SIEMENS

MICROMASTER 420

Parameter List **Issue 06/04**

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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SIEMENS

MICROMASTER 420

Parameter List
User Documentation

Valid for

Issue 06/04

Inverter Type
MICROMASTER 420

Software Version
V1.1

Issue 06/04

Block Diagram and Terminals

Parameter List

Function Diagrams

Faults and Alarms

Abbreviations

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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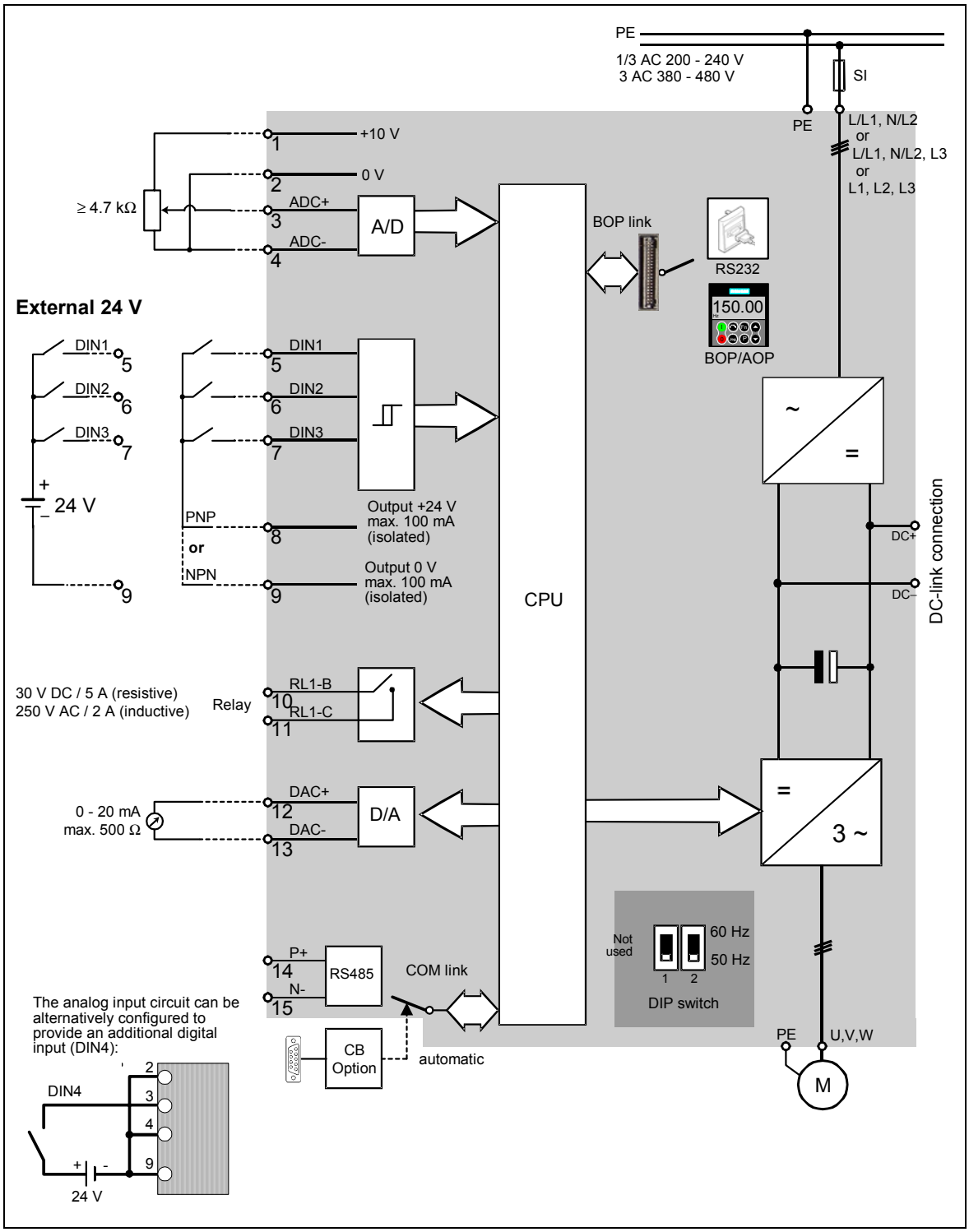
1 Block Diagram and Terminals

1.1 Block Diagram



1.2 Power Terminals

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

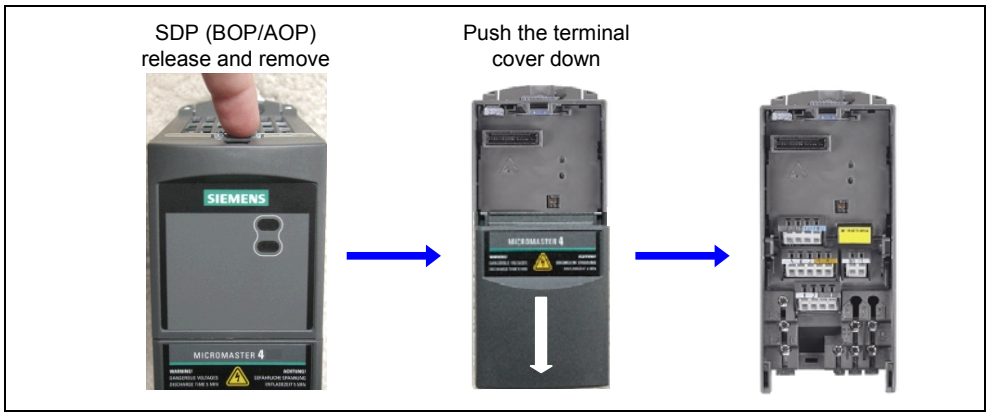


Fig. 1-1 Removing Front Covers

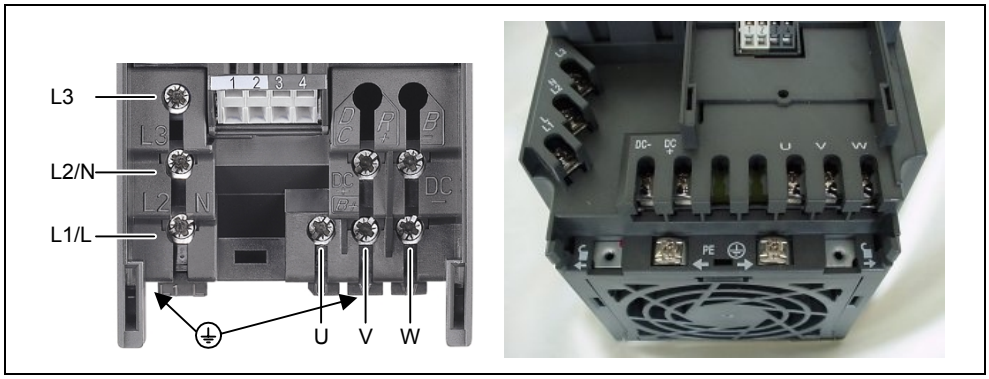
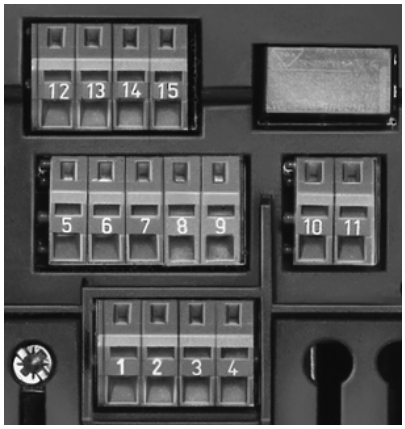


Fig. 1-2 Power Terminals

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.

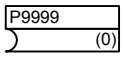
1 Par number [index]	**2 Parameter name**			**9 Min:**	12 Level: **2**
	3 CStat:	**5 Datatype**	**7 Unit:**	**10 Def:**	
	4 P-Group:	**6 active:**	**8 Quick Comm:**	**11 Max:**	
	13	Description:			

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.

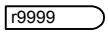
   [index] indicates that the parameter is an indexed parameter and specifies the number of indices available.

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.

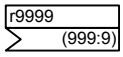
   These abbreviations have the following meanings:

   BI = 

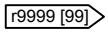
   Binector input, i.e. parameter selects the source of a binary signal

   BO = 

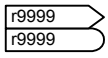
   Binector output, i.e. parameter connects as a binary signal

   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. 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	2	C
P0309	Motor efficiency rating	2	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. speed	1	CUT
P1082	Max. speed	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:

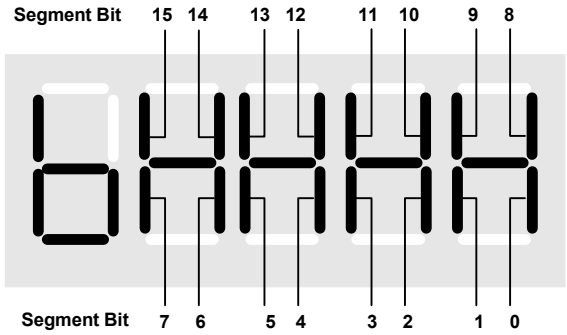
Set P0010 = 30

Set P0970 = 1

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

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
r0751	BO: Status word of ADC
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]
r1024	CO: Act. fixed frequency
r1050	CO: Act. Output freq. of the MOP
r1078	CO: Total frequency setpoint
r1079	CO: Selected frequency setpoint

ParNo	Parameter name
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
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

ParNo	Parameter name
r0056	CO/BO: Status of motor control
r0722	CO/BO: Binary input values
r0747	CO/BO: State of digital outputs
r2197	CO/BO: Monitoring word 1

2.8 Parameter Description

Note

Level 4 Parameters are not visible with BOP or AOP.

2.8.1 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

CStat: CUT **Datatype:** U16 **Unit:** - **Min:** 2
P-Group: FUNC **Active:** first confirm **QuickComm.:** No **Def:** 21
Max: 2294

Level **2**

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

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

Level **3**

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

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

Level **3**

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.

2.8.2 Diagnosis parameters

r0018	**Firmware version**		**Min:** -		Level
		Datatype: Float **Unit:** -	**Def:** -		**1**
	P-Group: INVERTER		**Max:** -		

Displays version number of installed firmware.

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

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.

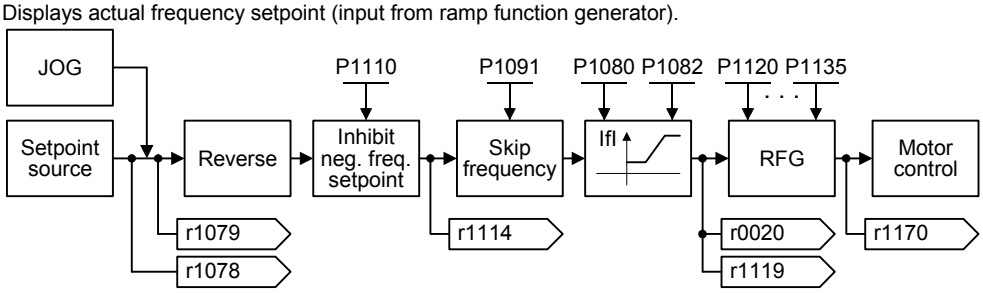
The following functions can be "connected" to individual buttons:
- ON/OFF1,
- OFF2,
- JOG,
- REVERSE,
- INCREASE,
- DECREASE

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

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

P-Group: CONTROL Level **3**

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



r0021 **CO: Act. frequency**

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

P-Group: CONTROL Level **2**

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

r0022 **Act. rotor speed**

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

P-Group: CONTROL Level **3**

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. output frequency**

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

P-Group: CONTROL Level **3**

Displays actual output frequency (slip compensation, resonance damping and frequency limitation are included).

r0025 **CO: Act. output voltage**

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

P-Group: CONTROL Level **2**

Displays [rms] voltage applied to motor.

r0026 **CO: Act. DC-link voltage**

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

P-Group: INVERTER Level **2**

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
$U_{DC\_max\_warn}$ A0502 $U_{DC\_max\_ctrl}$ (P1240)	r1242	
U_{DC_Comp} (P1236)	$0.98 \cdot r1242$	

r0027 **CO: Act. output current**

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

P-Group: CONTROL Level **2**

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

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

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

P-Group: MOTOR Level **2**

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**

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

P-Group: INVERTER

Level **4**

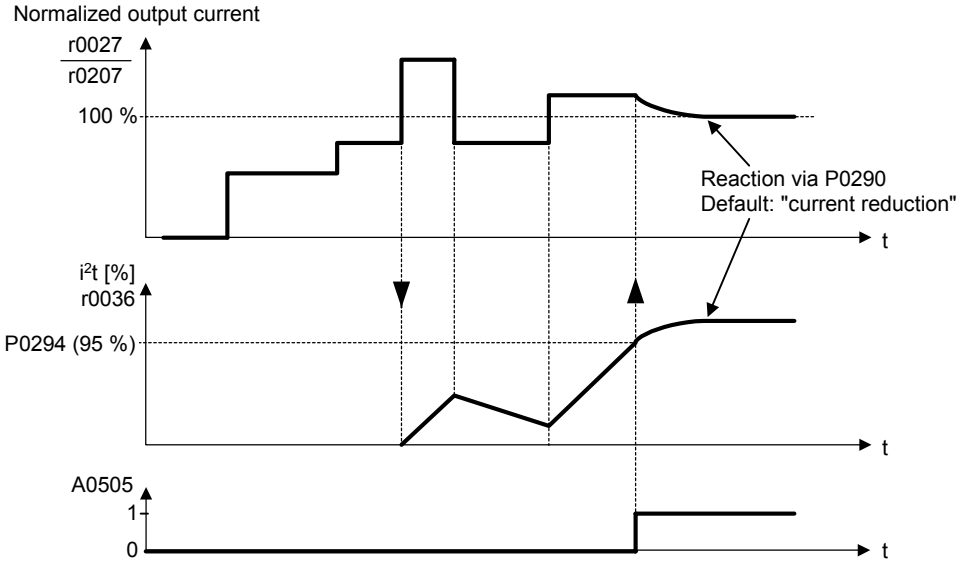
Displays inverter overload utilization calculated via I2t model.

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 exceed, utilization will be displayed. Otherwise, 0 % utilization is displayed.

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

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

P-Group: INVERTER

Level **3**

Displays internal inverter heatsink temperature.

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

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

P-Group: INVERTER

Level **2**

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**

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

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

Level **2**

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:** -	

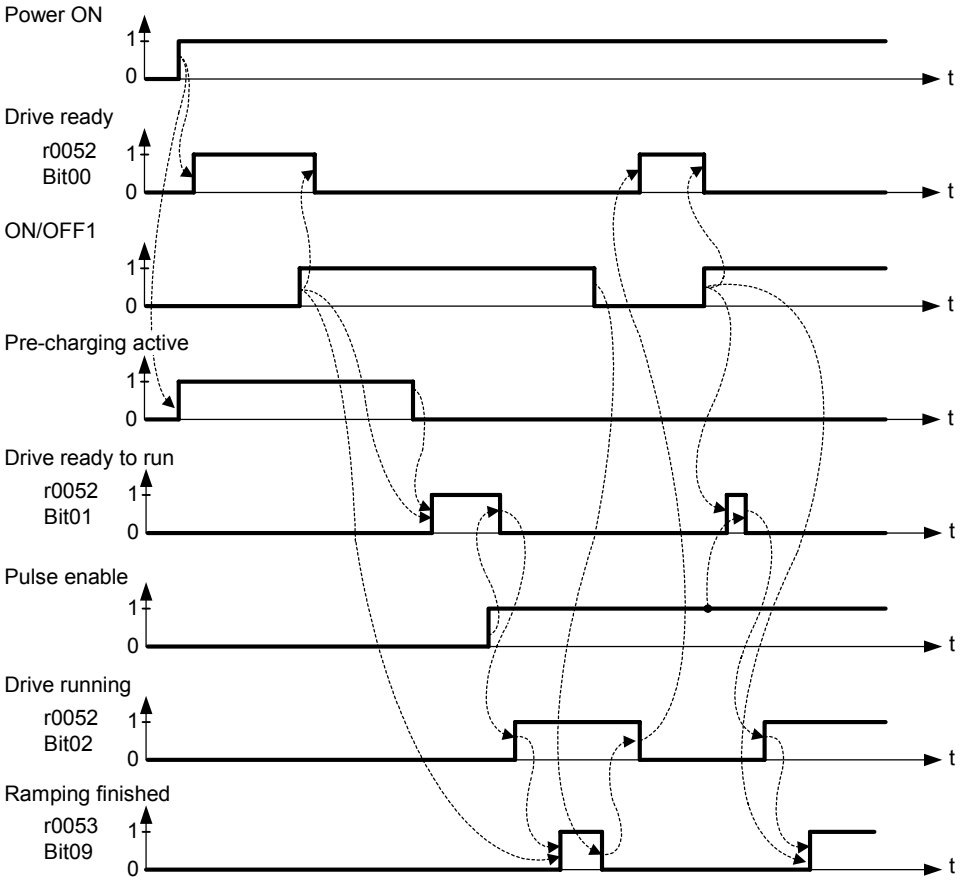
Displays first active status word of inverter (bit format) and can be used to diagnose inverter status.

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



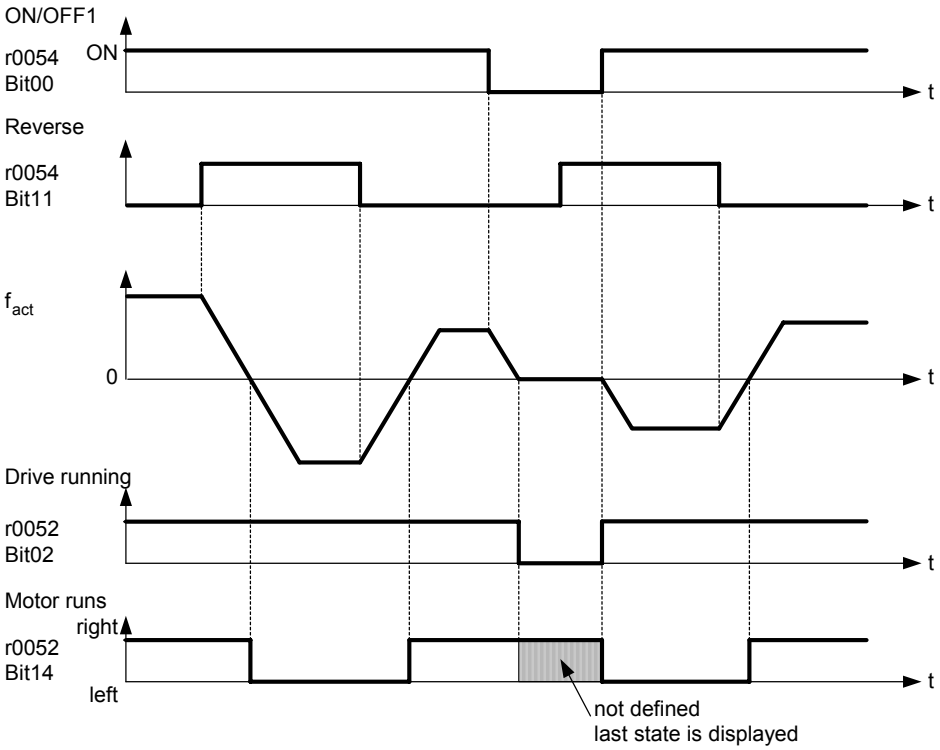
r0052 Bit03 "Drive fault active":
Output of Bit3 (Fault) will be inverted on digital output (Low = Fault, High = No Fault).

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:** -

P-Group: COMMANDS

Level **2**

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

Bitfields:

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

Details:

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

r0054 **CO/BO: Act. control word 1** Level **3**

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

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	Pulse enable	0	NO	1	YES
Bit04	RFG enable	0	NO	1	YES
Bit05	RFG start	0	NO	1	YES
Bit06	Setpoint enable	0	NO	1	YES
Bit07	Fault acknowledge	0	NO	1	YES
Bit08	JOG right	0	NO	1	YES
Bit09	JOG left	0	NO	1	YES
Bit10	Control from PLC	0	NO	1	YES
Bit11	Reverse (setpoint inversion)	0	NO	1	YES
Bit13	Motor potentiometer MOP up	0	NO	1	YES
Bit14	Motor potentiometer MOP down	0	NO	1	YES
Bit15	Local / Remote	0	NO	1	YES

Details:

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

r0055 **CO/BO: Act. control word 2** Level **3**

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

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 select	0	NO	1	YES
Bit04	Motor excitation finished	0	NO	1	YES
Bit05	Starting boost active	0	NO	1	YES
Bit06	Acceleration boost active	0	NO	1	YES
Bit07	Frequency is negative	0	NO	1	YES
Bit08	Field weakening active	0	NO	1	YES
Bit09	Volts setpoint limited	0	NO	1	YES
Bit10	Slip frequency limited	0	NO	1	YES
Bit11	F_out > F_max Freq. limited	0	NO	1	YES
Bit12	Phase reversal selected	0	NO	1	YES
Bit13	I-max controller active	0	NO	1	YES
Bit14	Vdc-max controller active	0	NO	1	YES
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**

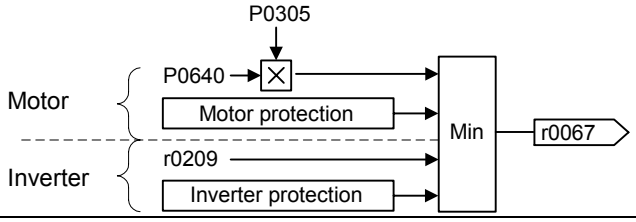
Datatype: Float **Unit:** A **Min:** - **Def:** - **Max:** -

Level **3**

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.

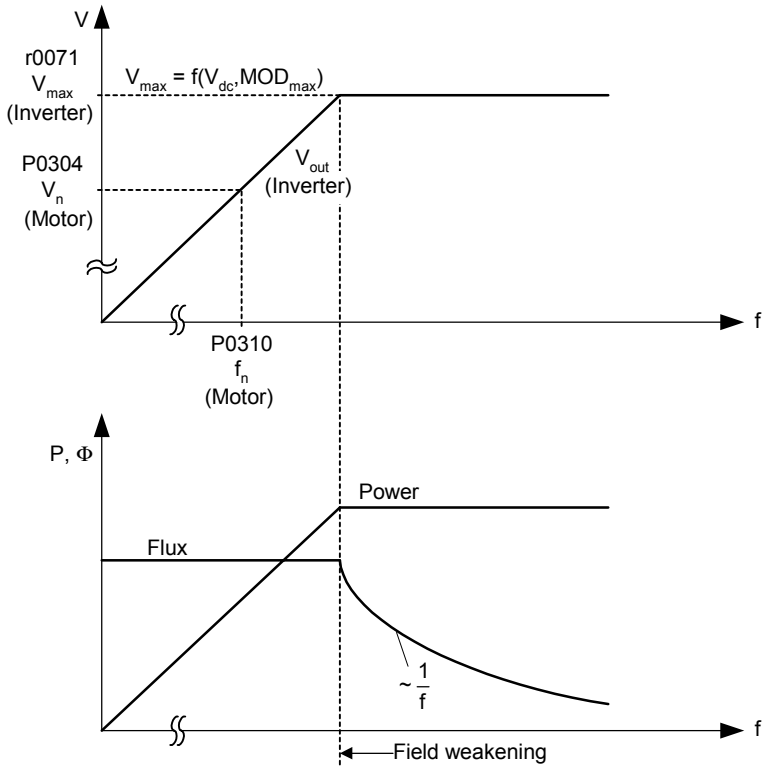
r0071 **CO: Max. output voltage**

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

Level **3**

P-Group: CONTROL

Displays maximum output voltage.



Dependency:

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

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			Min: -	Level
		Datatype: Float	Unit: A	Def: -	3
	P-Group: CONTROL			Max: -	

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.

2.8.3 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

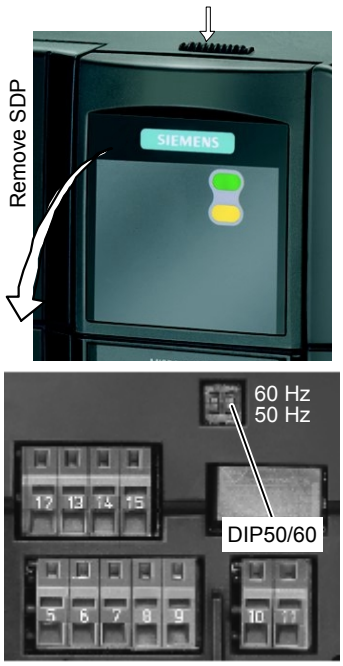
Dependency:

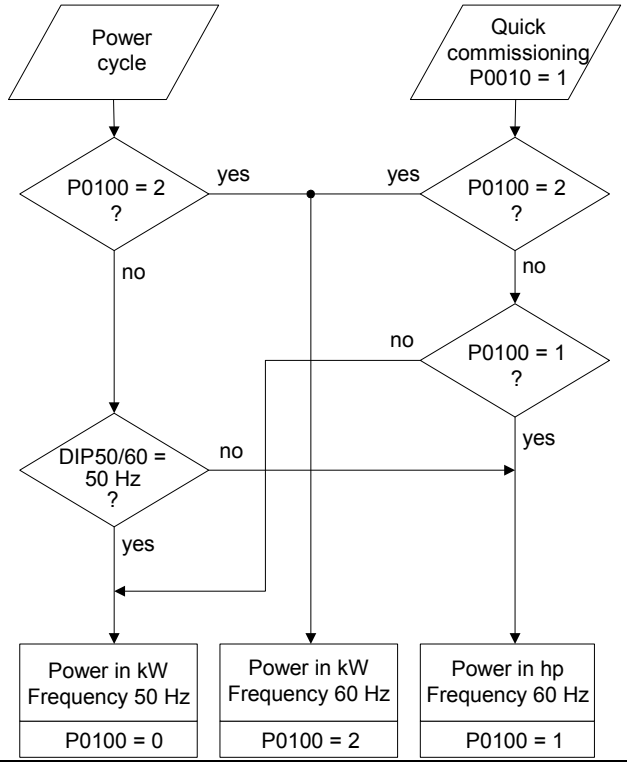
Where:

- Stop drive first (i.e. disable all pulses) before you change this parameter.
- 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 **Rated inverter current** Level **2**

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

P-Group: INVERTER

Displays maximum continuous output current of inverter.

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:

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).

Vdc_max switch-on level	$= 1.15 \cdot \sqrt{2} \cdot$ P0210
Compound braking switch-on level	$= 1.13 \cdot \sqrt{2} \cdot$ P0210

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).

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.

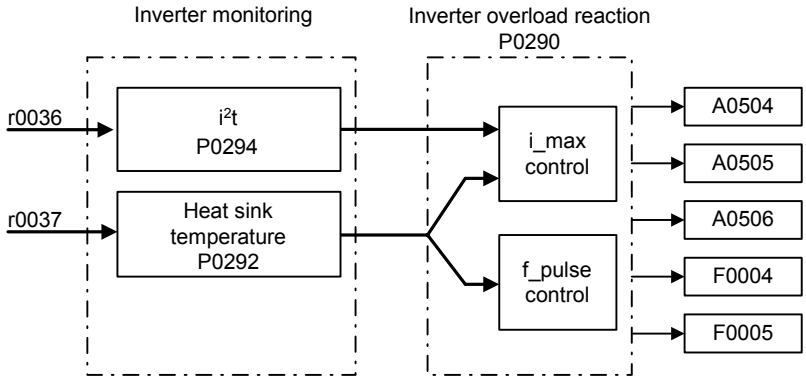
P0290 **Inverter overload reaction** Level **3**

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:	1

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
```

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.

2.8.4 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:

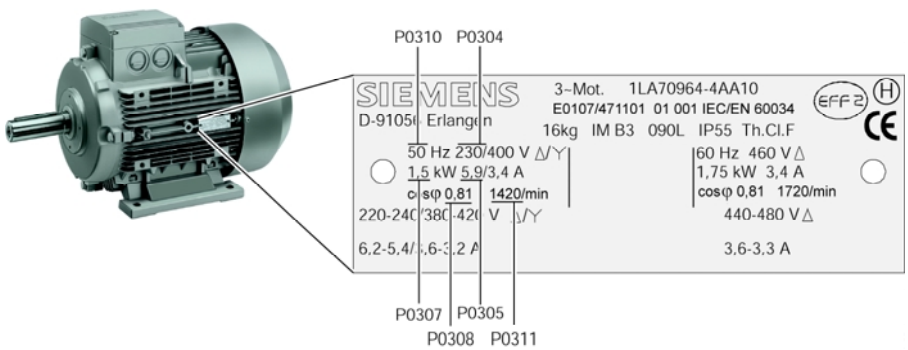
Changeable only when P0010 = 1 (quick commissioning).

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.



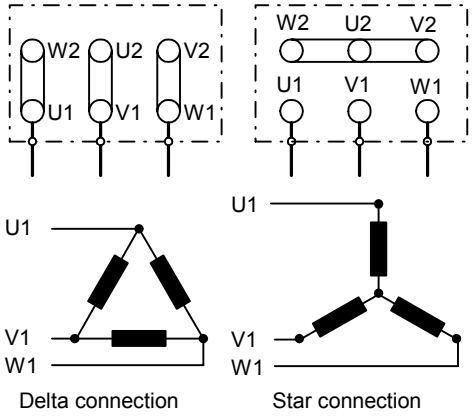
Line supply voltage	1 AC 110 V *)	1 AC 230 V	3 AC 230 V	3 AC 400 V	3 AC 500 V
MICROMASTER 410	X	X	-	-	-
MICROMASTER 411	-	-	-	X	-
MICROMASTER 420	-	X	X	X	-
MICROMASTER 430	-	-	-	X	-
MICROMASTER 440	-	X	X	X	X

*) 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).

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



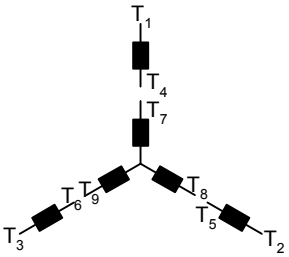
Delta connection Star connection

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

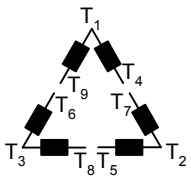
NEMA Motor

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	-	Δ Δ
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
P-Group:	MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Def:**	3.25
				Max:	10000.00

Level **1**

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

Dependency:
- Changeable only when P0010 = 1 (quick commissioning).
- Depends also on P0320 (motor magnetization current).

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

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

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

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

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

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

P0307 Rated motor power

CStat:	C	**Datatype:** Float	**Unit:** -	**Min:**	0.01
P-Group:	MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Def:**	0.12
				Max:	2000.00

Level **1**

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).

P0308 **Rated motor cosPhi** Level **2**

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

P0309 **Rated motor efficiency** Level **2**

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]).
- Setting 0 causes internal calculation of 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.
- Required for vector control and V/f control with speed controller.
- Slip compensation in V/f control requires rated motor speed for correct operation.
- Pole pair number recalculated automatically if parameter is changed.

Details:

See diagram in P0304 (rating plate)

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

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

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
P-Group:	MOTOR	**Active:** Immediately	**QuickComm.:** Yes	**Def:**	0.0
				Max:	99.0

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

Dependency:

P0320 = 0:
Setting 0 causes calculation by P0340 = 1 (data entered from rating plate) or by P3900 = 1 - 3 (end of quick commissioning). The calculated value is displayed in parameter r0331.

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 **Def:** 0 **Max:** 1

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

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.

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 may be reduced.

Notice:

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

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

Note:

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

Notice:

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

Overcurrent trips will occur if the time is decreased excessively.

P0350 **Stator resistance (line-to-line)** Level **2**

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.

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 [%] of the temperature value in P0625.

Note:

Rated motor impedance:

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

r0372 **Cable resistance [%]** Level **4**

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

P-Group: MOTOR

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 [%]** Level **4**

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

P-Group: MOTOR

Displays rated stator resistance of the motor equivalent circuit (phase value) in [%] of the temperature values in P0625 and P0627.

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 [%]** Level **4**

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

P-Group: MOTOR

Displays standardized rotor resistance of the motor equivalent circuit (phase value) in [%] of the temperature value in P0625.

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 [%]** Level **4**

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

P-Group: MOTOR

Displays rated rotor resistance of the motor equivalent circuit (phase value) in [%] of the temperature values in P0625 and P0628.

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 [%]** Level **4**

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

P-Group: MOTOR

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 [%]** Level **4**

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

P-Group: MOTOR

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** Level **3**

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

P-Group: MOTOR

Displays calculated rotor time constant [ms].

r0386 **Total leakage time constant**

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

P-Group: MOTOR

Level **4**

Displays total leakage time constant of motor.

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

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

P-Group: MOTOR

Level **3**

Displays stator resistance of motor (combined stator/cable resistance) in [%] of the temperature value in r0632.

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**

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

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

Level **3**

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:

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

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 motor's 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**

CStat: CT **Datatype:** U16 **Unit:** s **Min:** 0 **Def:** 100 **Max:** 16000

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

Level **2**

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:

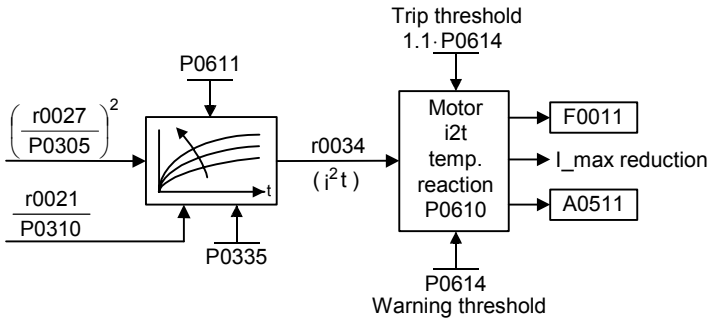
P0611 < 99 s (I2t-calculation inactive):
To activate I2t calculation set P0611 to a value > 99 s.

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**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	0.0
P-Group:	MOTOR	**Active:** first confirm	**QuickComm.:** No	**Def:**	100.0
				Max:	400.0

Level **2**

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 100 % 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 [%]**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	10.0
P-Group:	MOTOR	**Active:** Immediately	**QuickComm.:** Yes	**Def:**	150.0
				Max:	400.0

Level **2**

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.

2.8.5 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	

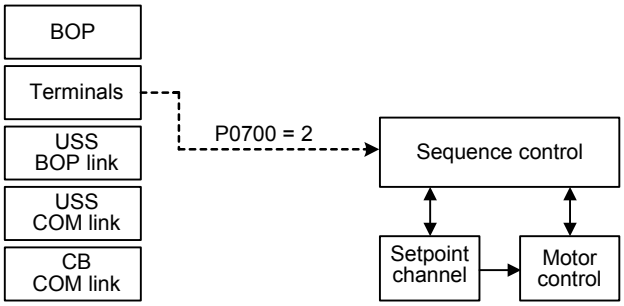
Selects digital command source.

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.



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:

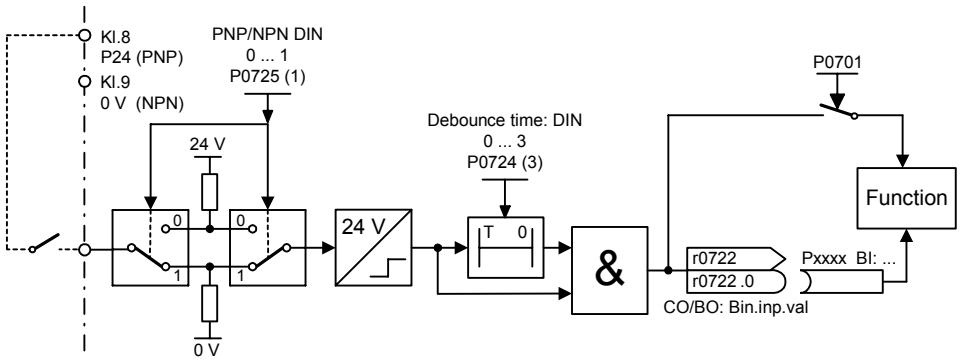
P0810

2.8.6 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.

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** Level **2**

CStat:	CT	**Datatype:** U16	**Unit:** -	**Min:**	0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				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 freq.)
14 MOP down (decrease freq.)
21 Local/remote
25 DC brake enable
29 External trip
33 Disable additional freq setpoint
99 Enable BICO parameterization

Details:

See P0701 (function of digital input 1).

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:	66

Central switch to select control command source for inverter.

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

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

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

The default setting is 0 for the first index (i.e. normal parameterization is active).
The second index is for control via BOP (i.e. activating the local/remote signal will then switch to BOP).

Possible Settings:

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

Index:

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

Note:

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).

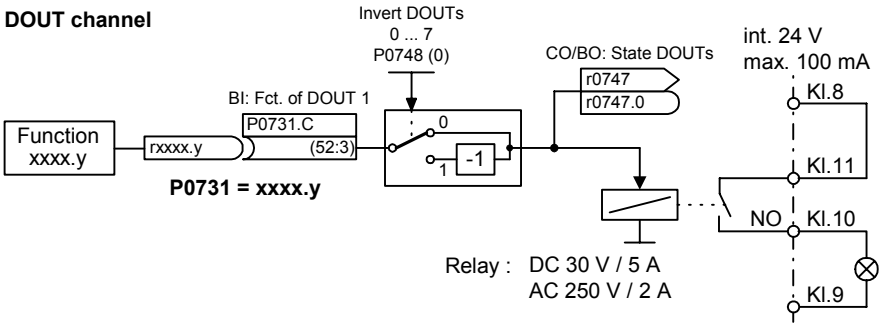
2.8.7 Digital outputs

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			Min:	0:0	Level
	CStat: CUT	Datatype: U32	Unit: -	Def:	52:3	2
	P-Group: COMMANDS	Active: first confirm	QuickComm.: No	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

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

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

P-Group: COMMANDS

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 **Def:** 0 **Max:** 1

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

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

Bitfields:

Bit00	Invert digital output 1	0	NO	1	YES

2.8.8 Analog inputs

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

Displays number of analog inputs available.

r0751	**BO: Status word of ADC**			**Min:** -	Level **4**
		Datatype: U16	**Unit:** -	**Def:** -	
	P-Group: TERMINAL			**Max:** -	

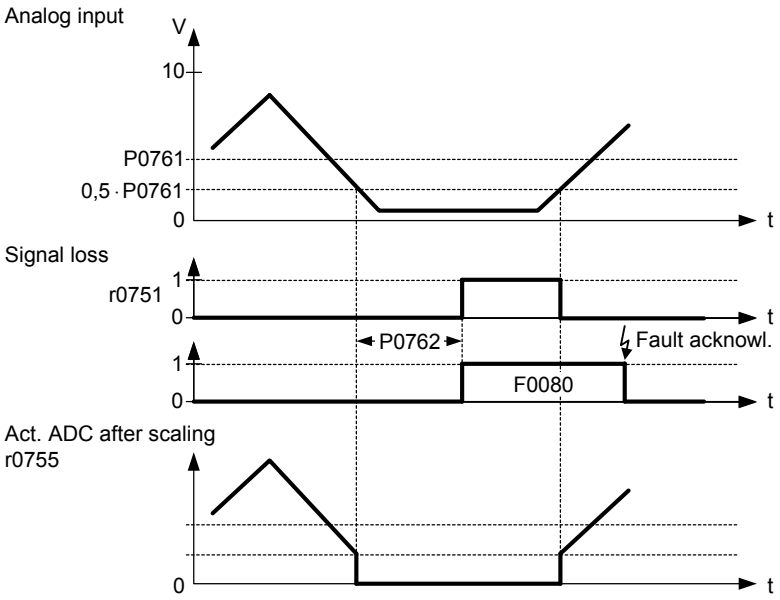
Displays status of analog input.

Bitfields:

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

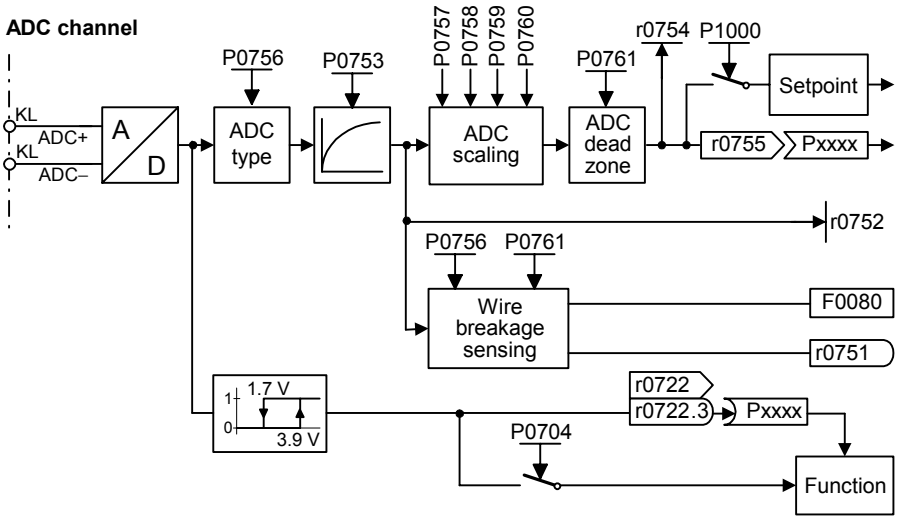
Dependency:

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 **2**
		Datatype: Float	**Unit:** -	**Def:** -	
	P-Group: TERMINAL			**Max:** -	

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



P0753 **Smooth time ADC** Level **3**

CStat: CUT **Datatype:** U16 **Unit:** ms **Min:** 0
P-Group: TERMINAL **Active:** first confirm **QuickComm.:** No **Def:** 3
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 [%]** Level **2**

Datatype: Float **Unit:** % **Min:** -
P-Group: TERMINAL **Def:** -
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]** Level **2**

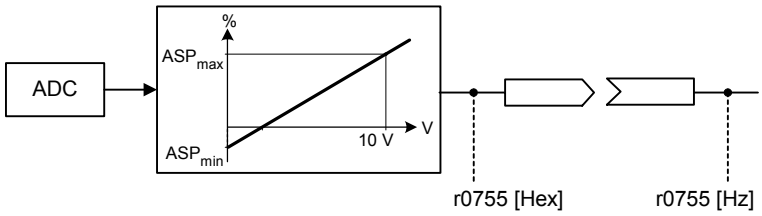
Datatype: I16 **Unit:** - **Min:** -
P-Group: TERMINAL **Def:** -
Max: -

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:



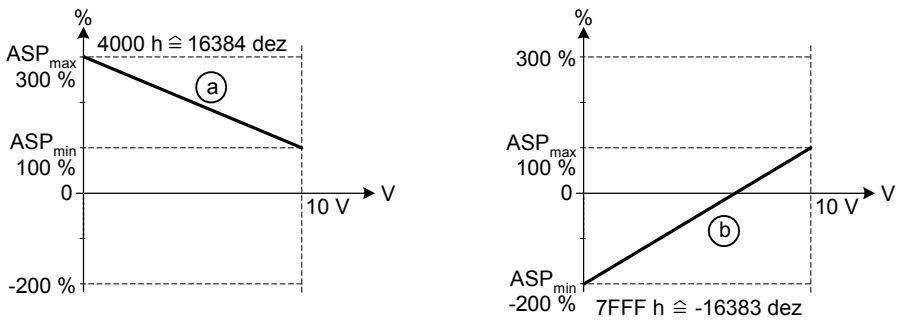
$$r0755\,[Hz] = \frac{r0755\,[Hex]}{4000\,[Hex]} \cdot P2000 \cdot \frac{\max(|ASP_{max}|, |ASP_{min}|)}{100\%}$$

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.

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



Note:

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

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

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

Details:

See parameters P0757 to P0760 (ADC scaling)

P0756 **Type of ADC** Level **2**

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

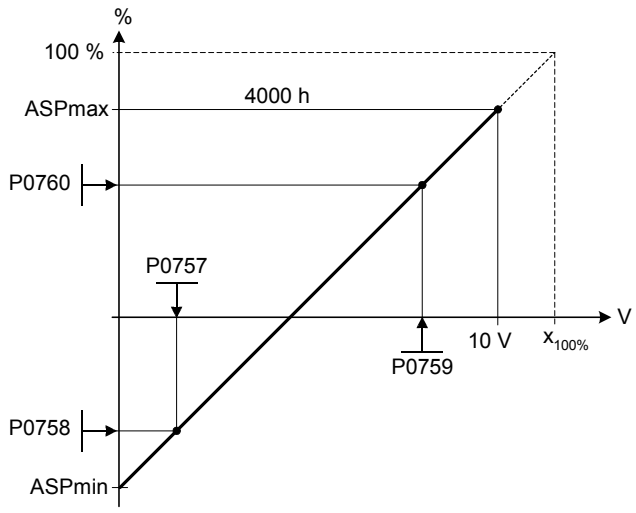
See P0757 to P0760 (ADC scaling).

P0757 **Value x1 of ADC scaling [V]** Level **2**

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

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

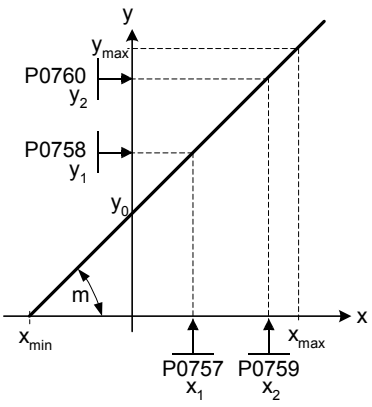
The transformation between these two forms is given by:

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

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** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	-99999.9
P-Group:	TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Def:**	0.0
				Max:	99999.9

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

Dependency:

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

P0759 **Value x2 of ADC scaling [V]** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** V	**Min:**	0
P-Group:	TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Def:**	10
				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** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	-99999.9
P-Group:	TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Def:**	100.0
				Max:	99999.9

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

Dependency:

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

P0761 **Width of ADC deadband [V]** Level **2**

CStat:	CUT	**Datatype:** Float	**Unit:** V	**Min:**	0
P-Group:	TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Def:**	0
				Max:	10

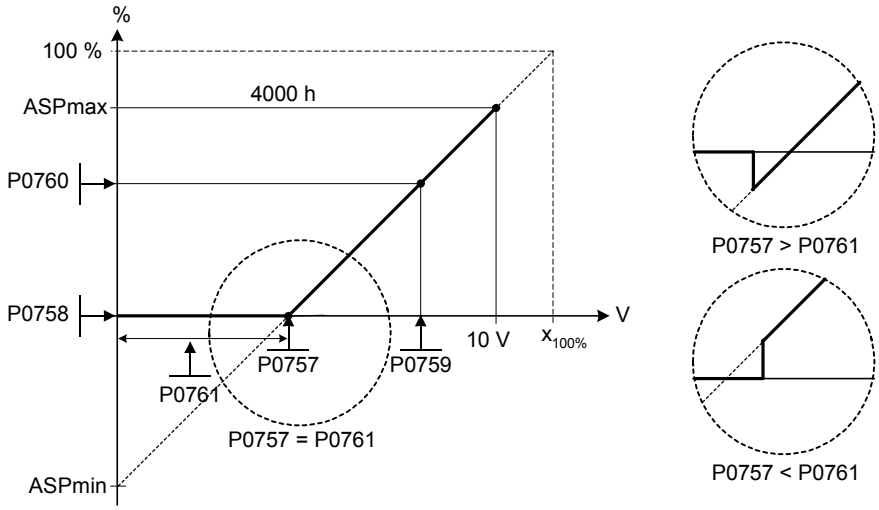
Defines width of deadband on analog input. The diagrams below explain its use.

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

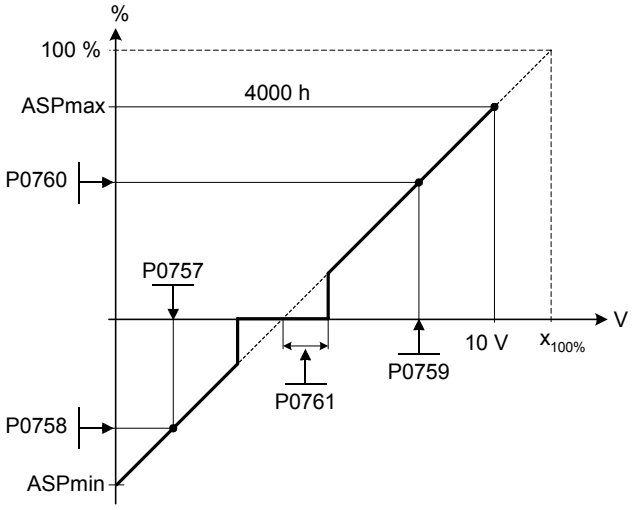
P0761 > 0 and (0 < P0758 < P0760 or 0 > P0758 > P0760)



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.

Notice:

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

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

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).

2.8.9 Analog outputs

r0770	**Number of DACs**			**Min:**	-	Level **3**
		Datatype: U16	**Unit:** -	**Def:**	-	
	P-Group: TERMINAL			**Max:**	-	

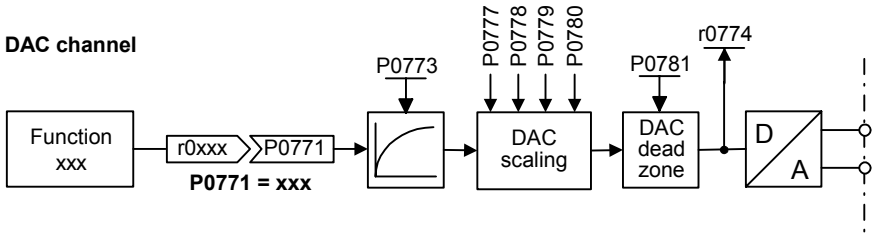
Displays number of analog outputs available.

P0771	**CI: DAC**			**Min:**	0:0	Level **2**
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:**	21:0	
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:**	4000:0	

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. DC-link voltage (scaled to P2001)
27 CO: Act. output current (scaled to P2002)



P0773	**Smooth time DAC**			**Min:**	0	Level **3**
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:**	2	
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:**	1000	

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]**			**Min:**	-	Level **2**
		Datatype: Float	**Unit:** -	**Def:**	-	
	P-Group: TERMINAL			**Max:**	-	

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

P0776	**Type of DAC**			**Min:**	0	Level **4**
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:**	0	
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:**	0	

Defines type of analog output.

Possible Settings:

0 Current output

Note:

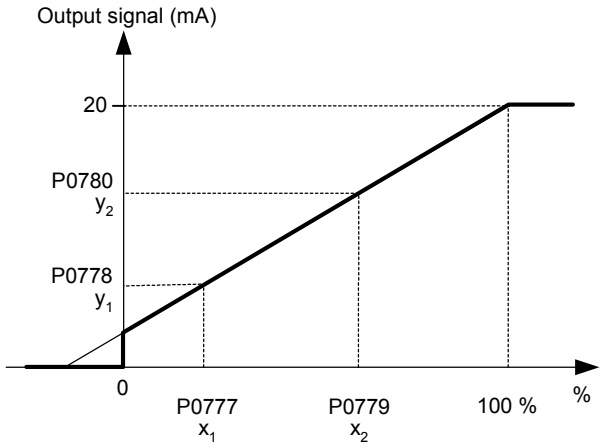
The analog output is designed as a current output with a range of 0...20 mA.

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 P2003 (referency frequency, voltage, current or torque) 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:

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

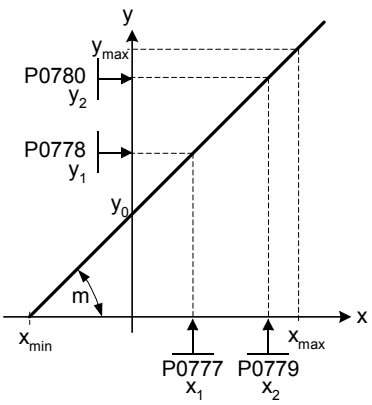
The transformation between these two forms is given by:

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

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
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Min:** 0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Def:** 0	
				Max: 20	

Defines y1 of output characteristic.

P0779	**Value x2 of DAC scaling**				Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Min:** -99999.0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Def:** 100.0	
				Max: 99999.0	

Defines x2 of output characteristic in [%].

Dependency:

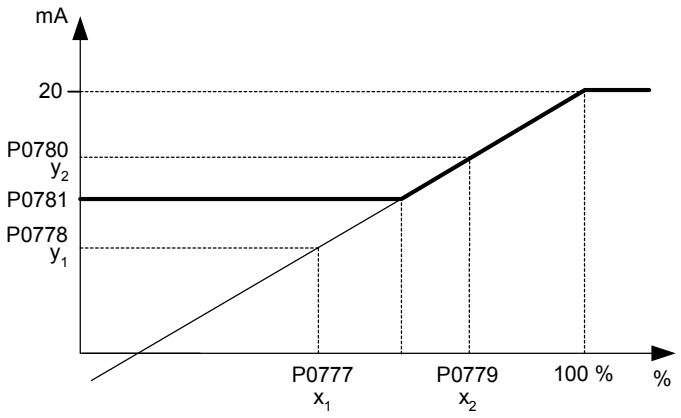
Affects P2000 to P2003 (referency frequency, voltage, current or torque) depending on which setpoint is to be generated.

P0780	**Value y2 of DAC scaling**				Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Min:** 0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Def:** 20	
				Max: 20	

Defines y2 of output characteristic.

P0781	**Width of DAC deadband**				Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Min:** 0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Def:** 0	
				Max: 20	

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



2.8.10 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

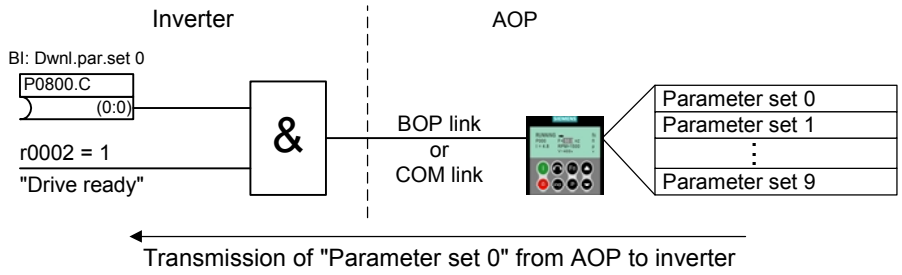
Defines source of command to start download of parameter set 0 from attached AOP.

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)

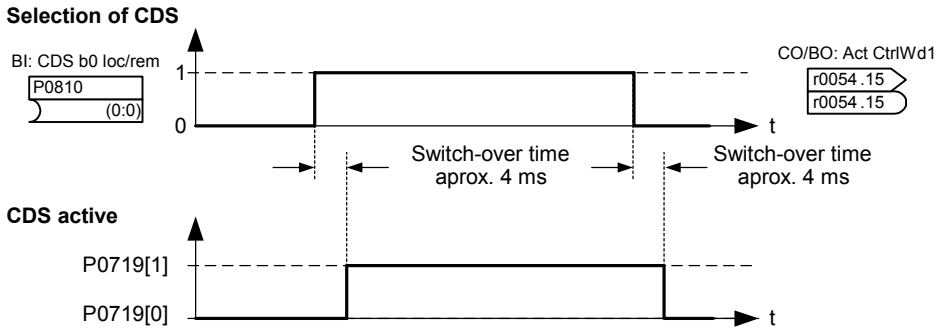
Note:

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).



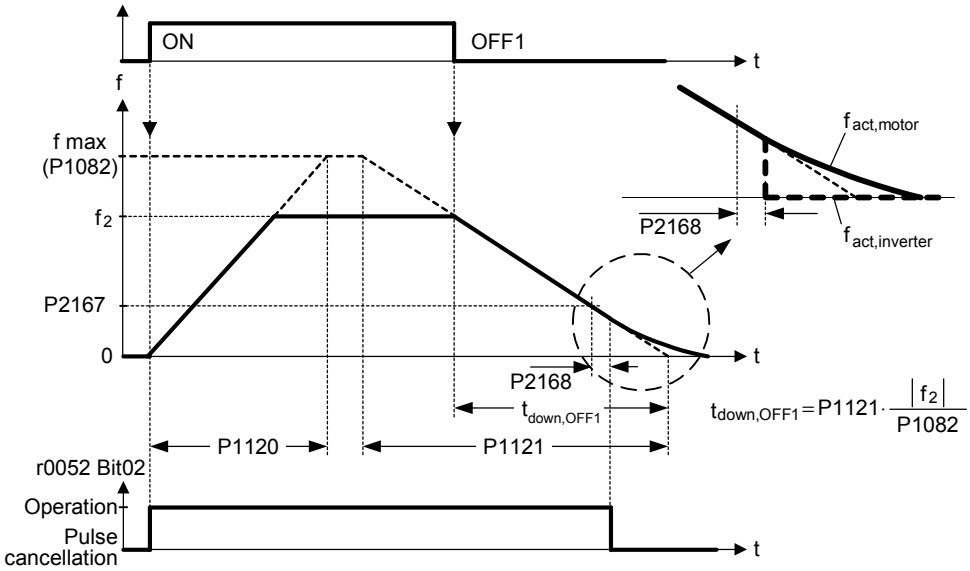
Common Settings:

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).

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.

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

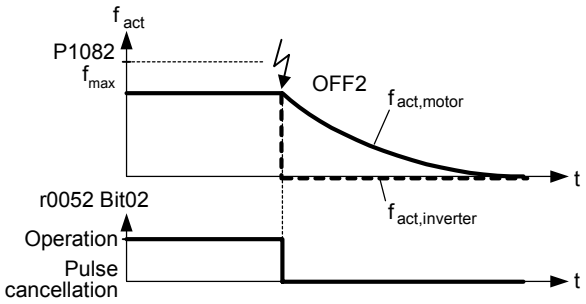
P0844 **BI: 1. OFF2**

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 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 immediate pulse-disabling; the motor is coasting.

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

P0845 **BI: 2. OFF2**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	19:1
				Max:	4000:0

Level **3**

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

Note:

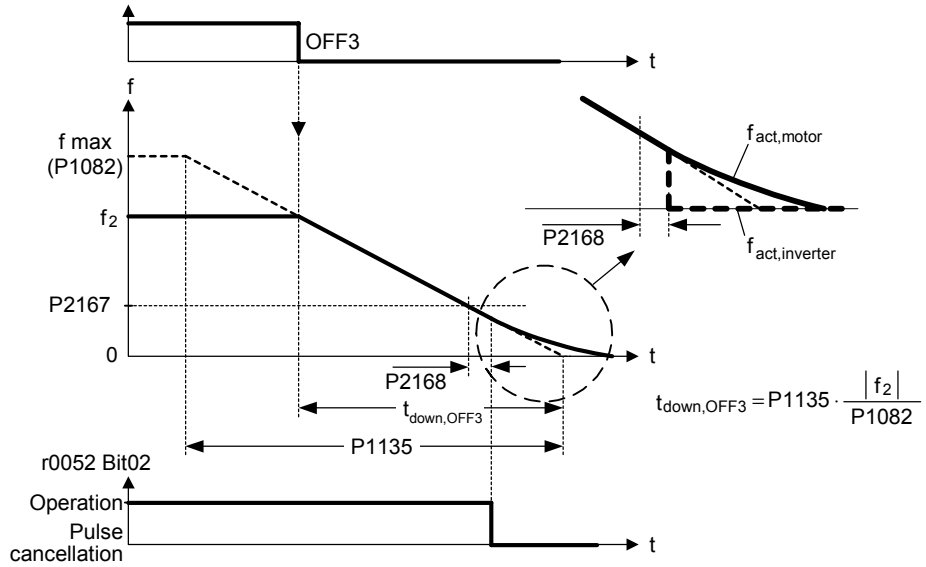
OFF2 means immediate pulse-disabling; the motor is coasting.

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

P0848	BI: 1. OFF3			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 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.

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

P0849	BI: 2. OFF3			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 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).

Note:

OFF3 means fast ramp-down to 0.

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

P0852	BI: Pulse enable				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).

2.8.11 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:

BOP: P0927 

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:

BOP: P0927 

Details:

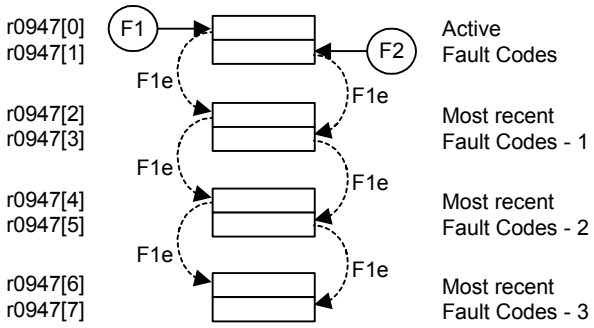
The seven-segment display is explained in the "Introduction to MICROMASTER System Parameters" in this handbook.

r0947[8]	**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] **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] **Fault value** **Datatype:** U16 **Unit:** - **Min:** - **Def:** - **Max:** - Level **4**

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: CT **Datatype:** U16 **Unit:** - **Min:** 0
P-Group: ALARMS **Active:** first confirm **QuickComm.:** No **Def:** 0
Max: 8

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:** -
P-Group: COMM **Def:** -
Max: -

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:** -
P-Group: COMM **Def:** -
Max: -

Identification for PROFIDrive. Profile number and version.

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

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

Displays control word 1.

Bitfields:

```
Bit00   ON/OFF1                              0  NO        1  YES
Bit01   OFF2: Electrical stop                0  YES       1  NO
Bit02   OFF3: Fast stop                      0  YES       1  NO
Bit03   Pulse enable                         0  NO        1  YES

Bit04   RFG enable                           0  NO        1  YES
Bit05   RFG start                            0  NO        1  YES
Bit06   Setpoint enable                      0  NO        1  YES
Bit07   Fault acknowledge                    0  NO        1  YES

Bit08   JOG right                            0  NO        1  YES
Bit09   JOG left                             0  NO        1  YES
Bit10   Control from PLC                     0  NO        1  YES
Bit11   Reverse (setpoint inversion)         0  NO        1  YES

Bit13   Motor potentiometer MOP up           0  NO        1  YES
Bit14   Motor potentiometer MOP down         0  NO        1  YES
Bit15   Local / Remote                       0  NO        1  YES
```

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:

- 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.
- 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.

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

Possible Settings:

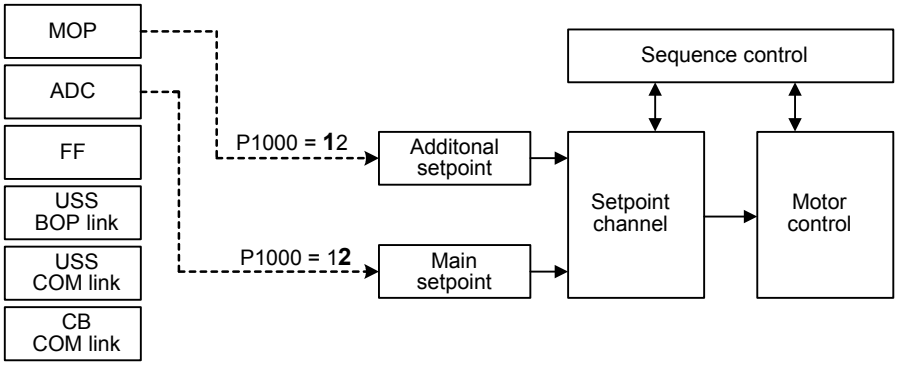
0	No main setpoint		
1	MOP setpoint		
2	Analog setpoint		
3	Fixed frequency		
4	USS on BOP link		
5	USS on COM link		
6	CB on COM link		
10	No main setpoint	+	MOP setpoint
11	MOP setpoint	+	MOP setpoint
12	Analog setpoint	+	MOP setpoint
13	Fixed frequency	+	MOP setpoint
14	USS on BOP link	+	MOP setpoint
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 = **1**2 ⇒ P1070 = 755	P1070 CI: Main setpoint
	r0755 CO: Act. ADC after scal. [4000h]
P1000 = 1**2** ⇒ P1075 = 1050	P1075 CI: Additional setpoint
	r1050 CO: Act. Output freq. of the MOP



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	755.01	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

2.8.13 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:

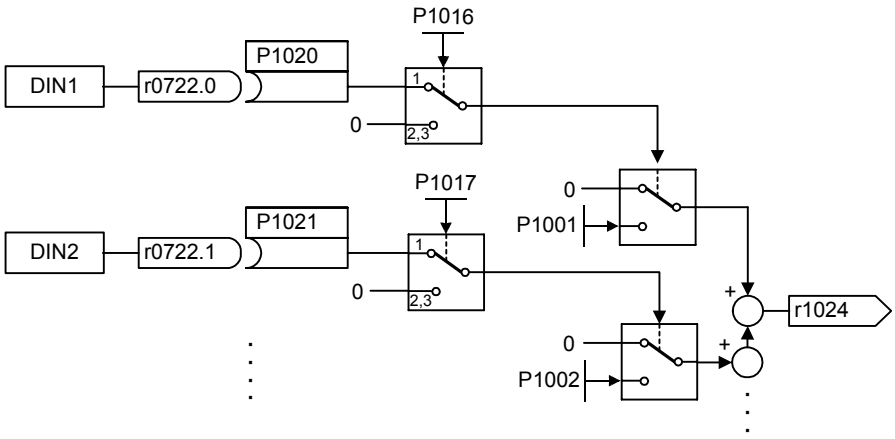
Example:

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.

2.8.14 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.

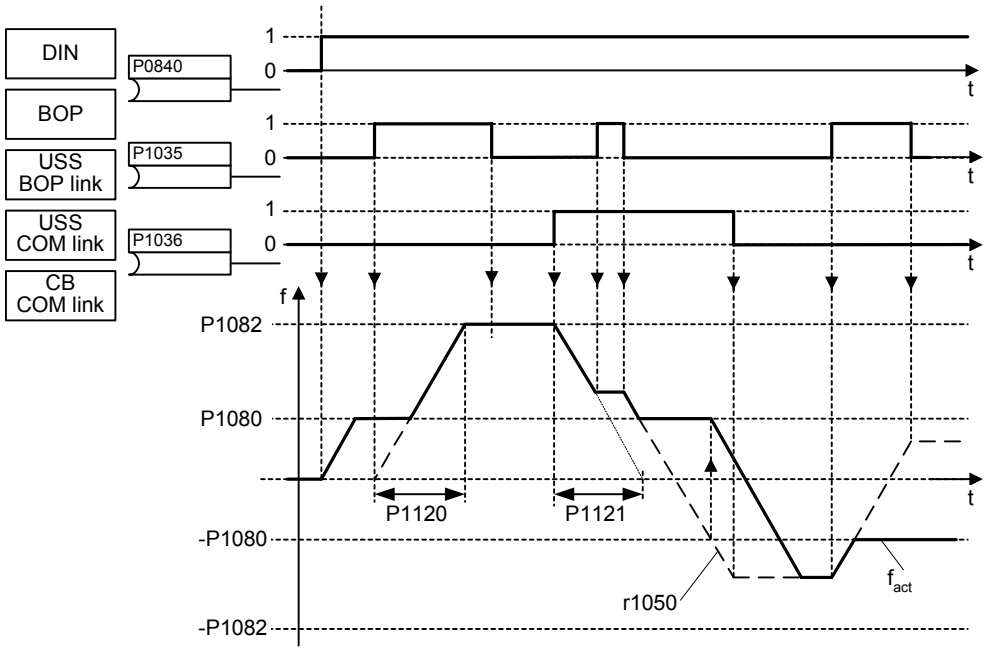
r1050 **CO: Act. Output freq. of the MOP**

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	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

2.8.15 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

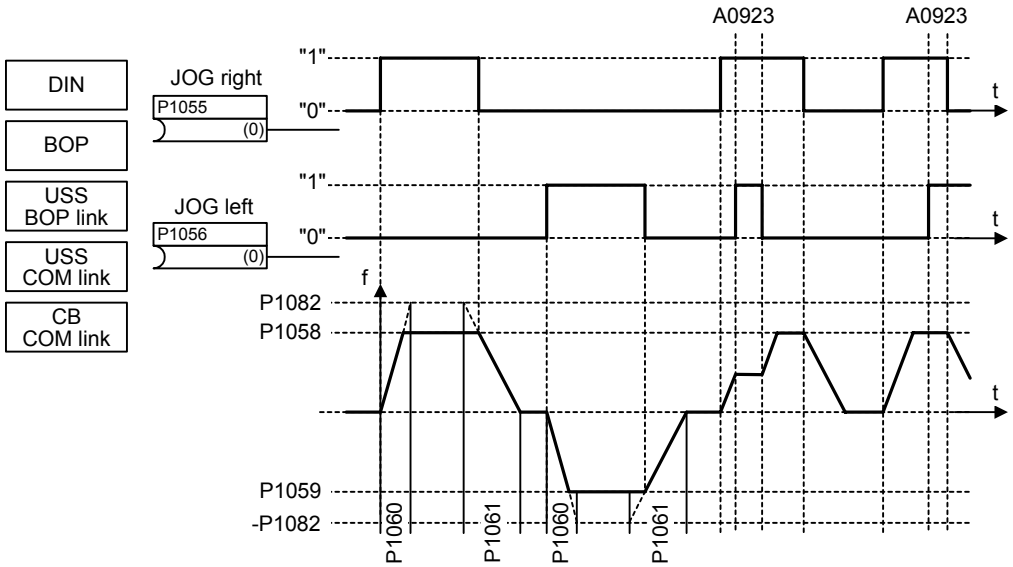
Dependency:

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.

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



Dependency:

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

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:

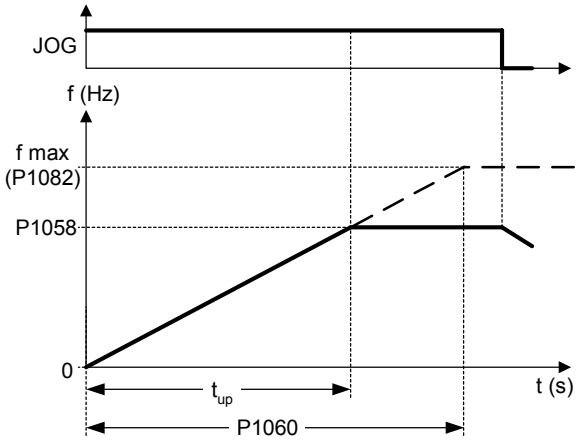
P1060 and P1061 set up and down ramp times respectively for jogging.

P1060 **JOG ramp-up time**

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

Level **2**

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



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

Notice:

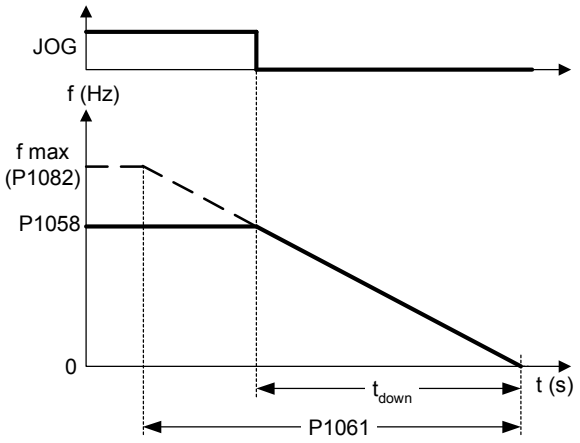
Ramp times will be used as follows:
- P1060 / P1061 : JOG mode is active
- P1120 / P1121 : Normal mode (ON/OFF) is active
- P1060 / P1061 : Normal mode (ON/OFF) and P1124 is active

P1061 **JOG ramp-down time**

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

Level **2**

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

2.8.16 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:** - | **Max:** -
P-Group: SETPOINT

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

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

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

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.

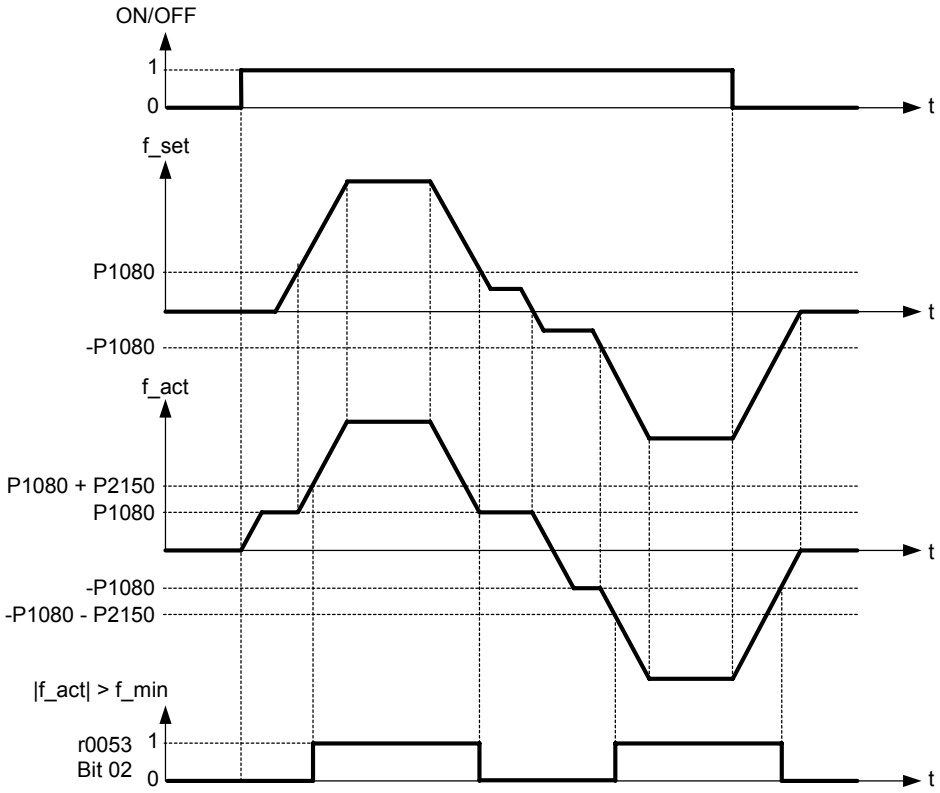
P1080	**Min. frequency**				**Min:**	0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz		**Def:**	0.00	**1**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** Yes		**Max:**	650.00	

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.

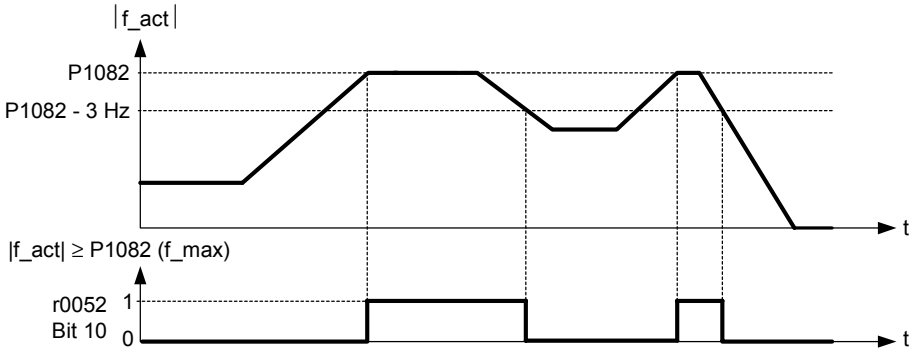
Under certain conditions (e.g. ramping, current limiting), motor can run below minimum frequency.

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 ≠ 0 (Slip compensation active) :

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

- P1200 ≠ 0 (Flying restart active) :

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

Note:

When using the setpoint source

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

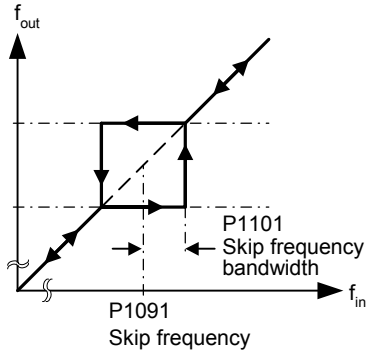
The setpoint frequency (in Hz) is cyclically calculated using a percentage value (e.g. for the analog input r0754) or a hexadecimal value (e.g. for the USS r2018[1]) and the reference frequency P2000.

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**

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

Level **3**

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

Common Settings:

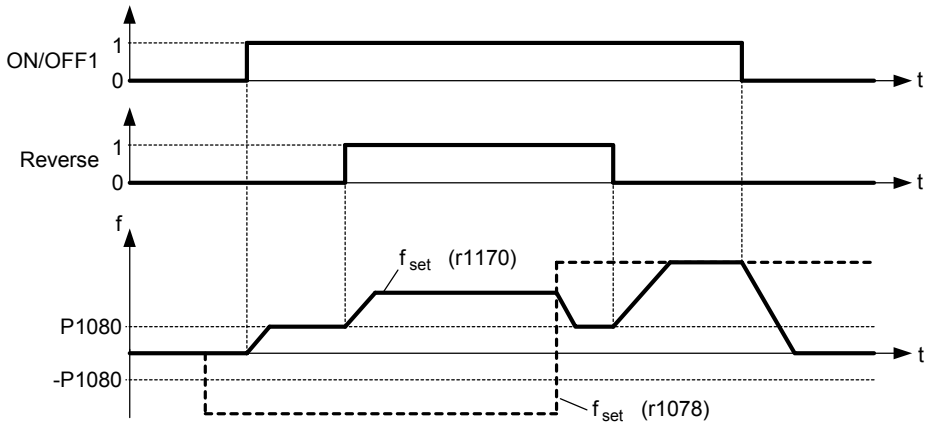
0 = Disabled
1 = Enabled

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.

P1110 = 1



P1113 **BI: Reverse**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	722:1
				Max:	4000:0

Level **3**

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).

r1114 **CO: Freq. setp. after dir. ctrl.**

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

Level **3**

Displays setpoint frequency after change of direction.

2.8.17 Ramp-function generator

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

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

P-Group: SETPOINT

Level **3**

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.

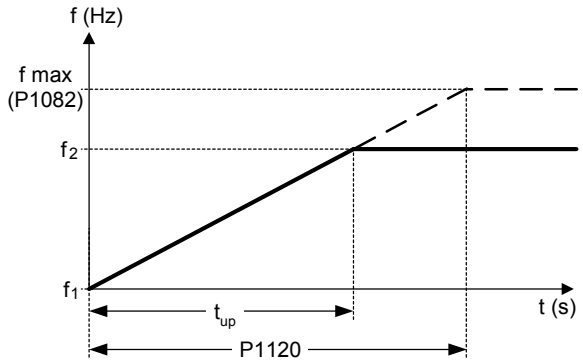
P1120 **Ramp-up time**

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

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

Level **1**

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.

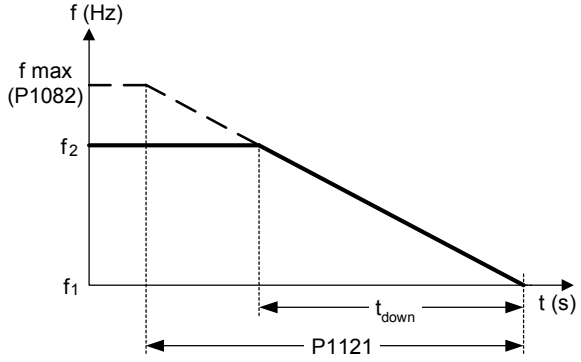
Notice:

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
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** Yes	**Def:**	10.00
				Max:	650.00

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:

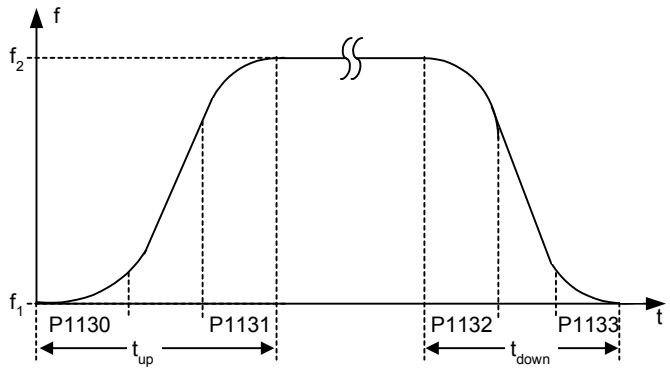
P1124 does not have any impact when JOG mode is selected. In this case, jog ramp times (P1060, P1061) will be used all the time.

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

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

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).

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

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

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).

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

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

P1133 **Ramp-down 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-down as shown in P1130 (ramp-up initial rounding time).

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

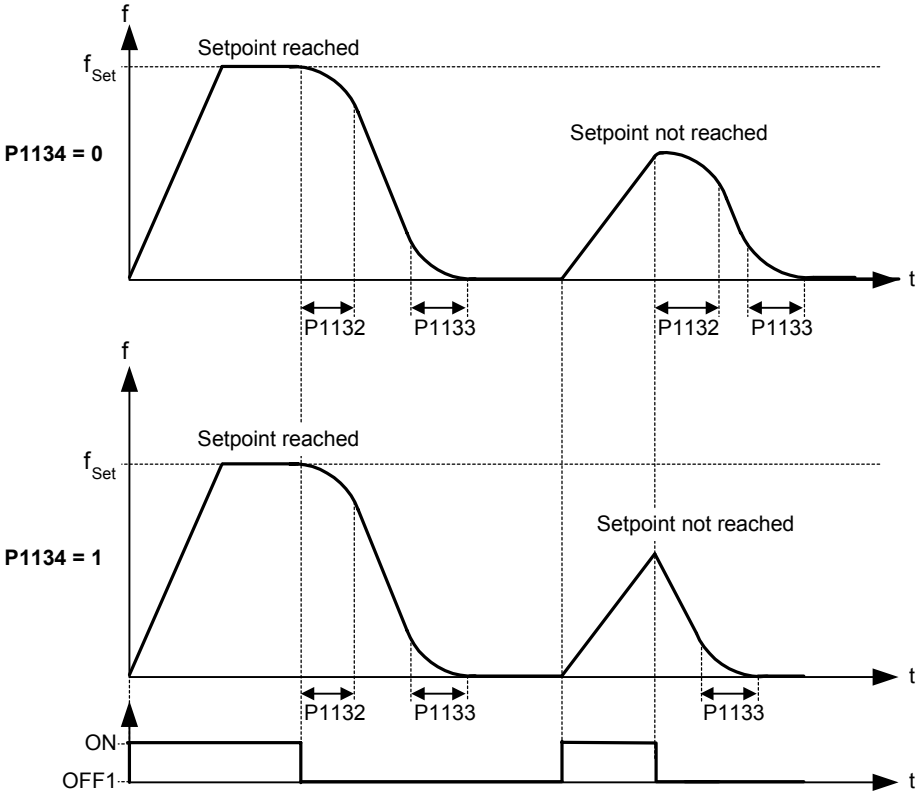
Notice:
Rounding times are not recommended when analog inputs are used, since they would result in overshoot/undershoot in the inverter response.

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.

P1132 > 0, P1133 > 0



Possible Settings:

0 Continuous smoothing
1 Discontinuous smoothing

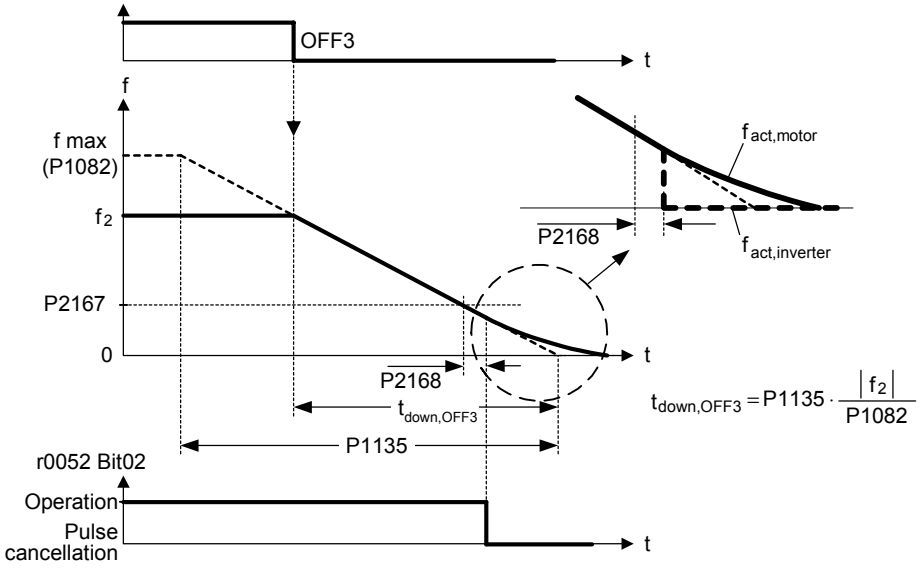
Dependency:

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

P1135 **OFF3 ramp-down time** Level **2**

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

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



Note:
This time may be exceeded if the VDC_max. level is reached.

P1140 **BI: RFG enable** Level **4**

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

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

P1141 **BI: RFG start** Level **4**

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

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

P1142 **BI: RFG enable setpoint** Level **4**

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

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

r1170 **CO: Frequency setpoint after RFG** Level **3**

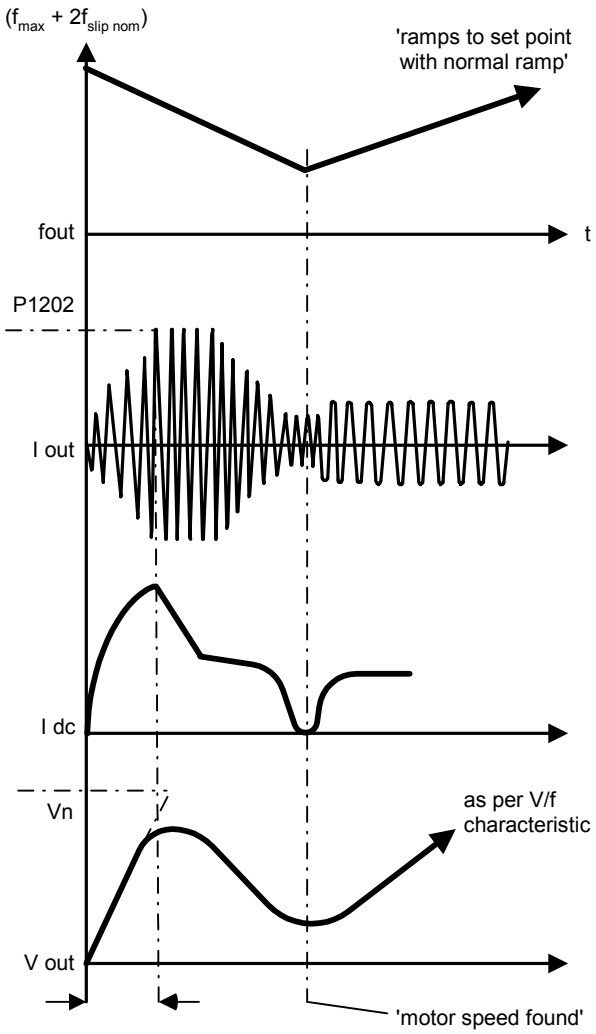
		Datatype: Float	**Unit:** Hz	**Min:**	-
				Def:	-
P-Group:	SETPOINT			**Max:**	-

Displays overall frequency setpoint after ramp generator.

2.8.18 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.

Notice:

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

P1202 **Motor-current: Flying start**

CStat:	CUT	**Datatype:** U16	**Unit:** %	**Min:**	10
P-Group:	FUNC	**Active:** first confirm	**QuickComm.:** No	**Def:**	100
				Max:	200

Level **3**

Defines search current used for flying start.

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

Note:

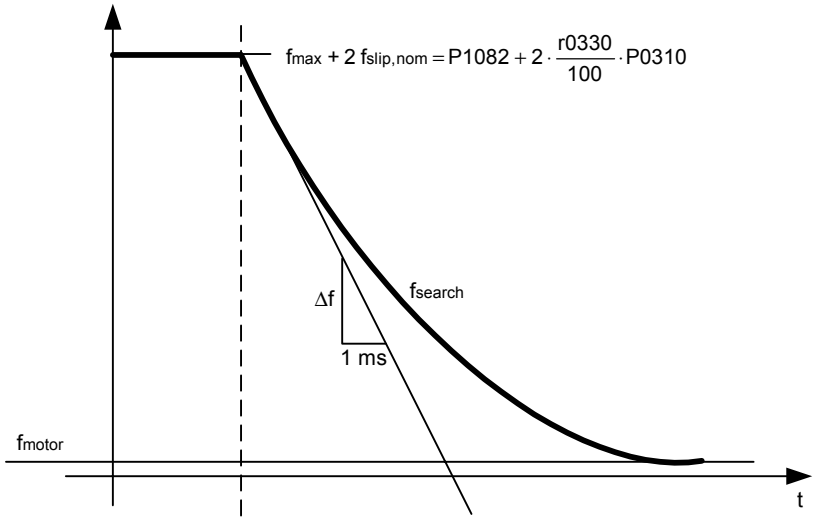
Reducing the search current may improve performance for flying start if the inertia of the system is not very high.

P1203 **Search rate: Flying start**

CStat:	CUT	**Datatype:** U16	**Unit:** %	**Min:**	10
P-Group:	FUNC	**Active:** first confirm	**QuickComm.:** No	**Def:**	100
				Max:	200

Level **3**

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



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

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

P1203 = 100 % is defined as giving a rate of 2 % of f_slip,nom / [ms].
P1203 = 200 % would result in a rate of frequency change of 1 % of f_slip,nom / [ms].

Example:

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

Note:

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

r1204 **Status word: Flying start V/f**

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

Level **4**

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

2.8.19 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.

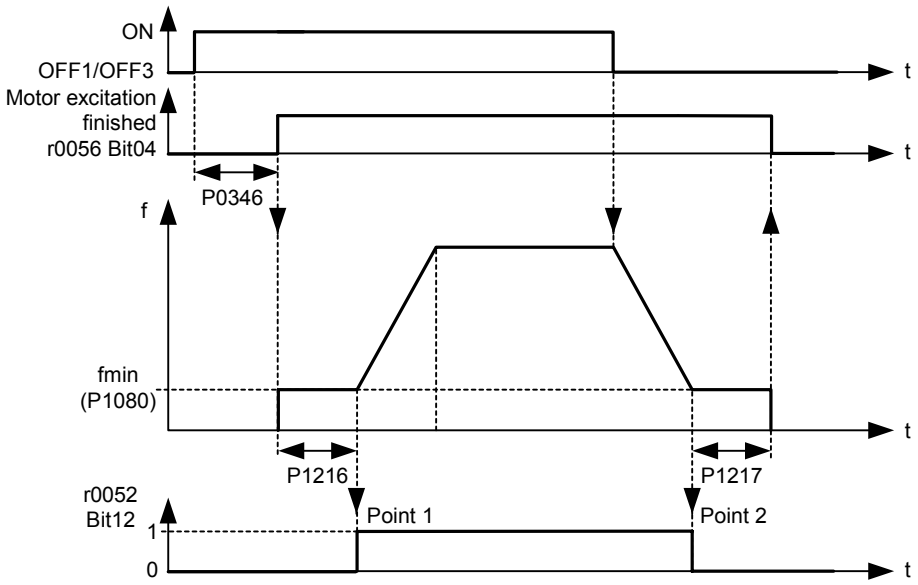
2.8.20 Motor holding brake

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	

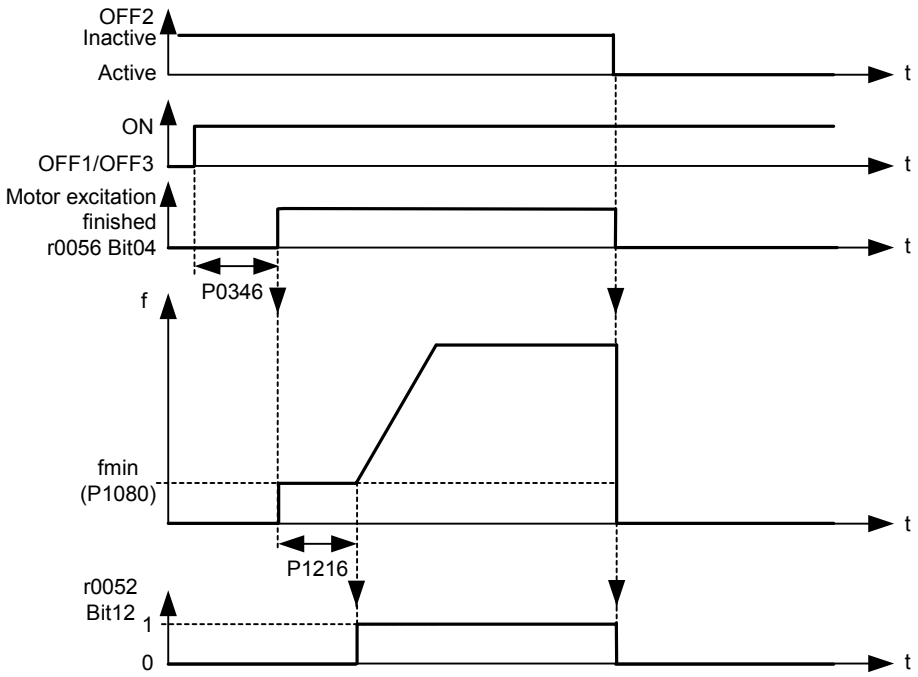
Enables/disables holding brake function.

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:

It is not permissible to use the motor holding brake as working brake, as it is generally only designed for a limited number of emergeny braking operations.

Note:

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

A typical value of min. frequency P1080 for motor holding brake is the slip frequency of the motor r0330.

P1216 **Holding brake release delay** Level **2**

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

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

Note:

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

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

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

Notice:

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

Details:

See diagram P1215 (holding brake enable).

P1217 **Holding time after ramp down** Level **2**

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

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

Details:

See diagram P1215 (holding brake enable).

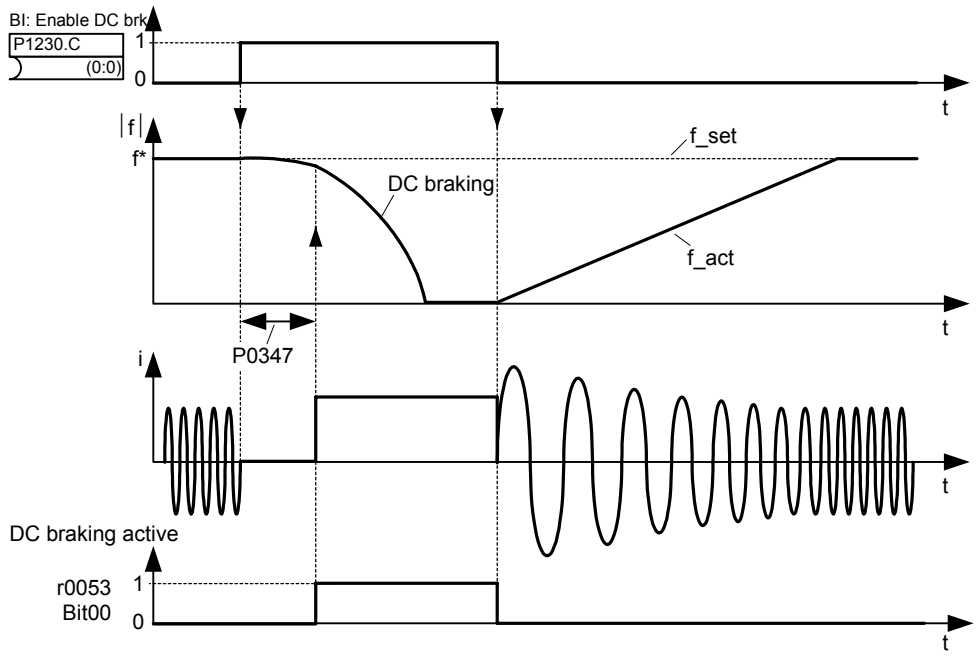
2.8.21 DC braking

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).

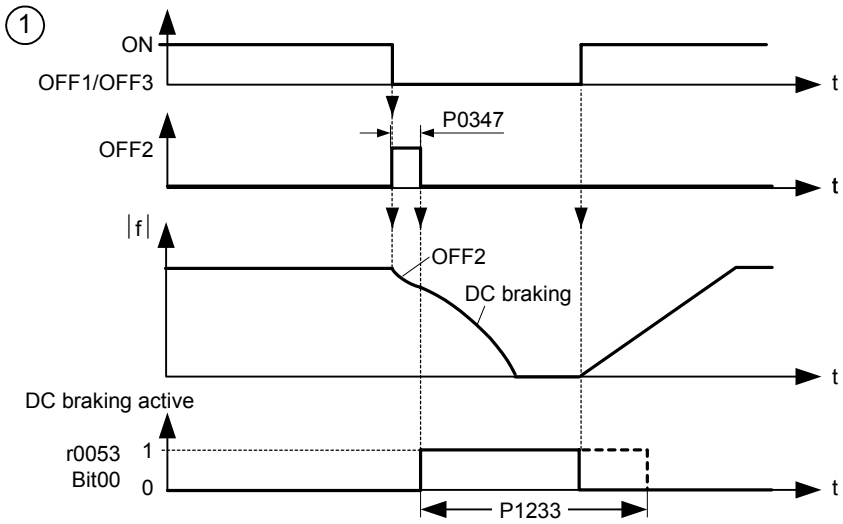
$$r0027_{DC-Brake}[A] \approx \frac{1}{\sqrt{2}} \cdot P0305 \cdot \frac{P1232}{100\,\%}$$

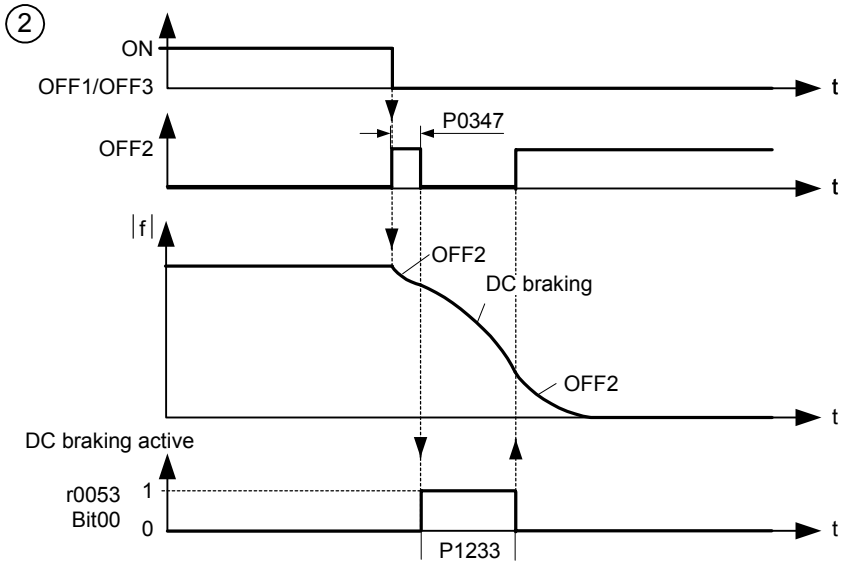
The current of the DC-braking is limited by r0067.

P1233 **Duration of DC braking** Level **2**

CStat:	CUT	**Datatype:** U16	**Unit:** s	**Min:**	0
P-Group:	FUNC	**Active:** Immediately	**QuickComm.:** No	**Def:**	0
				Max:	250

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





Parameter P1232 still controls the level of DC injection.

Value:

P1233 = 0 :
Not active following OFF1 / OFF3.

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

Caution:

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.

2.8.22 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).

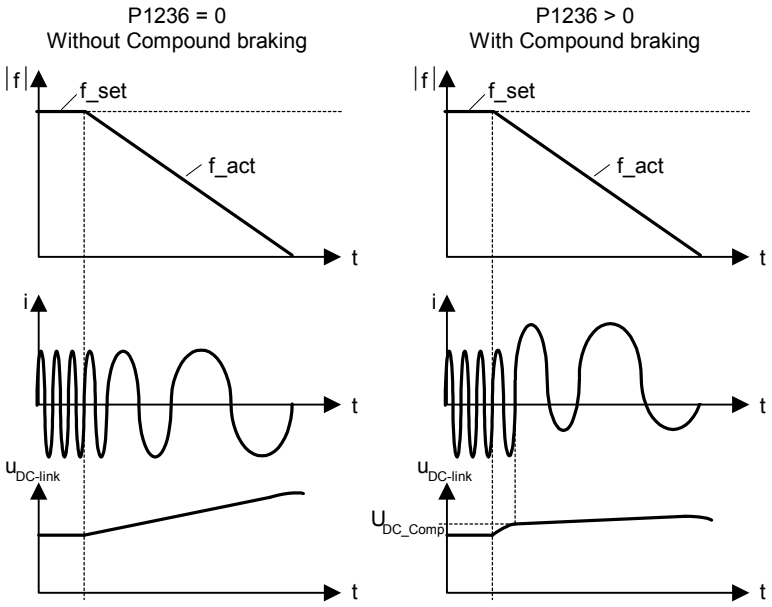
If P1254 = 0 :

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 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.

2.8.23 Vdc controller

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

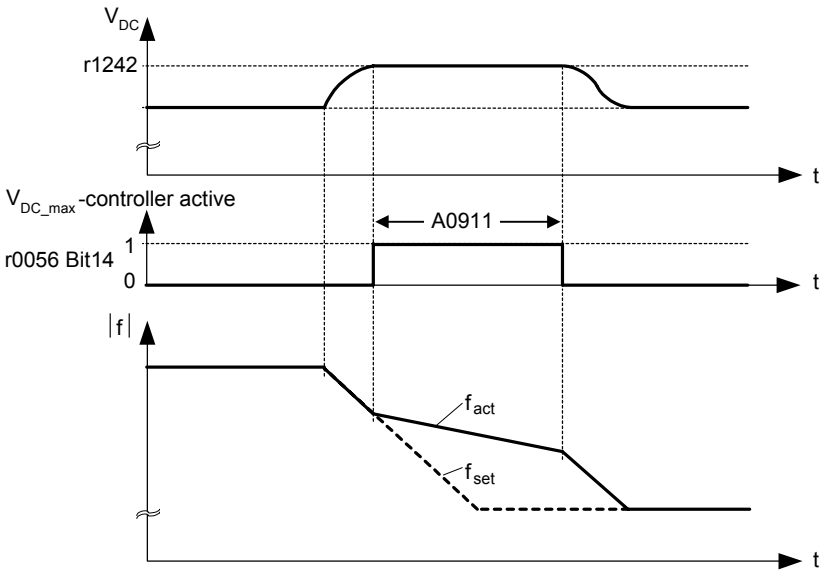
0 Vdc controller disabled
1 Vdc-max controller enabled

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				Min:	-	Level
			Datatype: Float	Unit: V	Def:	-	3
	P-Group:	FUNC			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				Min:	10	Level
	CStat:	CUT	Datatype: U16	Unit: %	Def:	100	3
	P-Group:	FUNC	Active: Immediately	QuickComm.: No	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				Min:	0.00	Level
	CStat:	CUT	Datatype: Float	Unit: -	Def:	1.00	4
	P-Group:	FUNC	Active: Immediately	QuickComm.: No	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:

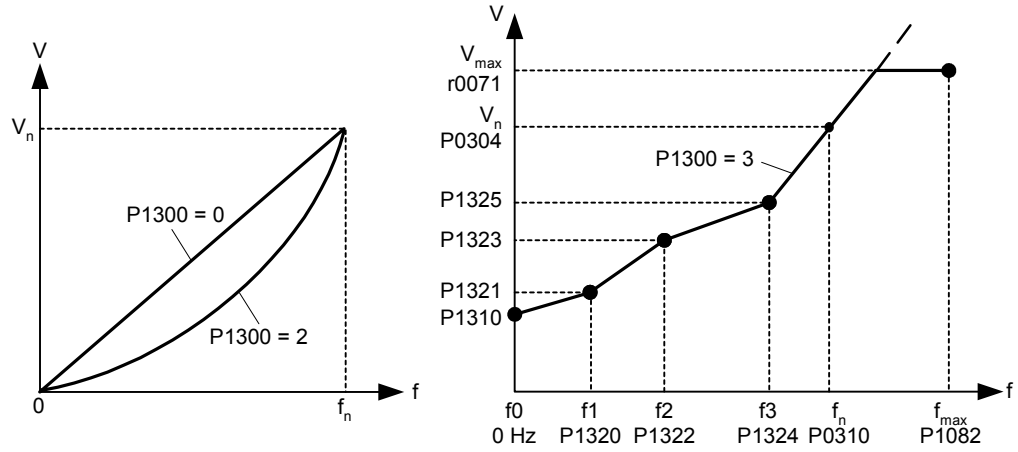
The switch-on thresholds are only calculated during the start-up of the inverter after connection to the mains. An online-adaption is not performed during operation. This means that modification of P1254 does not immediately take effect and variations in the mains are also not initially taken into account.

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

2.8.24 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

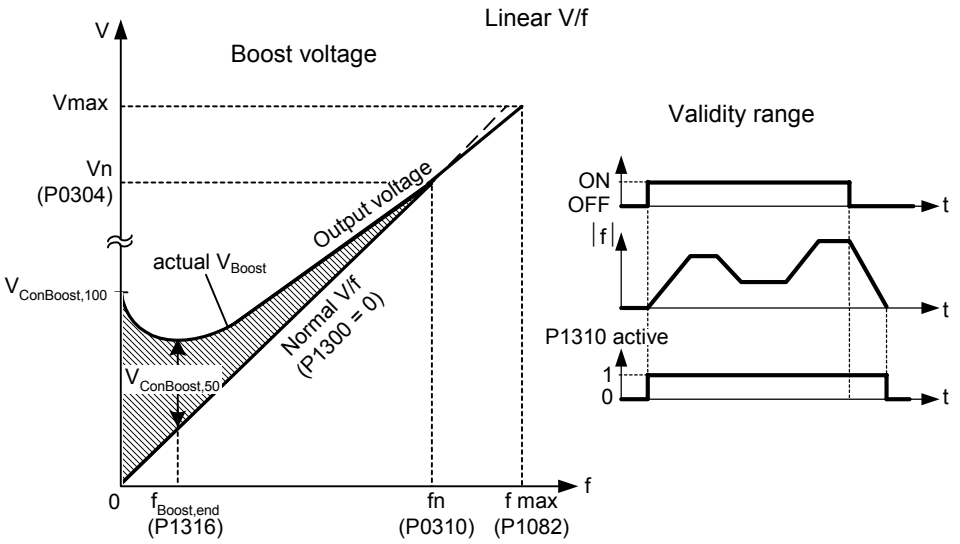
2.8.25 V/f control parameters

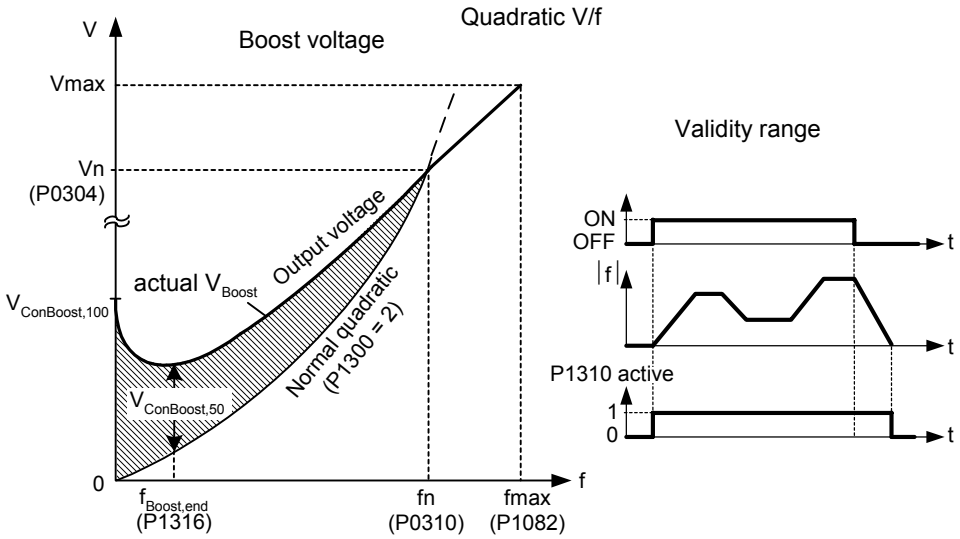
P1310	**Continuous boost**				**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %		**Def:** 50.0	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No		**Max:** 250.0	

At low output frequencies the output voltage is low to keep the flux level constant. However, the output voltage may be too low

- for magnetisation the asynchronous motor
- to hold the load
- to overcome losses in the system. The output voltage can be increased using parameter P1310.

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





where voltage values are given

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

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

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:

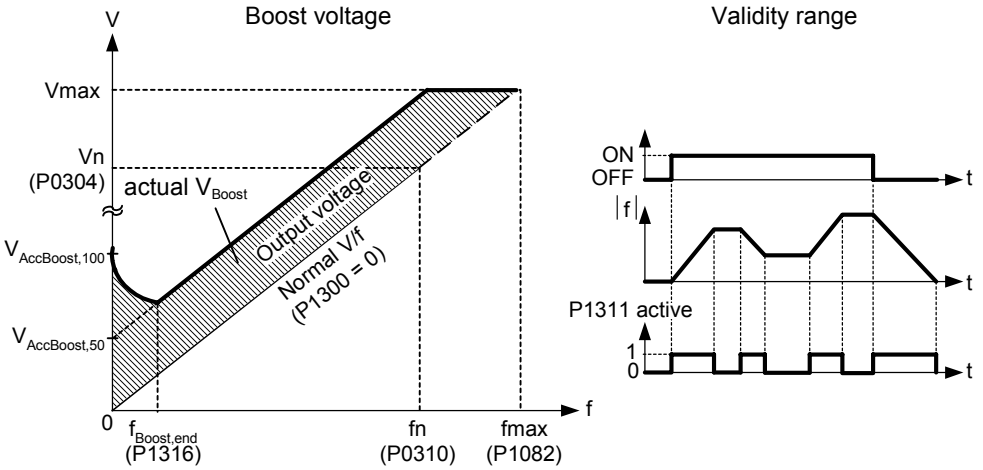
$$\frac{\sum V_{Boost}}{P0305 \cdot P0350} \leq \frac{P0640}{100}$$

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.

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



where voltage values are given

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

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

Note:

See parameter P1310

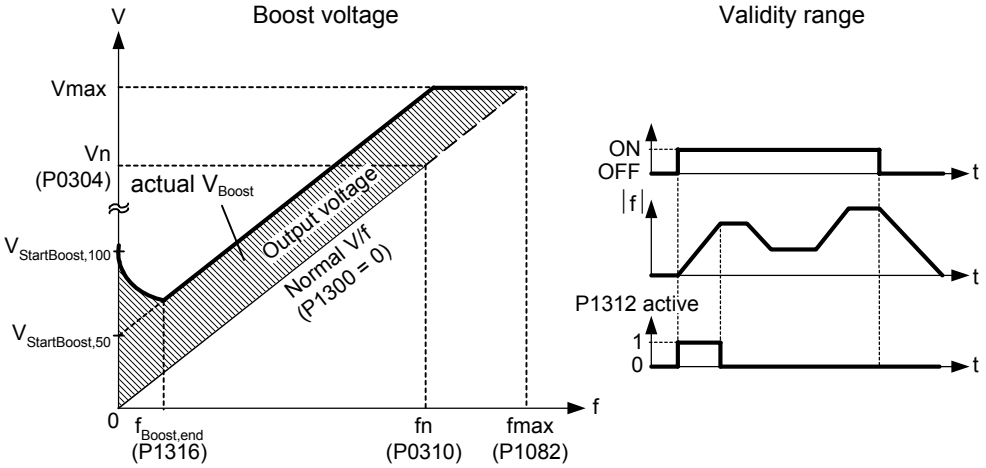
P1312 **Starting boost** Level **2**

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 = 50 Hz. 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:**	-
				Def:	-
P-Group:	CONTROL			**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:

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

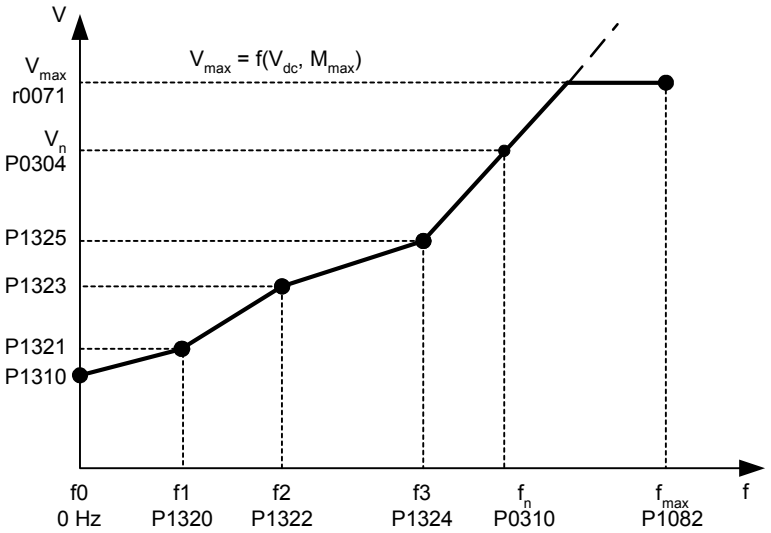
Note:
The expert user may change this value to alter the shape of the curve, e.g. to increase torque at a particular frequency.

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** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	0.0
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:**	10.0
				Max:	100.0

Defines start frequency at which FCC (flux current control) is enabled as [%] of rated motor frequency (P0310).

Notice:
If this value is too low, the system may become unstable.

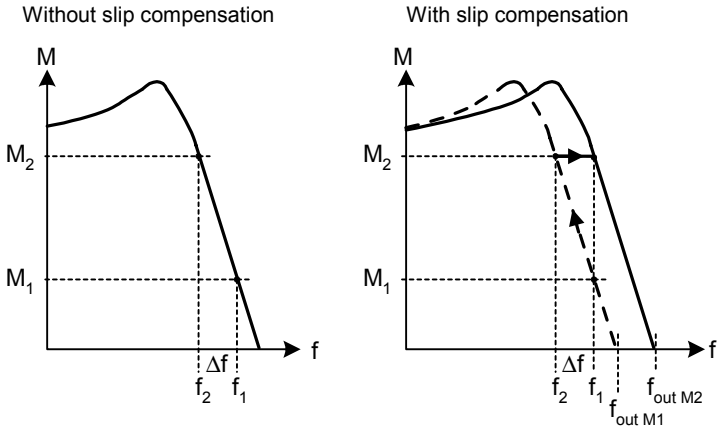
P1335 **Slip compensation** Level **2**

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



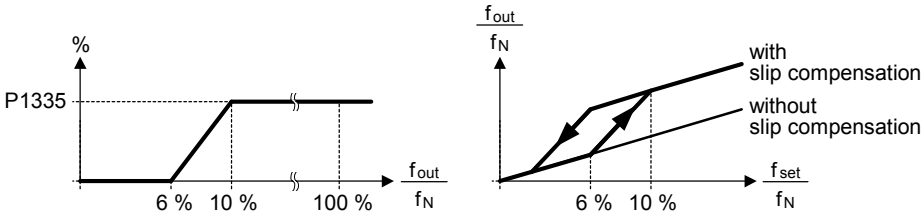
Value:

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:

$$f_{Slip\_comp\_max} = \frac{P1336}{100} \cdot r0330$$

P1336 **Slip limit** Level **2**

CStat:	CUT	**Datatype:** U16	**Unit:** %	**Min:**	0
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:**	250
				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** Level **3**

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

P-Group: CONTROL

Displays actual compensated motor slip as [%]

Dependency:

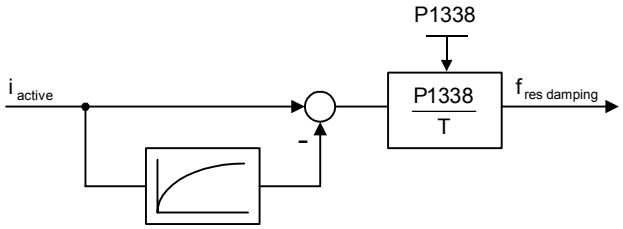
Slip compensation (P1335) active.

P1338 **Resonance damping gain V/f** Level **3**

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

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

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 circuit damps oscillations of the active current which frequently occur during no-load operation.

In V/f modes (see P1300), the resonance damping circuit is active in a range from approx. 6 % to 80 % of rated motor frequency (P0310).

If the value of P1338 is too high, this will cause instability (forward control effect).

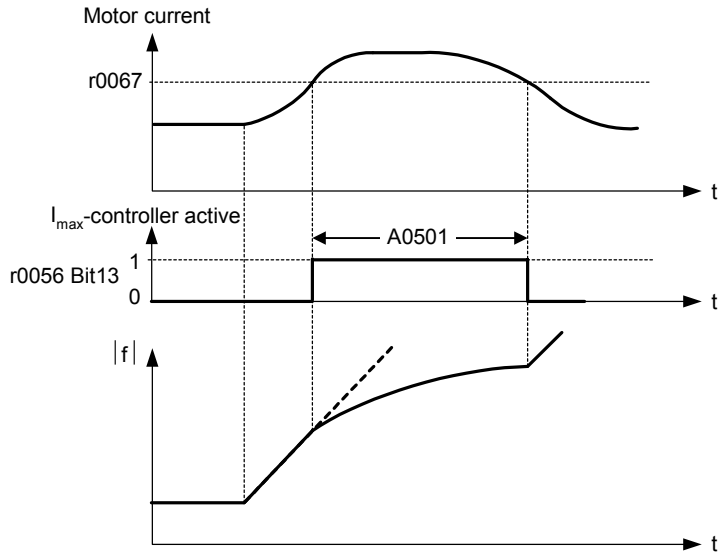
P1340 **Imax controller prop. gain** Level **3**

CStat: CUT **Datatype:** Float **Unit:** - **Min:** 0.000 **Def:** 0.000 **Max:** 0.499

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

Proportional gain of the I_max 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:**	-
P-Group:	CONTROL			**Def:**	-
				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**

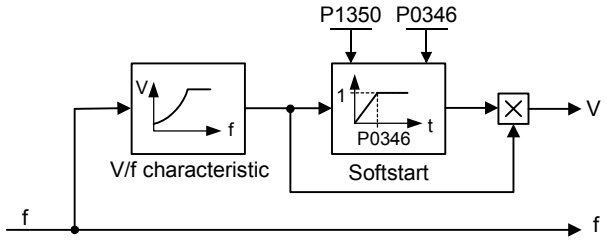
		Datatype: Float	**Unit:** V	**Min:**	-
P-Group:	CONTROL			**Def:**	-
				Max:	-

Displays amount by which the I_max controller is reducing the inverter output voltage.

P1350 **Voltage soft start** Level **3**

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

Sets whether voltage is built up smoothly during magnetization time (ON) or whether it simply jumps to boost voltage (OFF).



Possible Settings:
0 OFF
1 ON

Note:
The settings for this parameter bring benefits and drawbacks:

P1350 = 0: OFF (jump to boost voltage)
Benefit: flux is built up quickly
Drawback: motor may move

P1350 = 1: ON (smooth voltage build-up)
Benefit: motor less likely to move
Drawback: flux build-up takes longer

2.8.26 Inverter parameters (Modulator)

P1800 **Pulse frequency** Level **2**

CStat: CUT **Datatype:** U16 **Unit:** kHz **Min:** 2 **Def:** 4 **Max:** 16
P-Group: INVERTER **Active:** Immediately **QuickComm.:** No

Sets pulse frequency of power switches in inverter. The frequency can be changed in steps of 2 kHz.

Dependency:

Minimum pulse frequency depends on P1082 (maximum frequency) and P0310 (rated motor frequency).

The maximal value of motor frequency P1082 is limited to pulse frequency P1800 (see P1082).

Note:

If the pulse frequency is increased, max. inverter current r0209 can be reduced (derating). The derating characteristic depends on the type and power of the inverter (see 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:** - **Def:** - **Max:** -
P-Group: INVERTER

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 **Def:** 0 **Max:** 2
P-Group: INVERTER **Active:** first confirm **QuickComm.:** No

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 **Def:** 106.0 **Max:** 150.0
P-Group: INVERTER **Active:** Immediately **QuickComm.:** No

Sets maximum modulation index.

Note:

P1803 = 100 % : Limit for over-control (for ideal inverter without switching delay). For vector control the modulation limit will be reduced automatically with 4 %.

P1820 **Reverse output phase sequence** Level **2**

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

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)

2.8.27 Motor data identification

P1910	Select motor data identification			Min:	0	Level
	CStat: CT	Datatype: U16	Unit: -	Def:	0	2
	P-Group: MOTOR	Active: first confirm	QuickComm.: Yes	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:

Before selecting motor data identification, "Quick commissioning" has to be performed in advance.

Once enabled (P1910 = 1), A0541 generates a warning that the next ON command will initiate measurement of motor parameters.

Notice:

When choosing the setting for measurement, observe the following:

1. "with parameter change"
means that the value is actually adopted as P0350 parameter setting and applied to the control as well as being shown in the read-only parameters below.

2. "without parameter change"
means that the value is only displayed, i.e. shown for checking purposes in the read-only parameter r1912 (identified stator resistance). The value is not applied to the control.

r1912	Identified stator resistance			Min:	-	Level
		Datatype: Float	Unit: Ohm	Def:	-	2
	P-Group: MOTOR			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.

2.8.28 Reference parameters

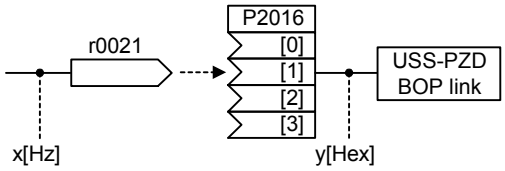
P2000	Reference frequency				Min:	1.00	Level
	CStat:	CT	Datatype: Float	Unit: Hz	Def:	50.00	2
	P-Group:	COMM	Active: first confirm	QuickComm.: No	Max:	650.00	

Parameter P2000 represents the reference frequency for frequency values which are displayed/transferred as a percentage or a hexadecimal value. Where:

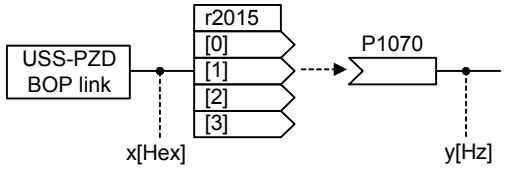
- hexadecimal 4000 H ==> P2000 (e.g.: USS-PZD)
- percentage 100 % ==> P2000 (e.g.: ADC)

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.



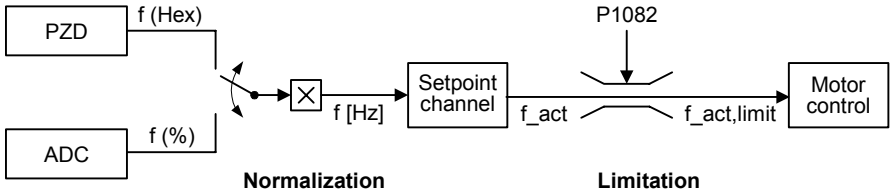
$$y[Hex] = \frac{r0021[Hz]}{P2000[Hz]} \cdot 4000[Hex]$$



$$y[Hz] = \frac{r2015[1]}{4000[Hex]} \cdot P2000$$

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) correspondes 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

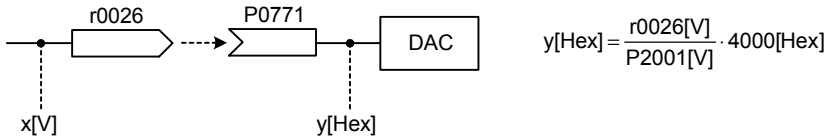
P2001	Reference voltage				Min:	10	Level
	CStat:	CT	Datatype: U16	Unit: V	Def:	1000	3
	P-Group:	COMM	Active: first confirm	QuickComm.: No	Max:	2000	

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.

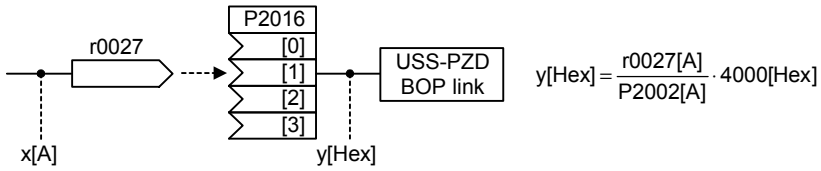


P2002	Reference current				Min:	0.10	Level
	CStat:	CT	Datatype: Float	Unit: A	Def:	0.10	3
	P-Group:	COMM	Active: first confirm	QuickComm.: No	Max:	10000.00	

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.



2.8.29 Communication parameters (USS, CB)

P2009[2]	USS denormalization				Min:	0	Level
	CStat:	CT	Datatype: U16	Unit: -	Def:	0	3
	P-Group:	COMM	Active: first confirm	QuickComm.: No	Max:	1	

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				Min:	3	Level
	CStat:	CUT	Datatype: U16	Unit: -	Def:	6	2
	P-Group:	COMM	Active: first confirm	QuickComm.: No	Max:	9	

Sets baud rate for USS communication.

Possible Settings:

3 1200 baud
4 2400 baud
5 4800 baud
6 9600 baud
7 19200 baud
8 38400 baud
9 57600 baud

Index:

P2010[0] : Serial interface COM link
P2010[1] : Serial interface BOP link

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**

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

Level **3**

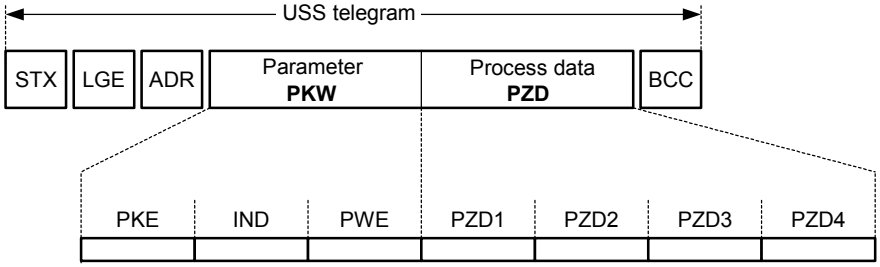
Defines the number of 16-bit words in PZD part of USS telegram. In this area, process data (PZD) are continually exchanged between the master and slaves. The PZD part of the USS telegram is used for the main setpoint, and to control the inverter.

Index:

P2012[0] : Serial interface COM link
P2012[1] : Serial interface BOP link

Notice:

USS protocol consists of PZD and PKW which can be changed by the user via parameters P2012 and P2013 respectively.



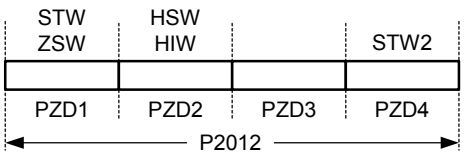
STX	Start of text	PKE	Parameter ID
LGE	Length	IND	Sub-index
ADR	Address	PWE	Parameter value
PKW	Parameter ID value		
PZD	Process data		
BCC	Block check character		

PZD transmits a control word and setpoint or status word and actual values. The number of PZD-words in a USS-telegram are determined by parameter P2012, where the first two words (P2012 >= 2) are either:

- control word and main setpoint or
- status word and actual value.

Restrictions:

- If the 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 area can be varied. Depending on the particular requirement, 3-word, 4-word or variable word lengths can be parameterized. The PKW part of the USS telegram is used to read and write individual parameter values.

Possible Settings:

0 No words
3 3 words
4 4 words
127 Variable

Index:

P2013[0] : Serial interface COM link
P2013[1] : Serial interface BOP link

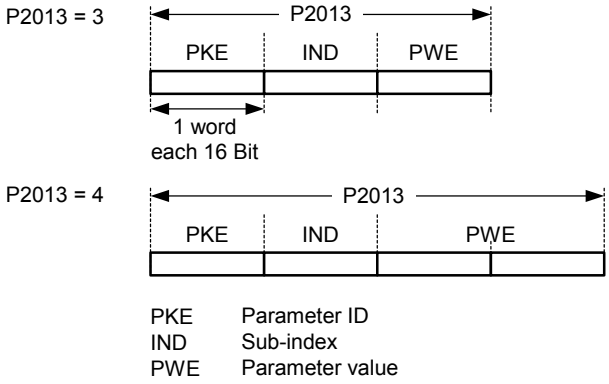
Example:

	Data type		
	U16 (16 Bit)	U32 (32 Bit)	Float (32 Bit)
P2013 = 3	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 words (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**

CStat:	CT	**Datatype:** U16	**Unit:** ms	**Min:**	0
P-Group:	COMM	**Active:** Immediately	**QuickComm.:** No	**Def:**	0
				Max:	65535

Level **3**

Defines a time T_off after which a fault will be generated (F0070) if no telegram is received via the USS channels.

Index:

P2014[0] : Serial interface COM link
P2014[1] : Serial interface BOP link

Notice:

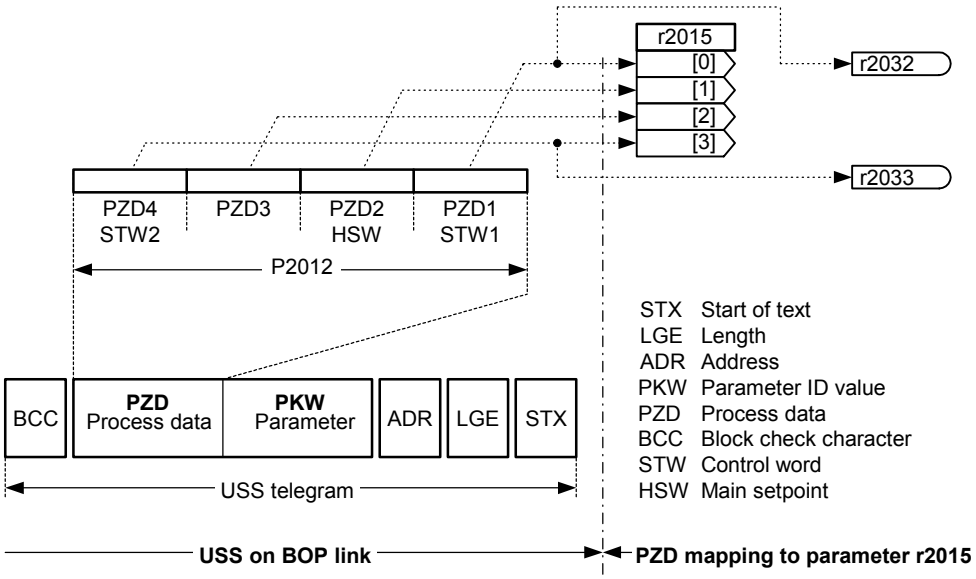
By default (time set to 0), no fault is generated (i.e. watchdog disabled).

r2015[4] **CO: PZD from BOP link (USS)**

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

Level **3**

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.

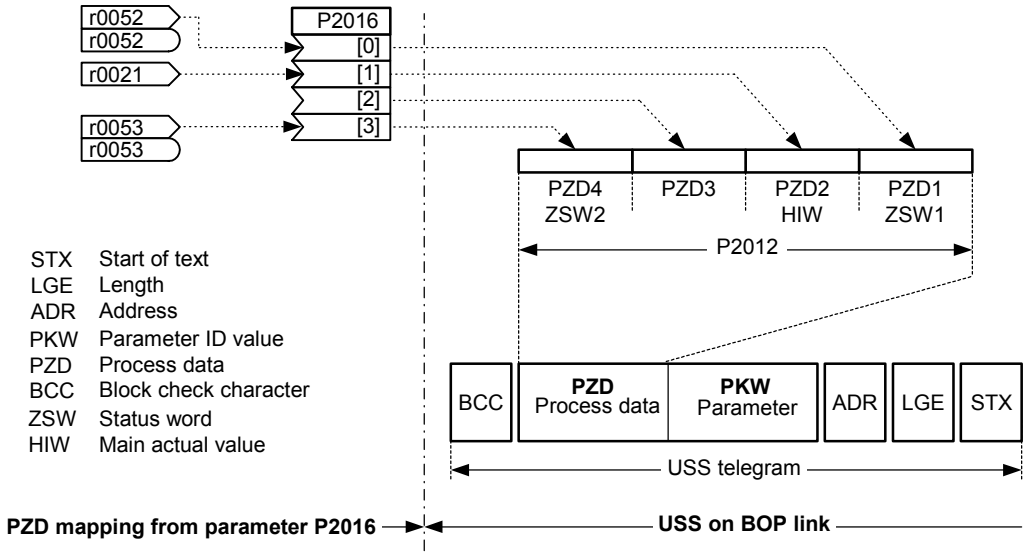
Restrictions:

- If the obove 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 obove serial interface controls the inverter (P0700 or P0719).

P2016[4] **CI: PZD to BOP link (USS)** Level **3**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMM	**Active:** Immediately	**QuickComm.:** No	**Def:**	52:0
				Max:	4000:0

Selects signals to be transmitted to serial interface via BOP link.



Index:

P2016[0] : Transmitted word 0
P2016[1] : Transmitted word 1
P2016[2] : Transmitted word 2
P2016[3] : Transmitted word 3

Example:

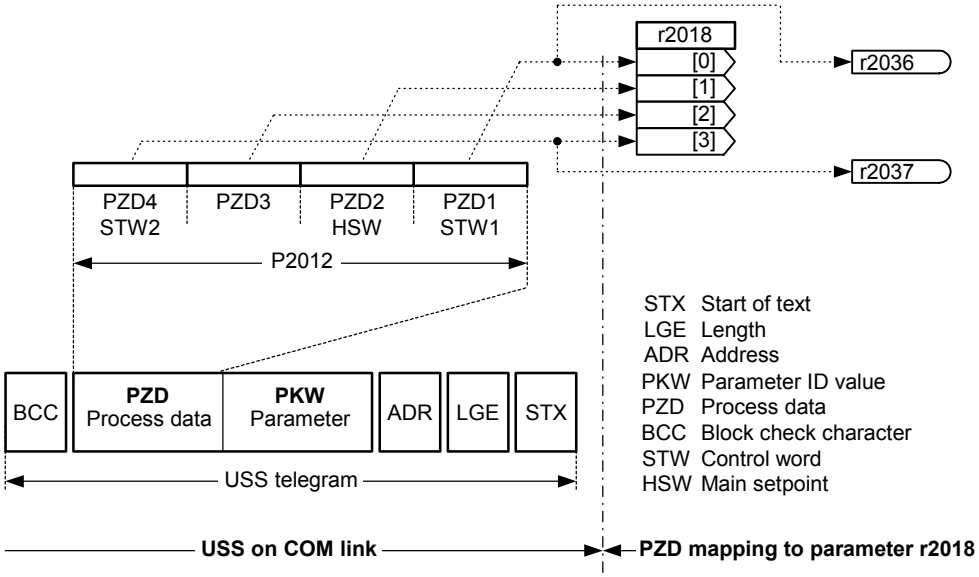
P2016[0] = 52.0 (default). In this case, the value of r0052[0] (CO/BO: Status word) is transmitted as 1st PZD to the BOP link.

Note:

If r0052 not indexed, display does not show an index (".0").

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:

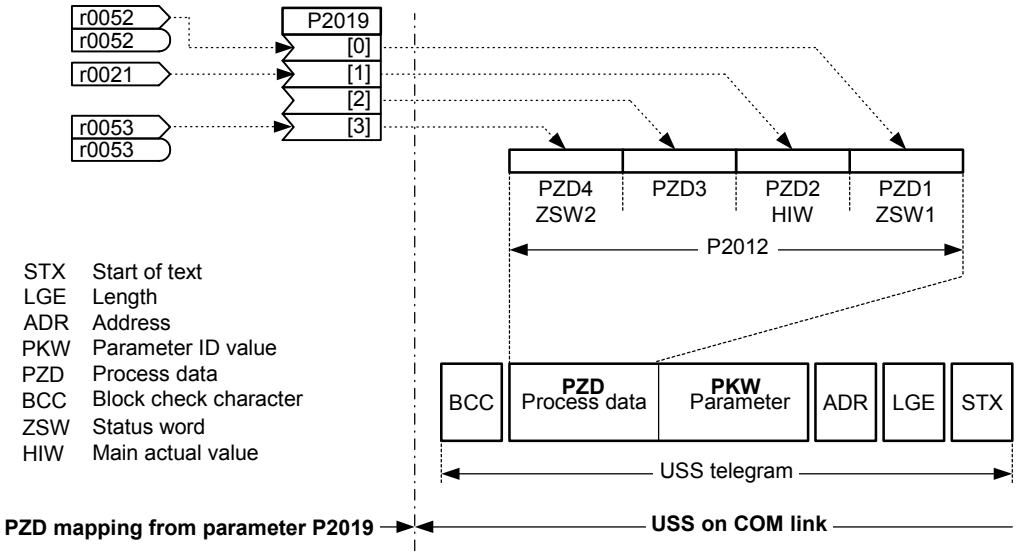
- If the obove serial interface controls the inverter (P0700 or P0719) then the 1st control word must be transferred in the 1st PZD-word.
- If the setpoint source is selected via P1000 or P0719, then the main setpoint must be transfered in the 2nd PZD-word,
- When P2012 is equal to 4 the additional control word (2nd control word) must transferred in the 4th PZD-word, if the obove 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**

Displays process data received via USS on COM link.



Index:
P2019[0] : Transmitted word 0
P2019[1] : Transmitted word 1
P2019[2] : Transmitted word 2
P2019[3] : Transmitted word 3

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 number of USS telegrams rejected.

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**

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

Level **3**

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	Pulse enable	0	NO	1	YES
Bit04	RFG enable	0	NO	1	YES
Bit05	RFG start	0	NO	1	YES
Bit06	Setpoint enable	0	NO	1	YES
Bit07	Fault acknowledge	0	NO	1	YES
Bit08	JOG right	0	NO	1	YES
Bit09	JOG left	0	NO	1	YES
Bit10	Control from PLC	0	NO	1	YES
Bit11	Reverse (setpoint inversion)	0	NO	1	YES
Bit13	Motor potentiometer MOP up	0	NO	1	YES
Bit14	Motor potentiometer MOP down	0	NO	1	YES
Bit15	Local / Remote	0	NO	1	YES

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	Pulse enable	0	NO	1	YES
Bit04	RFG enable	0	NO	1	YES
Bit05	RFG start	0	NO	1	YES
Bit06	Setpoint enable	0	NO	1	YES
Bit07	Fault acknowledge	0	NO	1	YES
Bit08	JOG right	0	NO	1	YES
Bit09	JOG left	0	NO	1	YES
Bit10	Control from PLC	0	NO	1	YES
Bit11	Reverse (setpoint inversion)	0	NO	1	YES
Bit13	Motor potentiometer MOP up	0	NO	1	YES
Bit14	Motor potentiometer MOP down	0	NO	1	YES
Bit15	Local / Remote	0	NO	1	YES

Details:

See 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.

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:

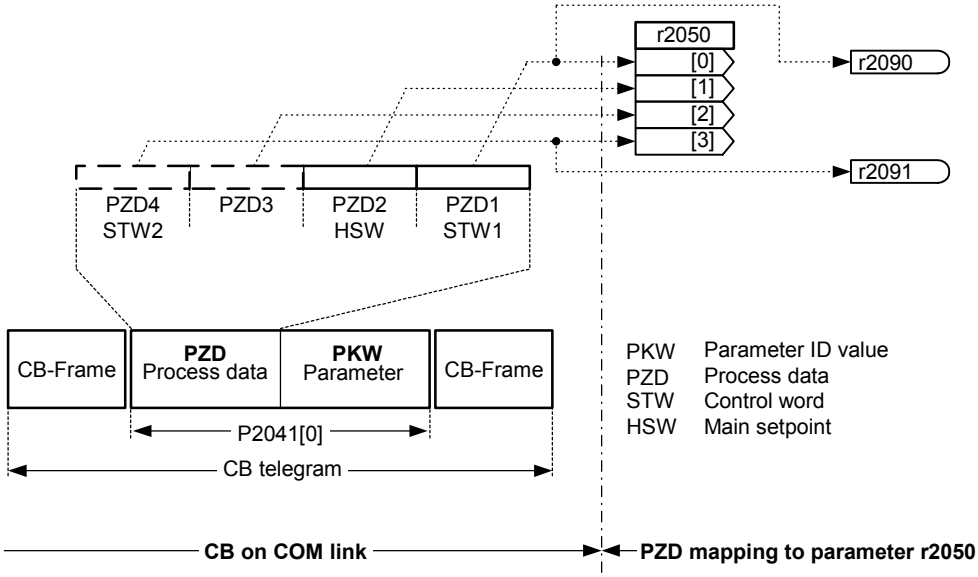
P2041[0] : CB parameter 0
P2041[1] : CB parameter 1
P2041[2] : CB parameter 2
P2041[3] : CB parameter 3
P2041[4] : CB parameter 4

Details:

See relevant communication board manual for protocol definition and appropriate settings.

r2050[4]	**CO: PZD from CB**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: COMM			**Max:** -	

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 obove 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 obove serial interface controls the inverter (P0700 or P0719).

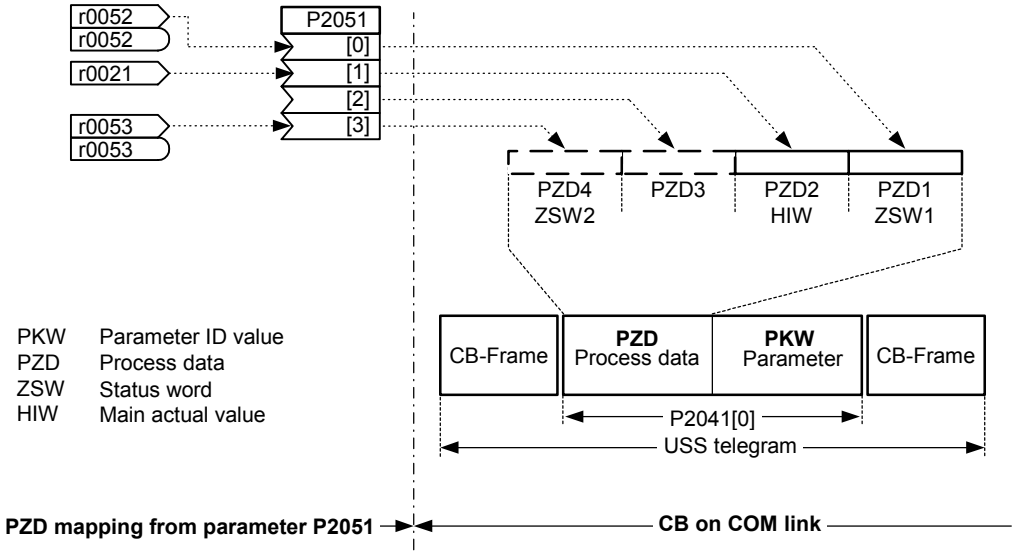
P2051[4] **CI: PZD to CB**

CStat: CT **Datatype:** U32 **Unit:** - **Min:** 0:0
P-Group: COMM **Active:** Immediately **QuickComm.:** No **Def:** 52:0
Max: 4000:0

Level **3**

Connects PZD to CB.

This parameter allows the user to define the source of status words and actual values for the reply PZD.



Index:

P2051[0] : Transmitted word 0
P2051[1] : Transmitted word 1
P2051[2] : Transmitted word 2
P2051[3] : Transmitted word 3

Common Settings:

Status word 1 = 52 CO/BO: Act. status word 1 (see r0052)
Actual value 1 = 21 inverter output frequency (see r0021)

Other BICO settings are possible

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**

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

Level **3**

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	Pulse enable	0	NO	1	YES
Bit04	RFG enable	0	NO	1	YES
Bit05	RFG start	0	NO	1	YES
Bit06	Setpoint enable	0	NO	1	YES
Bit07	Fault acknowledge	0	NO	1	YES
Bit08	JOG right	0	NO	1	YES
Bit09	JOG left	0	NO	1	YES
Bit10	Control from PLC	0	NO	1	YES
Bit11	Reverse (setpoint inversion)	0	NO	1	YES
Bit13	Motor potentiometer MOP up	0	NO	1	YES
Bit14	Motor potentiometer MOP down	0	NO	1	YES
Bit15	Local / Remote	0	NO	1	YES

Details:

See relevant communication board manual for protocol definition and appropriate settings.

r2091 **BO: Control word 2 from CB**

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

Level **3**

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.

2.8.30 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] **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:

The keypad will flash while a warning is active. The LEDs indicate the warning status in this case.

If an AOP is in use, the display will show number and text of the active warning.

Notice:

Indices 0 and 1 are not stored.

P2111 **Total number of warnings** Level **3**

CStat: CT **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**

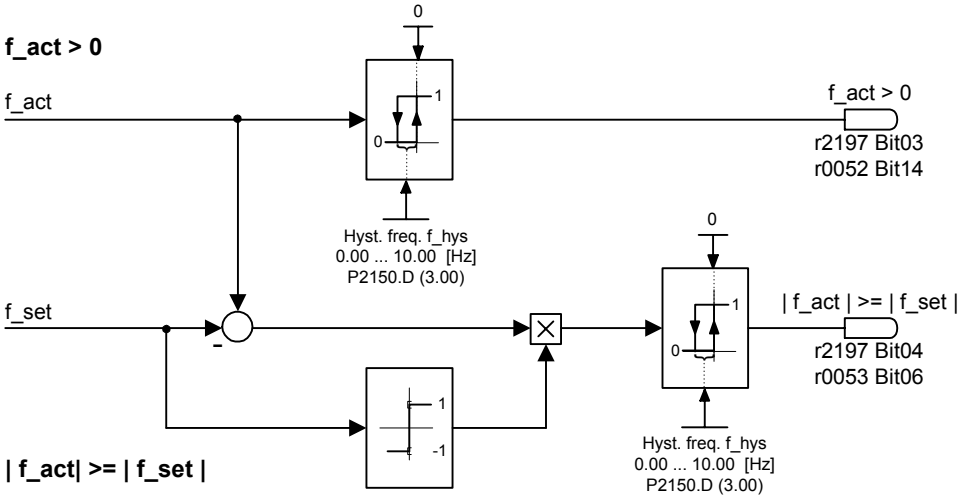
Indicates total number of alarm events. This parameter is incremented whenever an alarm event occurs. It also gets incremented when a warning is cleared or faults are cleared.

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

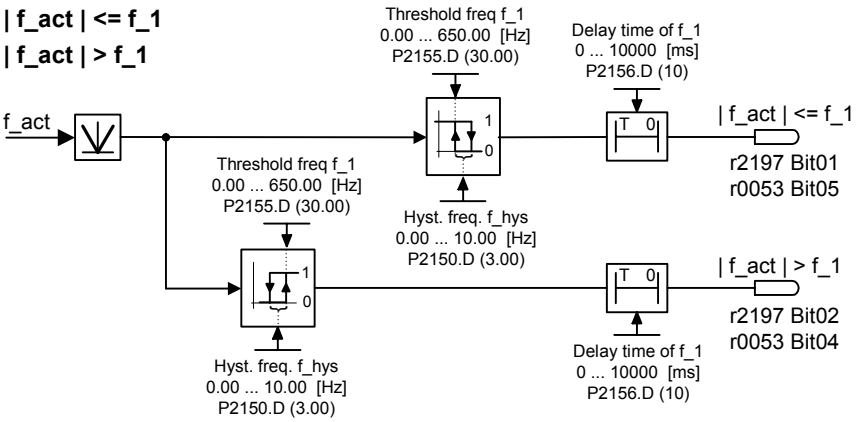
Defines hysteresis level applied for comparing frequency and speed to threshold as illustrated in the diagram below.



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).

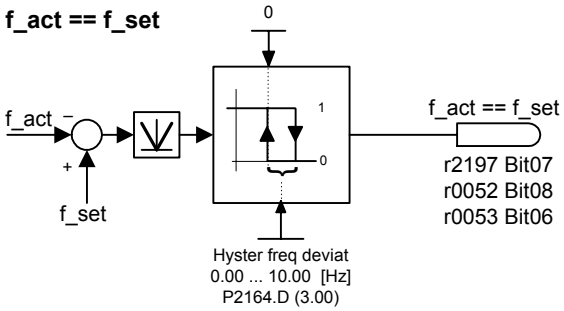
Details:

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).



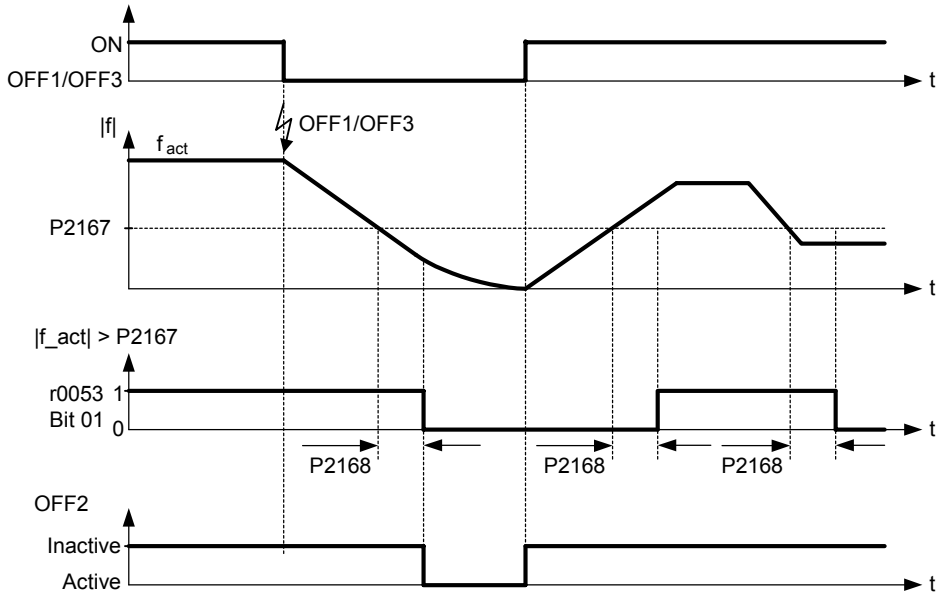
P2167 **Switch-off frequency f_off** Level **3**

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:

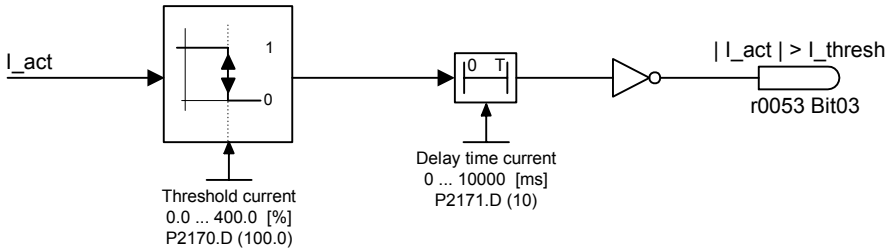
See diagram in P2167 (switch-off frequency)

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.

|I_act| > I_thresh



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.

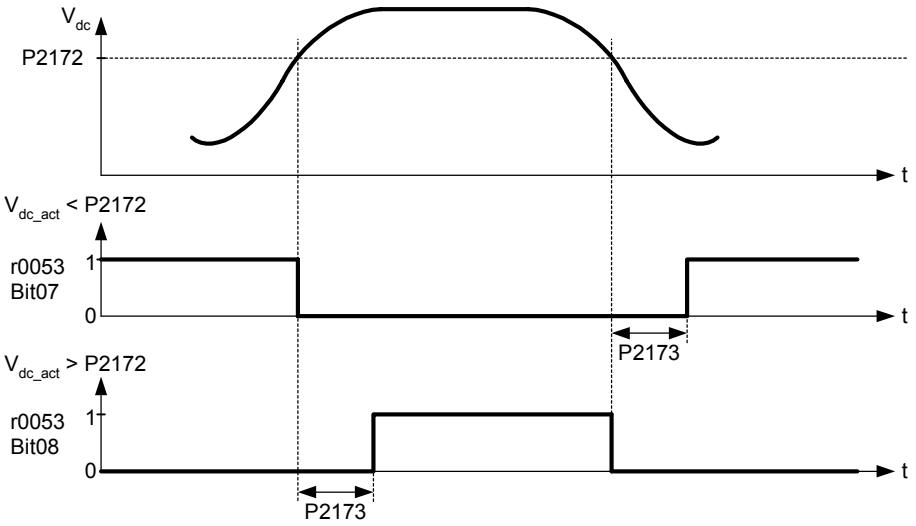
Details:

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).

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:

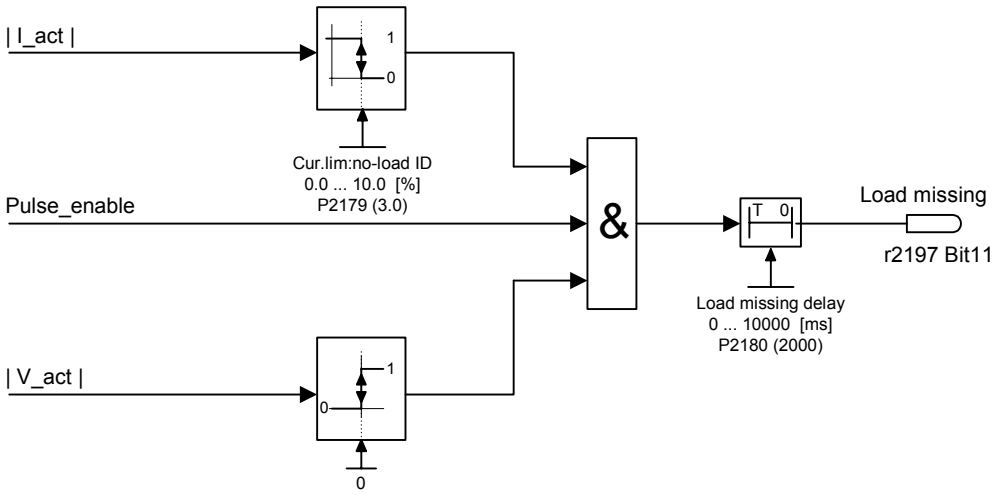
See diagram in P2172 (threshold DC-link voltage)

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.

Notice:
If a motor setpoint cannot be entered and the current limit (P2179) is not exceeded, Alarm A0922 (no load applied) is issued when delay time (P2180) expires.

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 load missing

Note:
It may be that the motor is not connected (load missing) or a phase could be missing.

Notice:
If a motor setpoint cannot be entered and the current limit (P2179) is not exceeded, alarm A0922 (no load applied) is issued when delay time (P2180) expires.

Details:
See diagram in P2179 (current limit for no load identification).

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.

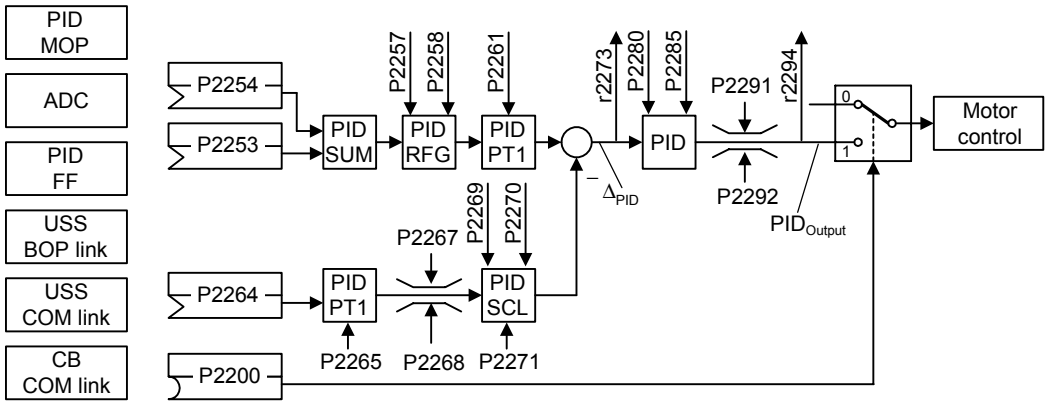
Bitfields:

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

2.8.31 Technology controller (PID controller)

P2200	BI: Enable PID controller				Min:	0:0	Level
	CStat:	CT	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.



Common Settings:

0	: PID controller de-activated
1	: PID controller permanently activated
BICO parameters	: PID controller event-controlled, de-activated/activated

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.

Notice:

The minimum and maximum motor frequencies (P1080 and P1082) as well as the skip frequencies (P1091 to P1094) remain active on the inverter output. However, enabling skip frequencies with PID control can produce instabilities.

P2201	Fixed PID setpoint 1				Min:	-200.00	Level
	CStat:	CUT	Datatype: Float	Unit: %	Def:	0.00	2
	P-Group:	TECH	Active: Immediately	QuickComm.: No	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):
   - 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:

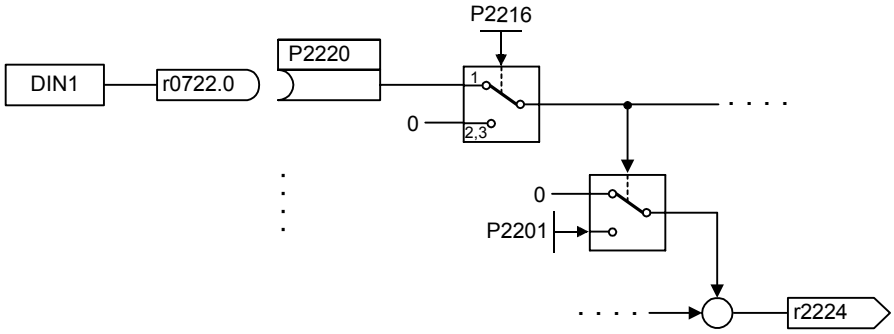
Example:

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:** - **Max:** -
P-Group: TECH

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 **Def:** 0 **Max:** 1
P-Group: TECH **Active:** Immediately **QuickComm.:** No

Setpoint memory

Possible Settings:
0 PID-MOP setpoint will not be stored
1 PID-MOP setpoint will be stored (P2240 is updated)

Dependency:
P2231 = 0:
If 0 selected, setpoint returns to value set in P2240 (setpoint of PID-MOP) after an OFF command.

P2231 = 1:
If 1 is selected, active setpoint is 'remembered' and P2240 updated with current value.

Details:
See P2240 (setpoint of PID-MOP)

P2232 **Inhibit neg. PID-MOP setpoints** Level **2**
CStat: CT **Datatype:** U16 **Unit:** - **Min:** 0 **Def:** 1 **Max:** 1
P-Group: TECH **Active:** first confirm **QuickComm.:** No

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 **Def:** 19:13 **Max:** 4000:0
P-Group: COMMANDS **Active:** first confirm **QuickComm.:** No

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 **Def:** 19:14 **Max:** 4000:0
P-Group: COMMANDS **Active:** first confirm **QuickComm.:** No

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 **Def:** 10.00 **Max:** 200.00
P-Group: TECH **Active:** Immediately **QuickComm.:** No

Setpoint of the motor potentiometer.

Allows user to set a digital PID setpoint in [%].

Note:
P2240 = 100 % corresponds to 4000 hex

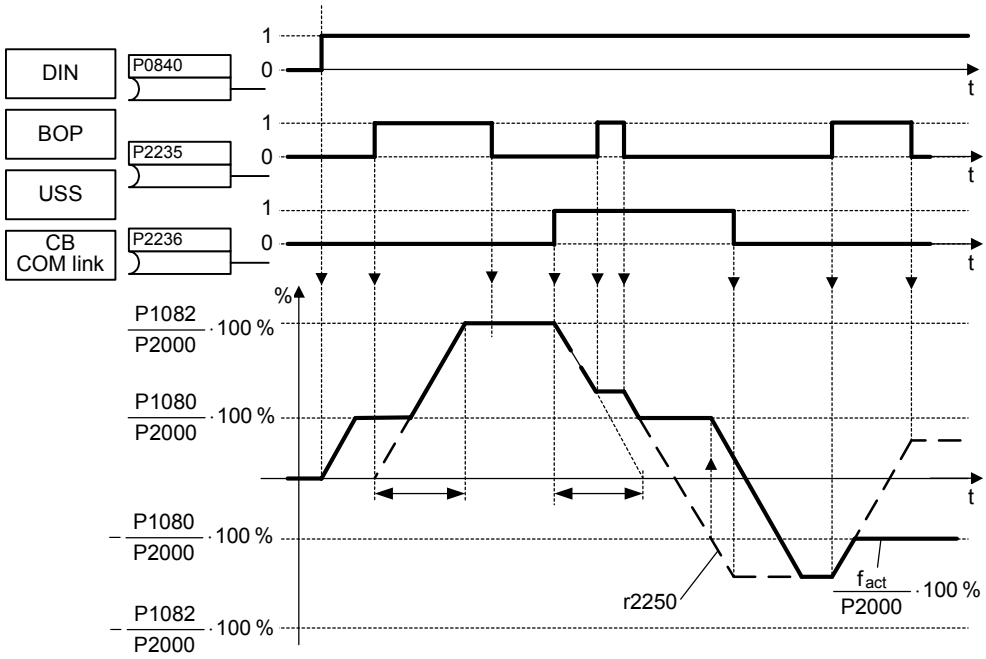
r2250 **CO: Output setpoint of PID-MOP**

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

Level **2**

P-Group: TECH

Displays output setpoint of motor potentiometer in [%].



Note:

r2250 = 100 % corresponds to 4000 hex

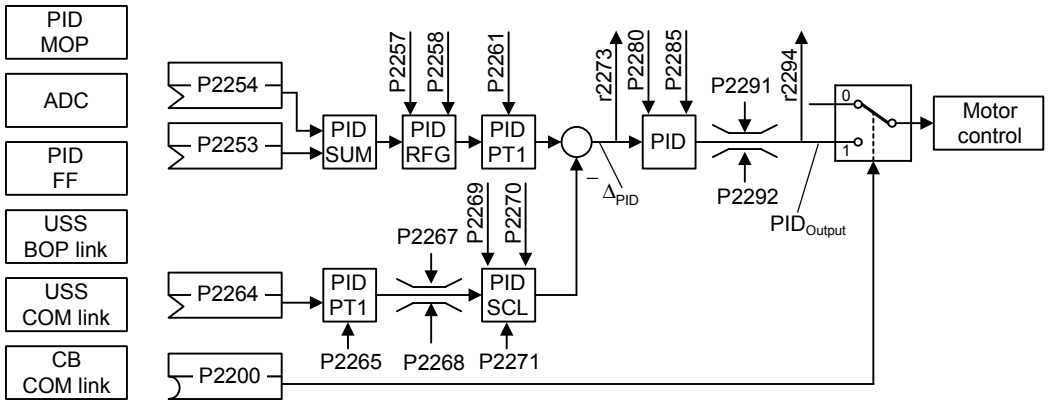
P2253 **CI: PID setpoint**

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

Level **2**

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

Defines setpoint source for PID setpoint input.



Common Settings:

Parameter	Parameter text	Setting	Meaning
P2200	BI: Enable PID controller	1.0	PID controller always active
		722.x	Digital input x
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** Level **3**

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

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** Level **3**

CStat:	CUT	**Datatype:** Float	**Unit:** -	**Min:**	0.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	100.00
				Max:	100.00

Gain factor for PID setpoint. The PID setpoint input is multiplied by this gain factor to produce a suitable ratio between setpoint and trim.

P2256 **PID trim gain factor** Level **3**

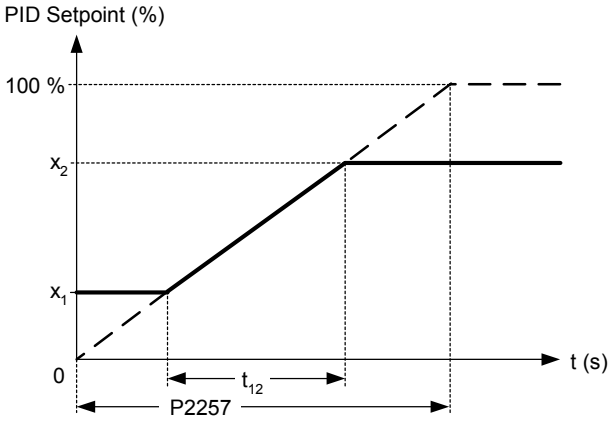
CStat:	CUT	**Datatype:** Float	**Unit:** -	**Min:**	0.00
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	100.00
				Max:	100.00

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.

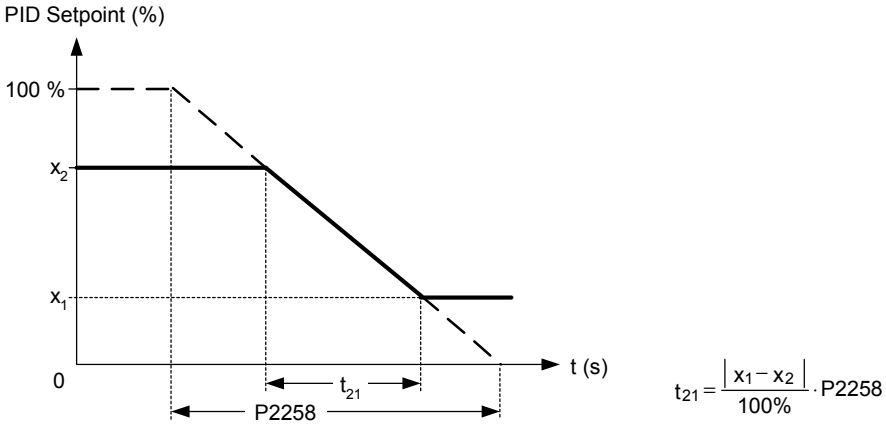
Notice:

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.



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 filtered PID setpoint after PID-RFG in [%].

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:

See parameter P2253

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**

Min: - **Def:** - **Max:** -

Datatype: Float **Unit:** % **P-Group:** TECH

Displays PID feedback signal in [%].

Note:
r2266 = 100 % corresponds to 4000 hex

P2267 **Max. value for PID feedback** Level **3**

Min: -200.00 **Def:** 100.00 **Max:** 200.00

CStat: CUT **Datatype:** Float **Unit:** % **P-Group:** TECH **Active:** Immediately **QuickComm.:** No

Sets the upper limit for the value of the feedback signal in [%].

Note:
P2267 = 100 % corresponds to 4000 hex

Notice:
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**

Min: -200.00 **Def:** 0.00 **Max:** 200.00

CStat: CUT **Datatype:** Float **Unit:** % **P-Group:** TECH **Active:** Immediately **QuickComm.:** No

Sets lower limit for value of feedback signal in [%].

Note:
P2268 = 100 % corresponds to 4000 hex

Notice:
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**

Min: 0.00 **Def:** 100.00 **Max:** 500.00

CStat: CUT **Datatype:** Float **Unit:** - **P-Group:** TECH **Active:** Immediately **QuickComm.:** No

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**

Min: 0 **Def:** 0 **Max:** 3

CStat: CUT **Datatype:** U16 **Unit:** - **P-Group:** TECH **Active:** Immediately **QuickComm.:** No

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**

Min: 0 **Def:** 0 **Max:** 1

CStat: CUT **Datatype:** U16 **Unit:** - **P-Group:** TECH **Active:** Immediately **QuickComm.:** No

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**

Min: - **Def:** - **Max:** -

Datatype: Float **Unit:** % **P-Group:** TECH

Displays PID scaled feedback signal in [%].

Note:
r2272 = 100 % corresponds to 4000 hex

r2273 **CO: PID error**

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

P-Group: TECH

Level **2**

Displays PID error (difference) signal between setpoint and feedback signals in [%].

Note:

r2273 = 100 % corresponds to 4000 hex

P2280 **PID proportional gain**

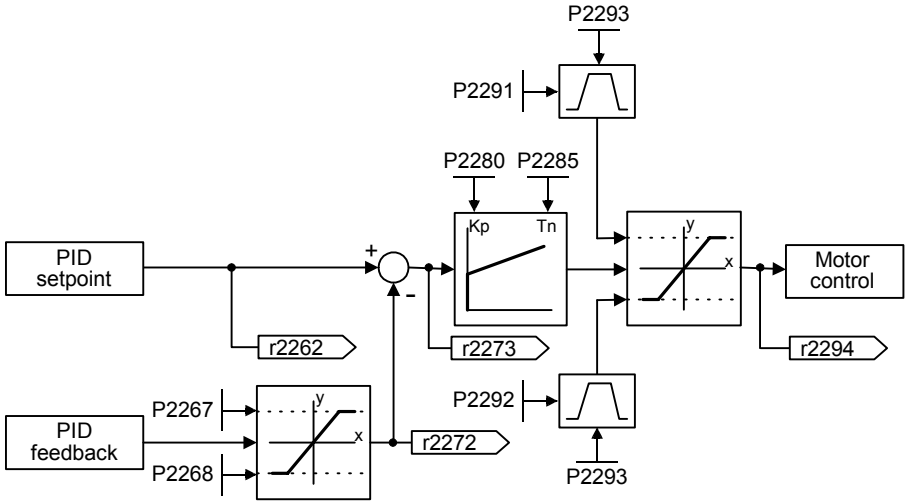
CStat: CUT **Datatype:** Float **Unit:** - **Min:** 0.000 **Def:** 3.000 **Max:** 65.000

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

Level **2**

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**

CStat: CUT **Datatype:** Float **Unit:** s **Min:** 0.000 **Def:** 0.000 **Max:** 60.000

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

Level **2**

Sets integral time constant for PID controller.

Details:

See P2280 (PID proportional gain).

P2291 **PID output upper limit**

CStat: CUT **Datatype:** Float **Unit:** % **Min:** -200.00 **Def:** 100.00 **Max:** 200.00

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

Level **2**

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

2.8.32 Inverter parameters

P3900	End of quick commissioning			Min:	0	Level
	CStat: C	Datatype: U16	Unit: -	Def:	0	1
	P-Group: QUICK	Active: first confirm	QuickComm.: Yes	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			Min:	0	Level
	CStat: CUT	Datatype: U16	Unit: -	Def:	0	4
	P-Group: ALWAYS	Active: first confirm	QuickComm.: No	Max:	255	

Accesses special parameters for development (expert only) and factory functionality (calibration parameter).

r3954[13]	CM version and GUI ID			Min:	-	Level
		Datatype: U16	Unit: -	Def:	-	4
	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: 66

Toggles command and setpoint sources between freely programmable BICO parameters and fixed command/setpoint profiles for commissioning.

The command and setpoint sources can be changed independently. The tens digit selects the command source, the ones digit the setpoint source.

Possible Settings:

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

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**

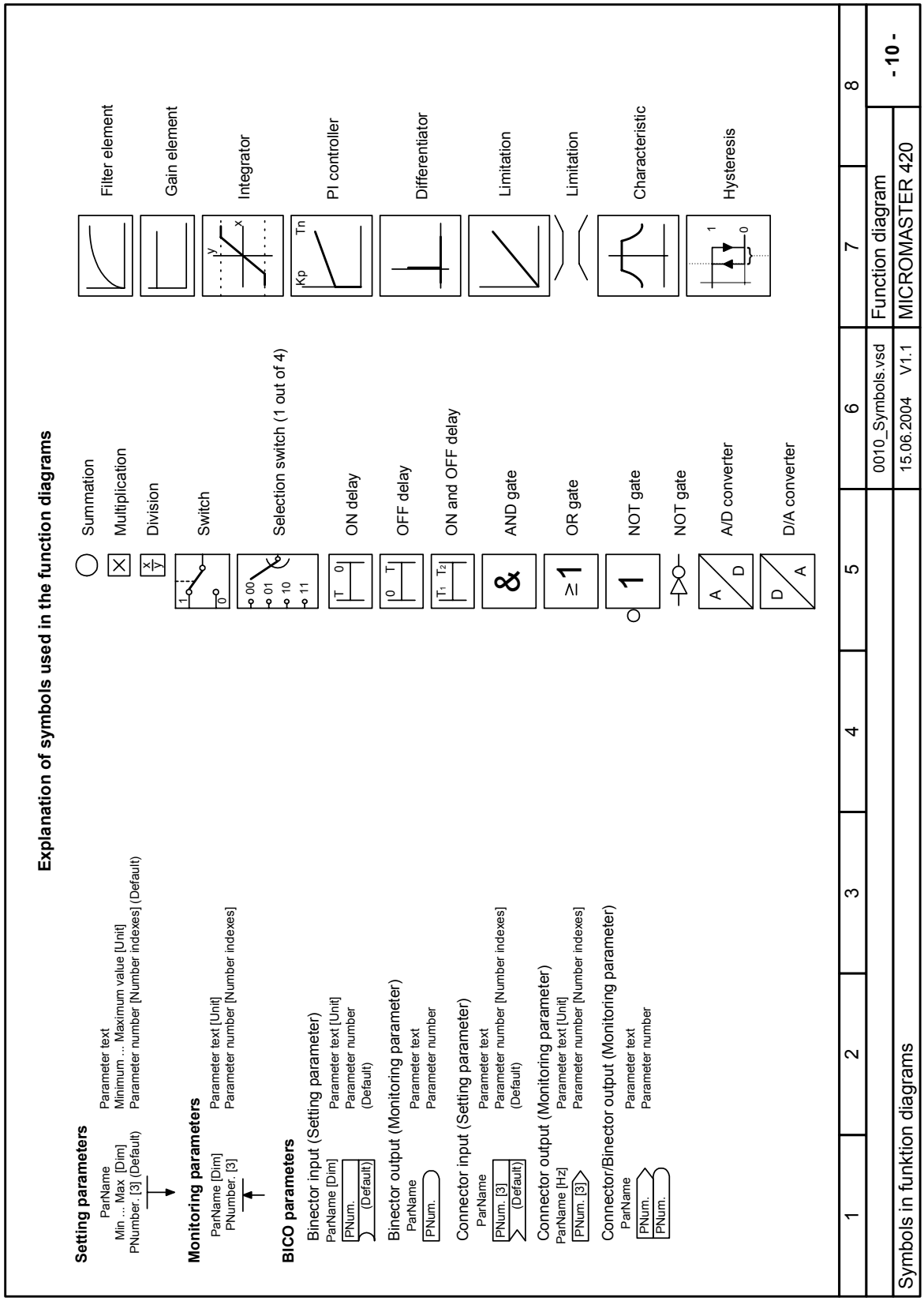
Datatype: U16 **Unit:** - **Min:** -
P-Group: - **Def:** -
Max: -

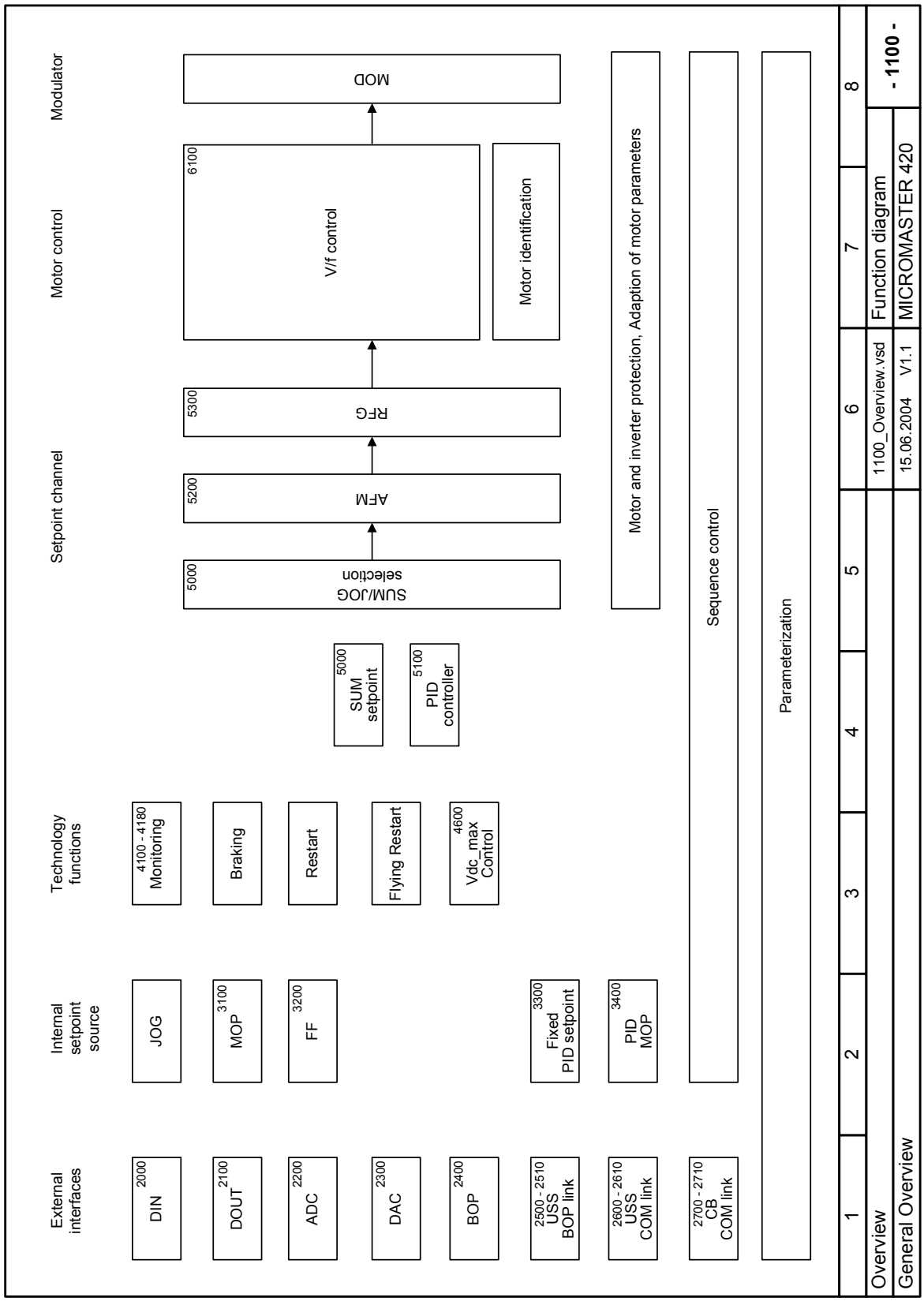
Number of parameters on the drive

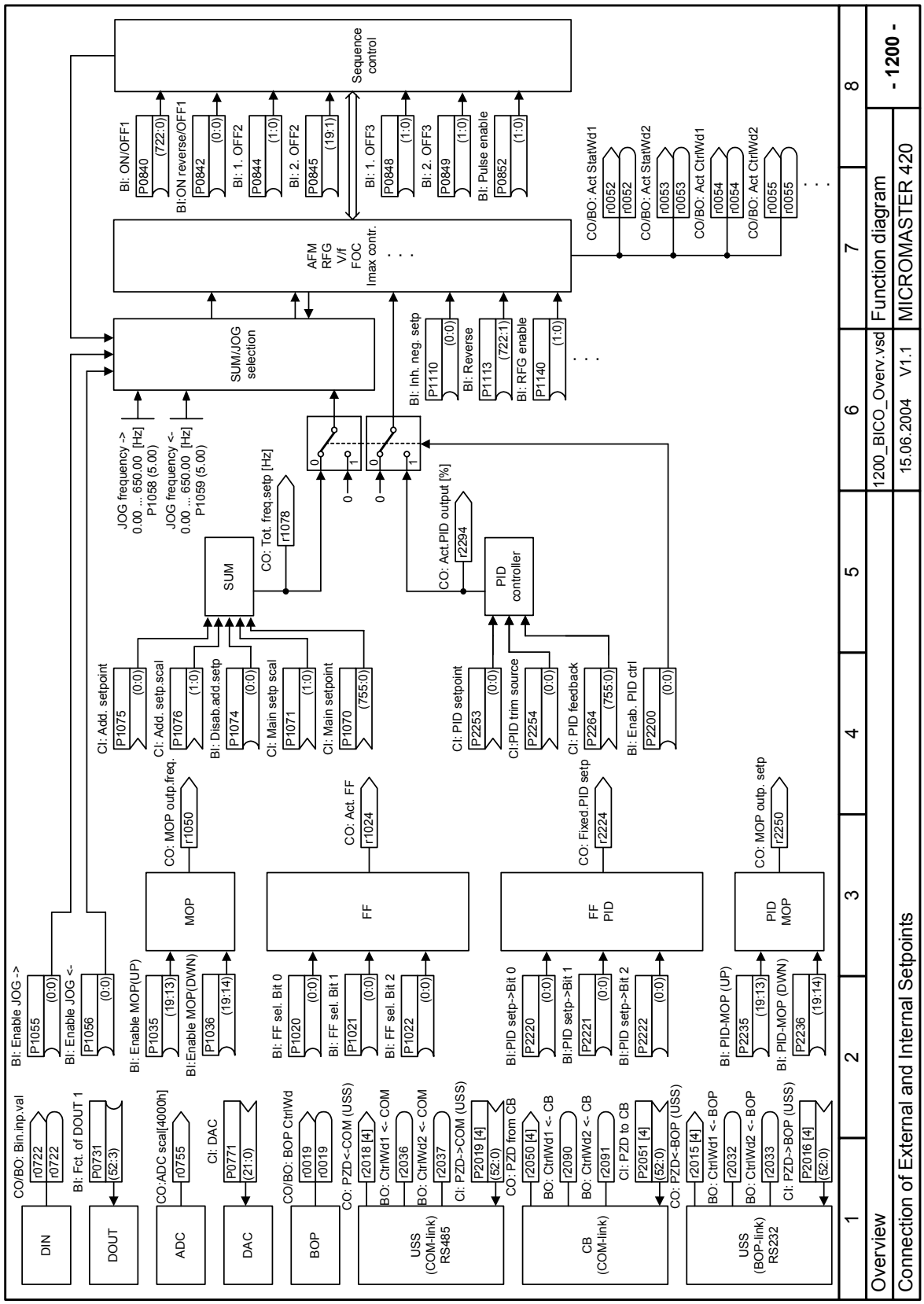
Index:

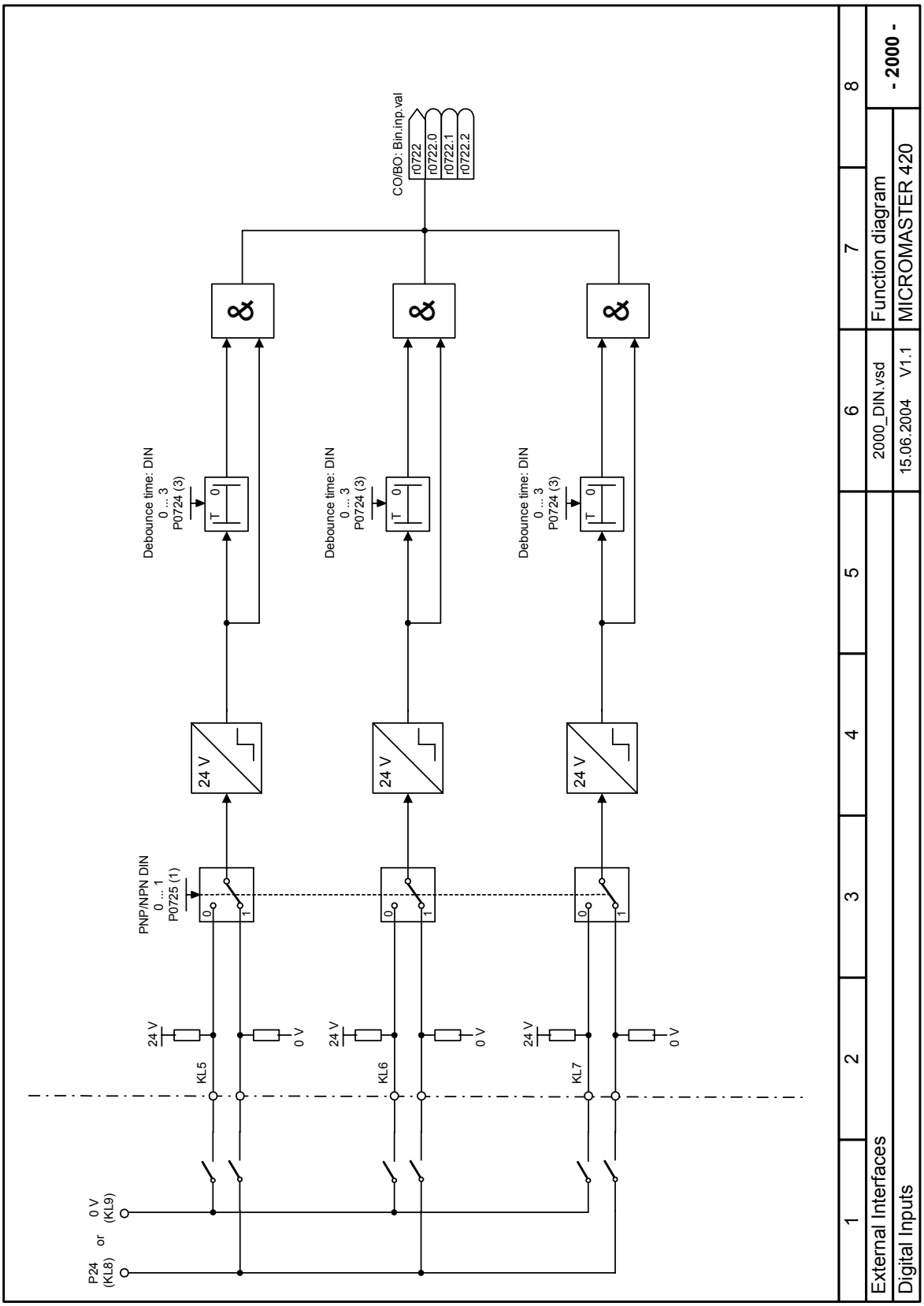
r3986[0] : Read only
r3986[1] : Read & write

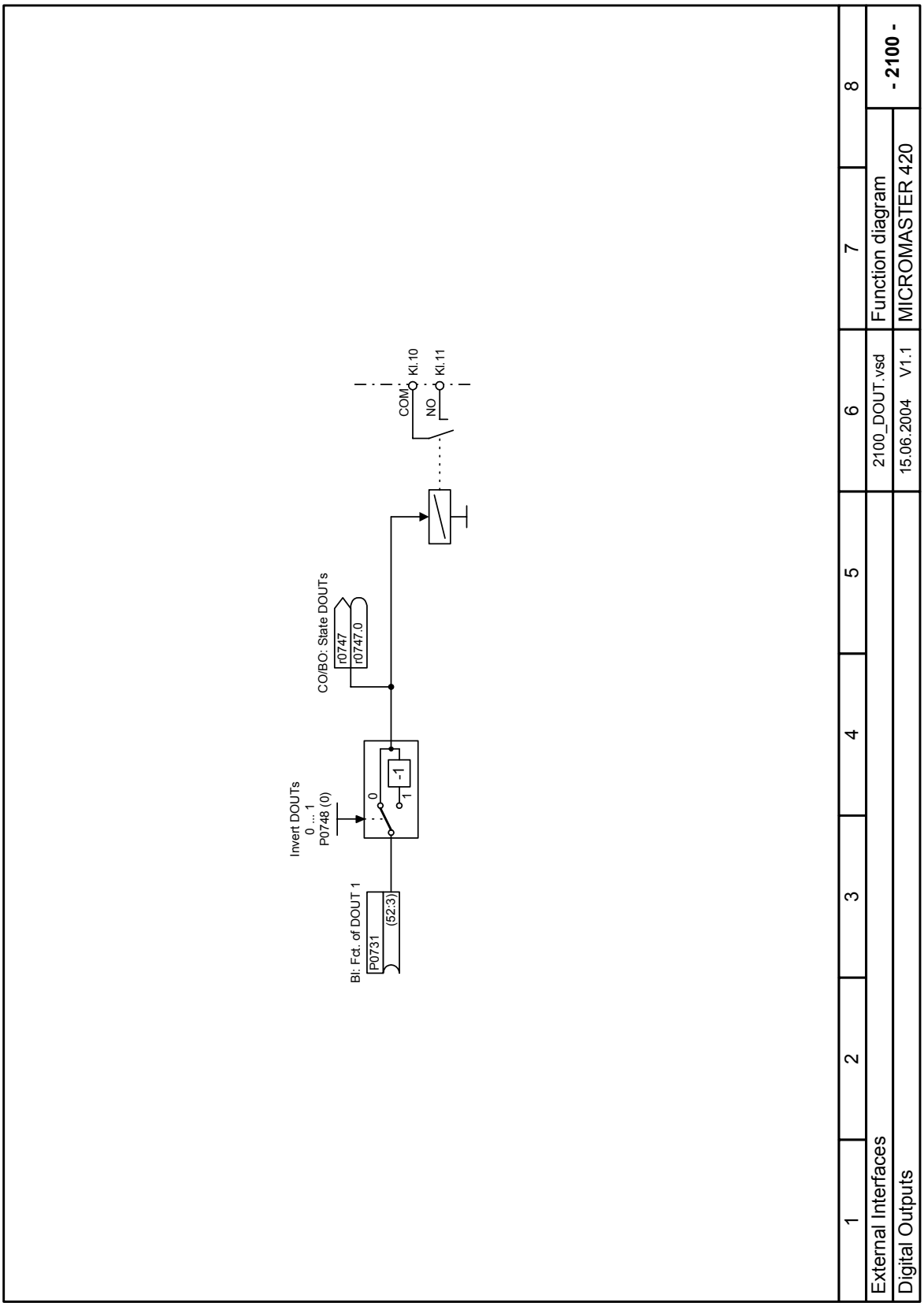
3 Function Diagrams

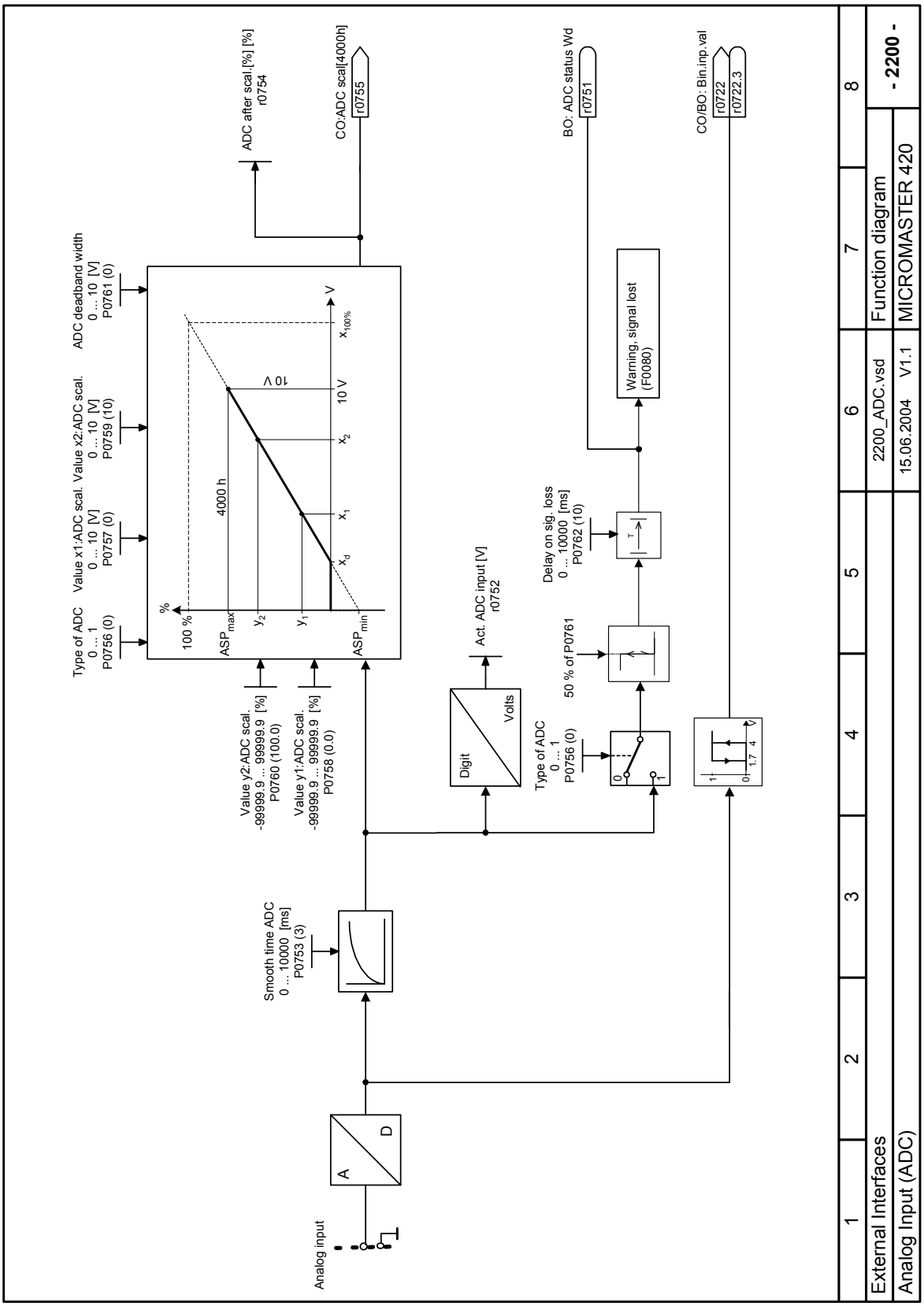


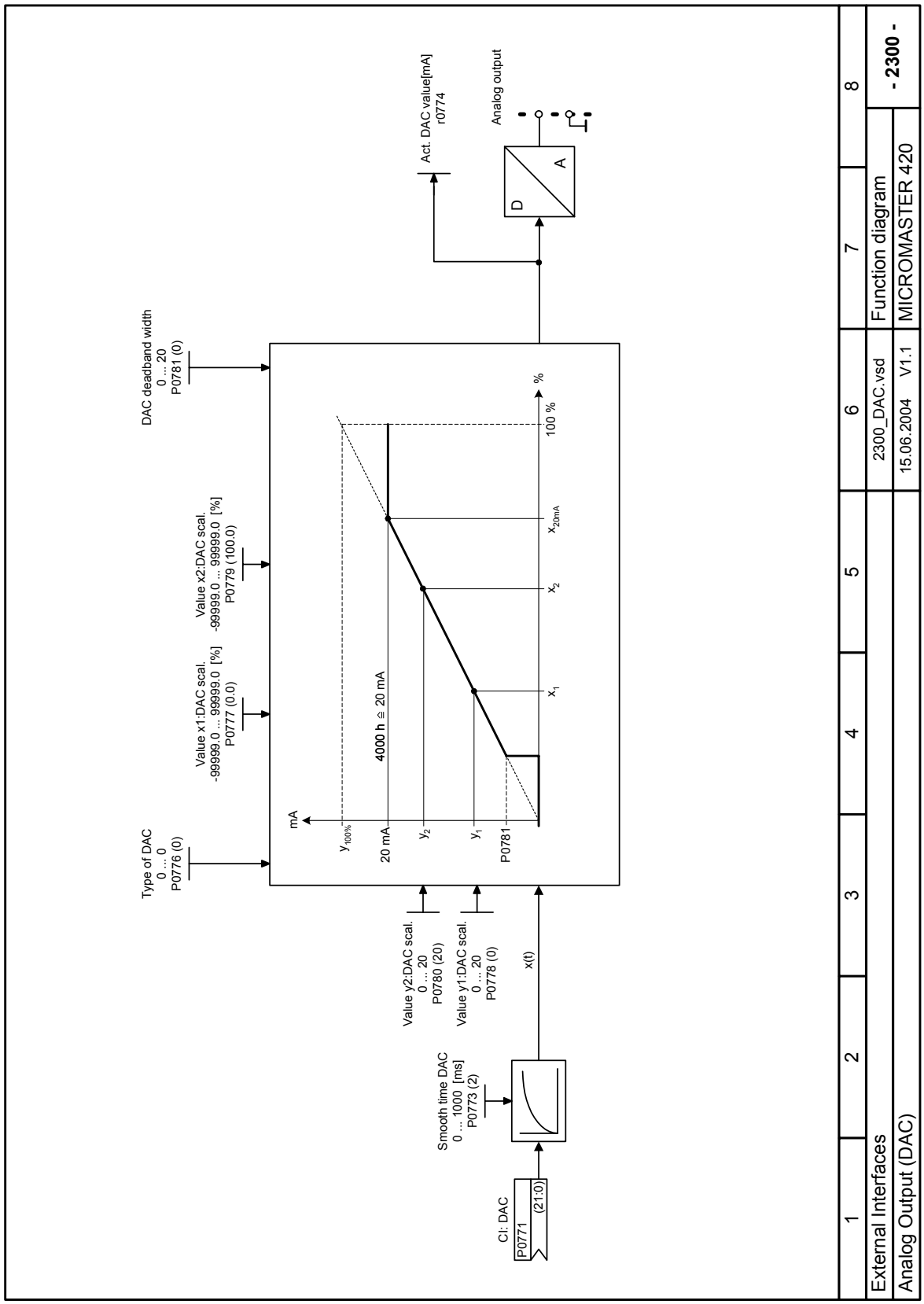


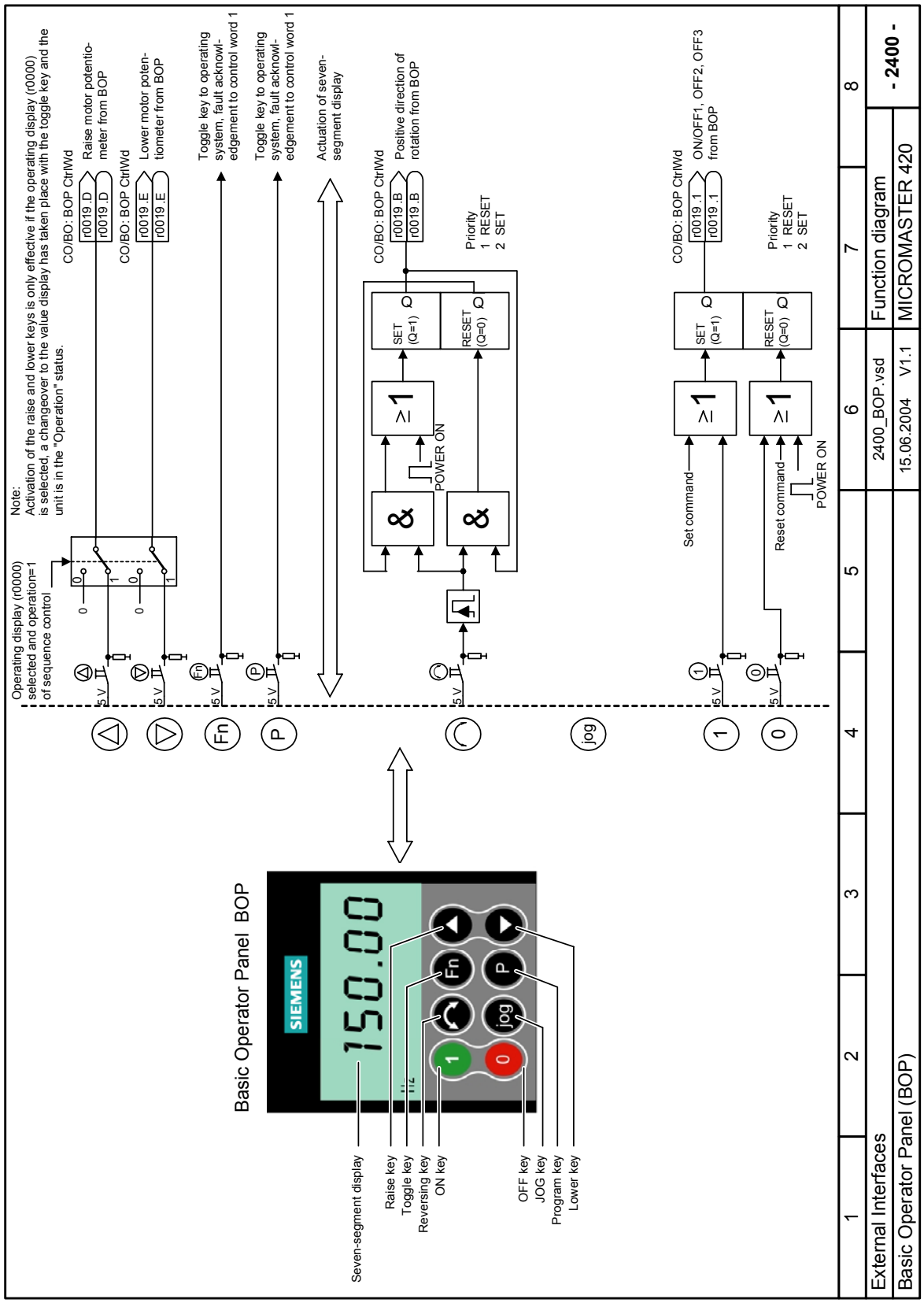


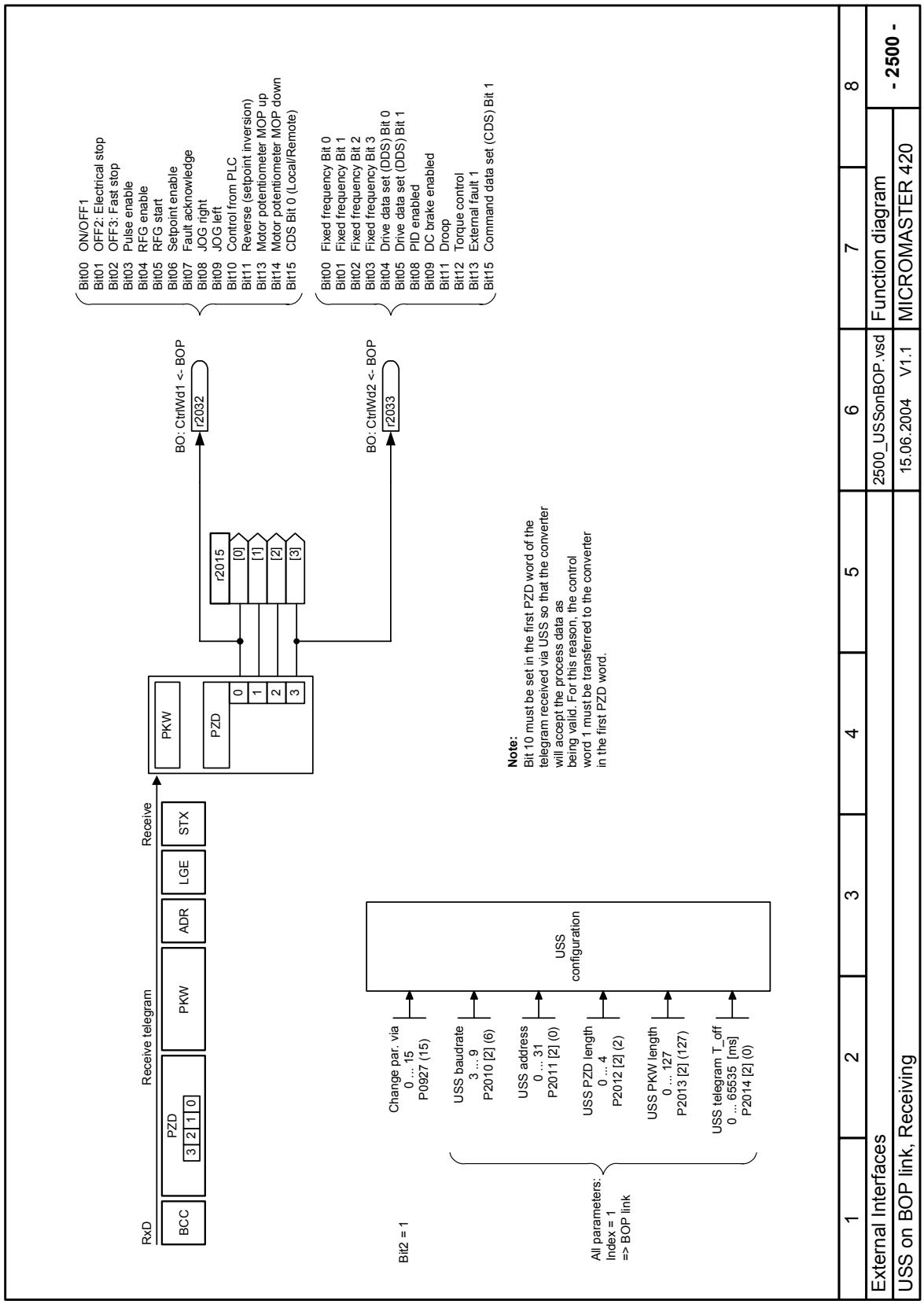


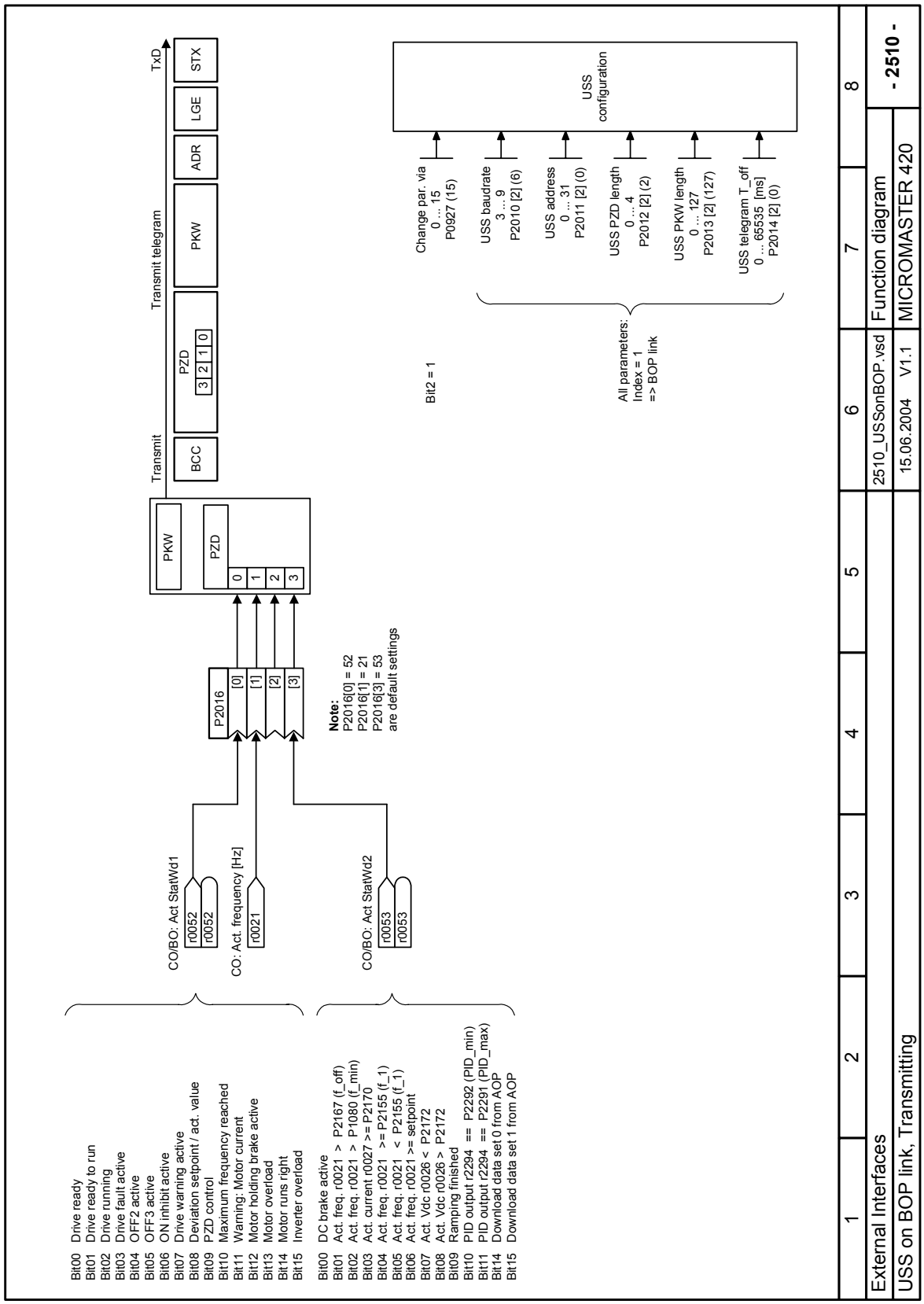


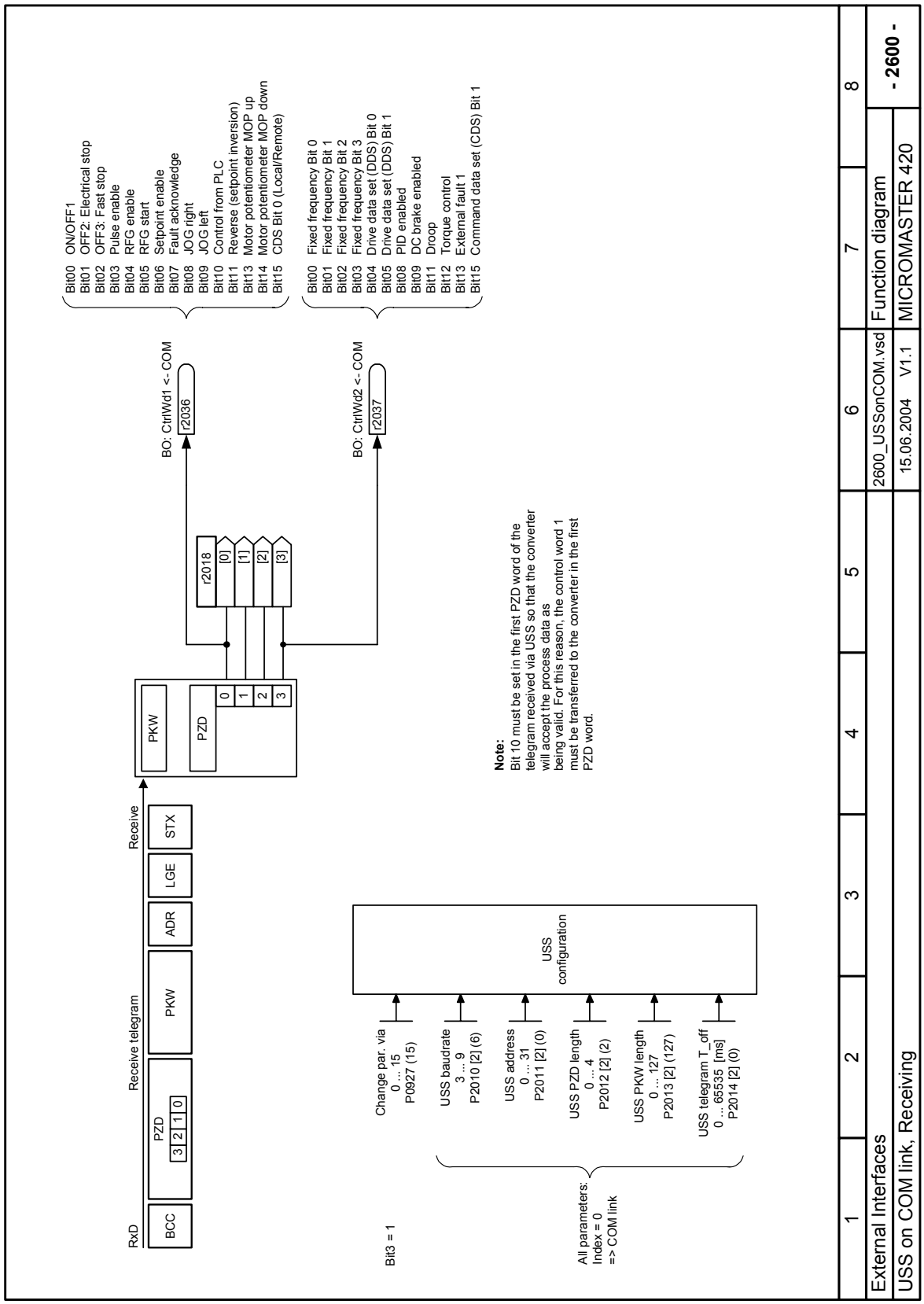


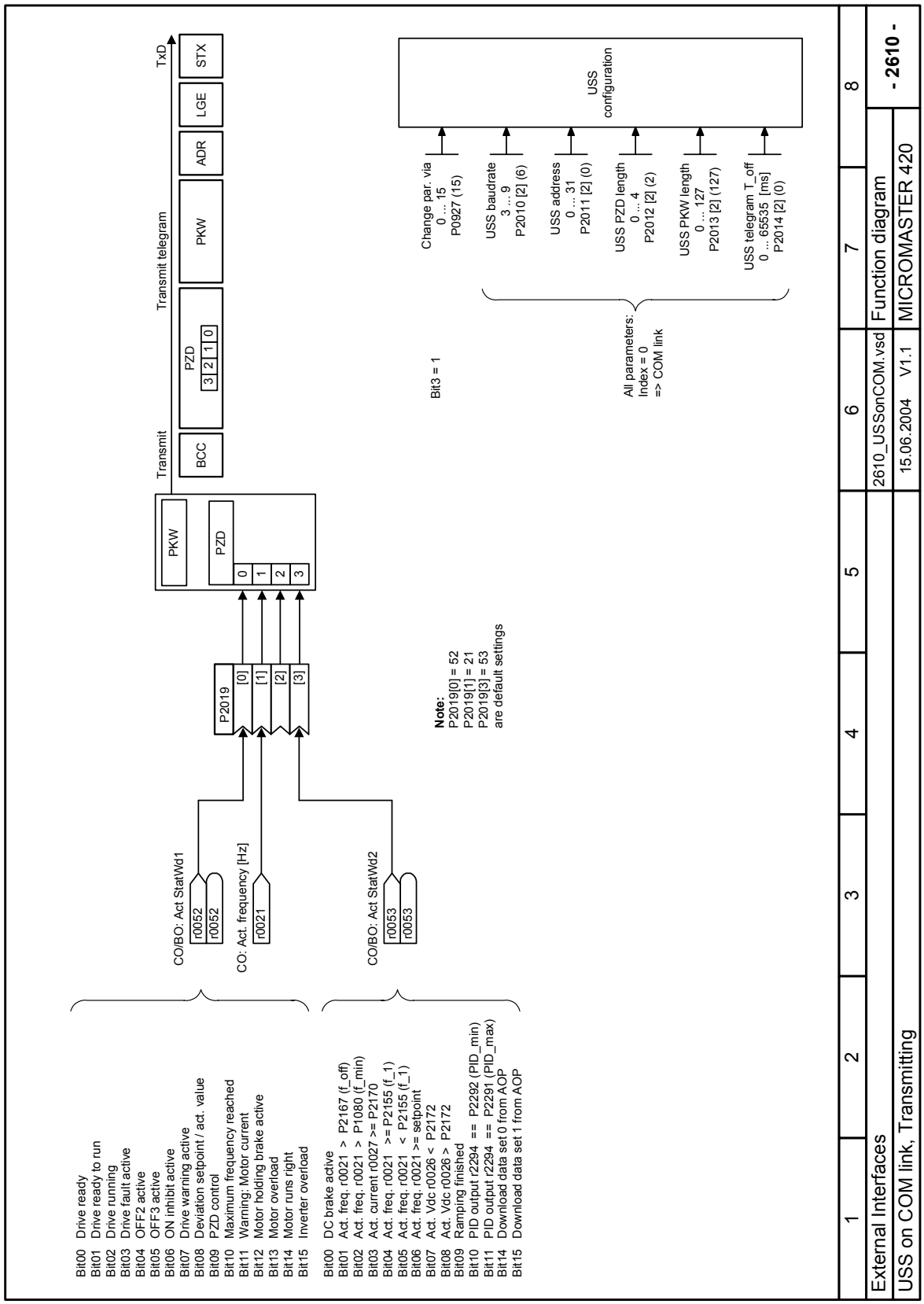


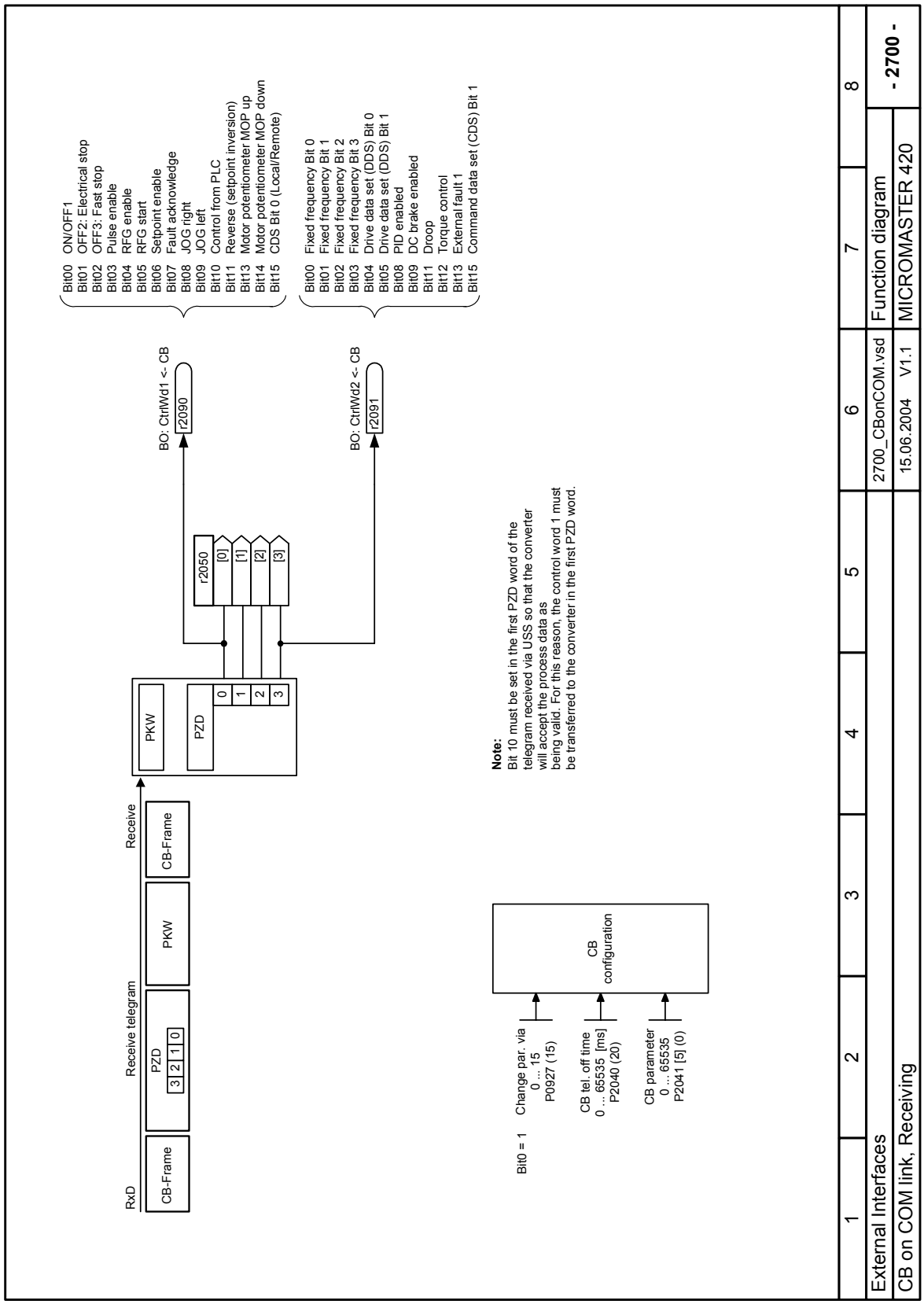


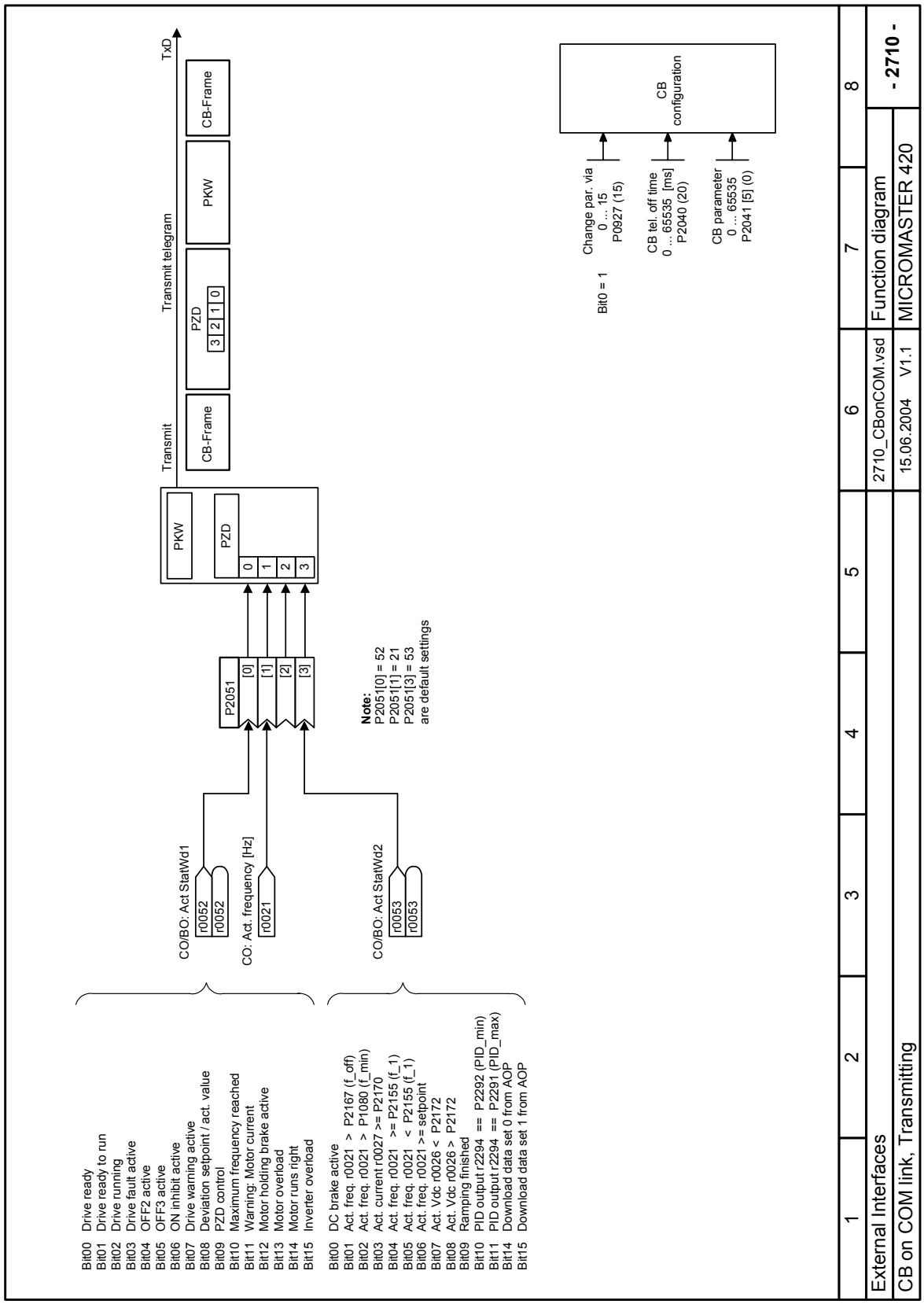


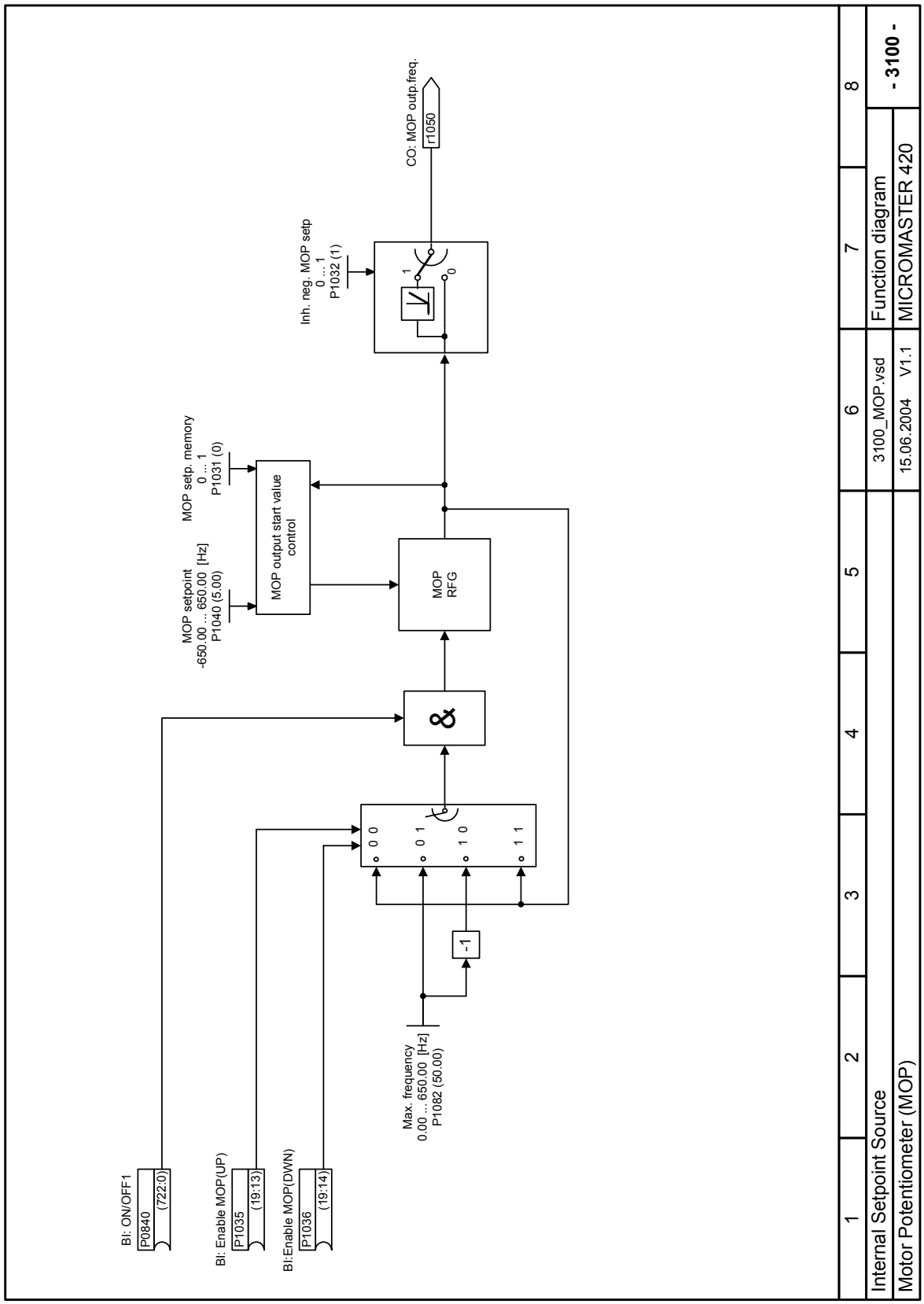


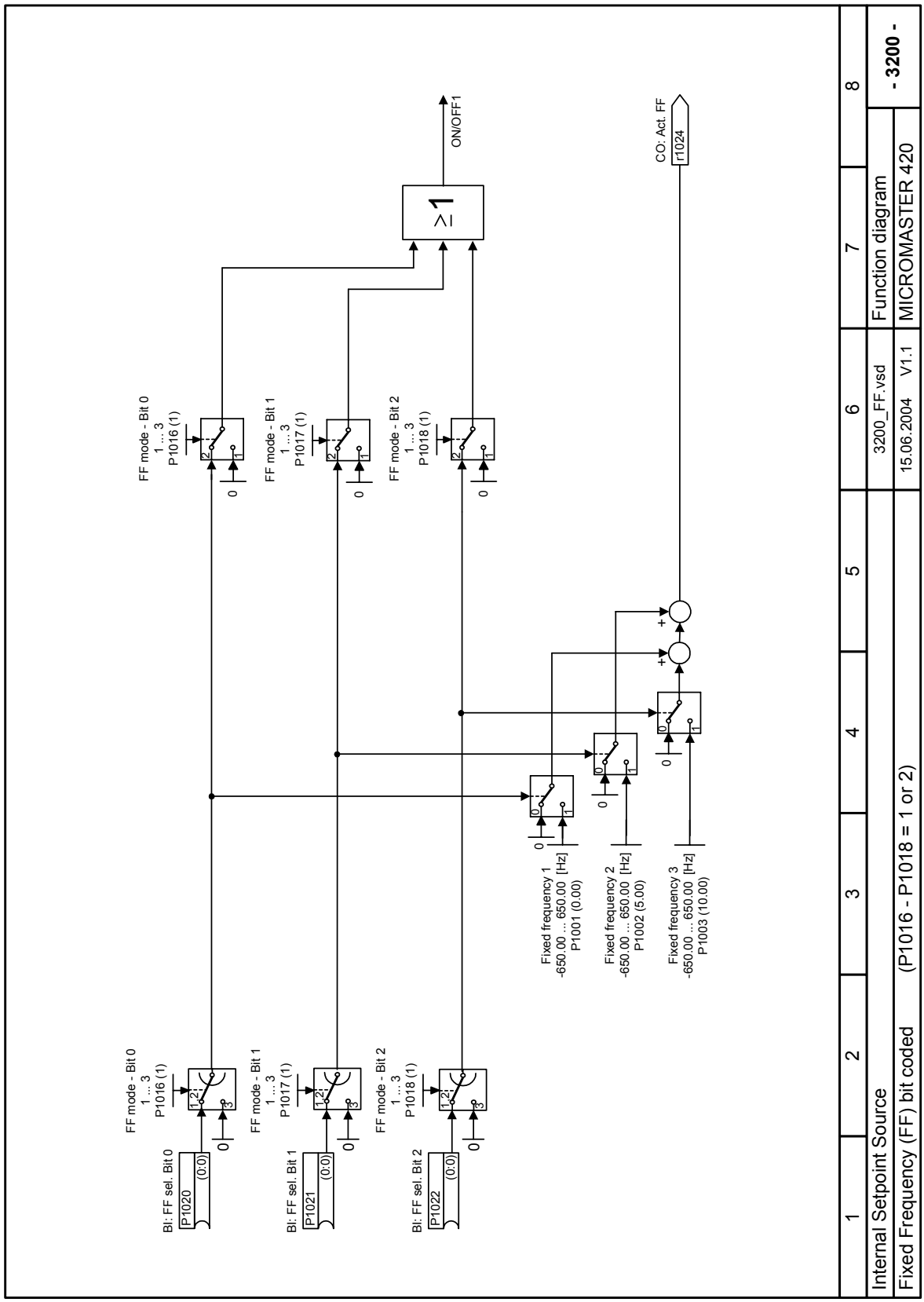


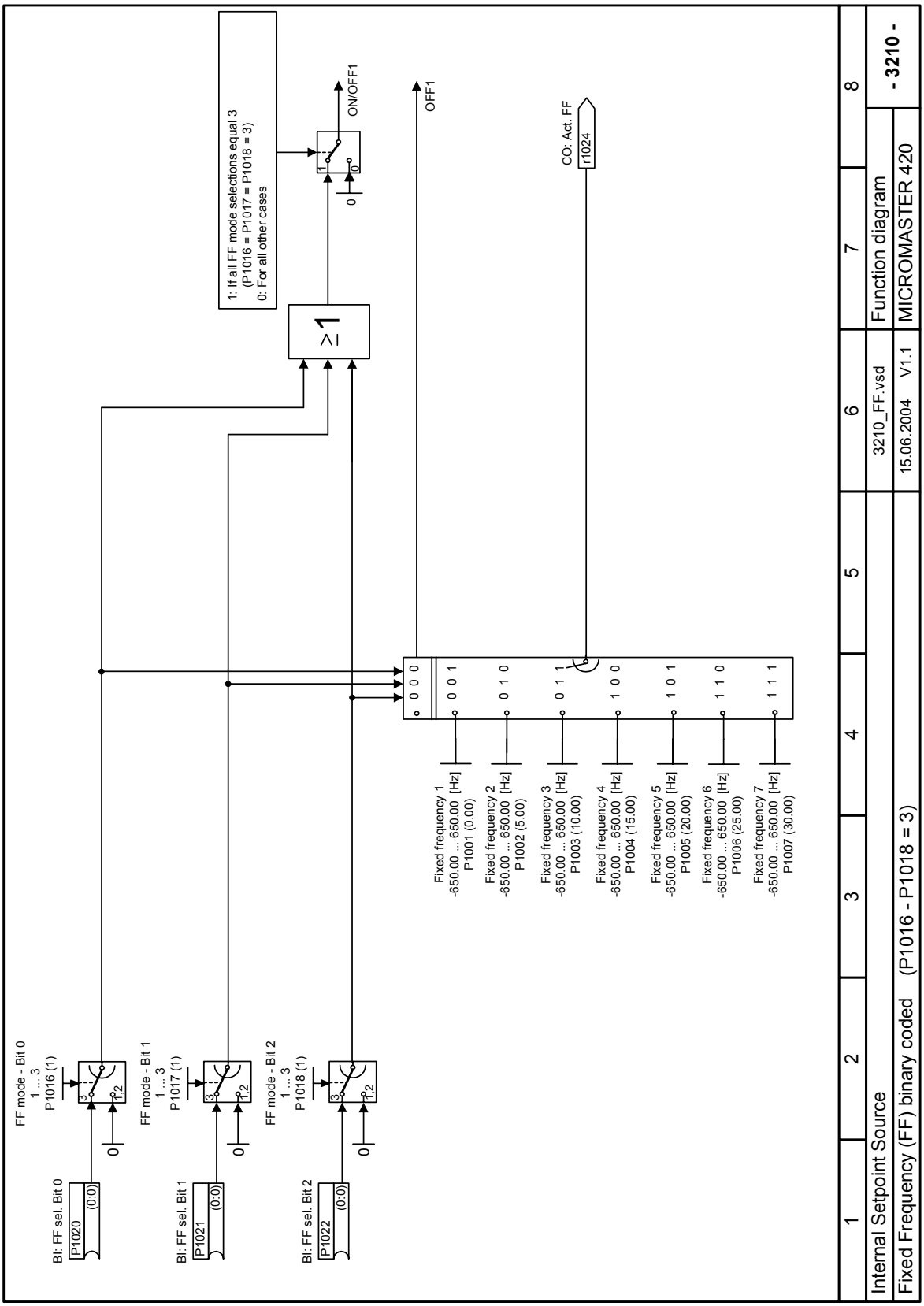


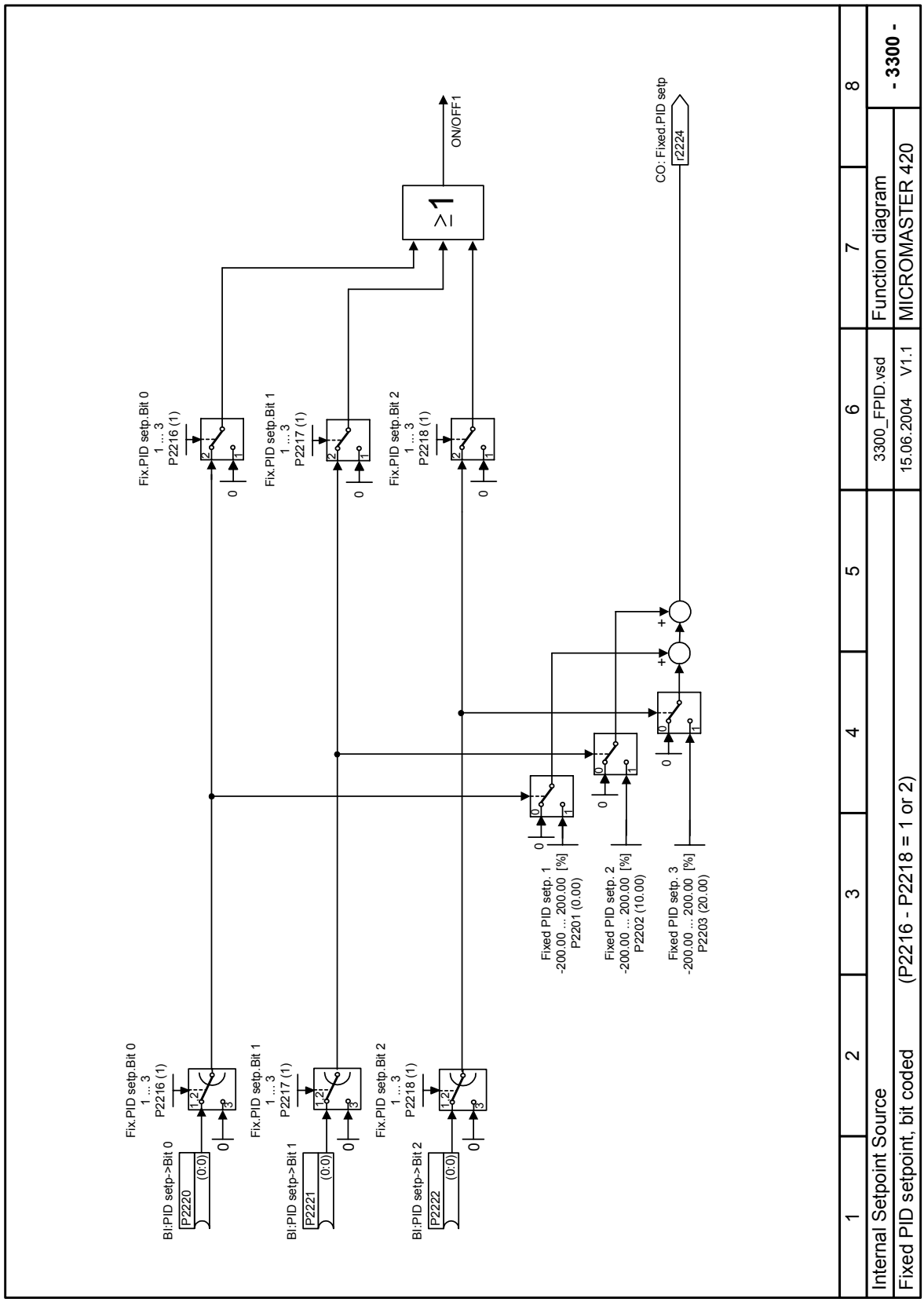


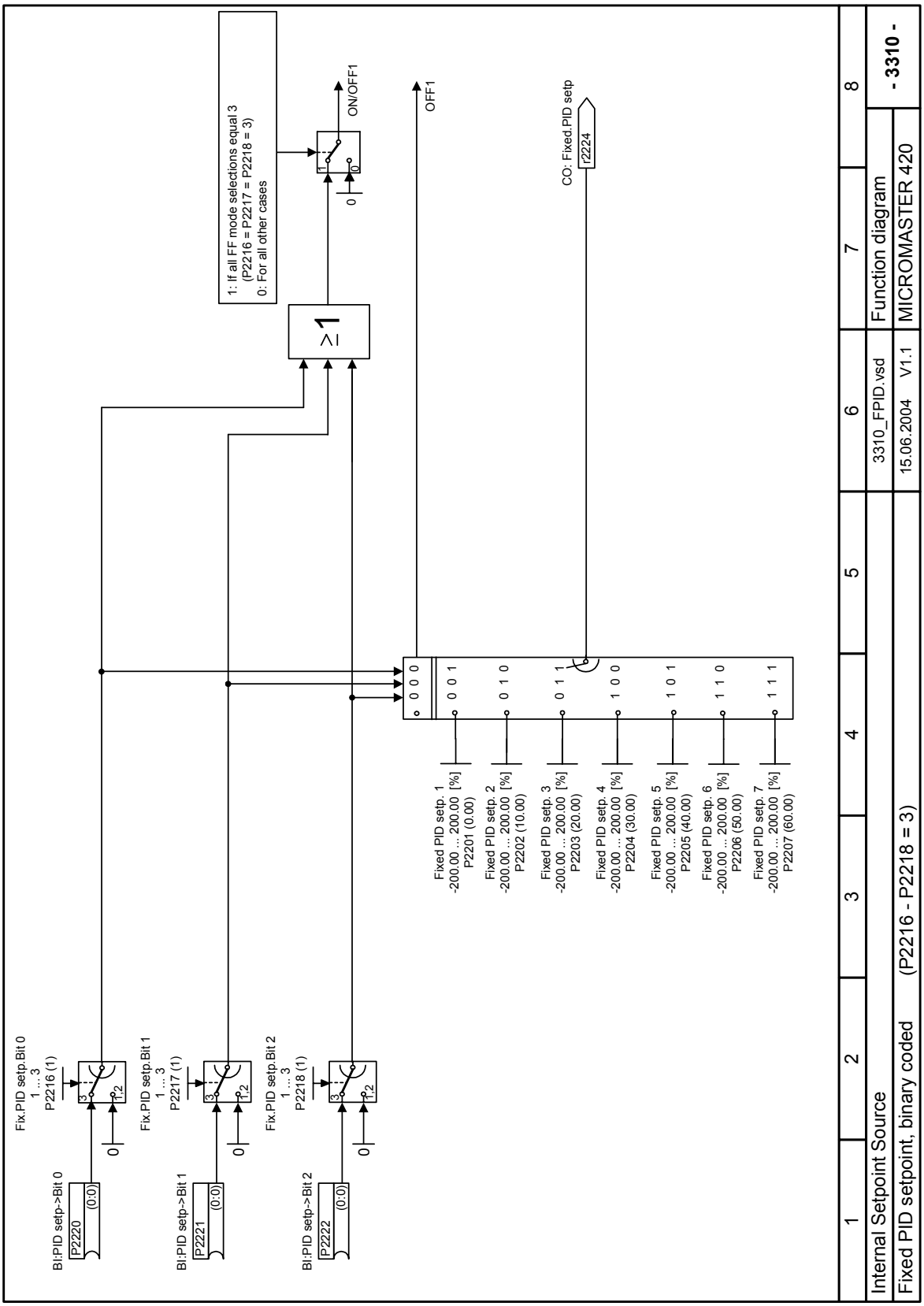


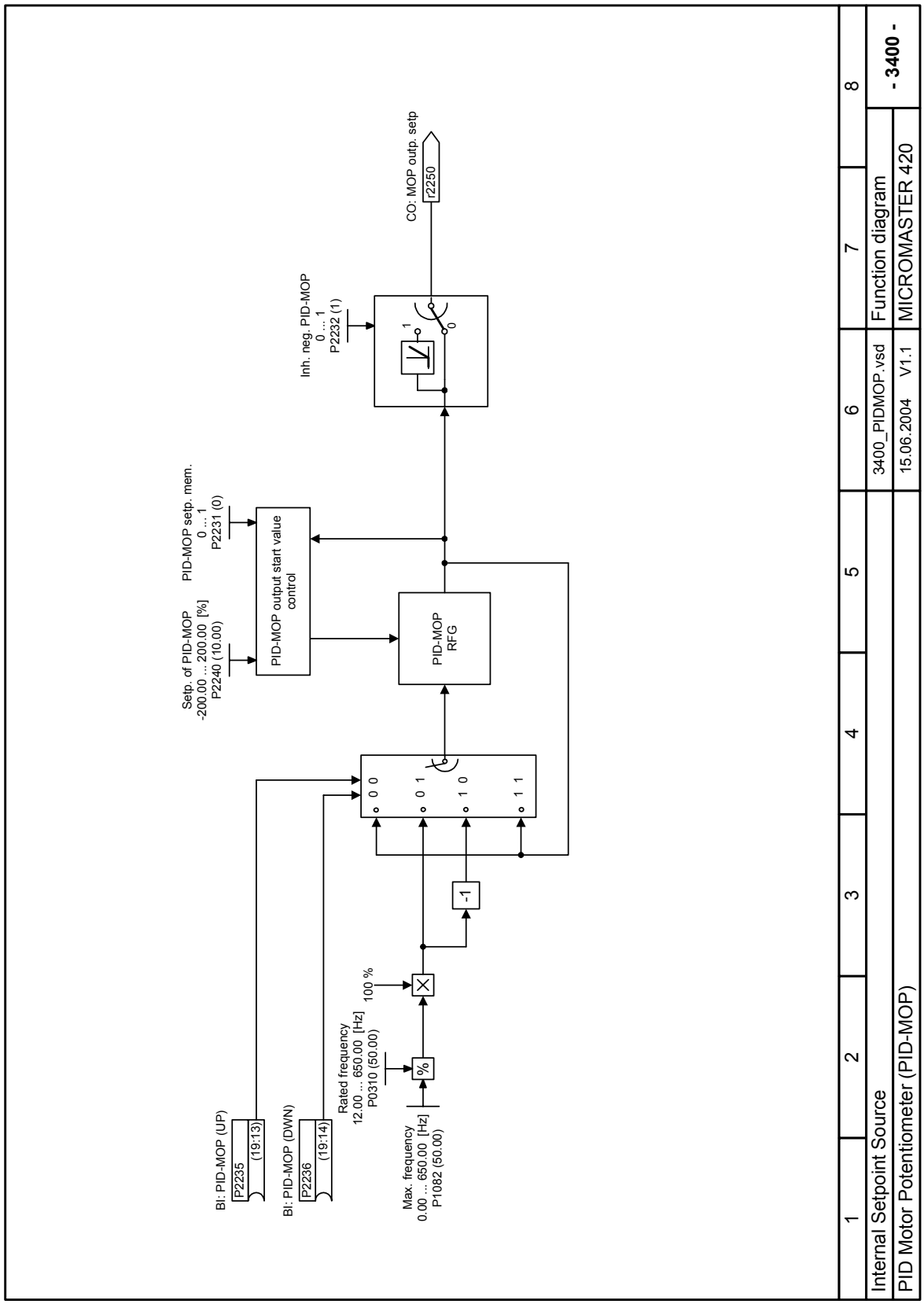


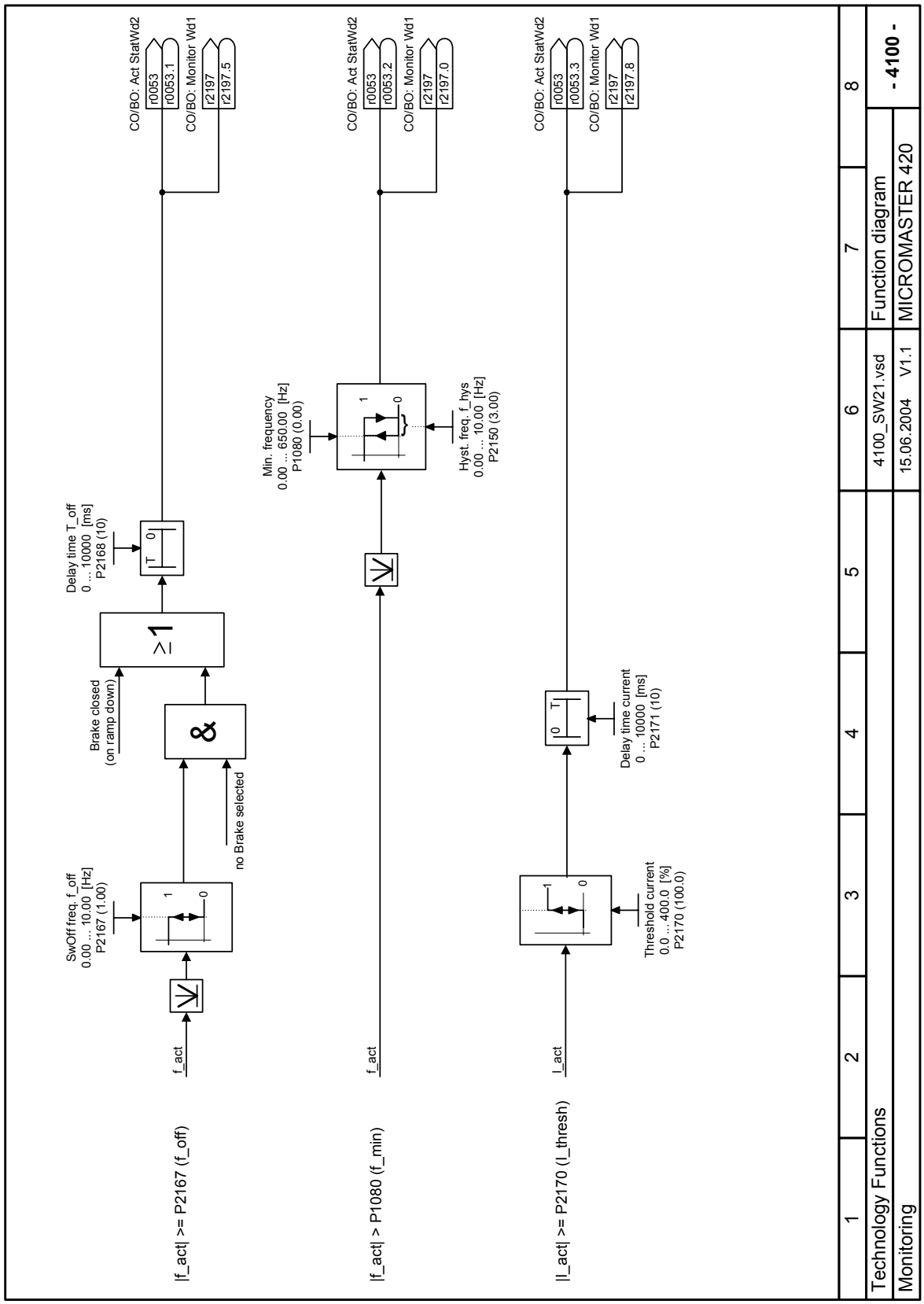


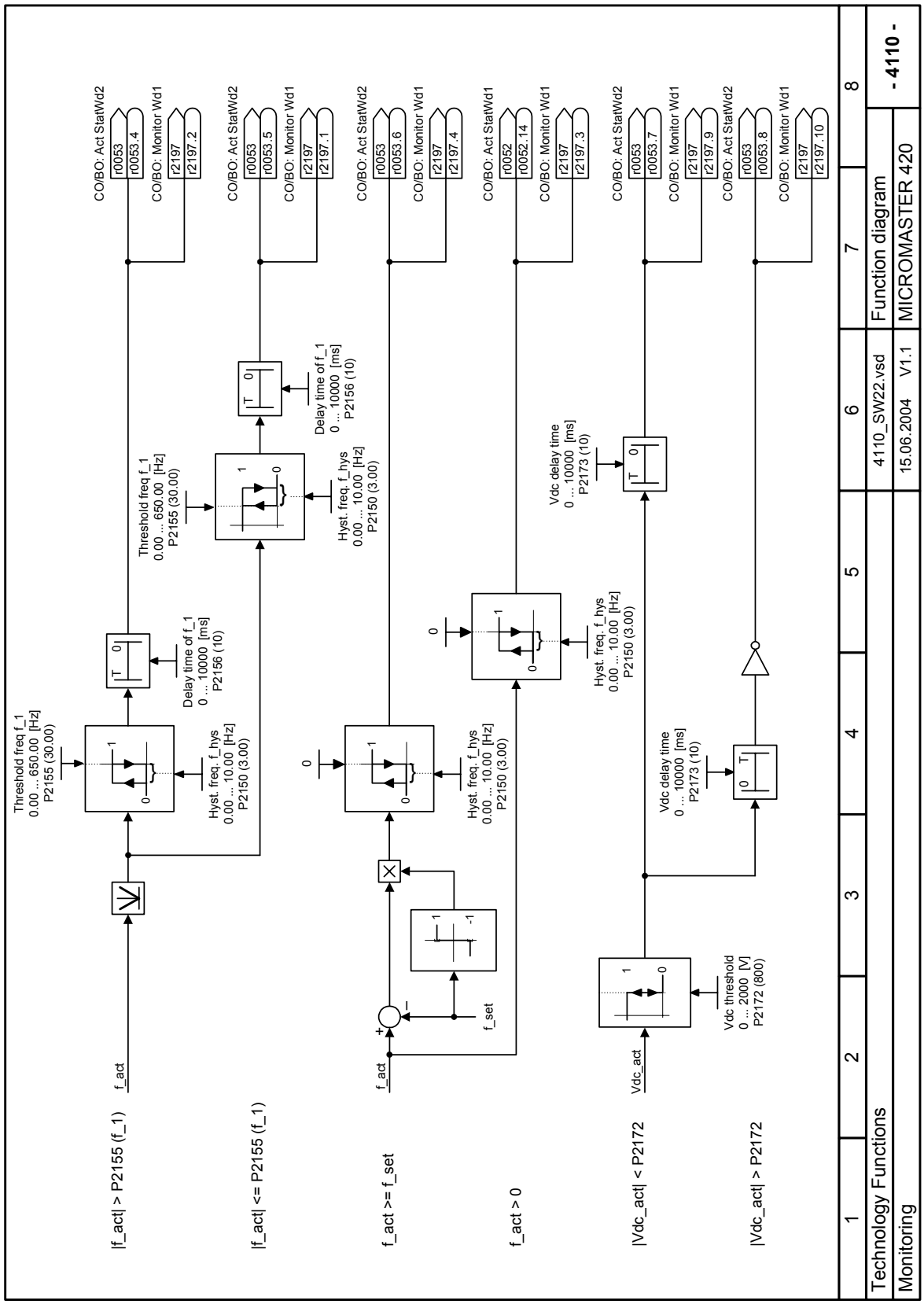


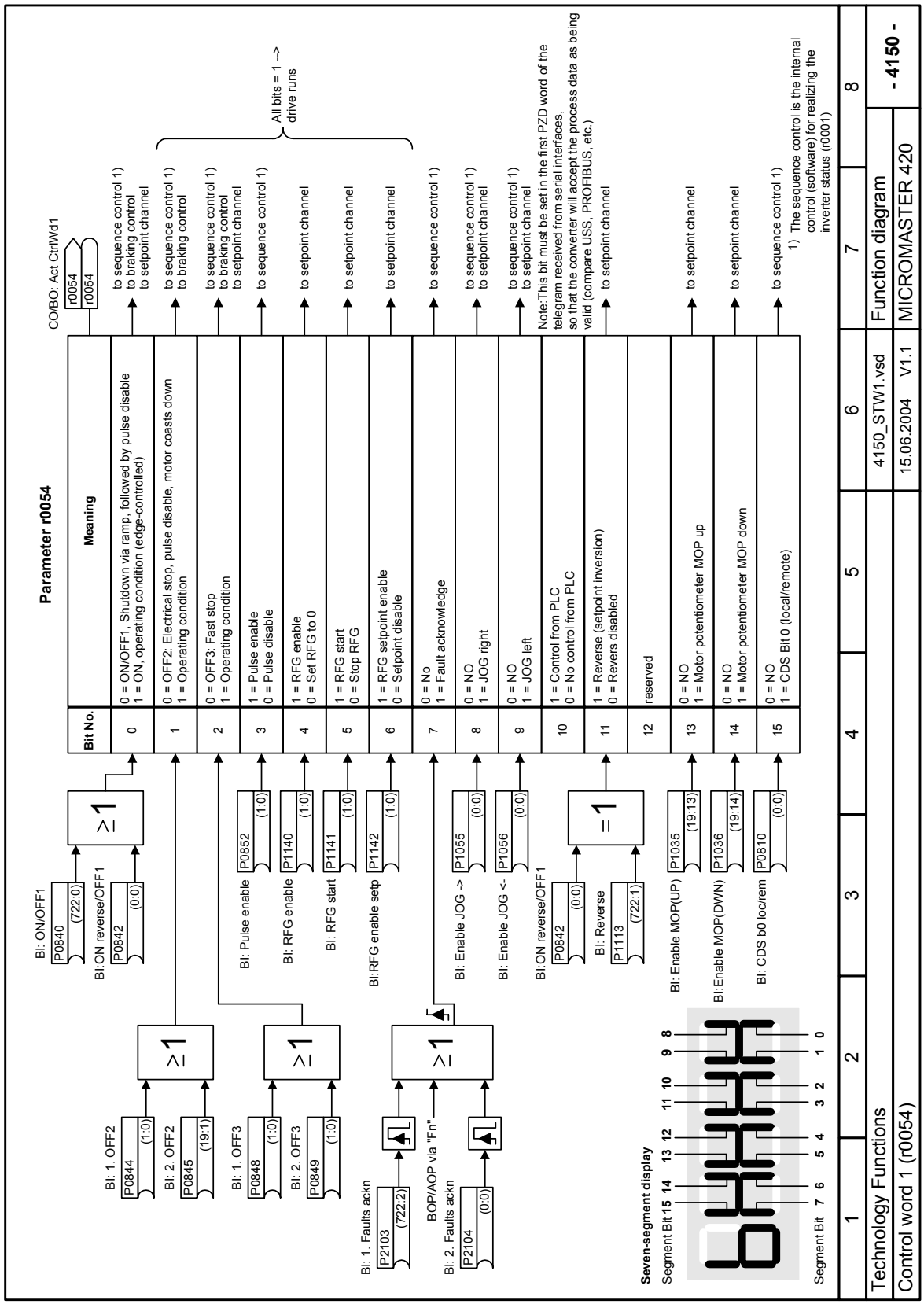


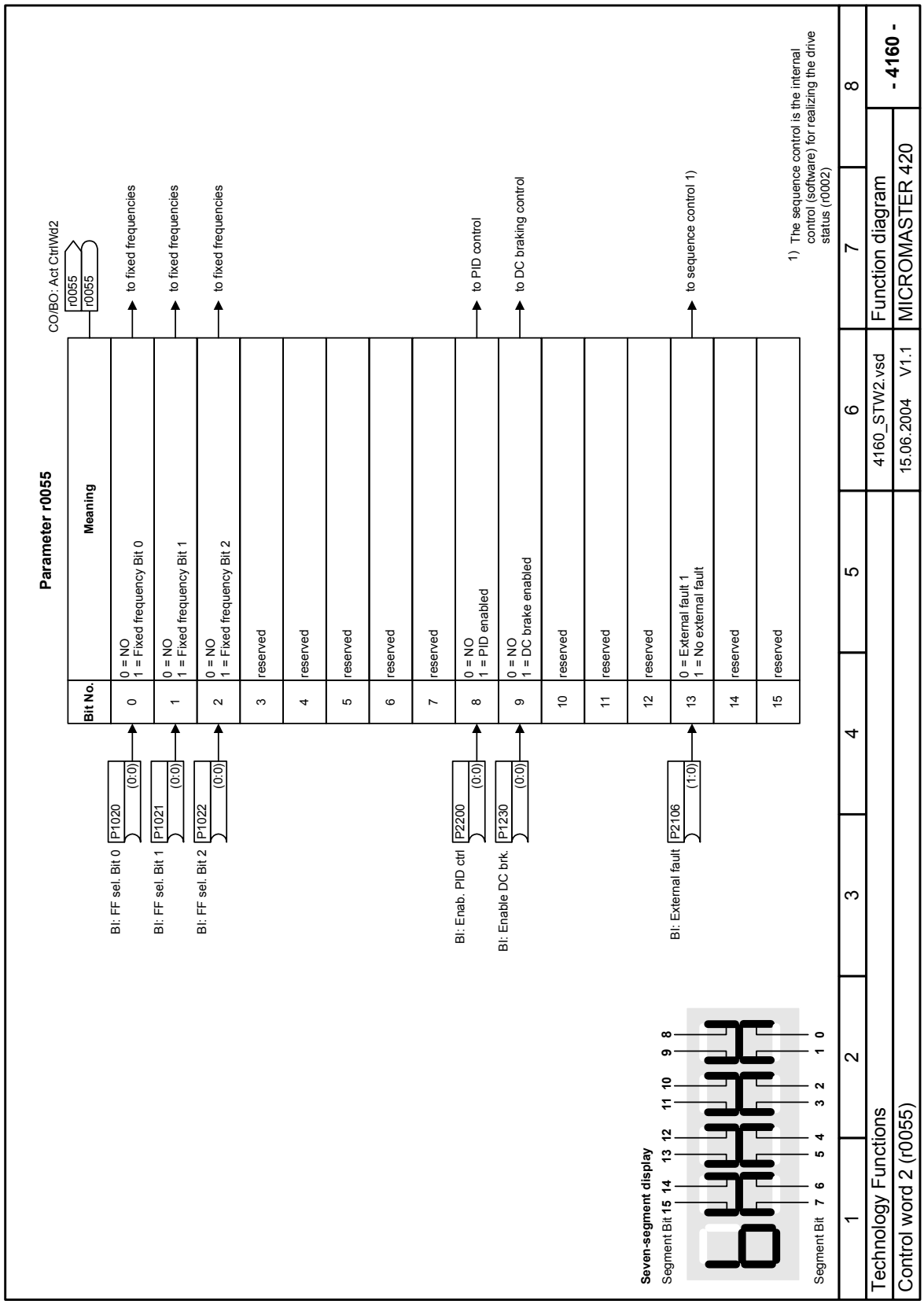


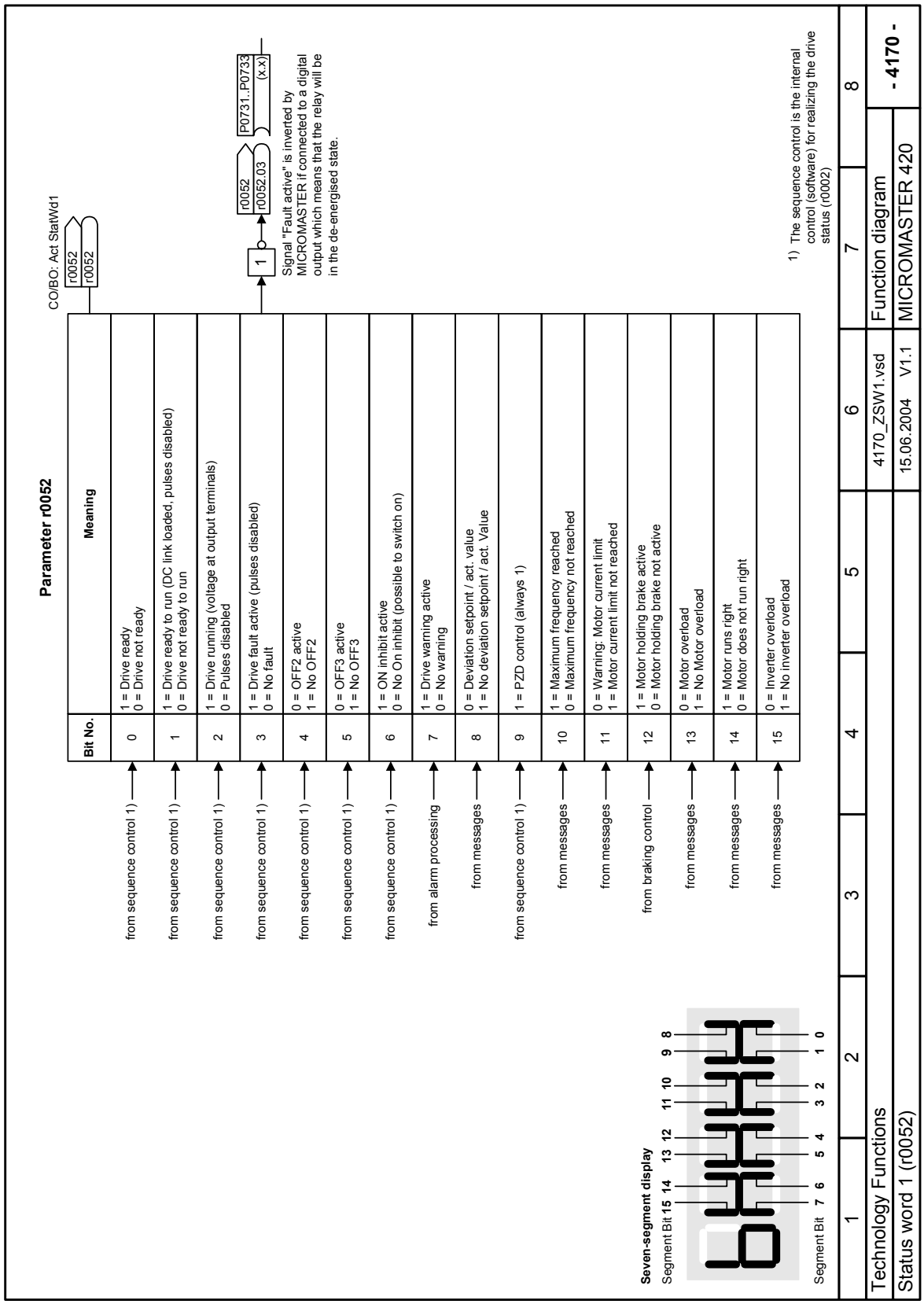


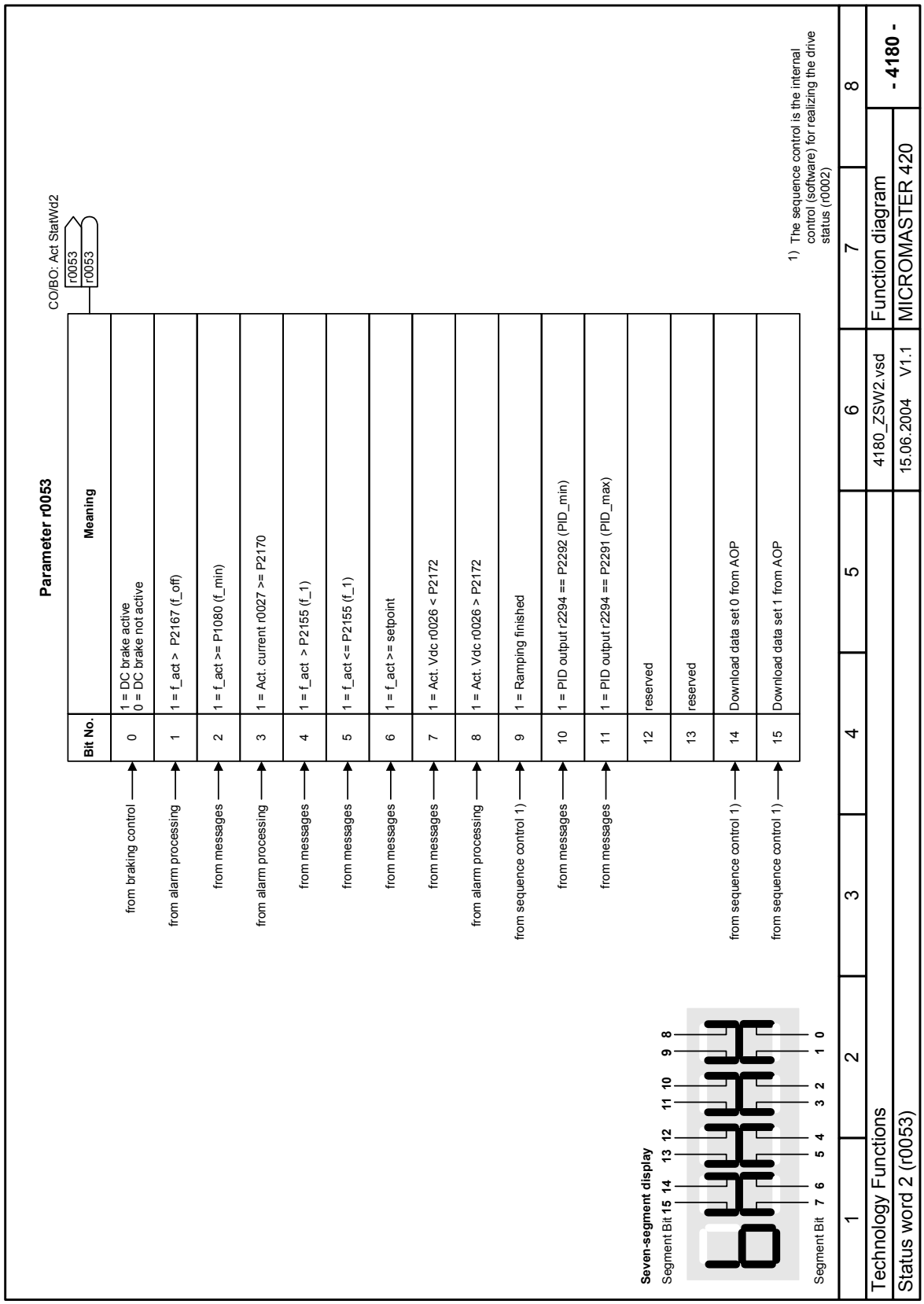


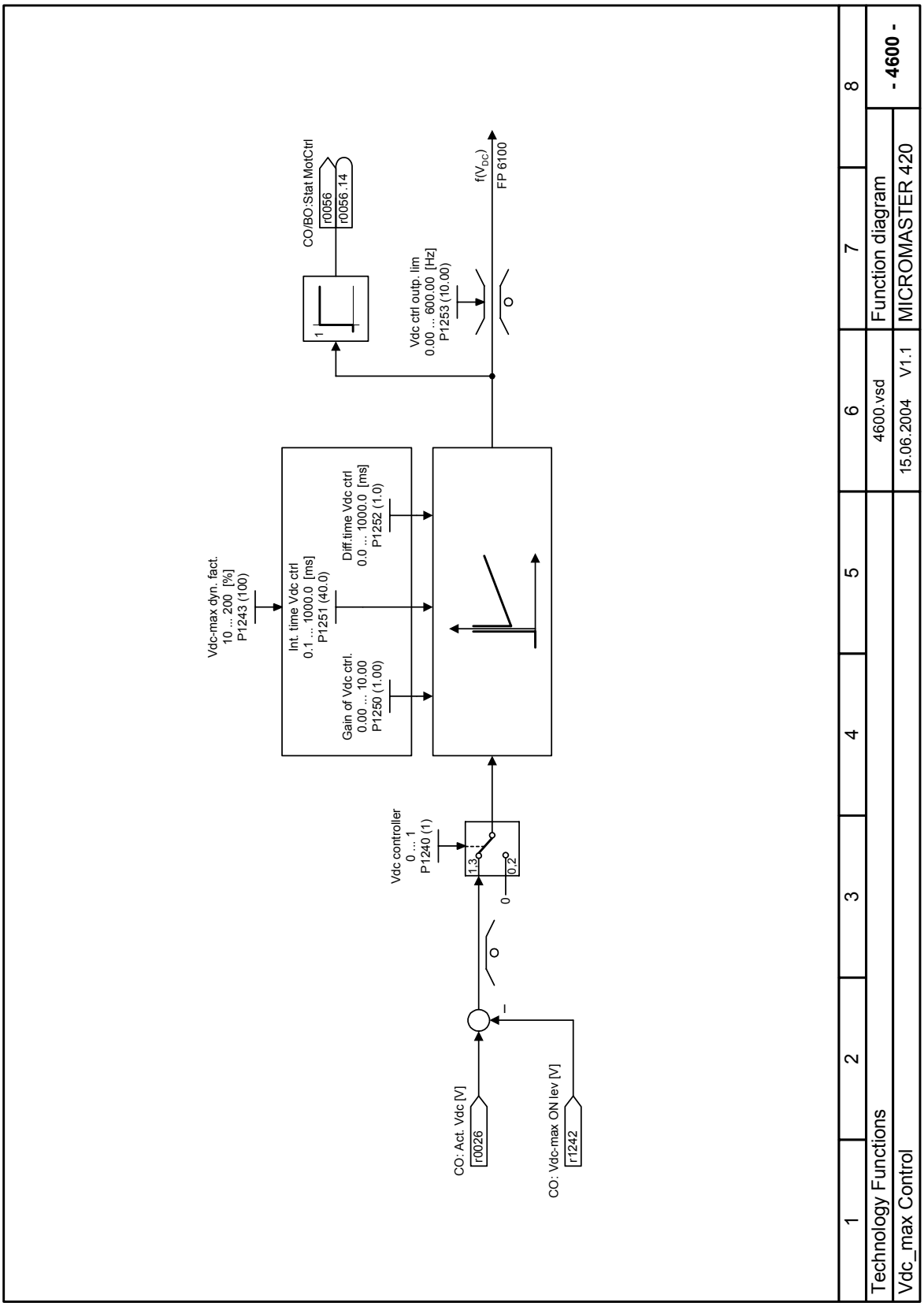


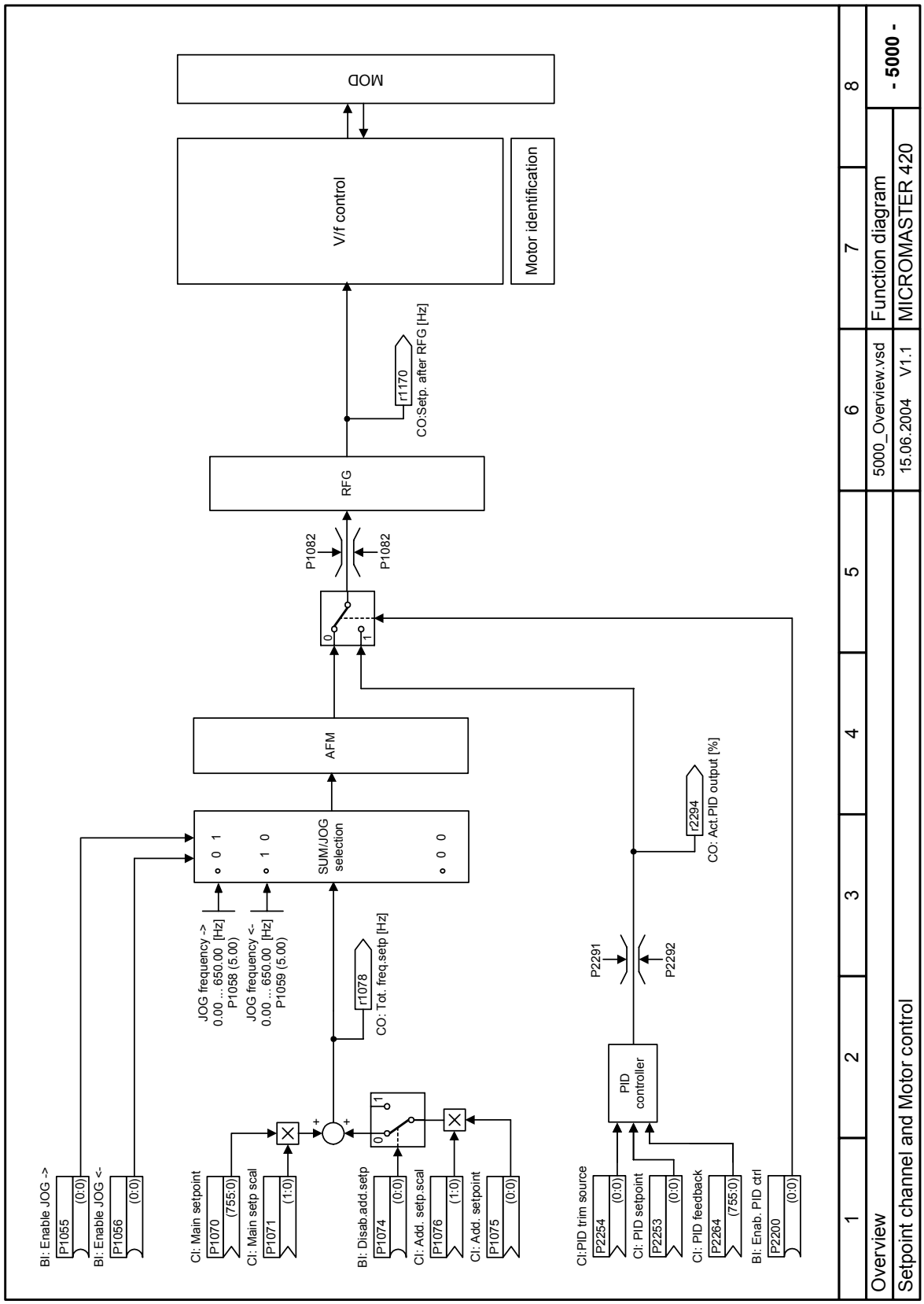


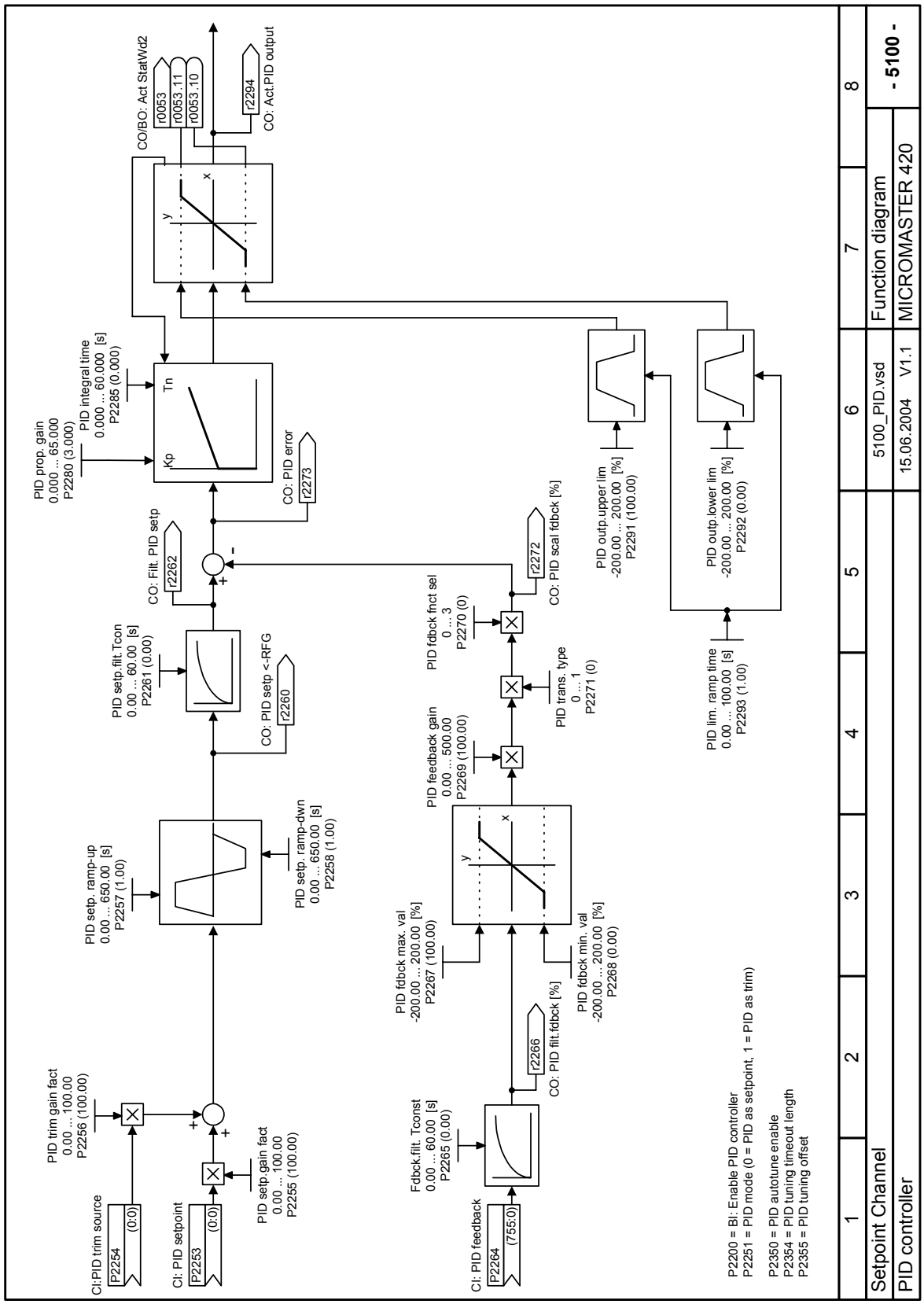


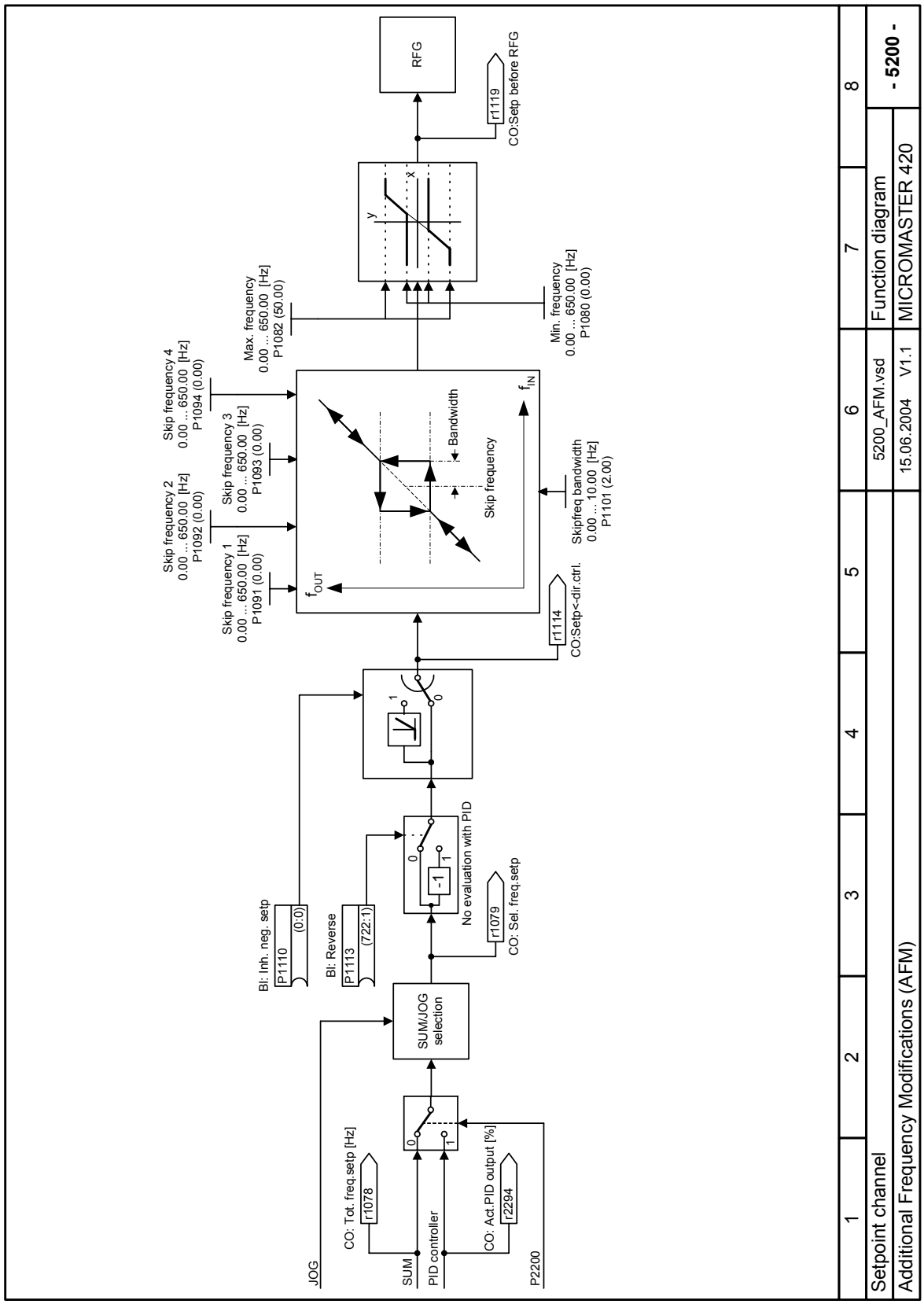


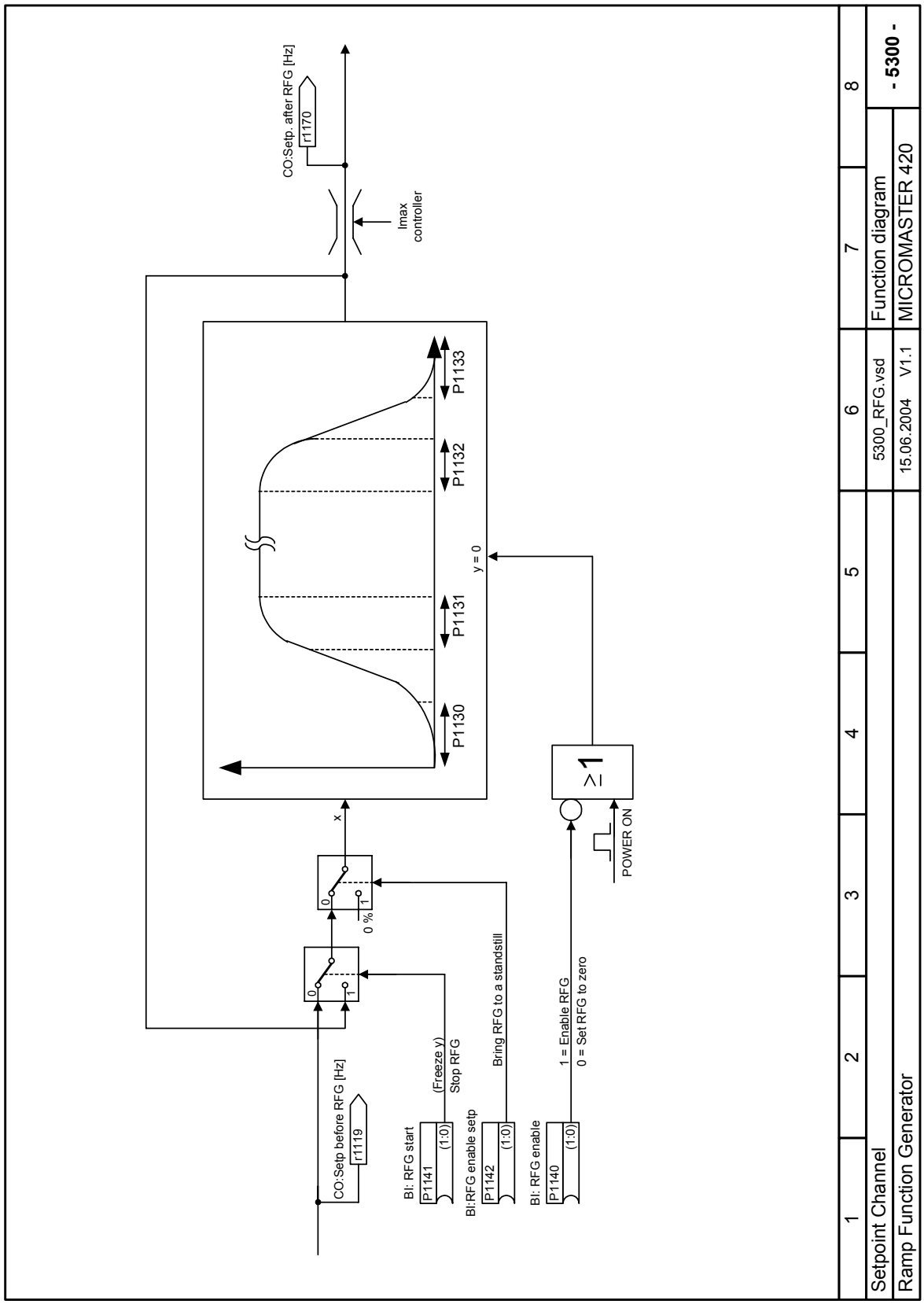


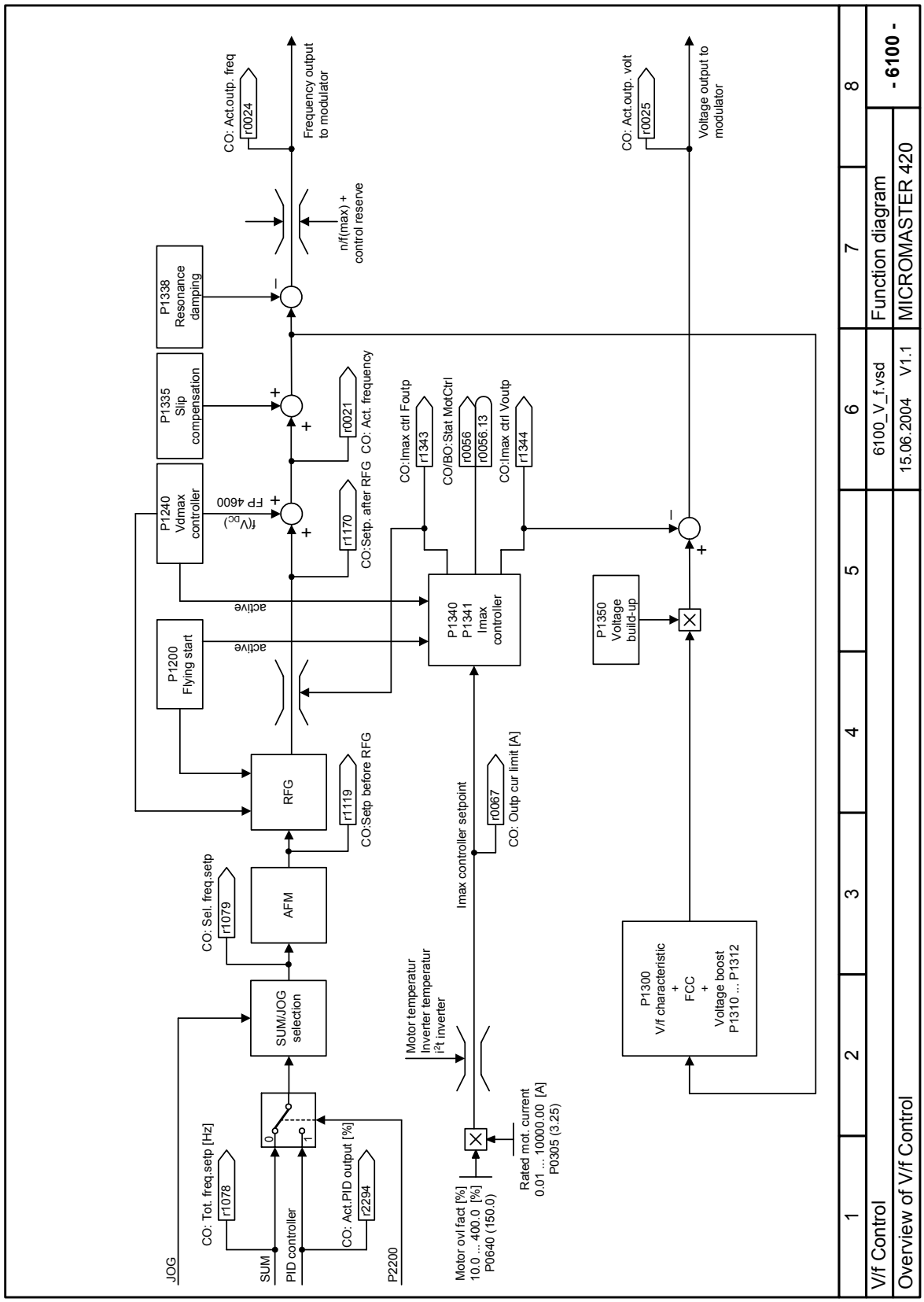


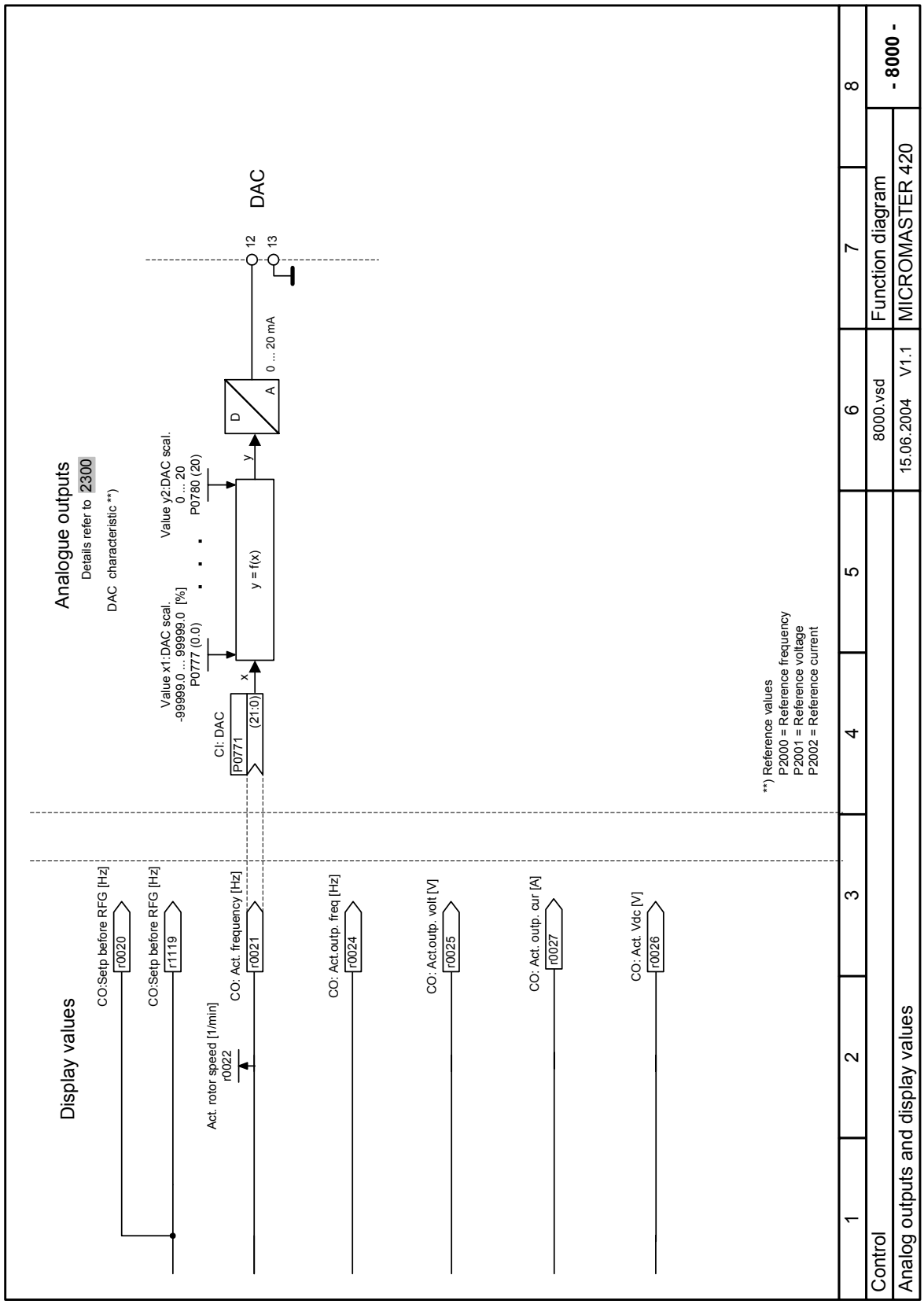












4 Faults and Alarms

4.1 Fault messages

In the event of a failure, the inverter switches off and a fault code appears on the display.

NOTE
To reset the fault code, one of three methods listed below can be used:

1. Cycle the power to the drive.
2. Press the button on the BOP or AOP.
3. Via Digital Input 3 (default setting)

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

Cause
Motor power (P0307) does not correspond to the inverter power (r0206)
- Motor lead short circuit
- Earth faults

Diagnosis & Remedy
Check the following:
- Motor power (P0307) must correspond to inverter power (r0206).
- Cable length limits must not be exceeded.
- Motor cable and motor must have no short-circuits or earth faults
- Motor parameters must match the motor in use
- Value of stator resistance (P0350) must be correct
- Motor must not be obstructed or overloaded
- Increase the ramp time
- Reduce the boost level

F0002 OverVoltage STOP II

Cause
- DC-link voltage (r0026) exceeds trip level (see parameter r0026)

NOTE
Overvoltage can be caused either by too high main supply voltage or if motor is in regenerative mode. Regenerative mode can be cause by fast ramp downs or if the motor is driven from an active load.

Diagnosis & Remedy
Check the following:
- Supply voltage (P0210) must lie within limits indicated on rating plate .
- DC-link voltage controller must be enabled (P1240) and parameterized properly.
- Ramp-down time (P1121) must match inertia of load.
- Required braking power must lie within specified limits.

NOTE
Higher inertia requires longer ramp times; otherwise, apply braking resistor.

F0003 UnderVoltage STOP II

Cause
- Main supply failed.
- Shock load outside specified limits.

Diagnosis & Remedy
Check the following:
- Supply voltage (P0210) must lie within limits indicated on rating plate.
- Supply must not be susceptible to temporary failures or voltage reductions.

F0004 Inverter Over Temperature STOP II

Cause
- Ventilation inadequate
- Ambient temperature is too high.

Diagnosis & Remedy
Check the following:
- Fan must turn when inverter is running
- Pulse frequency must be set to default value
- Ambient temperature could be higher than specified for the inverter

F0005 Inverter I2T STOP II

Cause
- Inverter overloaded.
- Duty cycle too demanding.
- Motor power (P0307) exceeds inverter power capability (r0206).

Diagnosis & Remedy
Check the following:
- Load duty cycle must lie within specified limits.
- Motor power (P0307) must match inverter power (r0206)

F0011 Motor Over Temperature I2T STOP II

Cause
Motor overloaded

Diagnosis & Remedy
Check the following:
- Load duty cycle must be correct
- Motor thermal time constant (P0611) must be correct
- Motor I2t warning level must match

F0041 Motor Data Identification Failure STOP II

Cause
Motor data identification failed.
Alarm value = 0: Load missing
Alarm value = 1: Current limit level reached during identification.
Alarm value = 2: Identified stator resistance less than 0.1% or greater than 100%.
Alarm value = 30: Current controller at voltage limit
Alarm value = 40: Inconsistency of identified data set, at least one identification failed
Percentage values based on the impedance Zb = Vmot,nom / sqrt(3) / Imot,nom

Diagnosis & Remedy
Check the following:
- 0: Check that the motor is connected to the inverter.
- 1-40: Check if motor data in P0304 P0311 are correct.
- Check what type of motor wiring is required (star, delta).

F0051 Parameter EEPROM Fault STOP II

Cause
Read or write failure while saving non-volatile parameter.

Diagnosis & Remedy
- Factory Reset and new parameterization
- Change drive

F0052 power stack Fault STOP II

Cause
Read failure for power stack information or invalid data.
Diagnosis & Remedy
Change drive

F0060 Asic Timeout STOP II

Cause
Internal communications failure
Diagnosis & Remedy
- If fault persists, change inverter
- Contact Service Department

F0070 CB setpoint fault STOP II

Cause
No setpoint values from CB (communication board) during telegram off time
Diagnosis & Remedy
Check CB and communication partner

F0071 USS (BOP-link) setpoint fault STOP II

Cause
No setpoint values from USS during telegram off time
Diagnosis & Remedy
Check USS master

F0072 USS (COMM link) setpoint fault STOP II

Cause
No setpoint values from USS during telegram off time
Diagnosis & Remedy
Check USS master

F0080 ADC lost input signal STOP II

Cause
- Broken wire
- Signal out of limits

F0085 External Fault STOP II

Cause
External fault triggered via terminal inputs
Diagnosis & Remedy
Disable terminal input for fault trigger.

F0101 Stack Overflow STOP II

Cause
Software error or processor failure
Diagnosis & Remedy
Run self test routines

F0221 PID Feedback below min. value STOP II

Cause
PID Feedback below min. value P2268.
Diagnosis & Remedy
- Change value of P2268.
- Adjust feedback gain.

F0222 PID Feedback above max. value STOP II

Cause

PID feedback above max. value P2267.

Diagnosis & Remedy

- Change value of P2267.
- Adjust feedback gain.

F0450 BIST Tests Failure STOP II

Cause

Fault value:

1. Some power section tests have failed
2. Some control board tests have failed
4. Some functional tests have failed
8. Some IO module tests have failed. (MM 420 only)
16. Internal RAM failed on power-up check

Diagnosis & Remedy

Drive may run but some features will not work properly.
Replace drive.

4.2 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

Cause
- Motor power does not correspond to the inverter power
- Motor leads are too long
- Earth faults

Diagnosis & Remedy

Check the following:
- Motor power (P0307) must correspond to inverter power (r0206).
- Cable length limits must not be exceeded.
- Motor cable and motor must have no short-circuits or earth faults
- Motor parameters must match the motor in use
- Value of stator resistance (P0350) must be correct
- Motor must not be obstructed or overloaded
- Increase the ramp-up-time.
- Reduce the boost.

A0502 Overvoltage limit

Cause

Overvoltage limit is reached.
This warning is generated,
- if the dc-link controller is disabled (P1240 = 0).
- if pulses are enabled
- if actual dc voltage r0026 > r1242.

Diagnosis & Remedy

If this warning is displayed permanently, check drive input voltage .

A0503 UnderVoltage Limit

Cause
- Main supply failed
- Main supply (P0210) and consequently DC-link voltage (r0026) below specified limit (see parameter r0026).

Diagnosis & Remedy

Check main supply voltage (P0210).

A0504 Inverter OverTemperature

Cause

Warning level of inverter heat-sink temperature (P0614) is exceeded, resulting in pulse frequency reduction and/or output frequency reduction (depending on parameterization in (P0610)

Diagnosis & Remedy

Check the following:
- Ambient temperature must lie within specified limits
- Load conditions and duty cycle must be appropriate

A0505 Inverter I2T

Cause

Warning level exceeded, current will be reduced if parameterized (P0610 = 1)

Diagnosis & Remedy

Check that duty cycle lies within specified limits

A0511 Motor Over Temperature I2T

Cause
- Motor overloaded.
- Load duty cycle too high.

Diagnosis & Remedy
Check the following:
- P0611 (motor I2t time constant) should be set to appropriate value
- P0614 (Motor I2t overload warning level) should be set to suitable level

A0535 Braking Resistor Hot

A0541 Motor Data Identification Active

Cause
Motor data identification (P1910) selected or running

A0600 RTOS Overrun Warning

A0700 CB warning 1 see CB manual for details.

A0701 CB warning 2 see CB manual for details.

A0702 CB warning 3 see CB manual for details.

A0703 CB warning 4 see CB manual for details.

A0704 CB warning 5 see CB manual for details.

A0705 CB warning 6 see CB manual for details.

A0706 CB warning 7 see CB manual for details.

A0707 CB warning 8 see CB manual for details.

A0708 CB warning 9 see CB manual for details.

A0709 CB warning 10 see CB manual for details.

A0710 CB communication error

Cause
Communication with CB (communication board) is lost

Diagnosis & Remedy
Check CB hardware

A0711 CB configuration error

Cause
CB (communication board) reports a configuration error.

Diagnosis & Remedy
Check CB parameters

A0910 Vdc-max controller de-activated

Cause

Vdc max controller has been de-activated, since controller is not capable of keeping DC-link voltage (r0026) within limits (see parameter r0026).

- Occurs if main supply voltage (P0210) is permanently too high.
- Occurs if motor is driven by an active load, causing motor to goes into regenerative mode.
- Occurs at very high load inertias, when ramping down.

Diagnosis & Remedy

Check the following:

- Input voltage (P0210) must lie within range.
- Load must be match.

A0911 Vdc-max controller active

Cause

Vdc max controller is active; so ramp-down times will be increased automatically to keep DC-link voltage (r0026) within limits (see parameter r0026).

A0920 ADC parameters not set properly.

Cause

ADC parameters should not be set to identical values, since this would produce 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 should not be set to identical values, since this would produce illogical results.

- Index 0: Parameter settings for output identical
- Index 1: Parameter settings for input identical
- Index 2: Parameter settings for output do not correspond to DAC type

A0922 No load applied to inverter

Cause

No Load is applied to the inverter.
As a result, some functions may not work as under normal load conditions.

A0923 Both JOG Left and JOG Right are requested

Cause

Both JOG right and JOG left (P1055/P1056) have been requested. This freezes the RFG output frequency at its current value.

5 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
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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