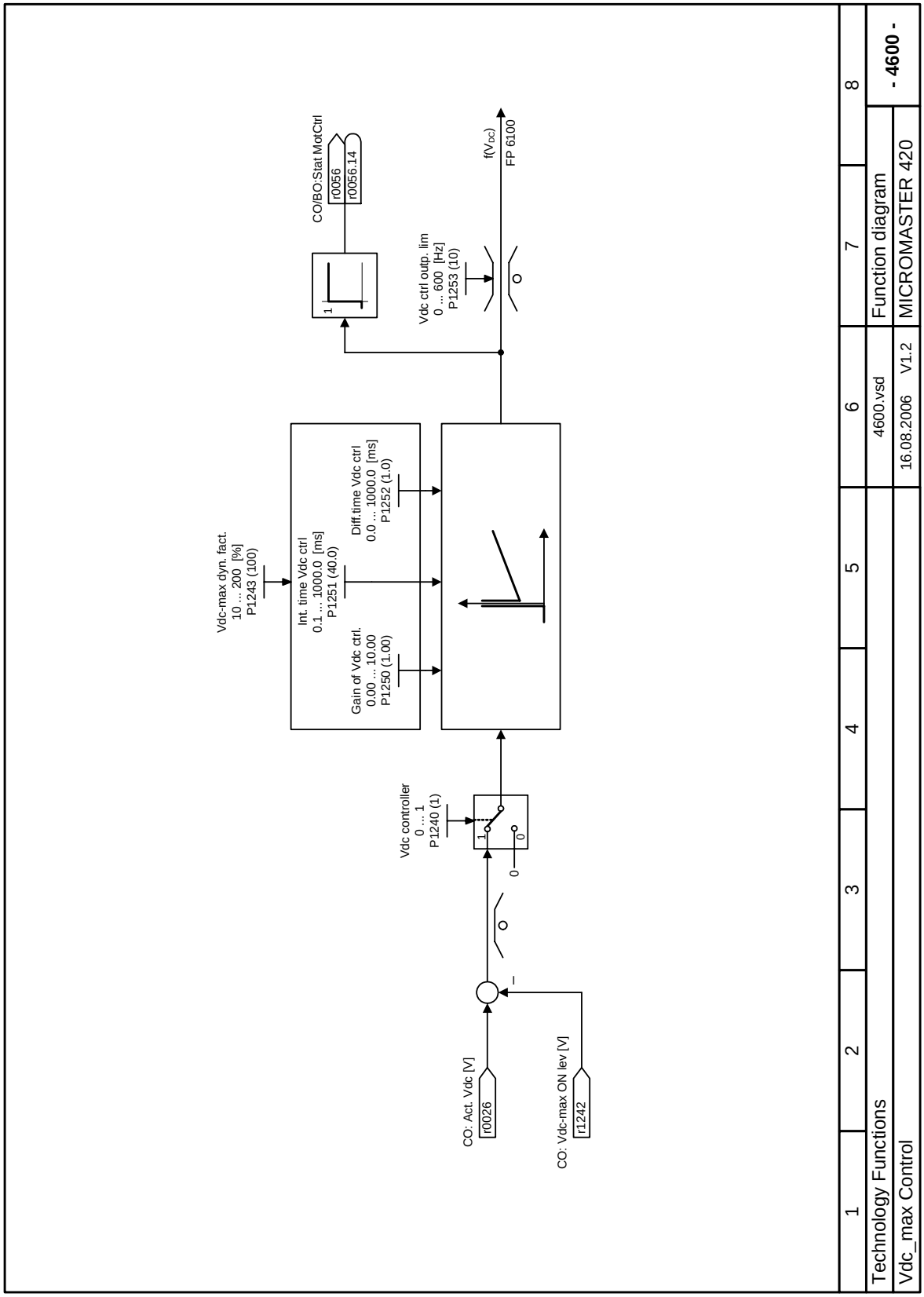

Technology Functions
Monitoring
Function diagram
- 4110 -
4110_SW22.vsd
16.08.2006 V1.2
MICROMASTER 420
|f_act| > P2155 (f_1)
|f_act| <= P2155 (f_1)
f_act >= f_set
f_act > 0
|Vdc_act| < P2172
|Vdc_act| > P2172
f_act
f_set
Vdc_act
Threshold freq f_1
0.00 ... 650.00 [Hz]
P2155 (30.00)
Hyst. freq. f_hys
0.00 ... 10.00 [Hz]
P2150 (3.00)
Delay time of f_1
0 ... 10000 [ms]
P2156 (10)
Vdc delay time
0 ... 10000 [ms]
P2173 (10)
Vdc threshold
0 ... 2000 [V]
P2172 (800)
CO/BO: Act StatWd2
r0053
r0053.4
r0053.5
r0053.6
r0053.14
r0053.7
r0053.8
CO/BO: Monitor Wd1
r2197
r2197.2
r2197.1
r2197.4
r2197.3
r2197.9
r2197.10

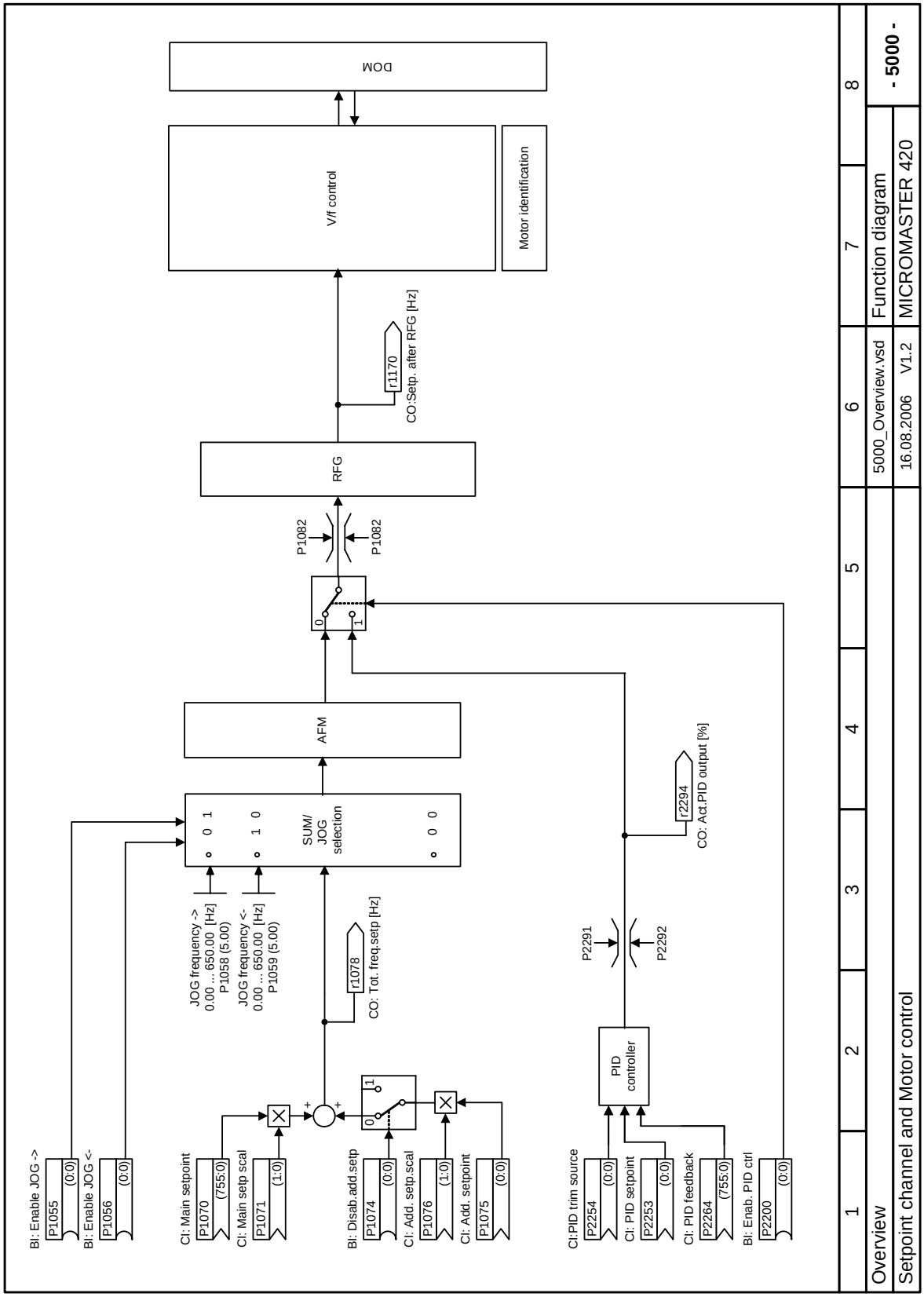

Parameter r0054
Bit No.
Meaning
0 = ON/OFF1, Shutdown via ramp, followed by pulse disable
1 = ON, operating condition (edge-controlled)
0 = OFF2: Electrical stop, pulse disable, motor coasts down
1 = Operating condition
0 = OFF3: Fast stop
1 = Operating condition
1 = Pulse enable
0 = Pulse disable
1 = RFG enable
0 = Set RFG to 0
1 = RFG start
0 = Stop RFG
1 = RFG setpoint enable
0 = Setpoint disable
0 = No
1 = Fault acknowledge
0 = NO
1 = JOG right
0 = NO
1 = JOG left
1 = Control from PLC
0 = No control from PLC
1 = Reverse (setpoint inversion)
0 = Revers disabled
reserved
0 = NO
1 = Motor potentiometer MOP up
0 = NO
1 = Motor potentiometer MOP down
0 = NO
1 = CDS Bit 0 (local/remote)
CO/BO: Act CtrlWd1
r0054
r0054
Sequence control 1)
Braking control
Setpoint channel
All bits = 1 --> drive runs
Note:This bit must be set in the first PZD word of the telegram received from serial interfaces, so that the converter will accept the process data as being valid (compare USS, PROFIBUS, etc.)
1) The sequence control is the internal control (software) for realizing the inverter status (r0001)
BI: ON/OFF1
P0840 (722:0)
BI:ON/OFF1 reverse
P0842 (0:0)
BI: 1. OFF2
P0844 (1:0)
BI: 2. OFF2
P0845 (19:1)
BI: 1. OFF3
P0848 (1:0)
BI: 2. OFF3
P0849 (1:0)
BI: 1. Faults ackn
P2103 (722:2)
BOP/AOP via "Fn"
BI: 2. Faults ackn
P2104 (0:0)
BI: Pulse enable
P0852 (1:0)
BI: RFG enable
P1140 (1:0)
BI: RFG start
P1141 (1:0)
BI:RFG enable setp
P1142 (1:0)
BI: Enable JOG ->
P1055 (0:0)
BI: Enable JOG <-
P1056 (0:0)
BI:ON/OFF1 reverse
P0842 (0:0)
BI: Reverse
P1113 (722:1)
BI: Enable MOP(UP)
P1035 (19:13)
BI:Enable MOP(DWN)
P1036 (19:14)
BI: CDS b0 loc/rem
P0810 (0:0)
Seven-segment display
Segment Bit 15 14 13 12 11 10 9 8
Segment Bit 7 6 5 4 3 2 1 0
1 2 3 4 5 6 7 8
Technology Functions
Control word 1 (r0054)
4150_STW1.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 4150 -

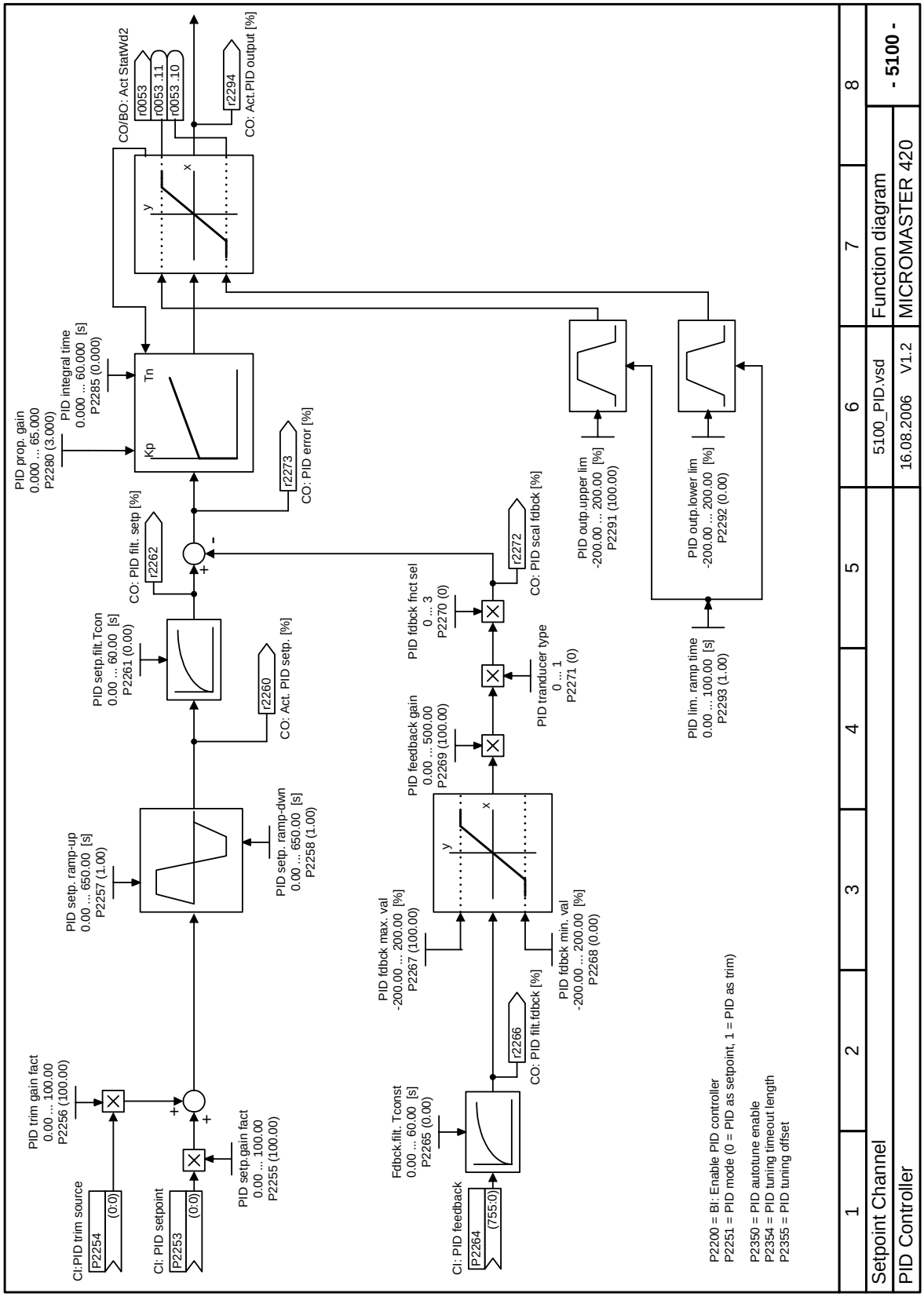

Parameter r0055
CO/BO: Add. CtrlWd
r0055
r0055
Bit No
Meaning
0 = NO
1 = Fixed frequency Bit 0
Fixed frequencies
0 = NO
1 = Fixed frequency Bit 1
Fixed frequencies
0 = NO
1 = Fixed frequency Bit 2
Fixed frequencies
reserved
reserved
reserved
reserved
reserved
0 = NO
1 = PID enabled
PID control
0 = NO
1 = DC brake enabled
DC braking control
reserved
reserved
reserved
0 = External fault 1
1 = No external fault
Sequence control 1)
reserved
reserved
1) The sequence control is the internal control (software) for realizing the drive status (r0002)
BI: FF sel. Bit 0
P1020 (0:0)
BI: FF sel. Bit 1
P1021 (0:0)
BI: FF sel. Bit 2
P1022 (0:0)
BI: Enab. PID ctrl
P2200 (0:0)
BI: Enable DC brk.
P1230 (0:0)
BI: External fault
P2106 (1:0)
Seven-segment display
Segment Bit 15 13 12 11 10 9 8
Segment Bit 7 6 5 4 3 2 1 0
1 2 3 4 5 6 7 8
Technology Functions
4160_STW2.vsd
Function diagram
- 4160 -
Control word 2 (r0055)
16.08.2006 V1.2
MICROMASTER 420

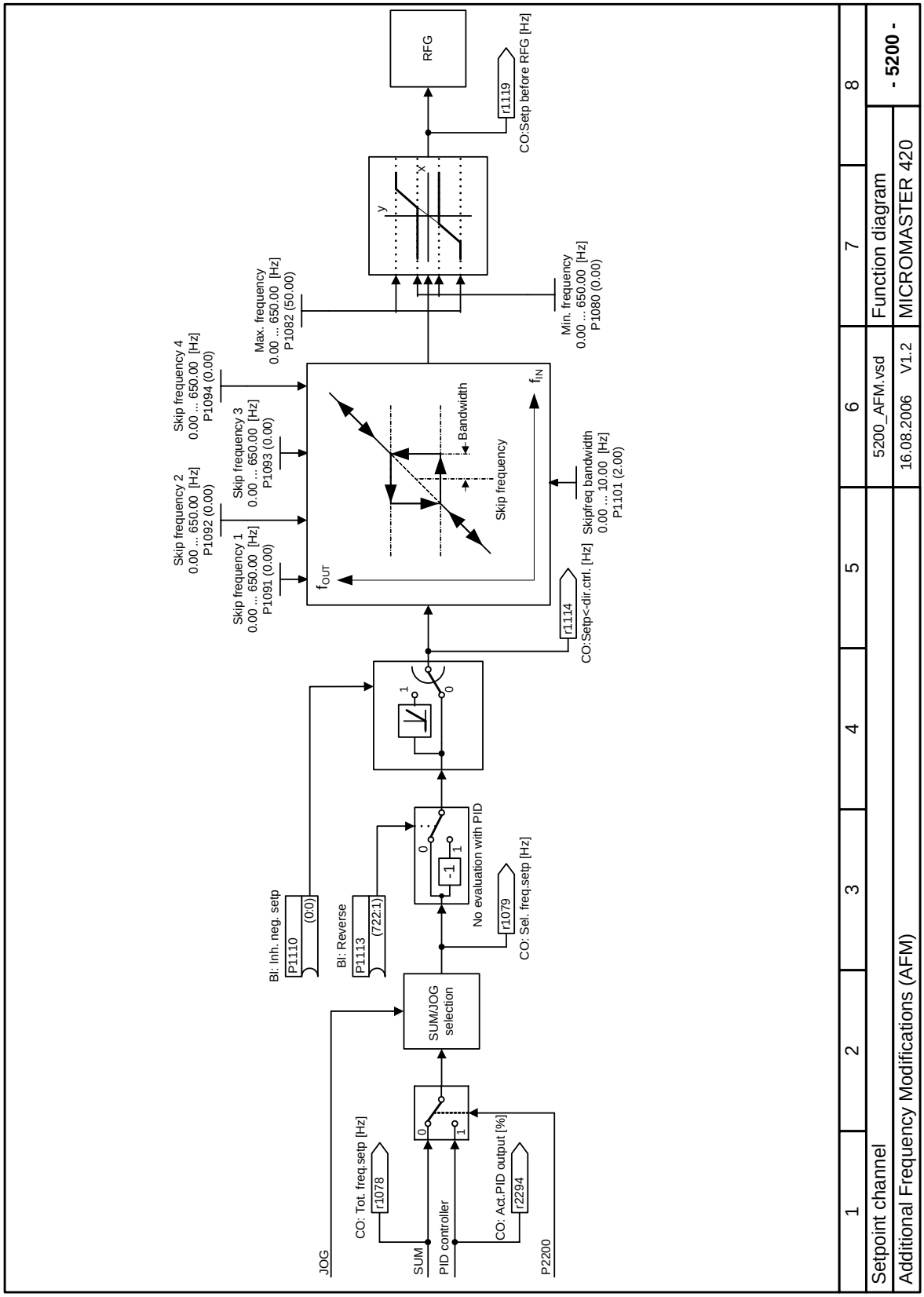

Parameter r0052
CO/BO: Act StatWd1
r0052
r0052
Bit No.
Meaning
Sequence control 1)
0
1 = Drive ready
0 = Drive not ready
Sequence control 1)
1
1 = Drive ready to run (DC link loaded, pulses disabled)
0 = Drive not ready to run
Sequence control 1)
2
1 = Drive running (voltage at output terminals)
0 = Pulses disabled
Sequence control 1)
3
1 = Drive fault active (pulses disabled)
0 = No fault
Sequence control 1)
4
0 = OFF3 active
1 = No OFF3
Sequence control 1)
5
0 = OFF3 active
1 = No OFF3
Sequence control 1)
6
1 = ON inhibit active
0 = No On inhibit (possible to switch on)
Alarm processing
7
1 = Drive warning active
0 = No warning
Messages
8
0 = Deviation setpoint / act. value
1 = No deviation setpoint / act. Value
Sequence control 1)
9
1 = PZD control (always 1)
Messages
10
1 = Maximum frequency reached
0 = Maximum frequency not reached
Messages
11
0 = Warning: Motor current limit
1 = Motor current limit not reached
Braking control
12
1 = Motor holding brake active
0 = Motor holding brake not active
Messages
13
0 = Motor overload
1 = No Motor overload
Messages
14
1 = Motor runs right
0 = Motor does not run right
Messages
15
0 = Inverter overload
1 = No inverter overload
r0052
r0052.03
1
P0731...P0733
(x.x)
Signal "Fault active" is inverted by MICROMASTER if connected to a digital output which means that the relay will be in the de-energised state.
1) The sequence control is the internal control (software) for realizing the drive status (r0002)
Seven-segment display
Segment Bit 15 14 13 12 11 10 9 8
Segment Bit 7 6 5 4 3 2 1 0
1
2
3
4
5
6
7
8
Technology Functions
4170_ZSW1.vsd
Function diagram
- 4170 -
Status word 1 (r0052)
16.08.2006 V1.2
MICROMASTER 420

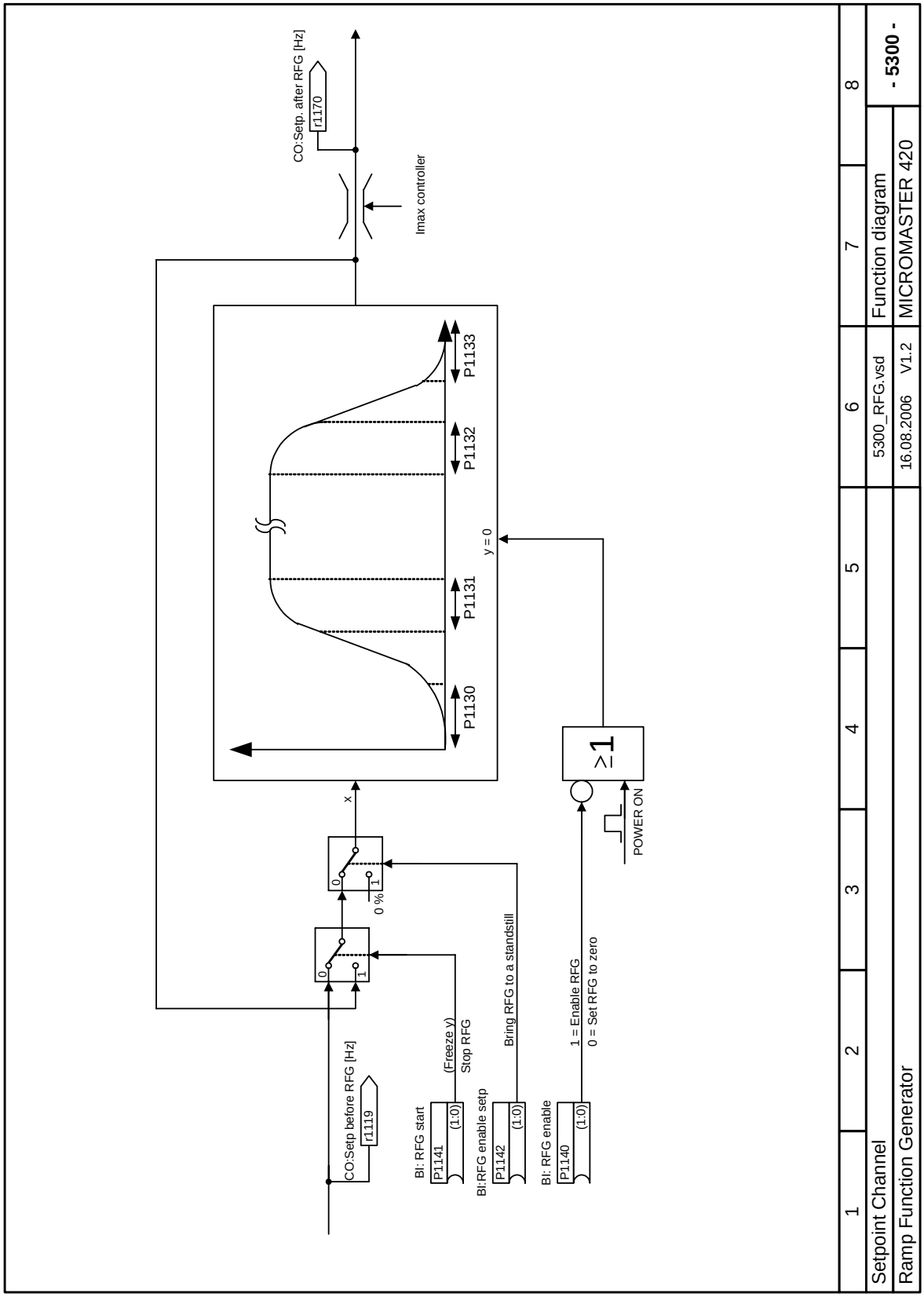

Parameter r0053
CO/BO: Act StatWd2
r0053
r0053
Bit No.
Meaning
0 1 = DC brake active 0 = DC brake not active
1 1 = f_act > P2167 (f_off)
2 1 = f_act >= P1080 (f_min)
3 1 = Act. current r0027 >= P2170
4 1 = f_act > P2155 (f_1)
5 1 = f_act <= P2155 (f_1)
6 1 = f_act >= setpoint
7 1 = Act. Vdc r0026 < P2172
8 1 = Act. Vdc r0026 > P2172
9 1 = Ramping finished
10 1 = PID output r2294 == P2292 (PID_min)
11 1 = PID output r2294 == P2291 (PID_max)
12 reserved
13 reserved
14 Download data set 0 from AOP
15 Download data set 1 from AOP
Braking control
Alarm processing
Messages
Alarm processing
Messages
Messages
Messages
Messages
Alarm processing
Sequence control 1)
Messages
Messages
Sequence control 1)
Sequence control 1)
1) The sequence control is the internal control (software) for realizing the drive status (r0002)
Seven-segment display
Segment Bit 15 14 13 12 11 10 9 8
Segment Bit 7 6 5 4 3 2 1 0
1 2 3 4 5 6 7 8
Technology Functions
4180_ZSW2.vsd
Function diagram
- 4180 -
Status word 2 (r0053)
16.08.2006 V1.2
MICROMASTER 420

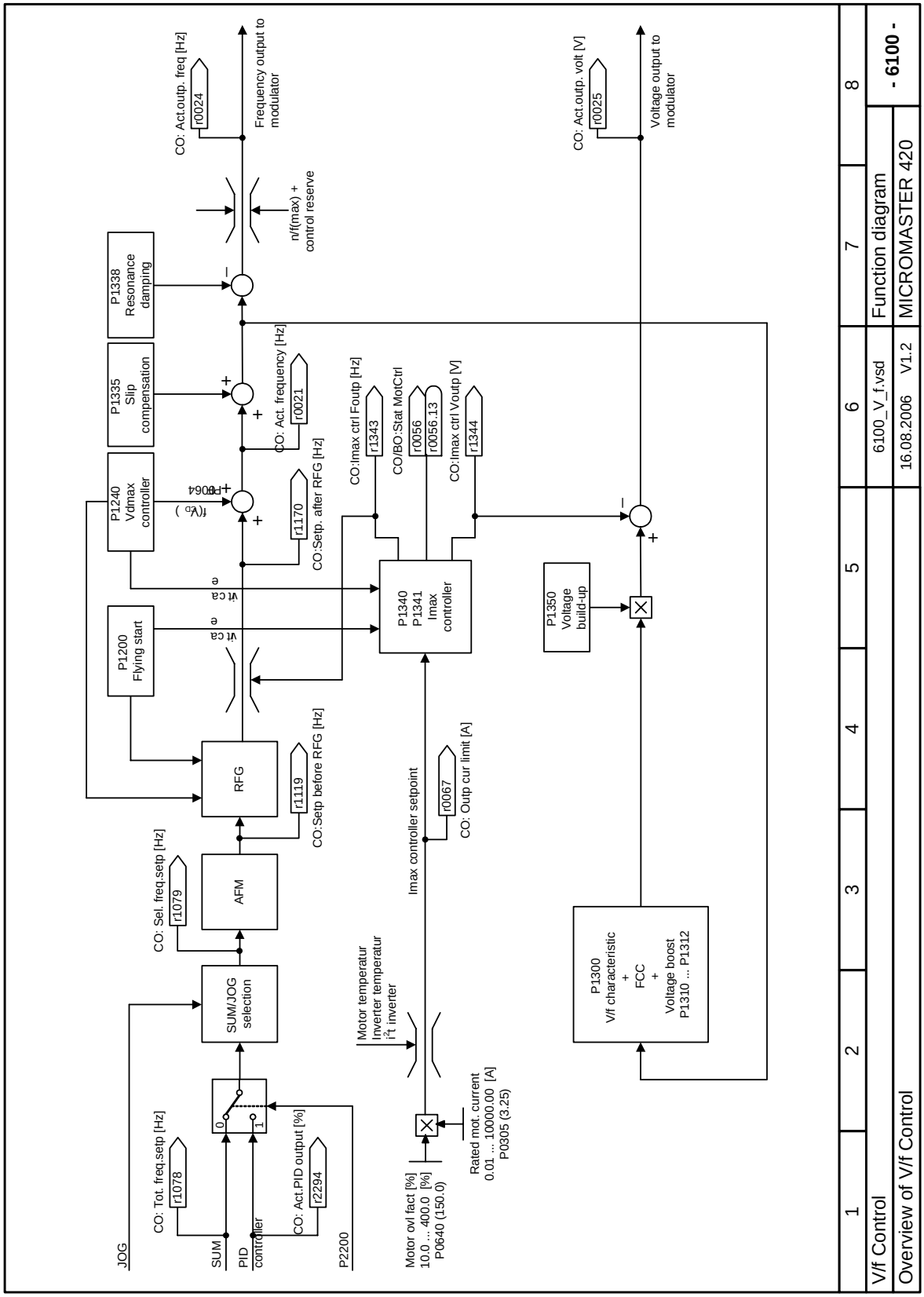

CO/BO:Stat MotCtrl
r0056
r0056.14
f(Vdc)
FP 6100
Vdc ctrl outp. lim
0 ... 600 [Hz]
P1253 (10)
Vdc-max dyn. fact.
10 ... 200 [%]
P1243 (100)
Int. time Vdc ctrl
0.1 ... 1000.0 [ms]
P1251 (40.0)
Diff.time Vdc ctrl
0.0 ... 1000.0 [ms]
P1252 (1.0)
Gain of Vdc ctrl.
0.00 ... 10.00
P1250 (1.00)
Vdc controller
0 ... 1
P1240 (1)
CO: Act. Vdc [V]
r0026
CO: Vdc-max ON lev [V]
r1242
1 2 3 4 5 6 7 8
Technology Functions
Vdc_max Control
4600.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 4600 -

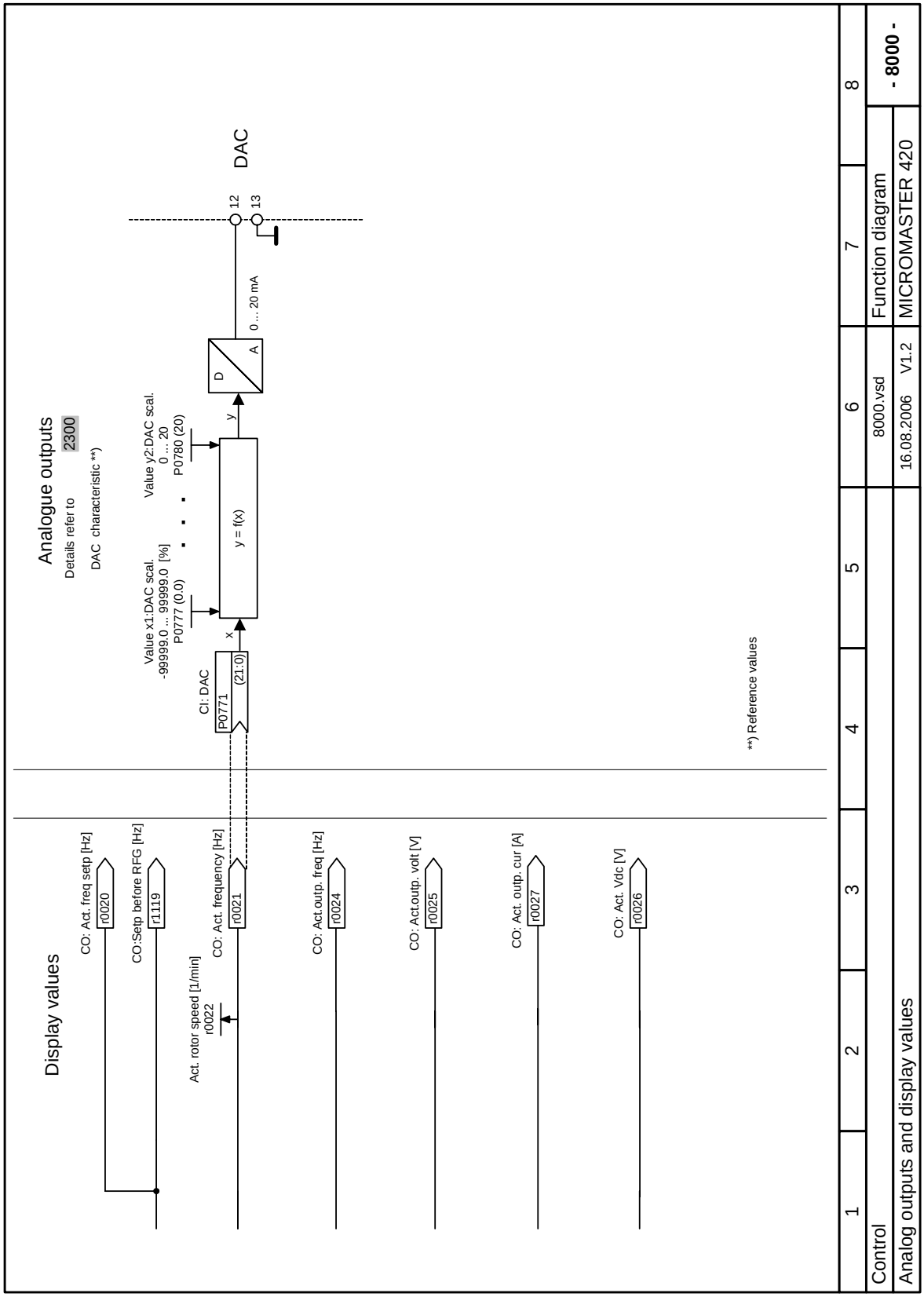

DOM
V/f control
Motor identification
r1170
CO:Setp. after RFG [Hz]
RFG
P1082
P1082
0
1
AFM
SUM/
JOG
selection
0 1
1 0
0 0
JOG frequency ->
0.00 ... 650.00 [Hz]
P1058 (5.00)
JOG frequency <-
0.00 ... 650.00 [Hz]
P1059 (5.00)
r1078
CO: Tot. freq.setp [Hz]
r2294
CO: Act.PID output [%]
P2291
P2292
PID
controller
BI: Enable JOG ->
P1055 (0:0)
BI: Enable JOG <-
P1056 (0:0)
CI: Main setpoint
P1070 (755:0)
CI: Main setp scal
P1071 (1:0)
BI: Disab.add.setp
P1074 (0:0)
CI: Add. setp.scal
P1076 (1:0)
CI: Add. setpoint
P1075 (0:0)
CI:PID trim source
P2254 (0:0)
CI: PID setpoint
P2253 (0:0)
CI: PID feedback
P2264 (755:0)
BI: Enab. PID ctrl
P2200 (0:0)
1
2
3
4
5
6
7
8
Overview
Setpoint channel and Motor control
5000_Overview.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 5000 -


PID Controller
Setpoint Channel
Function diagram
MICROMASTER 420
5100_PID.vsd
16.08.2006 V1.2
- 5100 -
CO/BO: Act StatWd2
r0053
r0053 .11
r0053 .10
r2294
CO: Act.PID output [%]
PID prop. gain
0.000 ... 65.000
P2280 (3.000)
PID integral time
0.000 ... 60.000 [s]
P2285 (0.000)
Tn
Kp
r2273
CO: PID error [%]
CO: PID filt. setp [%]
r2262
PID setp.filt.Tcon
0.00 ... 60.00 [s]
P2261 (0.00)
r2260
CO: Act. PID setp. [%]
PID setp. ramp-up
0.00 ... 650.00 [s]
P2257 (1.00)
PID setp. ramp-dwn
0.00 ... 650.00 [s]
P2258 (1.00)
PID trim gain fact
0.00 ... 100.00
P2256 (100.00)
CI:PID trim source
P2254
(0:0)
CI: PID setpoint
P2253
(0:0)
PID setp.gain fact
0.00 ... 100.00
P2255 (100.00)
PID fdbck max. val
-200.00 ... 200.00 [%]
P2267 (100.00)
PID fdbck min. val
-200.00 ... 200.00 [%]
P2268 (0.00)
Fdbck.filt. Tconst
0.00 ... 60.00 [s]
P2265 (0.00)
CI: PID feedback
P2264
(755:0)
r2266
CO: PID filt.fdbck [%]
PID feedback gain
0.00 ... 500.00
P2269 (100.00)
PID fdbck fnct sel
0 ... 3
P2270 (0)
PID tranducer type
0 ... 1
P2271 (0)
r2272
CO: PID scal fdbck [%]
PID outp.upper lim
-200.00 ... 200.00 [%]
P2291 (100.00)
PID outp.lower lim
-200.00 ... 200.00 [%]
P2292 (0.00)
PID lim. ramp time
0.00 ... 100.00 [s]
P2293 (1.00)
P2200 = BI: Enable PID controller
P2251 = PID mode (0 = PID as setpoint, 1 = PID as trim)
P2350 = PID autotune enable
P2354 = PID tuning timeout length
P2355 = PID tuning offset


RFG
r1119
CO:Setp before RFG [Hz]
Max. frequency
0.00 ... 650.00 [Hz]
P1082 (50.00)
Min. frequency
0.00 ... 650.00 [Hz]
P1080 (0.00)
Skip frequency 4
0.00 ... 650.00 [Hz]
P1094 (0.00)
Skip frequency 3
0.00 ... 650.00 [Hz]
P1093 (0.00)
Skip frequency 2
0.00 ... 650.00 [Hz]
P1092 (0.00)
Skip frequency 1
0.00 ... 650.00 [Hz]
P1091 (0.00)
Bandwidth
Skip frequency
Skipfreq bandwidth
0.00 ... 10.00 [Hz]
P1101 (2.00)
r1114
CO:Setp<-dir.ctrl. [Hz]
Bl: Inh. neg. setp
P1110 (0:0)
Bl: Reverse
P1113 (722:1)
No evaluation with PID
r1079
CO: Sel. freq.setp [Hz]
SUM/JOG selection
JOG
SUM
PID controller
P2200
CO: Tot. freq.setp [Hz]
r1078
CO: Act.PID output [%]
r2294
1 2 3 4 5 6 7 8
Setpoint channel
Additional Frequency Modifications (AFM)
5200_AFM.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 5200 -


CO:Setp. after RFG [Hz]
r1170
Imax controller
P1133
P1132
P1131
P1130
y = 0
≥1
POWER ON
x
0
1
0 %
CO:Setp before RFG [Hz]
r1119
BI: RFG start
P1141
(1:0)
(Freeze y)
Stop RFG
BI:RFG enable setp
P1142
(1:0)
Bring RFG to a standstill
BI: RFG enable
P1140
(1:0)
1 = Enable RFG
0 = Set RFG to zero
1 2 3 4 5 6 7 8
Setpoint Channel
Ramp Function Generator
5300_RFG.vsd
16.08.2006 V1.2
Function diagram
MICROMASTER 420
- 5300 -


JOG
SUM
PID controller
P2200
CO: Tot. freq.setp [Hz]
r1078
CO: Act.PID output [%]
r2294
SUM/JOG selection
AFM
CO: Sel. freq.setp [Hz]
r1079
RFG
r1119
CO:Setp before RFG [Hz]
P1200 Flying start
P1240 Vdmax controller
P1335 Slip compensation
P1338 Resonance damping
CO:Setp. after RFG [Hz]
r1170
CO: Act. frequency [Hz]
r0021
CO: Act.outp. freq [Hz]
r0024
Frequency output to modulator
n/f(max) + control reserve
P1340 P1341 Imax controller
CO:Imax ctrl Foutp [Hz]
r1343
CO/BO:Stat MotCtrl
r0056
r0056.13
CO:Imax ctrl Voutp [V]
r1344
Imax controller setpoint
CO: Outp cur limit [A]
r0067
Motor temperatur
Inverter temperatur
I²t inverter
Motor ovl fact [%]
10.0 ... 400.0 [%]
P0640 (150.0)
Rated mot. current
0.01 ... 10000.00 [A]
P0305 (3.25)
P1350 Voltage build-up
P1300 V/f characteristic + FCC + Voltage boost P1310 ... P1312
CO: Act.outp. volt [V]
r0025
Voltage output to modulator
1
2
3
4
5
6
7
8
V/f Control
6100_V_f.vsd
Function diagram
- 6100 -
Overview of V/f Control
16.08.2006 V1.2
MICROMASTER 420


Analogue outputs
Details refer to 2300
DAC characteristic **)
DAC
12
13
0 ... 20 mA
D
A
Value x1:DAC scal.
-99999.0 ... 99999.0 [%]
P0777 (0.0)
Value y2:DAC scal.
0 ... 20
P0780 (20)
y = f(x)
x
y
CI: DAC
P0771
(21:0)
**) Reference values
Display values
CO: Act. freq setp [Hz]
r0020
CO:Setp. before RFG [Hz]
r1119
Act. rotor speed [1/min]
r0022
CO: Act. frequency [Hz]
r0021
CO: Act.outp. freq [Hz]
r0024
CO: Act.outp. volt [V]
r0025
CO: Act. outp. cur [A]
r0027
CO: Act. Vdc [V]
r0026
1
2
3
4
5
6
7
8
Control
8000.vsd
Function diagram
- 8000 -
Analog outputs and display values
16.08.2006 V1.2
MICROMASTER 420

5 Faults and Alarms

5.1 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 Fn 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 STOP II

Quit
Remove fault and reset fault memory by
- disconnecting the drive converter from the line supply and powering-up again
- Press the Fn key on the BOP or AOP
- Acknowledge fault P2103, P2104
- P0952 (complete fault memory)

Cause
- short-circuit at the output
- ground fault
- excessively large motor (the motor power rating P0307 is greater than the inverter power r0206)
- defective final stage (end stage)

Diagnosis & Remedy
Please check the following:
- are the cable lengths within the limit values ?
- does the motor cable or motor have either a short-circuit or ground fault ?
- do the motor parameters correspond to those of the motor being used ?
- is the motor overloaded or stalled (locked rotor) ?
- increase the accelerating time.
- reduce the gain
- use a motor with a lower power rating
- is the stator resistance value (P0350) correct ?

F0002 Overvoltage STOP II

Quit
Refer to F0001.

Cause
- DC link voltage (r0026) higher than the overvoltage threshold (refer to parameter r0026)
- ground fault

Diagnosis & Remedy
Please check the following:
- is the line supply voltage within the permissible range?
- has the DC current DC link monitoring been enabled (P1240) and correctly parameterized?
- extend the deceleration ramp (ramp-down time P1121, P1135)
- remove the ground fault
- is the required braking power within the permissible limits?

NOTE
- a higher moment of inertia requires longer deceleration times; if required, use a braking resistor.
- overvoltage can either be caused by an excessively high line supply voltage or by the fact that the motor is generating (regenerative mode).
- the motor can be generating as it is decelerating quickly or due to the fact that an active load is driving the motor.

F0003 Undervoltage STOP II

Quit
Refer to F0001.

Cause
- line voltage failed
- shock stressing outside the permissible limits.

Diagnosis & Remedy
Please check the following:
- is the line supply voltage within the permissible range?
- is the line supply voltage stable with respect to sporadic failures and voltage dips (brown-outs) ?

F0004 Inverter overtemperature STOP II

Quit
Refer to F0001.

Cause
- inadequate cooling
- ambient temperature is too high.

ambient temperature is too high.

Diagnosis & Remedy
Please check the following:
- is the pulse frequency P1800 set to the factory setting ? If required reset P1800.
- does the ambient temperature lie within the permissible limits ?
- reduce the load and / or ensure adequate cooling

Please check the following:
- does the fan rotate if the inverter is operational ?

F0005 Inverter I2T STOP II

Quit
Refer to F0001.

Cause
- inverter overloaded.
- load duty cycle too high.
- the motor power rating (P0307) is greater than that of the inverter (r0206).
- 100 % overload reached (refer to utilization r0036)

Diagnosis & Remedy
Please check the following:
- does the load duty cycle lie within the permissible limits?
- use a motor with a lower rating (motor power P0307 is greater than ls inverter power r0206)

F0011 Motor overtemperature I2T STOP II

Quit
Refer to F0001.

Cause
Motor overloaded

Diagnosis & Remedy
Please check the following:
- is the load cycle correct?
- is the thermal motor time constant (P0611) correct ?
- is the motor I2t alarm threshold correct ?

F0035 Restart after n STOP II

Quit
reset fault memory or Power On / Stop

Cause
- restart fault after n attempts, refer to P1211

F0041 Failure, motor data identification STOP II

Quit
Refer to F0001.

Cause
Motor data identification run unsuccessful (refer to fault value r0949):
- r0949 = 0: Load missing.
- r0949 = 1: Current limit value reached during identification.
- r0949 = 2: Identified stator resistance less than 0.1% or greater than 100%.
- r0949 = 30: Current controller at voltage limit value
- r0949 = 40: Identified data set inconsistent; at least one identification run unsuccessful

NOTE
Percentage values based on the impedence Zb = Vmot,rated / sqrt(3) / Imot,rated

Diagnosis & Remedy
Please check the following:
- r0949 = 0: Is the motor connected to the inverter ?
- r0949 = 1-40: Is the motor data in P0304-P0311 correct ?
- r0949 = 1-40: Motor circuit configuration correct (star, delta configuration) ?

F0051 Parameter EEPROM fault STOP II

Quit
Refer to F0001.

Cause
- read or write operation while saving parameters in the EEPROM was unsuccessful.

Diagnosis & Remedy
- reset to factory setting and then re-parameterize
- if required, change the drive

F0052 Power stack fault STOP II

Quit
Refer to F0001.

Cause
- read error, power data or invalid power module data.

Diagnosis & Remedy
- change the drive

F0060 Asic time slice overflow STOP II

Quit
Refer to F0001.

Cause
- internal communications failure/error

Diagnosis & Remedy
- if the error still occurs, replace the inverter.
- contact customer service!

F0070 CB setpoint fault STOP II

Quit
Refer to F0001.

Cause
no setpoints received via the communications bus during the telegram failure time. Triggered by A0702 / A0703 / A0704.

Diagnosis & Remedy
- check the communications module (CB) and communications partner.
- check connection to communication partners and ensure valid control word (see A0702 / A0703 / A0704)

F0071 USS(BOP link) setpoint fault STOP II

Quit
Refer to F0001.

Cause
- no setpoint was received via the USS during the telegram off time

Diagnosis & Remedy
- check USS master

F0072 USS(COMM link) setpoint fault STOP II

Quit
Refer to F0001.

Cause
- no setpoints received via the USS during the telegram off time

Diagnosis & Remedy
- check USS master

F0080 ADC input signal lost STOP II

Quit
Refer to F0001.

Cause
- wire breakage
- signal outside the limit values

F0085 External fault STOP II

Quit
Refer to F0001.

Cause
- external fault as a result of command input via terminals.

Diagnosis & Remedy
- inhibit terminal input to initiate fault.

F0101 Stack overflow STOP II

Quit
Refer to F0001.

Cause
- software error or processor failure

Diagnosis & Remedy
- carry-out self-test routines

F0221 PID feedback below the minimum value STOP II

Quit
Refer to F0001.

Cause
- PID feedback below the minimum value P2268.

Diagnosis & Remedy
- change value of P2268.
- set feedback gain.

F0222 PID feedback above maximum value STOP II

Quit
Refer to F0001.

Cause
- PID feedback above maximum value P2267.

Diagnosis & Remedy
- change value of P2267.
- set the feedback gain.

F0422 No load applied to inverter STOP II

Quit
Refer to F0001.

Cause
No Load is applied to the inverter.
As a result, some functions may not work as under normal load conditions.

F0450 Failure BIST tests STOP II

Quit

Refer to F0001.

Cause

Self-test routine unsuccessful (refer to fault value r0949):

- r0949 = 1: Self-test routine for power module components unsuccessful
- r0949 = 2: Self-test routine for closed-loop control module components unsuccessful
- r0949 = 4: Several function tests were unsuccessful
- r0949 = 8: Several tests carried-out at the I/O module were unsuccessful (only MICROMASTER 420)
- r0949 = 16: Failure of the internal RAM at the switch-on test

Diagnosis & Remedy

- the drive is functional, but several functions are not correctly executed.
- replace the drive

5.2 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 value

Cause
- the motor power rating does not correspond to the inverter power rating
- motor cables are too long
- ground fault

Diagnosis & Remedy

Please check the following:
- does the motor power rating (P0307) match the inverter power rating (r0206) ?
- are the limit values for the cable lengths maintained ?
- does the motor cable or motor have a short-circuit or ground fault ?
- do the motor parameters correspond to those of the motor being used ?
- stator resistance value (P0350) correct ?
- is the motor overloaded or is the rotor locked (cannot rotate) ?
- ramp-up time P1120 too low ?

A0502 Overvoltage limit value

Cause
- the overvoltage limit value has been reached (actual value of the DC link voltage r0026 greater than r1242).

Diagnosis & Remedy
- if this alarm is permanently displayed, check the inverter input voltage.
- is the DC link voltage controller (Vdc_max controller) de-activated (refer to parameter P1240) ?
- short ramp times and/or large flywheel masses (moment of inertia) ?

A0503 Undervoltage limit value

Cause
- line supply has failed.
- line voltage and therefore also the DC link voltage (r0026) below the defined limit value (refer to parameter r0026).

Diagnosis & Remedy
- check the line voltage.

A0504 Inverter overtemperature

Cause
- alarm threshold of the inverter heatsink temperature (P0614) was exceeded; this results in a reduction of the pulse frequency and/or the output frequency (dependent on the parameterization in (P0610).

Diagnosis & Remedy

Please check the following:
- is the ambient temperature within the permissible limits ?
- are the load and load duty cycle within the permissible limits ?

A0505 Inverter I2T

Cause
- overload alarm limit P0294 is exceeded (refer to utilization r0036)
- the pulse frequency and/or the output frequency is reduced as a function of the setting of parameter P0290.

Diagnosis & Remedy
- check whether the load duty cycle lies within the permissible limits.

A0511 Motor overtemperature I2T

Cause
- motor is overloaded.
- load duty cycle is exceeded.

Diagnosis & Remedy

Please check the following:
- value P0611 (motor I2t time constant) suitable?
- is P0614 (motor I2t overload alarm) set to a suitable value?

A0541 Motor data identification routine active

Cause
- motor data identification routine (P1910) selected and is active

A0571 Auto restart after fault present

A0600 RTOS data loss alarm

Cause
- time slice overflow was identified

Diagnosis & Remedy
- use lower baud rate for USS
- de-activate inverter functions

A0700 CB alarm 1

Cause
- The parameter or configuring settings by the PROFIBUS master are invalid.

Diagnosis & Remedy
- Correct the PROFIBUS configuration.

A0701 CB alarm 2

Cause
- CB-(communications module)-specific

Diagnosis & Remedy
- refer to the CB User Manual

A0702 CB alarm 3

Cause
- The link to the PROFIBUS is interrupted.

Diagnosis & Remedy
- Check connector, cable and PROFIBUS master.

A0703 CB alarm 4

Cause
- No setpoints, or invalid setpoints (control word = 0) are being received from the PROFIBUS master

Diagnosis & Remedy
- Check setpoints from the PROFIBUS master. Switch SIMATIC CPU to "RUN".

A0704 CB alarm 5

Cause
- At least one configured internode transmitter is not yet active, or has failed.

Diagnosis & Remedy
- Activate internode transmitter.

A0705 CB alarm 6

Cause
- No actual values received from inverter.

Diagnosis & Remedy
- fault is in inverter.

A0706 CB alarm 7

Cause
- PROFIBUS-DP communication board: Software error.

Diagnosis & Remedy
- fault on the PROFIBUS-DP communication board, for details see diagnostic parameter.

A0707 CB alarm 8

Cause
- CB-(Communications module)-specific

Diagnosis & Remedy
- refer to the CB User Manual

A0708 CB alarm 9

Cause
- CB-(Communications module)-specific

Diagnosis & Remedy
- refer to the CB User Manual

A0709 CB alarm 10

Cause
- CB-(Communications module)-specific

Diagnosis & Remedy
- refer to the CB User Manual

A0710 CB communications error

Cause
- loss of communications with the CB (communications module).

Diagnosis & Remedy
- check the CB hardware.

A0711 CB communications error

Cause
- CB (communications module) signals a communications error.

Diagnosis & Remedy
- check the CB parameters

A0910 Vdc-max controller disabled/switched-out

Cause
- Vdc max controller was de-activated, as it was not able to keep the DC link voltage (r0026) within the limit values (refer to r0026 and P1240).

This occurs,
- if the line supply voltage is permanently too high.
- if the motor is driven by an active load, which means that the motor goes into regenerative operation.
- while decelerating (short down-ramps P1121) for extremely high load torques

Diagnosis & Remedy

Please check the following:
- is the input voltage (P0756) within the permissible range ?
- are load duty cycle and load limits within the permissible limits ?

A0911 Vdc-max controller active

Cause
- Vdc max controller is active
- the ramp-down times are automatically increased in order to keep the DC link voltage (r0026) within the limit values (refer to r0026 and P1240).

A0912 Vdc-min controller active

Cause

- Vdc min controller is activated, if the DC link voltage (r0026) falls below the minimum value (refer to r0026 or P1240).
- the kinetic energy of the motor is used to buffer the DC link voltage and therefore to slow down the drive.
- therefore brief line failures no longer automatically result in an undervoltage trip.

A0920 ADC parameters not correctly set

Cause

ADC parameters should not be set to identical values, as this would lead to illogical results.

- Index 0: Parameter settings for output identical.
- Index 1: Parameter settings for input identical.
- Index 2: Parameter settings for input do not correspond to ADC type.

A0921 DAC parameters not set properly.

Cause

- DAC parameters (P0777 and P0779) have identical values.

OR

- DAC parameters (P0778 and P0780) have identical values.

Identical values would produce illogical results.

Diagnosis & Remedy

Check the following:

- Output parameter settings. Ensure P0777 and P0779 are not identical.
- Input parameter settings. Ensure P0778 and P0780 are not identical.

A0922 No load at the inverter

Cause

- no load is connected to the inverter.
- therefore several functions can run differently than under normal load conditions.

A0923 JOG counter-clockwise as well as JOG clockwise are requested

Cause

- both JOG clockwise and JOG counter-clockwise (P1055/P1056) have been requested. This is the reason that the RFG output frequency has been frozen to the actual value.

6 Abbreviations

AC	Alternating current
AD	Analog digital converter
ADC	Analog digital converter
ADR	Address
AFM	Additional frequency modification
AIN	Analog input
AOP	Advanced operator panel
AOUT	Analog output
ASP	Analog setpoint
ASVM	Asymmetric space vector modulation
BCC	Block check character
BCD	Binary-coded decimal code
BI	Binector input
BICO	Binector / connector
BO	Binector output
BOP	Basic operator panel
C	Commissioning
CB	Communication board
CCW	Counter-clockwise
CDS	Command data set
CFM	Cubic feet per minute (1 l/s ≅ 2,1 CFM)
CI	Connector input
CM	Configuration management
CMD	Commando
CMM	Combimaster
CO	Connector output
CO/BO	Connector output / Binector output
COM	Common (terminal that is connected to NO or NC)
COM-Link	Communication link
CT	Commissining, ready to run
CT	Constant torque
CUT	Commissining, run, ready to run
CW	Clockwise
DA	Digital analog converter
DAC	Digital analog converter
DC	Direct current
DDS	Drive data set
DIN	Digital input
DIP	DIP switch
DOUT	Digital output
DS	Drive state
EEC	European Economic Community
EEPROM	Electrical erasable programmable read-only
ELCB	Earth leakage circuit breaker
EMC	Electro-magnetic compatibility

EMF	Electromotive force
EMI	Electro-magnetic interference
FAQ	Frequently asked questions
FCC	Flux current control
FCL	Fast current limit
FF	Fixed frequency
FFB	Free function block
FOC	Field orientated control
FSA	Frame size A
GSG	Getting started guide
GUI ID	Global unique identifier
HIW	Main actual value
HSW	Main setpoint
HTL	High-threshold logic
HVAC	heating, ventilation, air conditioning
I/O	Input and output
IBN	Commissioning
IGBT	Insulated gate bipolar transistor
IND	Sub-index
JOG	Jog
KIB	Kinetic buffering
LCD	Liguid crystal display
LED	Light emitting diode
LGE	Length
MHB	Motor holding brake
MM4	MICROMASTER 4th. Generation
MOP	Motor potentiometer
NC	Normally closed
NO	Normally open
OPI	Operating instructions
PDS	Power drive system
PID	PID controller (proportional, integral, derivative)
PKE	Parameter ID
PKW	Parameter ID value
PLC	Programmable logic controller
PLI	Parameter list
PPO	Parameter process data object
PTC	Positive temperature coefficient
PWE	Parameter value
PWM	Pulse-width modulation
PX	Power extension
PZD	Process data
QC	Quick commissioning
RAM	Random-access memory
RCCB	Residual current circuit breaker
RCD	Residual current device
RFG	Ramp function generator
RFI	Radio-frequency interference
RPM	Revolutions per minute

SCL	Scaling
SDP	Status display panel
SLVC	Sensorless vector control
STW	Control word
STX	Start of text
SVM	Space vector modulation
TTL	Transistor-transistor logic
USS	Universal serial interface
VC	Vector control
VT	Variable torque
ZSW	Status word

Suggestions and/or Corrections

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